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Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

AUGUST 2004

CQ

1945 Our 60th Year 2004

- Centennial of the "Bug," p. 11
- SSB Results: 2003 CQ World-Wide DX Contest, p. 16
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On the Cover: Phil Krichbaum, NØKE, of Vail, Colorado, guest-operates from the station of is, WØTM, on a ridge 20 miles west resort. Details on page 97.

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The super popular TH-3MK4 gives you the *most gain for your money* in a full-power, full-size durable Hy-Gain tri-bander!

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Fits on average size lot with room to spare -- turning radius is just 15.3 feet. Four piece boom is ideal for DXpeditions. Rotates with CD-45II or HAM-IV rotator.

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TH-2MK3, $369.95. 2-element, 1.5 kW PEP, 10,15,20 Meters

The 2-element TH-2MK3 is Hy-Gain's *most economical* full power (1.5kW PEP) full size tri-bander.

For just $339.95 you can greatly increase your effective radiated power and hear far better!

Ruggedly constructed, top-performing, compact 6 foot boom, tight 14.3 foot turning radius. Installs almost anywhere. Rotate with CD-45II or HAM-IV. BN-86 balun recommened.

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Revolutionary 4-element compact tri-bander *lets you add 40 or 30 Meters!* Has 14 foot boom and tight 17.25 feet turning radius. Fits on roof tri-pod, mast or medium duty tower.

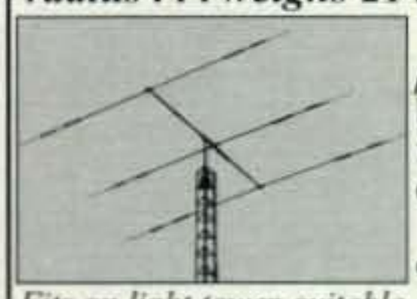
Hy-Gain's *patented* broadbanding *Para Sleeve* gives you less than 2:1 VSWR. 1.5kW PEP.

BetaMATCH™ provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

***Truly** competitive against giant tri-banders at half the cost!*

QK-710, $179.95. 30/40 Meter option kit for EXP-14.

Compact 3-element 10, 15, 20 Meter Tri-Bander
For limited space . . . Installs anywhere . . . 14.75 ft turning radius . . . weighs 21 lbs . . . Rotate with CD-45II, HAM-IV



Fits on light tower, suitable guyed TV pole, roof tri-pod

TH-3JRS, $359.95. Hy-Gain's *most popular* 3-element 10, 15, 20 Meter tri-bander fits on most lots! Same top performance as the full power TH3MK4 in a compact 600 watt PEP design.

Excellent gain and F/B ratio let *you* compete with the "big guns".

Tooled manufacturing gives you *Hy-Gain* durability with 80 MPH wind survival.

Model No.	No. of elements	avg Gain	dBd avg F/B	dB MaxPwr	watts PEP Bands	Covered Wind	sq.ft. area Wind (equiv)	Survival Boom	(feet) Longest	Elem. (ft) Turning	radius(ft) Weight	(lbs.) Mast dia	O.D.(in.) Recom.	Rotator Retail
TH-11DX	11	*For Gain and F/B ratio--See...*		4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1159.95
TH-7DX	**7**			**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$869.95**
TH-5MK2	5			1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$759.95
TH-3MK4	**3**			**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$469.95**
TH-3JRS	3			600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$359.95
TH-2MK3	**2**			**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$369.95**
EXP-14	4			1500	10,15,20 (40/30)	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$599.95

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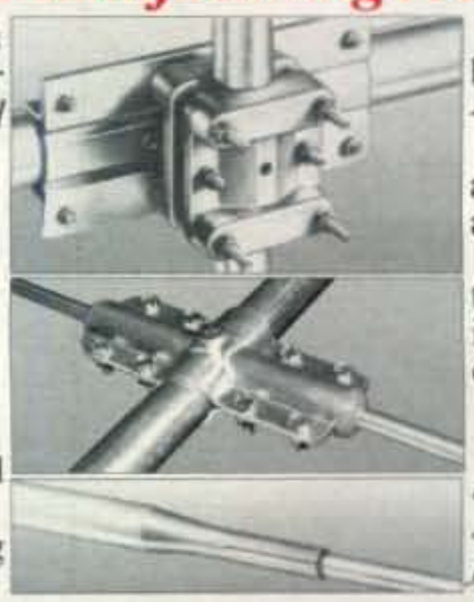
1. **Hy-Gain's** famous super strong *tooled* die cast *Boom-to-Mast Clamp*
2. ***Tooled** Boom-to-Element Clamp*
3. **Thick-wall** *swaged* aluminum tubing



***Tooled** manufacturing* is the difference between Hy-Gain antennas and the others -- they just don't have it (it's expensive!).

Die-cast aluminum boom-to-mast bracket and element-to-boom compression clamps are made with specially *tooled* machinery.

Hy-Gain antennas feature *tooled* swaged tubing that is easily and securedly clamped in place. All tubing is deburred and cleaned for smooth and easy assembly.

Durable precision injection molded parts.

***Hy-Gain** antennas are stronger, lighter, have less wind surface area, better wind survival, need no adjustments, look professional and last years longer.*

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IC-703
The QRP Rig!

THEIR SCREEN
IS THIS BIG

IN RELATION TO OURS...

(IC-703 shown actual size)

Looking for the best in a QRP rig?
Better check the fine print first.

- **DSP.** That's right, pull out the weak signals! Automatic Notch and Noise Reduction is included.
- **Low Current Consumption.** With current drain as low as 300mA on 9.6VDC, this QRP rig rivals some handheld radios. The '703 is designed for maximum efficiency!
- **Internal Antenna Tuner.** 160-10M or 160-6M*. Internal, automatic and designed with latching relays so no current draw when the match is achieved.
- **Big Ears.** Sensitivity of 0.16µV at 10dB S/N rivals some of the big rigs. This helps compensate for antenna compromises when you're in the field!
- **Cold Hands.** Don't worry, the '703 comes with the TXCO, so your frequency will not drift when you touch the knob with cold hands. Ready for outdoors!
- **CW Memory Keyer.** Contest QRP is sweet with the internal CW Memory Keyer. Three memories capable of holding 50 characters each. Variable pitch control (300-900Hz) with a bug, paddle, or straight key.
- **Easy to See, Large Display.** The '703's display is over 300% larger than the competition's .
- **Built-in Pop-up Stand.** The pop-up stand is great when operating from a table top.
- **Adjustable Power Output.** Power is adjustable from 10W down to 0.1W, for more flexibility.
- **Smart Power Mode.** The '703 knows when to throttle back the current to prolong battery life.
- **HF or HF & 6M.** Icom's engineers focused on the bands that really mean the most to QRP operators.
- **IC-706MKIIG Operations.** Anyone who has a '706 will know how to operate without the manual!
- **No Assembly Required.** The '703 is ready to go when you are!

AH-703 HF/50MHz 5 Band Antenna

Designed specifically for use with the '703 and LC-156 Backpack. Compact size - stows easily when not in use.

Going portable?

BP-228 Battery Pack

2800mAh/9.6V. Compact and lightweight. Up to 7 hour operating time depending on power level selected.

LC-156 Backpack

Designed by hams, for hams! Take your hobby with you into the great outdoors. The LC-156 offers plenty of room to store and protect your '703, batteries, antenna, and other gear!

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Go QRP!

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ham radio news

Ham, Cited as "Domestic Terrorist," Gets 8 Years for QRM

A Wisconsin ham radio operator has been sentenced to eight years in prison after being convicted of intentionally jamming the emergency radio system in Madison, the state capital, more than three dozen times in the course of a year. According to the Capital Times newspaper, 25-year-old Rajib Mitra, KB9DJE, of Brookfield, Wisconsin, was sentenced as a "domestic terrorist" under the terms of the Patriot Act for "the substantial disruption of a critical public infrastructure." His attorney says an appeal is planned.

ARRL Goes to Bat for Ham With BPL Interference

A ham in Iowa who has had severe interference from Broadband over Power Lines in his neighborhood for over two months is getting some help from the ARRL in efforts to get the FCC to take action. According to the *ARRL Letter,* Jim Spencer, WØSR, of Cedar Rapids, has been having interference problems ever since a BPL system in his area came on line. While the utility and BPL provider have been working with him to solve the problem, the interference has continued for more than two months. In mid-June, the ARRL filed a formal complaint with the FCC's Enforcement Bureau, calling on the Commission to order the field trial shut down until the problem is resolved, and to fine the utility $10,000 for knowingly continuing to cause interference to a licensed station, in violation of Part 15 FCC rules.

ARRL Chief Executive Officer Dave Sumner, K1ZZ, said Spencer's case is "egregious," and that "if this is the best we can expect when a BPL system causes interference, then the only answer is to prevent them from being deployed."

The League has also objected to public funding of a BPL trial in New York State, via a grant from the state's Energy Research and Development Authority. According to the *ARRL Letter,* Sumner has written to the agency's president saying that interference from the pilot system is violating federal law and questions "whether such a grant of funding is in the public interest."

ARRL Supports Most of FCC's "Omnibus" Proposals

The ARRL has filed comments with the FCC generally supporting most of the changes proposed in the Commission's so-called "omnibus" rulemaking proceeding, including the League's plan to "refarm" the HF Novice and Technician Plus bands and Kenwood's petition to permit auxiliary operation on 2 meters. The ARRL comments also supported the FCC's proposal to lift the restrictions on power amplifiers used by hams on the 12, 10, and 6 meter bands.

While supporting the FCC's plan to adopt its "refarming" proposal, the League called for the Commission to look at it in conjunction with a much broader restructuring proposal that it filed more recently. Support of allowing auxiliary operation on 2 meters is a reversal, as the League strongly opposed previous efforts by Kenwood to get FCC approval for its "Sky Command" remote-control system. ARRL CEO Dave Sumner, K1ZZ, told *CQ* the League is now satisfied that sufficient safeguards are in place to protect weak-signal and satellite frequencies.

Contesters Beware...

The FCC is starting to crack down on interference between hams during contests. A ham in California has gotten a "Rileygram" from FCC Amateur enforcement chief Riley Hollingsworth, K4ZDH, asking for his side of a complaint that his operations during the 2003 ARRL Sweepstakes contest caused interference to communications in progress on 14.230 MHz.

NTIA: BPL Could Help Cut Power-Line Noise

The National Telecommunications and Information Administration, whose own engineers determined that interference from Broadband over Power Lines, or BPL, signals extends out to a quarter mile on the ground and 25 miles at 20,000 feet, and that current methods to measure noise levels are inadequate, now tells the FCC that BPL could actually "reduce the risks of interference to radiocommunications" by cutting down on existing levels of power-line noise. At the same time, it calls for "notching out" BPL signals on certain key government frequencies. NTIA is the chief advisory agency to the White House on telecommunications matters and is in charge of frequency allocations for federal government agencies.

The ARRL, responding to the NTIA filing in its *ARRL Letter* newsletter, said the comments "more clearly reveal the political face of an agency eager and determined to sell the technology's viability, no matter what its own scientists have concluded."

Meanwhile, the FCC agreed to multiple requests and extended until June 22 the deadline for reply comments on its BPL Notice of Proposed Rule Making. This was to give commenters a chance to digest and respond to NTIA's earlier engineering study (see last month's "Ham Radio News" column for a summary).

ECHO Satellite Set for Launch

The AMSAT News Service reported in mid-June that the new ECHO satellite had been successfully moved to its launch site at the Baikonur Cosmodrome in Kazakhstan and that work was under way to integrate it into the launch vehicle. The 30-day launch window was supposed to open on June 28, so the satellite may be in orbit by the time you read this. It will operate on 2 meters and 70 centimeters.

A decision in Washington will likely make future amateur satellite launches more expensive. The FCC has ruled that amateur satellites, like commercial satellites, must have plans and procedures for reducing the amount of orbital debris they might produce, possibly including the installation of thruster engines to force re-entry after a satellite's useful life is complete.

New Antenna Design May Help in Restricted Spaces

A new antenna design, developed by a ham working for the University of Rhode Island, has the potential to greatly reduce the amount of space needed for an efficient radiator. Rob Vincent, K1DFT, says his "distributed load monopole" antenna will permit efficient, wide-bandwidth operation on 15 meters with an antenna just 18 inches high, according to a university news release. Details were not available at press time due to patent filings, but we hope to bring you more information in upcoming issues so the amateur community can discuss and experiment with Vincent's design.

Restaurant Fined $10K

A Chinese restaurant in New Jersey has been fined $10,000 by the FCC for continued use of a high-power cordless telephone that operates on the 2-meter ham band. Best Wok, of Westville, NJ, apparently did not respond to previous correspondence from the FCC, including a Notice of Apparent Liability (NAL). As a result, the FCC on May 19 issued a Forfeiture Order affirming the $10,000 fine proposed in the NAL.

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

hy-gain ROTATORS

. . . the first choice of hams around the world!

HAM-IV

HAM-IV
$559.95

The most popular rotator in the world! For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum readability. *New* indicator potentiometer. *New* ferrite beads reduce RF susceptibility. *New* Cinch plug plus 8-pin plug at control box. Dual 98 ball bearing race for load bearing strength and electric locking steel wedge brake prevents wind induced antenna movement. North or South center of rotation scale on meter, low voltage control, max mast size of 2 1/16 inches.

HAM IV and HAM V Rotator Specifications	
WindLoad capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power (in lbs.)	800
Brake Power (in lbs.)	**5000**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	26
Effective Moment (in tower)	**2800 ft/lbs.**

TAILTWISTER SERIES II

For large medium antenna arrays up to 20 sq. ft. wind load. Available with *DCU-1 Pathfinder* digital control (T2XD) or standard analog control box (T2X) with *new* 5-second brake delay and *new* Test/ Calibrate function. Low temperature grease, alloy ring gear, indicator potentiometer, ferrite beads on potentiometer wires, *new* weatherproof AMP connectors plus 8-pin plug at control box, triple bearing race with 138 ball bearings for large load bearing strength, electric locking steel wedge brake, North or South center of rotation scale on meter, low voltage control, 2 1/16 inch max. mast.

T-2X
$649.95

T-2XD
$1029.95
with DCU-1

TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power (in lbs.)	1000
Brake Power (in lbs.)	**9000**
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	31
Effective Moment (in tower)	**3400 ft/lbs.**

CD-45II

CD-45II
$389.95

For antenna arrays up to 8.5 sq. feet mounted inside tower or 5 sq. ft. with mast adapter. Low temperature grease good to -30 F degrees. *New* Test/Calibrate function. Bell rotator design gives total weather protection, dual 58 ball bearing race gives proven support. Die-cast ring gear, stamped steel gear drive, heavy duty, trouble free gear train, North center scale, lighted directional indicator, 8-pin plug/socket on control unit, snap-action control switches, low voltage control, safe operation, takes maximum mast size to 2 1/16 inches. MSLD light duty lower mast support included.

CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power (in lbs.)	600
Brake Power (in lbs.)	**800**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	22
Effective Moment (in tower)	**1200 ft/lbs.**

HAM-V

HAM-V
$949.95
with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

ROTATOR OPTIONS

MSHD, $99.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $39.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

AR-40

AR-40
$289.95

For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. 2 1/16 inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power (in lbs.)	350
Brake Power (in lbs.)	**450**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight (lbs.)	14
Effective Moment (in tower)	**300 ft/lbs.**

HDR-300A

HDR-300A
$1379.95

For ***king-sized*** antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power (in lbs.)	5000
Brake Power (in lbs.)	**7500**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight (lbs.)	61
Effective Moment (in tower)	**5000 ft/lbs.**

Digital Automatic Controller

DCU-1
$649.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1 degree accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

AR-35 Rotator/Controller

AR-35
$69.95

For UHF, VHF, 6-Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

RBD-5
$29.95

NEW! Automatic Rotator Brake Delay

Provides automatic 5-second brake delay -- insures your rotator is fully stopped before brake is engaged. Prevents accidentally engaging brake while rotator is moving. Use with HAM II, III, IV, V, T2Xs. Easy-to-install. Includes pre-assembled PCB, hardware.

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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

Reaching Out

Twenty years ago, I remember walking to work in midtown Manhattan, talking on an HT and having kids ask me if I was an undercover cop. Today, virtually *everybody* walks down the street talking on a two-way radio. Half the time, it's not even disguised as a phone. Nextel and its competitors have made HTs "mainstream."

Fifteen years ago, I remember being at the New York City Marathon, where several of the hams who were heavily into packet radio had these new-fangled laptop computers and were setting up a digital network to pass text messages by radio to the family reunion area with information about runners who had dropped out—where and why they'd stopped, how they were getting back to the finish line area, or if they were going to a hospital. Today, anyone with a cell-phone equipped for text messaging can do the same thing (at a price).

The revolution is over and we've won. Of course, many people worry that in winning the battle, we're losing the war—that with handheld radios and wireless long-distance becoming commonplace, ham radio is losing its uniqueness and its appeal. Perhaps what we need to do is pay more attention to designing and building products with which non-hams, particularly young non-hams, are already familiar, and then introducing the unique aspects of our hobby.

For example, I just got a new laptop computer with a built-in wireless modem. It operates on the 2.4 GHz shared Part 15/ham band. I'm finally active on microwaves! But if computer makers are routinely building radio transceivers into their computers, why aren't radio manufacturers routinely building computers into their radios? Yes, I realize that most radios today are run by sophisticated microprocessors and that users can customize many (in some cases, all) of the radio's parameters. But I have yet to see a radio with a USB or firewire port for connecting to a computer. For that matter (and I know our friends who make these add-ons won't like this idea, but I don't think they have too much to worry about in the near future), why don't we routinely have radios with built-in TNCs and digital software (in upgradeable flash memory) and a PS-2 or USB port for a keyboard? Forget the computer. Why don't handhelds and mobile rigs—especially those already equipped for location tracking with APRS—have GPS receivers built in so they can automatically transmit their precise locations?

My kids hardly use the phone anymore to talk to their friends. Instead, they spend hours in front of the computer instant-messaging—it's packet radio or PSK-31 without the radio. If I had text-messaging enabled on my cell phone, they'd be continuing to chat even while we're out. That's packet *with* the radio! But it's also a budget-buster, which is a big plus for ham radio. Why can't our handhelds do text-messaging without plugging in a TNC and a laptop? Why not put little Blackberry®-type alphanumeric keyboards on them instead of just numeric keypads (although cell-phone text messaging works fine with the standard keypad)?

Why not build amateur wireless networks that encourage kids to use our microwave frequencies for multi-player computer games for which they now need to rely on the internet or linked computers at an internet café? My son and some of his friends enjoy "battling" each other on computer games at the local internet café. But what if they could do it just as easily from their homes, without the need to pay for computer time? There's no difference between using ham radio for computer games and using ham radio for chess games.

Our manufacturers are remarkably responsive to the desires of their existing customer base. Many new features on most new models have their origins in some ham saying, "Why don't you do this?" But they're not quite as good at anticipating the wants and needs not only of current customers but of potential customers as well. We want to bring more young people into ham radio? Let's start building radios that do what they want to do as well as what we old folks want to do.

*e-mail: <w2vu@cq-amateur-radio.com>

Today's kids already "do" ham radio, but without realizing it. They're constantly using two-way voice and text communications. There are people going out into the desert to see how much range they can get out of their 802.11 wireless networks - without realizing that if they got their ham licenses, they could crank up the power to a watt (or more) and really get some distance. But where are the hams who should already be doing this? Where are the 2.4 GHz and 5.7 GHz ham networks using modified (or unmodified) off-the-shelf wireless cards? Why can't I put my laptop on a 2.4 GHz ham network as well as a 2.4 GHz Part 15 network?

Bottom line: if we want to draw more young people into the hobby, we need to give them a reason to do their wireless communication as hams, and produce equipment that will meet their needs. For more on this general topic, see N6CL's "VHF Plus" column in this issue (p. 84), which shows how hams can become heroes in helping to develop a wireless alternative to BPL (Broadband over Power Lines) known as WiMax. We'd help our non-ham neighbors and, at the same time, build a vibrant ham radio wireless network.

Megan McClellan, KE5BSZ, seen here with her parents, Lisa, KB5NEB, and Jim, N5MIJ, was the first new ham to receive an "instant license." W5YI-VEC submitted 24 applications to the FCC directly from the Hamcom hamfest in Dallas via an internet link. Megan's callsign (and 23 others) were issued just two hours later.

Instant Licensing

A little bit of ham history occurred Friday afternoon, June 18 at the Hamcom hamfest in Dallas. Twenty years ago, the first volunteer-administered ham licensing tests were given at Dayton. This year, Hamcom and W5YI-VEC worked out an arrangement to have internet access at the hamfest and to immediately submit licensing paperwork to the FCC. Some two dozen people who took tests for new ham licenses at the hamfest on Friday went home with their callsigns! The first was 12-year-old Megan McClellan, a new Technician, now KE5BSZ. Congratulations to Megan and to the Hamcom/W5YI-VEC folks who made this possible. We hope it's the beginning of what should become a regular feature at test sessions.

A Singular Accomplishment

We'd like to acknowledge the achievement of Stanislav Blazka, OK1MS, who has qualified for Worked All Zones EME (Earth-Moon-Earth) Award number one. OK1MS is the first ham to confirm contacts with at least 25 CQ zones entirely via moonbounce contacts. Congratulations, Stan! We hope to have details of his accomplishment in an upcoming issue.

Speaking of upcoming issues, I promised last month that this issue would include an article on young hams at Dayton. Well, guess what? It didn't fit. Neither did a planned feature on the 5JØX operation from San Andres during last year's CQ World-Wide DX Contest SSB weekend, to go along with the results in this issue. We'll get both in as soon as space permits.

73, Rich W2VU

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Rear (L-R): Staff engineers Boyd Lichlyter, KE4MCF; Eric Guinn, AC4LS; Bill Curb, WA4CDM; Mike Webber, KE4VSQ.

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announcements

Amateur Radio Lighthouse Society (ARLHS) Contest – This event will take place 0001Z August 7 to 2359Z August 8, all modes, SSB and CW. The purpose of this international contest is promote public awareness of ham radio and lighthouses. Last year over 40 countries participated and more than 400 lighthouses wee activated. For details, go to: <http://arlhs.com/NLLW-2004-guidelines. html>.

International Lighthouse-Lightship Weekend – The ARLHS will sponsor this annual event from 0001Z August 21 to 2359 August 22 in conjunction with International Lighthouse Day. For more information, see: <http://arlhs.com>.

W3SSA Special Event – The Social Security Employees' ARC will be on the air with the call W3SSA from 1300–2200Z August 15 to commemorate the 69th anniversary of the Social Security Act. Frequencies will be near 7.280 and 14.280 MHz. For a certificate send QSL and SASE to Greg Stec, K3ANG, 1624 Pickett Rd. Lutherville, MD 21093, or electronically by e-mail to <ac3p@arrl.net>.

N7C from Navajo Code Talkers Day – Special event station N7C will be active 1400Z August 14 to 0200Z August 15 from Window Rock, Arizona to commemorate Navajo Code Talkers Day. Frequencies: SSB 7.260, 14.260, 21.360, 28.460; CW 3.533, 7.033, 14.033 MHz. QSL direct with SASE to Herbert Goodluck, N7HG, P.O. Box 3611, Window Rock, AZ 86515.

N9L to Activate Wisconsin Lighthouses – Special event station N9L will operate from several lighthouses along the Door Peninsula of Wisconsin from August 5–14 (1400–2100Z each day), including activation of the Eagle Bluff Lighthouse (USA-252) during the National Lighthouse/Lightship Weekend on August 7 and 8. Frequencies will be centered on 14.270 or 7.270 ±. A QSL of each of the lighthouses as well as a certificate representing all of the lighthouses will be available to confirmed contacts and SWLs. QSL direct to W5AZN. For details go to: <http://www.w5azn.com>.

• **The following hamfests, etc., are scheduled for August:**

Aug. 7, **West Central Illinois Hamfest**, Macoupin County Fairgrounds, Carlinville, Illinois. Contact Tim Jones, KA9VIV, 217-627-2355, e-mail: <ka9viv@yahoo.com>. (Talk-in 146.82–)

Aug. 7, **Juniata Valley ARC Hamfest**, Decatur Fire Co., Lewistown, Pennsylvania. Contact Cliff Bell, WB3IVX, 717-248-2616, e-mail: <wb3ivx@localnet.com>. (Talk-in 146.910)

Aug. 8, **Hamfesters RC Hamfest**, Will County Fairgrounds, Peotone, Illinois. Contact R. J. Morrow, KB9YRE, 708-636-0963, e-mail: <kb9yre@aol.com>; <www.hamfesters.org>. (Talk-in 146.52; exams 8–10:30 AM)

Aug. 13–15, **Boxboro 2004**, ARRL New England Division Convention, Holiday Inn Conference Center, Boxboro, Massachusetts. For details go to <www.boxboro.org>. (Talk-in 146.52; exams Saturday 10 AM & 1 PM and Sunday noon, preregistration suggested and state preferred time—contact Bruce Anderson, W1LUS, 16 Regis Rd., Tewksbury, MA 01876 with SASE, or e-mail <w1lus@arrl.net>)

Aug. 20–21, **Duke City Hamfest**, University of New Mexico Continuing Education Conference Center, Albuquerque, New Mexico. Contact Brian Mileshosky, N5ZGT, e-mail: <n5zgt@juno.com>; <www.qsl.net/dchf>. (Talk-in 145.33– and 444.00+; exams)

Aug. 21, **Huntsville Hamfest**, Von Braun Center, Huntsville, Alabama. Contact Huntsville Hamfest, 1215 Dale Drive SE, Huntsville, AL 35801; or Don Tunstill, W4NO, e-mail: <DonTunstill@hamfest.org>; <www.hamfest.org>. (Exams Saturday and Sunday at 1000 hrs.)

Aug. 21, **Central Missouri Radio Assn. Hamfest**, National Guard Armory, Columbia, Missouri. Contact Bob Clinton, WØBUX, 573-696-0231; e-mail: <rhclinton@tranquility.net>; <www.qsl.net/cmra/>.

Aug. 22, **Northern Berkshire ARC Hamfest**, Bowe Field/Adams Agricultural Fairgrounds, Adams, Massachusetts. Contact Al Vigiard, K1SAV, 413-743-1619, e-mail: <k1sav@nobarc.org>; <www.nobarc.org/hamfest>. (Exams registration 8:30 AM, test 9 AM)

Aug. 27–29, **ARRL Southwest Division Convention**, Sheraton Wild Horse Pass Resort and Spa, Phoenix, Arizona. Contact Bob Davies, K7BHM, e-mail: <k7bhm@cox.net>; on the web: <http://www.hamradio2004.com>.

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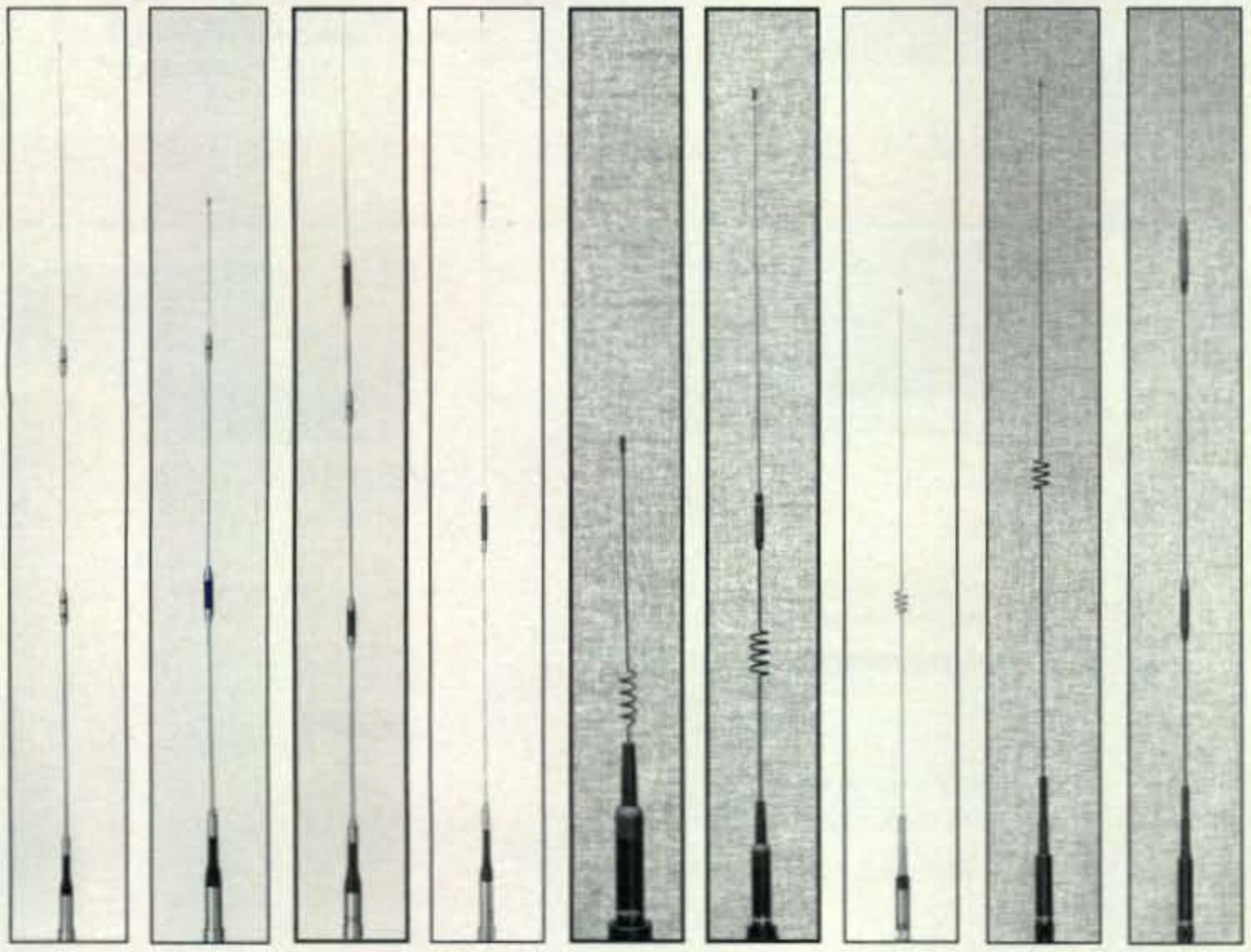

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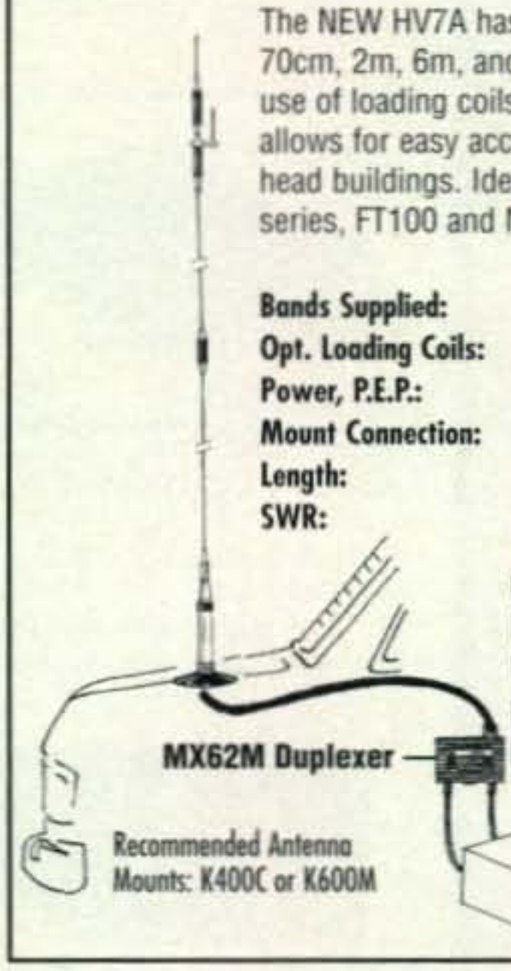

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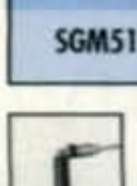
HVC21	15m

MODEL	BAND (MHz)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
MR77	2m/70cm	70	MAG	20	1/4λ, 1/2λ
MR77SMA	2m/70cm	70	MAG	20	1/4λ, 1/2λ
NR72BNMO*6	2m/70cm	100	NMO	13.8	1/4λ, 1/2λ
NR73BNMO	2m/70cm	100	NMO	33.5	1/2λ, 1-5/8λ
NR770HA7	2m/70cm	200	UHF	40.2	1/2λ, 2-5/8λ
NR770HNMO8	2m/70cm	200	NMO	38.2	1/2λ, 2-5/8λ
NR770RA	2m/70cm	200	UHF	38.6	1/2λ, 2-5/8λ
NR7900A*	2m/70cm	300/250	UHF	57	1/4+1/2λ, 3-5/8λ
SG7000A*6	2m/70cm	100	UHF	18.5	1/4λ, 6/8λ
SG7500A	2m/70cm	150	UHF	40.6	1/2λ, 2-5/8λ
SG7500NMO	2m/70cm	150	NMO	41.0	1/2λ, 2-5/8λ
SG7900A*	2m/70cm	150	UHF	62.2	7/8λ, 3-5/8λ
SG7900ANMO*	2m/70cm	150	NMO	62	7/8λ, 3-5/8λ
SGM510	2m/70cm	100	UHF	37	1/2λ, 2-5/8λ

MODEL	BAND (MHz)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
CR8900A*6, 11	10m/6m/2m 70cm	60	UHF	50	1/4λ, 1/4λ 1/2λ, 2-5/8λ
SG2000HD*	2m	250	UHF	62.6	1/2λ+3/8λ
CR320A*6	2m/1-1/4m 70cm	200/100 200	UHF	37.4	1/4λ, 1/2λ 2-5/8λ
CR627B*6,9 CR627BNMO*6,9	6m/2m 70cm	120	UHF/NMO	60	1/4λ, 1/2+1/4λ 2-5/8λ
HF6FX*6	6m	250	UHF	40	1/4λ
HF50CX*6	6m	200	UHF	75	3/8λ
NR22L*	2m	100	UHF	96.8	2-5/8λ
NR2000NA	2m/70cm 23cm	100	N	39	1/2λ, 2-5/8λ 5-5/8λ
M285*10	2m	200	UHF	52.4	5/8λ
M685*6	6m	200	UHF	52.4	1/4λ
MG200	2.4GHz	-	N	23.6	3-1/2λ
SGM911*6,9	6m/2m/70cm	60	UHF	41	1/4λ, 1/2λ,2-5/8λ
NR124	23cm	100	N	25	4-5/8λ



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It's a mainstay of many a ham shack, but how many of you realize that your Vibroplex "Bug" semi-automatic key has a history that goes back a century? Vibroplex owner Mitch Mitchell, W4OA, provides us with some history and a look at how today's "Bugs" are built.

Centennial of the "Bug"
Vibroplex®, 100 Years Later!

BY MITCH MITCHELL,* W4OA

Vibroplex is celebrating 100 years of continuous production of telegraph keys in 2004! There are not many companies that can claim a product that has been in continuous production for 100 years with only cosmetic changes. Horace G. Martin, inventor of the Vibroplex, was a mechanical genius, and he got it right with the "Bug," the 100-year, premier product of The Vibroplex Co. (photo 1). *(For the early history of the Bug, see the sidebar—ed.)* Although there is controversy about the exact year the Bug came into existence, the official company position has always been that the Bug originated in 1904, and all of the early Vibroplex logo plates carry the August 9, 1904 patent date.

As just about everyone knows, the telegraph was invented by Samuel F. B. Morse in 1836. He patented the telegraph in 1840, and the first commercial message ("What hath God wrought?") was transmitted in 1844. From the invention of the telegraph in 1836 until the Vibroplex came into widespread use in the early 1900s, telegraphy sending primarily was done with what we now call a *hand key*. The most prominent modern example of the hand key is the famous World War II era J-38.

A good telegrapher can send 20 to 25 words per minute with a hand key. However, try sending 20 wpm with a hand key continuously for about a half hour, and you'll find you have to go lie down and take a rest! Your poor arm and wrist will be numb. Over time, the constant, unvarying motion of the hand key could cause temporary or permanent damage to cartilage, tendons, ligaments, nerves, and muscles involved in producing the motion. Early telegraphers suffered from this malady, which they called "glass arm," and which we now know as "repetitive motion injury." There were literally tens of thousands of telegraph operators in the U.S. manning telegraph offices 24/7. Being a telegrapher was a modern profession that was being decimated by the glass-arm malady, for which there was no cure.

Necessity being the mother of invention, enter the Vibroplex. With a Vibroplex Bug, and its side-to-side motion, a good operator could send effortlessly at blazing speeds of 50, 60, and even 70 wpm or above for hours without becoming subject to glass arm. The Vibroplex

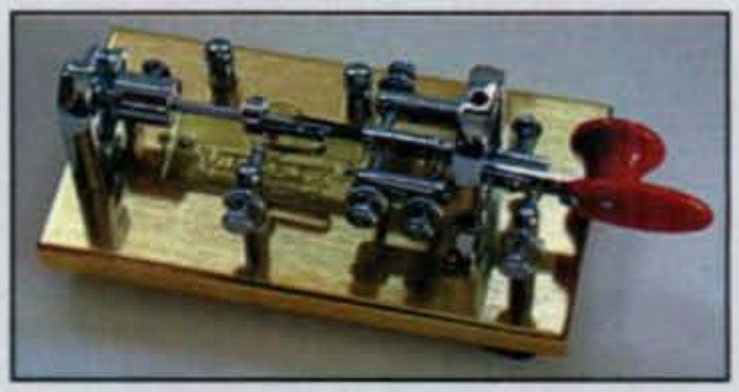


Photo 1– Original Bug with gold base. (Photos courtesy of the author)

Photo 2– Hand Key Deluxe.

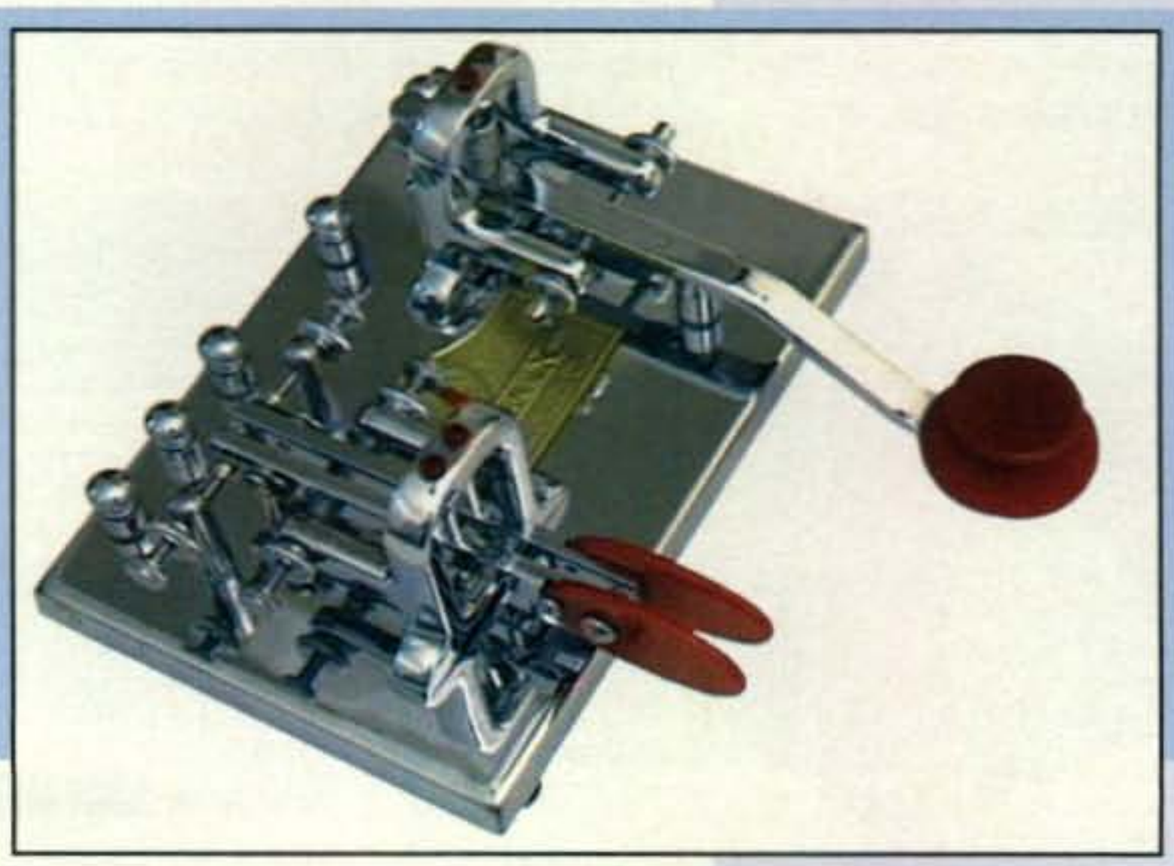


Photo 3– Double Key.

**Owner, The Vibroplex Co., Inc., 11 E. Midtown Park, Mobile, AL 36606*
on the web: <www.vibroplex.com>

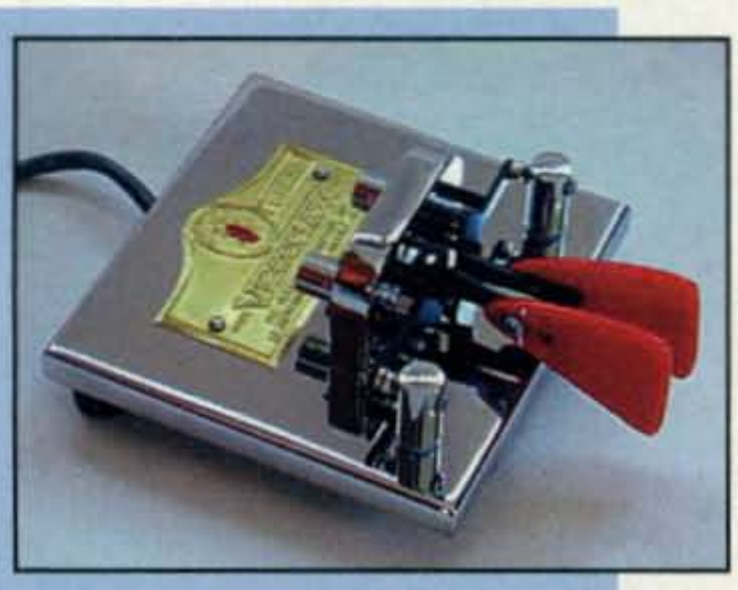


Photo 4– Square Racer Deluxe.

in a very short time became *the* tool of the telegrapher's trade, with each telegrapher having his (or her) own Bug with its carrying case. When the telegrapher went to work, he took his Bug with him. The telegraph operating positions were set up with a hand key designed to allow the easy substitution of the Bug, with its "cord and wedge" as the sending key. If you closely examine almost any old (pre-World War II) Bug, you'll most likely find an extra hole that was drilled in the base after the Bug left the Vibroplex factory. This allowed the telegrapher to slide his Bug down on a bolt that was attached to the operating table to keep the Bug from moving while being used.

Just think, for a moment, of the speed of communication. With the advent of the telegraph, with a hand key a good operator could send 20 to 25 wpm. With a Vibroplex Bug, the speed of communications easily doubled, to 40 to 50 wpm, or faster. It took 60 years, from 1844 to 1904, to double communications speed. Today we spew data at billions of bits per second (or faster).

A Family Business

Horace Martin, by the way, had a great incentive to develop the Vibroplex. He was one of the premier telegraph operators in the country at the time, and he attended the contests where top telegraph operators competed for prizes. Martin couldn't enter the competitions, though, because he could no longer send. He, too, suffered from telegrapher's glass arm. (For a very good biographical sketch of Martin, see <http://www.telegraph-history.org>.)

Vibroplex has always been a small business. First with Martin and partner J. E. Albright (see sidebar), then with members of Albright's family, and then with members of the La Hiff family, Vibroplex continued in business on Broadway in New York City for approximately 65 years. It is interesting to note that Vibroplex's last Broadway address, 833 Broadway, is now an antique shop. In 1979 the company was bought by Peter Garsoe and moved to Portland, Maine, where it remained until I bought the company in 1995.

Enter the Ham!

I am the first ham owner of Vibroplex. In all of the books and articles about Vibroplex, I have not found any reference to any of the prior owners being hams. Today Vibroplex remains a small company. When I bought the company, I moved the production facility to LaGrange, Georgia (my hometown), with my sister, Betty M. Harper, as production manager. The administrative

Early Vibroplex History

There has been confusion as to exactly when Horace G. Martin developed the Bug, with many conflicting stories, and the confusion continues to generate magazine articles today (see "Technical and Legal History of the 'Bug' Trademark," *Old Timer's Bulletin, Official Journal of the Antique Wireless Association, Inc.*, February 2004, page 50). Based upon the information in Vibroplex's official history book, *The Vibroplex Co., Inc. 1890 to 1990*, the prototype of the telegraph instrument that came to be called the Bug, and which is still manufactured today, was patented on August 9, 1904, patent number 767,303. Unfortunately, a competing patent by William O. Coffe was filed shortly before Martin's. Although in 1902 Martin had patented an electromechanical key, the "Autoplex," a patent infringement lawsuit with Coffe resulted in a draw, with both parties being allowed to manufacture their keys.

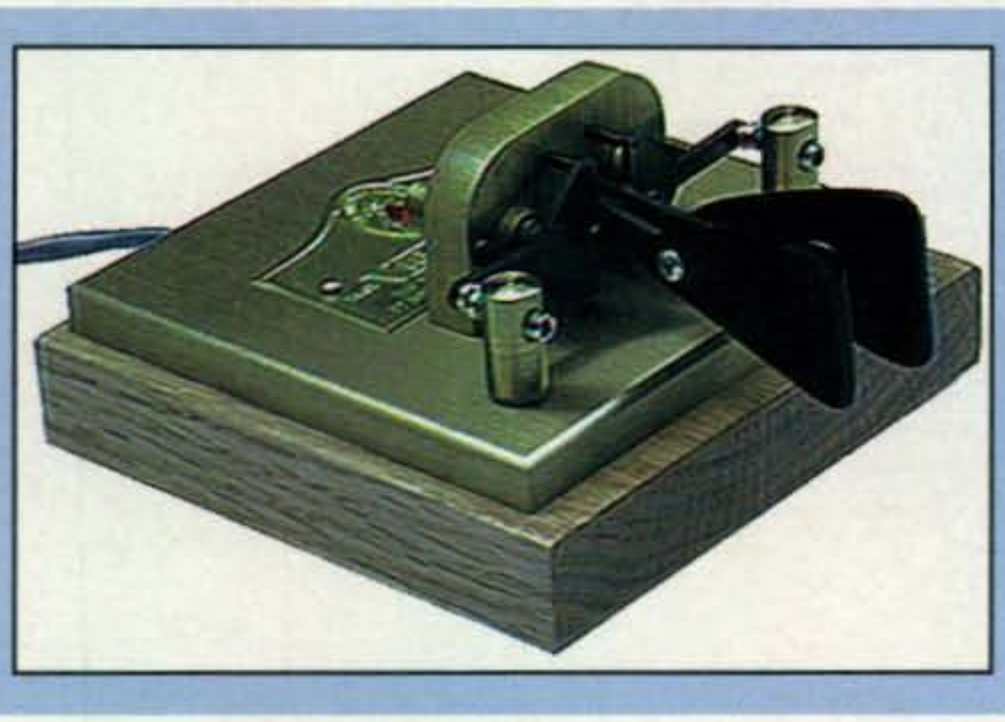
Martin continued to develop his key, and in 1905 he began production of what we now call the Bug. Although production of the Bug began in 1905, Martin did not apply for a patent until 1906, and the patent was granted in 1907 (patent no. 842,154). With the 1907 patent and the later purchase of the Coffe patent, Vibroplex owned the technology, which was to dominate the telegraph-key market for the next 40 years.

Martin partnered with a typewriter salesman and former railroad telegrapher, J. E. Albright, in 1911 to market the Bug. Why a typewriter salesman? Well, the custom of the time was for a telegrapher to furnish his own typewriter, removing the variable of handwriting in delivering telegraphic messages.

Vibroplex continued to be involved in litigation about the Bug. Patent infringers were vigorously pursued in court, but when the patents on the Bug expired, many competitors entered the market. Vibroplex continued to protect its trademarks, but received a real setback in 1927 when a suit against Bunnell for naming one of its keys the "Gold Bug" was lost. The court held that the term "Bug" had become generic in describing all telegraph sending machines.

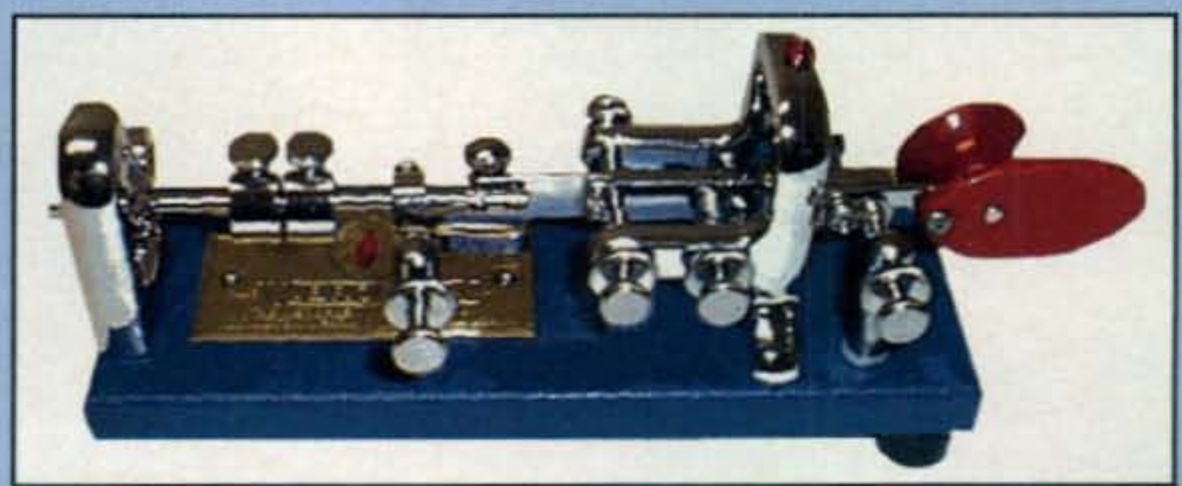
For a complete history of the Vibroplex Company, see the official company history, *The Vibroplex Co., Inc., 1890 to 1990*, available from Vibroplex, 11 E. Midtown Park, Mobile, AL 36606 (phone 251-478-8873, <www.vibroplex.com>).

There are many resources available on the internet on the history of Vibroplex and telegraph keys. Just do a search on Vibroplex and you will get thousands of hits.



← *Photo 5– Square Brass Racer.*

Photo 6– Blue Racer 2000.



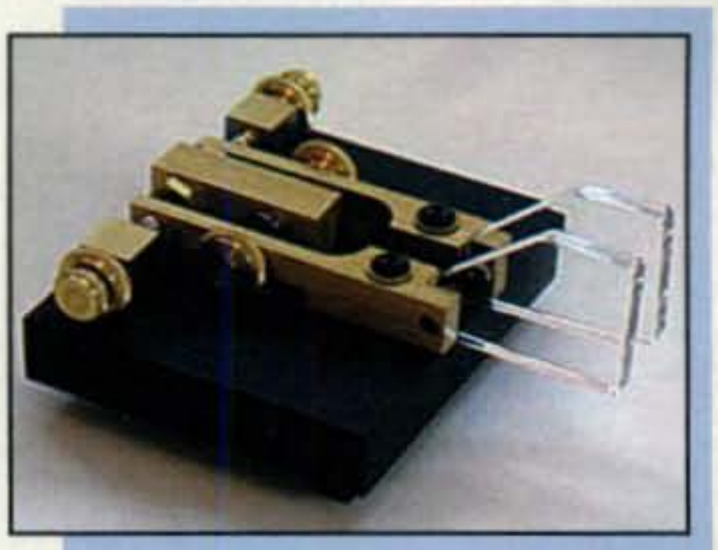


Photo 7– Code Warrior.

office was moved to Mobile, Alabama. Unfortunately, my sister succumbed to cancer in 1999. At that time, production was moved to Mobile and located in the same building as the administrative offices. If you are in the Mobile, Alabama area, come by and visit us.

Changes at Vibroplex

Vibroplex has produced a large variety of keys over the years. Significant new keys since World War II include the Vibrokeyer, introduced in 1960, and the Iambic, introduced in 1979. No new keys were introduced from 1979 until I bought the company.

As anyone reading the ham radio magazines realizes, new products are the lifeblood of amateur radio. Since buying Vibroplex, I have introduced several new keys, with the most significant being the Vibroplex hand key. As a Vibroplex hand key seems to be an oxymoron, I wanted the key to instantly be recognized as a Vibroplex. Also, from a production viewpoint, I wanted to use as many parts that are common to our other keys as possible to minimize inventory. If you look at photo 2, I think you will agree that we accomplished the objectives.

Other new traditional Vibroplex keys that have been introduced include the Double (photo 3) and the Triple (not pictured). We also introduced the Square Racer (photo 4) and the Square Brass Racer (photo 5). A really fun key is the reintroduction of the most collectable modern Vibroplex, our "millennium Bug," the Blue Racer 2000 (photo 6). Each of the Vibroplex keys is available in a variety of finishes, including the Standard, with a black wrinkle powder coating; the Deluxe, which is chrome plated; and Gold, in 14k gold plate. Of course, too, we can't overlook the QRP crowd, so we spiffed up the NorCal kit key as the Code Warrior (photo 7).

Then there are parts. People are con-

Photo 8– The Vibroplex hamfest crew, left to right: Les, AA4F; Wayne, WB4JUJ; Marv, K4BVG (SK); and George, W4LT.

Photo 9– (Left) Betsy, WB4ZYK, administration and key refurbisher, and (right) Mitch, W4OA, owner, The Vibroplex Co.

stantly coming up to our displays at hamfests wanting to know if we have parts for grandpa's old bug. Our answer is, if it was made after World War II, we probably have the parts. Parts lists for current-production and other post-WW II keys are on our website, <www.vibroplex.com>. We also offer a refurbishing service. For a standard price of $40 plus parts and return shipping, we will refurbish your post-WW II key. We don't, however, do plating, but suggest you find a local plating shop that does plating for the motorcycle crowd. They know the meaning of decorative plating.

Vibroplex Today

Although we are not perfect, our quality control is the best it has ever been. Our plating is superb! For example, there are our bases. First, we cut and mill the raw-steel bases square, and then radius the edges. The tops of the bases are milled 30 mils to remove the imperfections in the steel. The base is then polished and plated with 4 to 5 mils of copper. Next the base is polished again, with the soft copper being easy to polish. The polished copper-plated base is then plated with 4 to 5 mils of nickel, and polished again. Then the base is plated with a very thin coat of chrome, just a fraction of a mil, which protects the soft nickel from scratching and keeps it from tarnishing. The shine you see on the base comes from the nickel, which shows through the layer of chrome, and which is so thin that it is transparent.

Our standard-model keys are not painted, but are powder coated. Powder coating is a very fine plastic powder sprayed on the part with a powder gun, which charges the powder so it will stick to the part using static electricity. The part is then placed in an oven and "baked." The plastic powder actually is so fine that it penetrates the pores of the metal and bonds with the metal during the "baking" process. This process produces a finish that is very tough and durable. It will not flake or peel. You can scratch it with a sharp object, but otherwise it is impervious to normal wear and use. The powder coating process can duplicate any paint color or finish. Of course, Vibroplex traditionally uses a wrinkle finish.

A company and its products are no better than its people. We think we have the best crew ever at Vibroplex. I have been a ham since 1963 and have held my Extra Class license since 1969. I have been active on almost all modes and bands except microwaves. My favorite modes are 40-meter CW and 6-meter sideband. I got my first Vibroplex, a Standard Vibrokeyer, in 1963 when I got my Novice license. I built a W9TO electronic keyer for it and have been "Vibroplexing" ever since.

Our crew at Vibroplex includes Betsy Hopson, WB4ZYK, administrationand key refurbisher, and Joan Turner, production and shipping. We also have several part-time employees and contractors who make parts for us. Last, but not least, is the Vibroplex hamfest crew. George, W4LT; Marv, K4BVG (sadly now a Silent Key); Les, AA4F; and Wayne, WB4JUJ, are regulars at our hamfest booths (photo 8). Come by and see us at the Dayton Hamvention® next year.

The Future of Code

I often am asked what I think about the possible elimination of the code requirement for getting a ham license. My answer, and I have always thought this, is that the more people we have in ham radio, the better off we all are. If you want to contest, you almost have to know code. If you want to participate in QRP, you *have* to know code. As new people come into amateur radio, they will migrate into a particular facet of the hobby that appeals to them. That means a certain percentage of them will learn the code in order to participate in QRP or contesting type activities. That's good for amateur radio, and good for Vibroplex. If ham radio ever "goes away," I believe the last transmission will be "dit dit."

Owning Vibroplex for the past ten years has been a lot of fun. I enjoy meeting people at hamfests and talking to them about their grandfather's Bug. I like talking to people on the telephone and helping them get their key or keyer working with their rig. I enjoy getting a call from the *New York Times* librarian asking about the Phillips code. I enjoy seeing a new key come into production. I especially enjoy working with the Vibroplex crew and going to Dayton. I really enjoy looking on eBay and seeing the large number of old Vibroplex keys for sale at sometimes exorbitant prices.

Vibroplex has now been an American institution for 100 years. I hope ham radio and Vibroplex will be around for another 100 years, making quality products for hams working the original digital mode. ■

AMERITRON *True Legal Limit*™ Tuner

Easily handles 1500 Watts continuous carrier even on 160 Meters . . . High-current edge-wound silver plated Roller Inductor . . . Two 500 pf high capacitance tuning capacitors with 6:1 vernier reduction drives . . . 3 core choke balun . . . Six position antenna switch . . . True peak reading Cross-Needle SWR/Wattmeter . . .

Call your dealer for your best price!

AMERITRON ATR-30

$599

Suggested Retail

- ***Handles 1500 Watts carrier***
- ***Super High Current edge-wound silver plated Roller Inductor***
- ***500 pf tuning capacitors with 6:1 vernier reduction drives***
- ***3 core choke balun***
- ***6 position antenna switch***
- ***True peak reading meter***

AMERITRON's ATR-30 *True Legal Limit*™ roller inductor antenna tuner is ham radio's toughest! It'll handle 1500 Watts *continuous carrier output* on *all* modes and *all* HF bands into most antennas -- even on 160 Meters where most antenna tuners fail.

It's perfect for Ameritron's most powerful amplifiers where the ATR-30 just loafs.

All band coverage lets you operate 1.8-30 MHz including all MARS and WARC bands.

Super High Current Roller Inductor

You'll see Ameritron's new *super high current* air core roller inductor. It's *edge wound* from a thick solid copper strip and silver plated. This produces a large surface area and a massive conductor. It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn ordinary roller inductors.

A gear driven turns counter and crank knob gives you precise inductance control.

Two 500 pf Tuning Capacitors

Two 500 pf -- *the highest of any antenna tuner* -- variable transmitting capacitors give you no-arc wide range impedance matching for true high power performance.

6:1 vernier reduction drives makes capacitor tuning smooth and easy.

Super Balun, 6 position Antenna Switch

Super heavy duty three core choke balun lets you match virtually any balanced feedline antenna without core saturation.

A 6 position antenna switch lets you select your desired operating antenna.

Read *true* Peak Power

Ameritron's active electronic *true* peak reading meter accurately reads forward and reflected power and SWR *simultaneously* on a lighted Cross-Needle meter.

Roomy Cabinet maintains High-Q

Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅝Hx17½D inches.

AMERITRON ATR-20 Antenna Tuner

ATR-20, $459. Handles a full 1.2 kW SSB and 600 Watts CW. It's designed to safely handle the full SSB power of Ameritron's AL-811/811H/80B, ALS-500M/600 and other 1.2 kW SSB amplifiers.Has vernier reduction drives.

Ameritron has the best selection of *True Legal Limit*™ HF Amplifiers

AMERITRON's legal limit amplifiers use super heavy duty Peter Dahl Hypersil® power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

with Eimac® 3CX1500/8877 ceramic tube

AL-1500

$3045

Suggested Retail

TrueLegalLimit™

Ameritron's *most powerful* amplifier uses the herculean *Eimac®* 3CX1500/8877 ceramic tube. It's so powerful that 65 Watts drive gives you the full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 lbs., 17Wx10Hx18½D inches.

Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 tube

AL-1200

$2645

Suggested Retail

TrueLegalLimit™

Get ham radio's *toughest* tube with AL-1200. The *Eimac®* 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 17Wx18½Dx10H in.

Ameritron's *classic* Amp

with 2 graphite plate Amperex® 3-500G tubes

AL-82

$2545

Suggested Retail

TrueLegalLimit™

Most linears using 3-500Gs *can't* give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500G amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 17Wx10Hx18½D inches.

Desktop Kilowatt

with Amperex® 3-500G tube

AL-80B, $1349. Gives you full kilowatt SSB PEP output (85 Watts in) from a whisper quiet compact desk- top linear. 14Wx8½Hx 15½D". Plugs into 120 VAC outlet. Graphite plate *Amperex®* 3-500G tube. Nearly 70% efficiency. Weighs 48 lbs.

AMERITRON *no tune* Solid State Amplifiers

500 Watt Mobile Amp

ALS-500M, $799. 500 Watts PEP/400W CW output, 1.5-22 MHz, instant bandswitching, no tuning, no warm-up. SWR, load fault, thermal overload protected. On/off/bypass switch. Remote on/off control. DC current meter. Extremely quiet, fan off until needed. 13.8 VDC. 9Wx3½Hx15D in.

600 Watt FET Amp

ALS-600, $1299. *No tuning, no fuss, no worries -- just turn on and operate.* 600 Watts PEP/500W CW, 1.5-22 MHz, instant bandswitching, SWR protected, extremely quiet, lighted peak reading Cross-Needle SWR/Wattmeter, front panel ALC control, operate/standby switch. 120 or 220 VAC. Inrush current protected. 9½Wx6Hx12D in.

Precision SWR/Wattmeter

AWM-30, $149 suggested retail. Active circuit gives *true* peak/average readings on lighted Cross-Needle meter. 3000/300 Watt ranges. Remote sensor.

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Results of the 2003 CQ WW DX SSB Contest

BY BOB COX,* K3EST

Expanded CQ WW Contest Results on the Web

We've moved a few elements of our contest reporting onto the CQ website again this year, including **Station Operators** of Multi-Op stations, **Team Contesting**, and **Zone Leaders/ Single Op**. In addition, we have expanded **QRM** on the web.

To view these additional and expanded elements of the 2003 CQ WW SSB results, go to <http://www.cq-amateur-radio.com/cqwwhome.html>, then click on "Expanded Results, 2003 CQ WW SSB" and select the category you want to see. You may also get there by going to our home page at <http://www.cq-amateur-radio.com>, clicking on "Contest Rules & Info," then clicking on "CQ World Wide DX Contest" and selecting "Expanded Results, 2003 CQ WW SSB."

It was predicted that solar conditions would not cooperate for the 2003 CQ WW DX SSB Contest. However, that did not stop 4093 contesters from entering the world's largest international radio event. For weeks before the contest the bands were quiet. Suddenly, at 0000 UTC on October 25 they exploded into life, and once again the CQ WW made its own propagation. The activity over the weekend can best be summarized by the words of the entrants themselves:

"Once again CQ WW SSB beat the propagation pundits! The sheer volume of signals on the band during CQ WW must warm up the ionosphere, providing better than expected conditions"—*G3TXF*. "Wow, what a ride! Solar flares followed by great activity and then interrupted by 'RF blackouts'—*WN6K (the best description of the weekend's propagation—ed.)*. "Flux at 298—wow! Great conditions; amazing signals on 10 meters. Went very auroral Sunday evening on 40"—*G3BJ*. "CQ WW wins again!"—*GU5W*. "Conditions were great on 15 meters! That major flare right before the contest seemed to seed the ionosphere with DX-friendly electrons!"—*K2MFY*. "Another great WW! The RF blackout on Sunday was the strangest thing we ever saw. All three high bands went to S0 in seconds at 1751Z. After confirming the towers were still standing, we realized what had happened"—*W4WS*. Aurora, our faithful friend, was again present, even in visible form on Friday night—*OH1F*.

Sure the CQ WW is a fantastic competition, but it is much more than that. It is a celebration of ham radio skill and effort. Over the years, thousands of hams throughout the world have received their first ham radio thrill in the CQ WW. New hams and old timers who enter the CQ WW become addicted, as evidenced by the following comments from the 2003 contest: "My first contest. I am trapped! —*OA4BQE*. This could be addictive—*KA2BZS*. The greatest phone contest, a five-star contest!—*YC2ECG*.

Following is a summary of the results. The line scores are presented elsewhere in this issue. Look them over and find your callsign.

High Power, All Band

D4B is located on a mountaintop on an island at 15°N latitude. Over the last few years Al, 4L5A, has built a world-class station, which can be seen at <http://www.qsl.net/d44tt>. All of his hard work has paid off, too. Al took the top position in the world in the very competitive High Power All Band category with the all-time #2 score. Finishing in second place was Jim, W7EJ, who operated CN2R to new heights. Third place went to Dave, NN1N, who put HC8N in lots of logs (http://hc8n.info/). The top three entrants in Europe all broke the 5-million points barrier. First place in Europe was M6T operated by Andy, G4PIQ. Second was taken by Steve, GW4BLE, and third place went to Tonno, ES5TV, with his FB station (http://www.lhv.ee/images/files/es5tv.htm).

Breaking the 6-million point barrier is a real accomplishment. Bob, KQ2M/1, pushed his station over the barrier for the top U.S. position. A little farther to the north, Randy, K5ZD/1 (on <www.qrz.com>), took second-place honors. There was a *real* battle for third place between two Indiana friends. Finally, Mike, W9RE, just edged out Pat, N9RV (www.qrz.com). The difference was only about two QSOs! Special mention must be made of the fine score of KH7X operated by Mike, KH6ND. What an effort! For the first time, three Canadian stations made the world top ten box: VY2ZM, VC3AT, and VE2IM.

The top scorers from each continent were: North America 8P1A, Africa D4B, Asia C4W, Japan JH4UYB, Europe M6T, South America HC8N, and Oceania KH7X.

Low Power, All Band

Zone 34 is hard to work, as everyone knows. When SU9NC operated by W9NC takes the world top place Low Power All Band, you know there were a lot of smiles around the world during the contest. I'll bet he could hear, "Yes!!" every time he worked someone. World second place went to CQØT operated by CT1ILT, who is 17 years old! Quite a job. Third place in the world went to A45WD operated by Alex, YO9HP. Another Asian top score and tops in Asiatic Russia was Willy, UA9BA, operating UA9AYA. Second place in Europe went to Zlatko, 9A2EU, and rounding out the top three was Dave, G4BUO.

All three top U.S. entrants were *not* on the east coast . . . well, sort of. Jeff, N8II, in West

The Cape Verde mountaintop location of Single Op, High Power, All Band World winner D4B, operated by Alex, 4L5A.

*e-mail: <k3est@cqww.com>

TROPHY WINNERS AND DONORS

SINGLE OPERATOR
World All Band
D4B (Opr. Alexander Teimurazov, 4L5A)
Donor: Dave Rosen, K2GM
WA2RAU and W2SKE Memorial

World Low Power
Thomas Poland, SU9NC
Donor: Slovenian Contest Club

World QRP
Valentin Benzar, 5B4AGM
Donor: Doc Sayre, W7EW

World Assisted
9Y4ZC (Opr. Bernd Och, DL6FBL)
Donor: CTRI Contest Group

USA
Robert Shohet, KQ2M/1
Donor: Potomac Valley R.C. – KC8C Memorial

USA Low Power
Jeffrey Hartley, N8II
Donor: North Coast Contesters

USA Zone 3
Mitch Mason, K7RL
Donor: Dave Pruett, K8CC & Greg Surma, K8GL

USA Zone 4
Mike Wetzel, W9RE
Donor: Dave Pruett, K8CC & Greg Surma, K8GL

Canada
VY2ZM (Opr. Jeffrey Briggs, K1ZM)
Donor: Niagara Frontier Int'l DX Assn.
VE3WT Memorial

Caribbean/C.A.
8P1A (Opr. Thomas Georgens, W2SC)
Donor: Alex M. Kasevich, VP2MM

Europe
M6T (Opr. Andy Cook, G4PIQ)
Donor: Potomac Valley R.C.– W4BVV Memorial

Europe Low Power
CQØT (Opr. Filipe Monteiro Lopes, CT1ILT)
Donor: Scott Jones, N3RA & Tim Duffy, K3LR

Russia
Paul Bogachev, RK4FD
Donor: Roman Thomas, RZ3AA

Africa
CN2R (Opr. Jim Sullivan, W7EJ)*
Donor: Gordon Marshall, W6RR

Asia
C4W (Marios Nicolaou, 5B4WN)
Donor: 2 AM Dayton Pizza Gang

Japan
Masaki Okano, JH4UYB
Donor: Tack Kumagai, JE1CKA

Japan Low Power
Minoru Kumoi, JE6EKC/3
Donor: Western Washington DX Club

Oceania
KH7X (Opr. Michael Gibson, KH6ND)
Donor: Northern California DX Club

South America
HC8N (Opr. David Patton, NN1N)
Donor: Yankee Clipper Contest Club

SINGLE OPERATOR, SINGLE BAND
World – 28 MHz
ZY5G (Opr. Walter Gomes Filho, PP5WG)
Donor: Joel Chalmers, KG6DX

World – 21 MHz
PX5E (Opr. Sergio Almeida, PP5JR)
Donor: Robert Naumann, N5NJ

World – 14 MHz
P40A (Opr. John Bayne, KK9A)
Donor: North Jersey DX Assn. – K2HLB Memorial

World – 7 MHz
EA8AH (Opr. Pekka Kolehmainen, OH1RY)
Donor: Fred Laun, K3ZO – K7ZZ Memorial

World – 3.7 MHz
Hrane Milosevic, YT1AD
Donor: Fred Capossela, K6SSS

World – 1.8 MHz
Bojan Sever, S57M
Donor: Robert Wruble, W7GG

USA – 28 MHz
Bill Tippett, W4ZV
Donor: Donald Thomas, N6DT

USA – 21 MHz
David Pascoe, KM3T/1
Donor: WorldRadio

USA – 14 MHz
Gene Frohman, K1RU
Donor: Southern California DX Club

USA – 7 MHz
Bill Kollenbaum, K4XS
Donor: Stanley Cohen, W8QDQ

USA – 3.7 MHz
Theodore Demopoulos, KT1V
Donor: Alex Jozsa, KG1E

USA – 1.8 MHz
Charles Dietz, W5PR
Donor: CQ Magazine

Carib./C.A.(14 MHz)
KP2A (Opr. James Neiger, N6TJ)
Donor: Nate Moreschi, N4YDU

Europe – 28 MHz
Danijel Voncina, S58D
Donor: WorldRadio

Europe – 21 MHz
Emil Balen, 9A9A
Donor: Tine Brajnik, S50A

Europe – 14 MHz
Robert Cummings, GIØKOW
Donor: A.G. Anderson, GM3BCL

Europe – 7 MHz
Joseph Cornee, F6CTT
Donor: Roger Burt, N4ZC

Europe – 3.7 MHz
Anrzej Worosz, SP8BRQ
Donor: CQ Magazine

Europe – 1.8 MHz
Markovic Milovan, T9/KG6KZK*
Donor: Robert Kasca, S53R

Oceania (28 MHz)
Hans Budhiono, YB2DX
Donor: Bruce D. Lee, KD6WW

Japan – 21 MHz
JI2UNR
Donor: DX Family Foundation

Japan – 14 MHz
Hiroyuki Inaba, JS3CTQ
Donor: Take Yokoyama, JL1BLW

MULTI-OPERATOR, SINGLE TRANSMITTER
World
VP2E (Oprs.: KC5EA, N5AU, N5KO, N5TJ, K5MR)
Donor: So. Calif. DX Club – W6AM Memorial

USA
K8AZ (Oprs.: K8AZ, K8BL, K8MR, K8PP, N8AA, ND8L, W8CAR, W8KIC, WB8K, WT8C)
Donor: Carolina DX Association

Carib./C.A.
VP5DX (Oprs.: AB4UF, NF4L, N4EPD, N4KE, K4UTE, WA4ET, NU4Y)*
Donor: Eric Scace, K3NA

Africa
3V8BB (Oprs.: PY5EG, S56A, YT1AD, YU1AO, YU1FW, YZ1BX)
Donor: Tikirriki Contest Club – IH9P

Asia
P3A (Oprs.: RA9JX, RZ9UA, RW4WR, UA9CDV, UA9UR, RA3AUU, RZ3AA, RAØAM)
Donor: Edward L. Campbell, NT4TT
AA6BB and KA6V Memorial

Japan
JA7YAA (Oprs.: JI5RPT, JE7HLZ, JG7PSJ, JO7DJT, JO7FTJ, JHØNZN)
Donor: Vienna Int'l ARC – 4U1VIC

Europe
IR4X (Oprs.: I4VEQ, I4TJE, I4IND, I4EAT, I4IKW, IK4DCT, IK2NCJ, IK2JUB, IK2QPR, IK2ULH, IZ4BOY)
Donor: Bob Cox, K3EST

Oceania
YBØZDA (Oprs.: YB0ØAI,YBØAR,YBØDPO, YBØECT,YBØLBK,YFØANA)
Donor: Junichi Tanaka, JH4RHF

South America
FY5KE (Oprs.: F1HAR, F5HRY, F5LND, F5MZN, F6FGZ, F6FVY, FY5FY)
Donor: The Cuba Libra Contest Club – Victor Burns, KI6IM

MULTI-OPERATOR, TWO TRANSMITTERS
World
IH9P (Oprs.: I2IFT, IK2ANI, IK2CIO, IK2HKT, IK7JWY, I8QLS, IK8ETA, IN3QGY, IT9BLB, OK1FUA)
Donor: Ranko Boca, YT6A

USA
K4JA (Oprs.: K4JA, W3BP, K9JY, KA9FOX, K4MA, K4ZW, KE9I, K9GY)
Donor: Doug Morgan, KH6U – KL7Y Memorial

Europe
9A7A (Oprs.: 9A8A, 9A7V, 9A4RX, 9A4PA, 9A3OS, 9A3TR, 9A6DM)
Donor: Aki Nagi, JA5DQH

Oceania
KHØAA (Oprs.: JP1NWZ, JF1SQC, JA5OVU, JH1EAQ, JE1JKL)
Donor: Japan CQ Ham Radio

MULTI-OPERATOR, MULTI-TRANSMITTER
World
C5Z (Oprs: AB6BH, K5OT, K6AM, K6JL, OH2KI, N6AA, N6VI, N6ZZ, W6XD)
Donor: Dave Leeson, W6NL & Barb Leeson, K6BL

USA
KC1XX (Oprs.: KC1XX, K1DG, K3EST, K6AW, W2RQ, K1EA, W1FV, K1GQ, P4WW, KC1F)
Donor: Paul Hellenberg, K4JA

Europe
OT3A (Oprs.: DH5HV, JK3GAD, ON1AEI, ON2BIG, ON2BJC, ON4AID, ON4AMI, ON4ASB, ON4AWU, ON4AWV, ON4BAG, ON4CCL, ON4CCM, ON4CDE, ON4CFQ, ON4CHO, ON4CMT, ON4DB, ON4FG, ON4FI, ON4LN, ON4LO, ON4XB, ON5CIM, ON5JC, ON5OT, ON5UM, ON6FX, ON6LK, ON6MR, ON6PU, ON6UM, ON7AM, ON7AW, ON7BRA, ON7CIP, ON7HU, ON7NB, ON9CC, Daniel, Denis, Francois, Laurens, Mia, Nancy, Rupert, ONL10449, ONL10577, PA1BX, PC5A, SP8ARY)
Donor: Finnish Amateur Radio League

Japan
JA3YBK (Oprs.: JH3PRR, JG3KIV, JI3OPA, JP3PZD, JM3XKG, JH4IFF, JH4NMT, JR4PMX, JF4FUF)
Donor: Ryozo Goto, JH3JYS

CONTEST EXPEDITIONS
World Single Operator
VK9XD (Opr. David Burger, VK2CZ)
Donor: National Capitol DX Assn.
Stuart Meyer, W2GHK Memorial

World Multi-Single
VP2E (Oprs.: KC5EA, N5AU, N5KO, N5TJ, K5MR)
Donor: Gail Schieber, K2RED

World Multi-Multi
5I3A (Oprs: 5H3GRN, 5H3JMN, 5H3NNN, 5H3PEN, 5H3WJN, K1XM [5H1X], KQ1F [5H1F])
Donor: Tachio Yuasa, JA9VDA

SPECIAL SINGLE OPERATOR AWARD
World-All Band Under 21 years old
CQØT (Opr. Filipe Monteiro Lopes, CT1ILT)
Donor: Gene Zimmerman, W3ZZ

**Second place*

Virginia used his skills to take the top U.S. spot. Second place went to Terry, N4TZ/9, in Indiana, while the bronze went to Marvin, N5AW, down in Texas.

The top scorers from each continent were: North America H7A, Africa SU9NC, Asia A45WD, Japan JE6EKC/3, Europe CQØT, South America PR2F, and Oceania KHØA.

QRP

QRP in the CQ WW—what a great way to learn or improve those important contesting skills. Searching the bands for contacts and knowing when to call a station or give up and find the next log entry is what QRP is all about. Working stations with 5 watts is exciting and may bring back long-forgotten contest skills.

The top three scores came from different continents. Taking the top world QRP place was Val, 5B4AGM. Second place and the top European entrant was Gerard, F5BEG. Third place and the top North American scorer was Dan, N8IE. Second place in the U.S. went to Tom, N4KG, followed by Tony, K8ZT. Second place in Europe was won by Guliev, UA3BLS, and third place went to DF1DX. Special mention must be made of the fine efforts of LU1VK, WAØVBW, KIØOV, and W7RAB. All of these stations were a long way from top QSO centers.

TOP SCORES

WORLD

All Band

D4B	20,119,968
CN2R	18,743,250
HC8N	16,394,049
PTØF	14,426,804
8P1A	14,413,170
C4W	10,174,500
VY2ZM	8,843,125
KH7X	8,488,048
VC3AT	6,898,752
VE2IM	6,534,052

28 MHz

ZY5G	1,749,325
PX2W	1,629,950
ZW5B	1,597,968
9Y4NZ	1,392,026
S58D	1,040,230
CE3BFZ	1,015,350

21 MHz

PX5E	2,207,000
9A9A	1,594,264
OK1RI	1,397,964
EA8EA	1,342,440
KM3T/1	1,304,015
CX5BW	1,182,978

14 MHz

P4ØA	1,882,925
GIØKOW	1,266,660
4L6AM	1,227,132
KP2A	1,105,955
9A5E	1,066,164
PT5A	938,918

7 MHz

EA8AH	844,606
F6CTT	618,562
IR7G	554,996
OE6Z	535,734
YT7A	487,736
LX7I	466,610

3.7 MHz

YT1AD	230,845
EA8BH	194,820
SP8BRQ	175,616
SNØVC	167,292
KT1V	158,930
4N1A	157,183

1.8 MHz

S57M	88,825
4X4NJ	78,440
T9/KG6KZK	73,632
PA3GCV	62,050
IU3X	58,900
OZ3SK	51,612

Low Power All Band

SU9NC	6,812,478
CQØT	5,291,104
A45WD	4,267,708
UA9AYA	3,829,947
PR2F	3,464,188
EA8AJO	2,952,600
9A2EU	2,199,724
JY4NE	2,126,412
G4BUO	2,050,815
H7A	1,936,322

28 MHz

HC1JQ	903,886
CX1TA	850,766
LU5EML	631,433
V31LZ	568,750
PY2SBY	565,586
LU4DLL	526,932

21 MHz

XE1CQ	691,680
YZ1AU	637,956
HG8I	510,300
YU1EA	392,751
CX2AM	385,140
PY4OY	321,678

14 MHz

LY9A	417,760
PY2NY	389,136
IT9STX	375,600
4N1N	373,490
9A7D	350,838
FM5FJ	326,616

7 MHz

HC1/NP3D	308,712
LY5A	197,965
OE5CWL	75,144
YY5OIG	65,961
CO2JD	64,970
W2MF	58,512

3.7 MHz

PAØMIR	507,899
4L2M	97,680
RA9MJ	86,614
DL3LE	85,946
OK1FFU	73,416
IR5B	63,640
S53F	63,360
YZ1SG	61,884
S58J	58,064

1.8 MHz

YT1R	33,600
UT3SA	31,000
9A7ZZ	24,708
SP4XQN	18,354
SO6A	16,500
SP7JOA	15,730

QRP, All Band

5B4AGM	1,423,175
F5BEG	924,426
N8IE	484,300
N4KG	470,808
K8ZT	449,202
UA3BL	448,448
DF1DX	400,780
OK2PP	350,470
WAØVBW	342,016
LU1VK	317,184

Assisted, All Band

9Y4ZC	14,979,055
P4ØW	11,755,443
D44TD	10,139,976
KP3Z	8,181,096
PJ7/AH8DX	7,073,259
ZX2B	5,540,722
W2RE	5,410,032
YM2ZF	5,377,395
TM7F	5,321,810
RG9A	5,260,115

Multi-Op, Single Trans

VP2E	25,299,296
FY5KE	21,729,494
P3A	20,196,420
3V8BB	15,548,610
IR4X	11,866,656
VP5DX	11,106,072

Multi-Op, Two Trans

IH9P	29,447,379
PJ2T	26,212,824
CT9L	24,455,105
VP5B	18,404,223
V26B	16,622,600
KHØAA	14,109,480

Multi-Op, Multi-Trans

C5Z	33,764,550
A61AJ	30,033,600
CQ9K	26,357,967
YV4A	18,744,300
KC1XX	17,442,900
OT3A	15,855,120

EUROPE

All Band

M6T	5,518,331
GW4BLE	5,356,955
ES5TV	5,049,000
GM7V	4,948,370
TM2Y	4,376,532
S57DX	4,344,600
DJ5MW	4,118,400
EA4KD	3,850,674
OHØB	3,807,620
DJ4PT	3,712,885

28 MHz

S58D	1,040,230
IQ2MG	601,809
GØAEV	499,446
IK2PTR	487,202
LZ1NG	478,202
CT1AHU	339,930

21 MHz

9A9A	1,594,264
OK1RI	1,397,964
TM9R	1,043,784
S57O	855,680
S51FB	761,442
G3TXF	679,448

14 MHz

GIØKOW	1,266,660
9A5E	1,066,164
CT8T	922,922
SN7Q	898,280
M7Z	839,160
YT9X	779,976

7 MHz

F6CTT	618,562
IR7G	554,996
OE6Z	535,734
YT7A	487,736
LX7I	466,610
OH2U	418,091

3.7 MHz

YT1AD	230,845
SP8BRQ	175,616
SNØVC	167,292
4N1A	157,183
OH5B	146,222
YU7AV	143,900

1.8 MHz

S57M	88,825
T9/KG6KZK	73,632
PA3GCV	62,050
IU3X	58,900
OZ3SK	51,612
OZ1HXQ	51,027

Low Power All Band

CQØT	5,291,104
9A2EU	2,199,724
G4BUO	2,050,815
I3MLU	1,742,503
F6DZU	1,588,074
UA4FER	1,476,366
9A7P	1,474,653
OT3R	1,446,640
EA4PL	1,328,635
OK1TN	1,170,094

28 MHz

EA5AER	379,488
CT1EAT	288,234
EA2CAR	247,929
EA4TV	209,088
IT9JOF	136,764
SP3LWP	130,379

21 MHz

YZ1AU	637,956
HG8I	510,300
YU1EA	392,751
HA3NU	316,096
EA5DF	313,608
9A4W	273,222

14 MHz

LY9A	417,760
IT9STX	375,600
4N1N	373,490
9A7D	350,838
DL1LH	325,950
HG4F	282,264

7 MHz

LY5A	197,965
OE5CWL	75,144
YT1LT	57,267
OL6T	51,168
SM6DOI	40,514
LY2TE	39,420

3.7 MHz

DL3LE	85,946
OK1FFU	73,416
IR5B	63,640
S53F	63,360
YZ1SG	61,884
S58J	58,064

1.8 MHz

YT1R	33,600
UT3SA	31,000
9A7ZZ	24,708
SP4XQN	18,354
SO6A	16,500
SP7JOA	15,730

QRP, All Band

F5BEG	924,426
UA3BL	448,448
DF1DX	400,780
OK2PP	350,470
IK5RUN	316,683
S59D	307,430
SM3C	264,327
EA3FF	268,478
CT1DYV	194,821
I1ZHH	175,925

Assisted, All Band

TM7F	5,321,810
IT9GSF	4,782,904
UT7QF	4,168,026
ON4UN	3,804,300
LY2FY	3,759,120
DLØWW	3,400,704
DJ2YA	3,204,160
S52ZW	2,816,844
SP6EKS	2,737,800
OK2FD	2,237,872

Multi-Op, Single Trans

IR4X	11,866,656
HG1S	8,960,680
OK5W	8,635,320
OM7M	8,137,620
OE2S	8,087,625
SY8A	7,632,300

Multi-Op, Two Trans

9A7A	12,757,650
HG6N	11,501,568
DAØBCC	10,940,896
RU1A	10,925,937
MD4K	9,976,698
OH1F	7,140,442

Multi-Op, Multi-Trans

OT3A	15,855,120
DFØHQ	15,798,744
LZ9W	10,184,832
RW2F	10,120,190
HBØ/HB9AON	8,942,519
ISØ/DL3EW	8,254729

USA

All Band

KQ2M/1	6,088,992
K5ZD/1	5,630,769
W9RE	4,872,366
N9RV	4,868,525
K3ZO	4,240,200
K3CR	4,021,509
K9NW	3,611,608
W3BGN	3,456,607
K5TR	3,337,350
N2LT	3,245,274

28 MHz

W4ZV	896,636
*K4EA	643,218
K9BGL	481,200
K5RX	459,033
N4BP	455,225
AB9H	80,036
W9IL	79,768

21 MHz

KM3T/1	1,304,015
NG2X	688,152
N7DD	680,340
N3HBX	554,510
WB9Z	533,876
N8TO	501,320

14 MHz

K1RU	559,586
W7WA	327,288
WA2QNW	296,904
W5FO	154,956
W8TWA	154,113
K1QS	112,770

7 MHz

K4XS	169,176
WQ2M	98,000
N2GC	55,620
N5JB	55,144
N2WW/Ø	49,788
KE4SCY	45,885

3.7 MHz

KT1V	158,930
AA1BU	119,674
W6KW	42,000
K7ZZZ	11,115
AA4MM	11,020
W8GG	4,840

1.8 MHz

W5PR	2,673
K6SE	156

Low Power All Band

N8II	1,660,288
N4TZ/9	1,581,888
N5AW	1,551,930
K1LD	1,542,078
KVØQ	1,476,291
N1SV	1,458,500
W1TE	1,405,829
N1UR	1,399,680
K1RV	1,283,997
KS1J	1,281,336

28 MHz

K4WI	422,279
KT3RR	250,617
KC2LLM	207,438
K8OZ	125,337
KU1CW/Ø	116,616
K6EID/4	113,407

21 MHz

K2MFY	200,245
N4MO	174,230
W4LC	163,457
WØAH	160,020
K8IR	149,898
NG3Q/8	143,706

14 MHz

KD2RD	241,098
KX2S	86,184
WØYR/4	68,234
K9AW	54,752
K2RED	43,521
KZ5OH/4	27,456

7 MHz

W2MF	58,512
N2KX	30,150
K2UF	17,487
WA6WPG	6,862
N3RW	5,109
KU6T	2,492

3.7 MHz

W9IND	7,440

1.8 MHz

No Entry	

QRP, All Band

N8IE	484,300
N4KG	470,808
K8ZT	449,202
WAØVBW	342,016
N1TM	156,585
KIØOV	145,400
WA3NKO	106,212
KR1ST/4	78,624
K1DX	47,972
W7RAB	39,676

Assisted, All Band

W2RE	5,410,032
W4MYA	4,087,167
K2NG	4,039,176
K3WW	3,714,126
N2MM	3,369,807
W2WB	3,177,831
K2OWE	2,850,155
AA3B	2,793,272
N1DG	2,413,418
N8TR	2,329,397

Multi-Op, Single Trans

K8AZ	5,334,459
K1IR	4,569,953
N4PN	4,258,124
NØNI	3,563,010
W4WS	3,538,161
AA2MF	3,248,505

Multi-Op, Two Trans

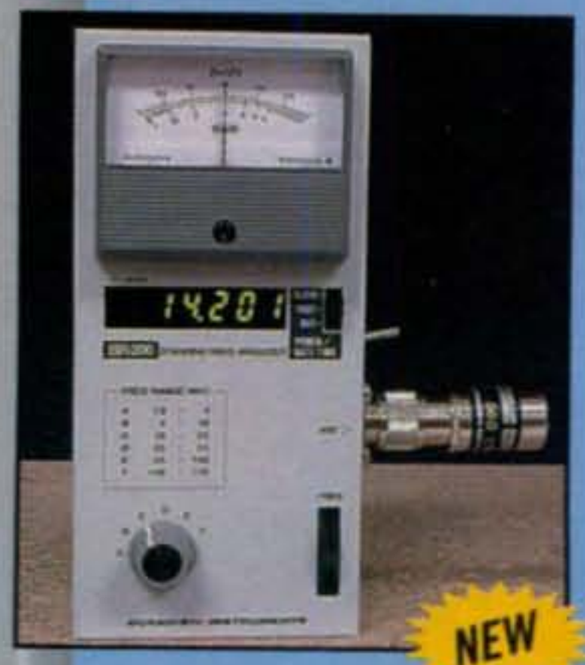
K4JA	12,327,066
N3RS	11,054,901
K1KI	9,787,520
N2NT	8,166,574
W4RM	7,829,741
NT1Y	7,004,981

Multi-Op, Multi-Trans

KC1XX	17,442,900
W3LPL	14,897,584
K9NS	13,202,948
K1TTT	9,345,200
NQ4I	8,610,210
K1RX	7,950,756

NEW from Kuranishi Instruments LTD, Japan

BR-200 Professional-Grade SWR/Antenna Analyzer



NEW

Perform SWR and impedance measurements with confidence! The BR-200 is a laboratory grade precision test instrument providing a wideband RF signal source for analyzing antenna systems and other equipment without the need for a separate transmitter. • 1.8-170MHz • High precision meter • 500mW 50 Ohm dummy load included • Impedance measurements: 12.5 - 300 Ohm • Connector: SO-239

COMET™ & Maldol

Dualband and Multiband Base Antennas

Wi-Fi/802.11b/LAN/HSMM Access Point Antennas

COMET GP-15 • Tri-band 52/146/446MHz Base Repeater Antenna • Gain & Wave: 52MHz 3.0dBi 5/8 wave • 146MHz 6.2dBi 5/8 wave x 2 • 446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 150W • Length: 7'11" • Weight: 3lbs. 1oz. • Conn: Gold-plated SO-239 • 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass radome

COMET CX-333 • Tri-band 146/220/446MHz Base Repeater Antenna • Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 220MHz 7.8dBi 5/8 wave x 3 • 446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 120W • Length: 10'2" • Weight: 3lbs. 1oz. • Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

COMET GP-3 • Dual-band 146/446MHz Base Repeater Antenna • Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Max Pwr: 200W • Length: 5'11" • Weight: 2lbs. 9ozs. • Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

COMET GP-6 • Dual-band 146/446MHz Base Repeater Antenna • Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 200W • Length: 10'2" • Weight: 3lbs. 8ozs. • Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

NEW

***Maldol NEW* HVU-8** **Ultra-compact 8 band HF/VHF/UHF vertical antenna**
80/40/20/15/10/6/2M/70cm Only 1/2 the traditional size and weight of vertical HF antennas, and it includes 2M/70cm! Unique radial system rotates for balcony installations, the radials can all be rotated to one side. • HF and 6M: 1/4 wave-length • Gain 70cm: Two 5/8 waves in phase, 5.5dBi • Impedance: 50 Ohm • Max Power: HF 200W • Length: 2M: 1/2 wave-length, 2.15dBi • Gain 70cm: Two 5/8 • Conn: SO-239 • Height: Only 8'6" • Weight: 5lbs. 7ozs. • Construction: Fiberglass, 3 Sections

COMET GP-9/GP-9N • Dual-band 146/446MHz Base Repeater Antenna • BEST SELLER! • Gain & Wave: 146MHz 8.5dBi 5/8 wave x 3 • 446MHz 11.9dBi 5/8 wave x 8 • Max Pwr: 200W • Length: 17'8" • Weight: 5lbs. 11ozs. • Conn: GP-9 Gold-plated SO-239 • GP-9N Gold-plated N-type female • Construction: Heavy-duty white fiberglass radome

COMET GP-24 The standard high gain 2.4GHz access point antenna for maximum range/signal strength • 2400-2500MHz • Gain: 15.4dBi • Length: 5'10" • Weight: 2lbs. 9ozs. • Conn: Gold-plated N-female • Construction: Heavy-duty white fiberglass radome

COMET GP-24-3 The same physical high gain 2.4GHz antenna as the GP-24, but with a 3-degree electrical downtilt to concentrate the signal to the horizon and below

COMET GP-24-S Medium gain access point antenna for applications where maximum distance is not as important as a solid signal around and directly below the antenna. • Gain: 9.9dBi • Length: 3'9" • Weight: 1lb. 14ozs. • Conn: Gold-plated N-female • Construction: Heavy-duty white fiberglass radome

NCG COMPANY

For a complete catalog, call or visit your local dealer. Or, contact NCG Company.
1275 N. Grove Street • Anaheim • California 92806
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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
D4B	99/14/53	278/24/76	434/27/95	2733/38/141	1785/34/130	3627/32/139
CN2R	111/9/53	587/21/85	960/26/98	1993/31/131	1676/35/113	3355/30/114
HC8N	73/8/17	295/19/64	1048/30/103	1608/33/106	1834/31/120	3506/30/122
PTØF	29/8/16	150/19/58	616/28/95	2825/34/115	1309/31/113	2883/30/105
8P1A	76/7/22	373/17/64	774/24/92	2045/31/107	2990/33/113	3205/27/108
C4W	128/8/41	366/14/64	666/24/88	1344/29/118	613/28/88	2679/30/114
VY2ZM	90/10/31	470/18/76	423/22/74	1157/28/104	2176/29/112	1343/22/99
KH7X	18/7/8	262/24/38	933/33/64	1074/35/90	1319/34/68	2557/32/63
VC3AT	112/6/8	262/15/50	489/21/65	1465/32/113	1825/30/112	819/27/97
VE2IM	22/4/3	247/15/48	300/18/65	1695/25/108	1938/25/105	856/20/82

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
KQ2M/1	17/5/9	274/17/72	182/23/85	1880/33/114	1438/36/125	952/29/108
K5ZD/1	18/6/9	209/17/72	283/23/7	834/32/107	1359/29/110	749/24/95
W9RE	18/6/7	111/15/55	227/25/82	587/34/108	860/32/119	1219/28/110
N9RV	19/7/11	116/14/47	341/23/83	666/31/105	959/30/101	1054/28/95
K3ZO	12/5/9	200/16/60	233/23/77	408/26/84	957/29/104	959/23/99
K3CR	15/5/7	95/14/50	206/23/76	537/30/100	748/30/100	1032/26/102
K9NW	19/7/10	72/16/42	235/20/72	424/31/101	773/28/110	931/29/106
W3BGN	26/7/13	127/18/60	138/23/69	609/29/101	661/26/101	610/29/107
K5TR	12/6/9	62/17/37	201/27/82	411/29/91	1104/32/105	902/31/104
N2LT	15/6/9	44/12/24	78/19/47	404/29/92	650/31/108	1092/30/115

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

VP2E	128/13/47	414/24/88	1162/32/130	2763/39/147	2990/39/151	4160/35/157
FY5KE	100/13/50	320/21/79	903/29/119	1201/35/138	2268/35/145	4276/33/145
P3A	163/10/61	923/20/83	1201/27/103	1835/36/131	1671/37/133	3417/37/145
3V8BB	215/7/53	629/16/74	1008/24/100	1734/34/122	1801/37/135	2362/35/133
IR4X	69/8/58	259/18/77	1045/32/118	994/38/136	1867/38/145	1815/37/147
VP5DX	106/12/26	294/18/66	664/25/91	973/34/126	2274/30/116	1932/31/121

USA MULTI-OPERATOR SINGLE TRANSMITTER

K8AZ	18/6/17	99/21/67	193/28/101	921/37/135	742/34/125	800/32/138
K1IR	14/7/13	263/17/76	254/27/98	490/34/117	1024/30/116	571/30/118
N4PN	24/9/22	44/16/42	175/29/96	532/34/112	901/34/122	862/31/129
NØNI	20/11/16	63/16/41	174/25/84	522/33/114	652/33/118	801/31/127
W4WS	9/4/8	67/12/38	175/25/85	432/33/113	803/33/120	759/31/125
AA2MF	24/6/10	120/16/53	191/24/88	326/28/106	876/29/113	661/29/115

WORLD MULTI-OPERATOR TWO TRANSMITTER

IH9P	457/11/6	1024/21/88	1290/28/107	2265/37/139	3491/38/144	3304/36/144
PJ2T	146/8/23	498/19/63	1495/30/120	2443/36/130	4015/33/134	3732/31/132
CT9L	71/7/49	273/15/73	1119/28/105	2455/36/133	3227/36/135	3815/33/135
VP5B	214/9/22	1078/23/81	1431/28/85	2156/31/97	3968/33/118	3967/31/103
V26N	112/7/21	292/18/59	1059/22/95	2427/32/115	3431/33/129	3780/31/118
KHØAA	3/2/3	187/27/38	782/31/79	1218/37/131	2831/39/119	2568/36/118

USA MULTI-OPERATOR TWO TRANSMITTER

K4JA	64/12/33	498/21/93	540/31/117	911/39/142	1780/37/145	1583/34/142
N3RS	47/9/21	329/19/85	580/31/115	993/38/140	1933/36/140	1394/32/137
K1KI	23/7/16	215/19/71	378/29/98	1112/37/131	1921/35/134	1301/32/137
N2NT	53/10/27	297/19/81	320/26/99	966/36/130	1361/33/126	1180/30/137
W4RM	24/7/10	260/18/72	380/29/101	869/37/123	1330/35/127	1283/31/141
NT1Y	42/11/22	321/21/82	277/28/95	796/36/123	1377/29/129	998/31/132

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

C5Z	69/11/39	690/22/91	1474/35/120	3637/37/146	3982/38/148	4178/34/129
A61AJ	309/8/55	1432/29/95	2107/38/137	2371/40/164	3100/39/153	3671/37/164
CQ9K	107/8/48	444/16/82	1171/27/101	3367/38/149	2999/38/143	3521/35/152
YV4A	129/9/29	339/19/59	921/29/105	2772/37/128	2581/31/117	3088/30/113
KC1XX	101/12/38	632/23/98	805/34/126	1551/39/161	2702/37/158	1846/32/142
OT3A	764/11/64	1374/20/82	1909/33/115	2411/40/152	2334/36/137	1566/32/133

USA MULTI-OPERATOR MULTI-TRANSMITTER

KC1XX	101/12/38	632/23/98	805/34/126	1551/39/161	2702/37/158	1846/32/142
W3LPL	236/12/30	457/22/93	789/34/125	1682/38/152	2022/36/149	1708/35/145
K9NS	207/12/28	272/24/72	448/31/110	1469/40/145	2340/36/151	1910/34/153
K1TTT	95/9/24	373/19/86	301/26/96	1270/38/133	1935/32/138	1031/31/134
NQ4I	216/9/26	319/23/88	293/26/95	1483/39/143	1632/35/133	1381/33/140
K1RX	51/6/19	220/17/70	484/27/106	1262/38/136	1677/33/131	897/30/124

The top scorers from each continent were: North America N8IE, Africa EA8TX, Asia 5B4AGM, Japan JH7RTQ, Europe F5BEG, South America LU1VK, and Oceania KH6/KØCD.

Assisted

The Assisted category offers a way for DXers and contesters to contribute to their club scores. The secret to doing well in this category is to remember that QSOs are the name of the game. Try not to chase the band map too much, and you may end up with a better score than by QSYing each time a juicy multiplier flies by on the screen.

Place an excellent operator in an excellent location and the combination is tough to beat. Bernd, DL6FBL, as 9Y4ZC talked his way to the world #1 spot in the Assisted category. Perennially among the world's top scorers is John, W2GD; second place went to him. Third place went to D44TD. The top honor in Europe was won by TM7F. He was followed by Fabio, IT9GSF, and Igor, UT7QF. In the U.S., W2RE walked away with a 1.3-million point lead to garner the top spot. Second place went to Bob, W4MYA, operating from central Virginia, while third place went to Noah, K2NG. Two Asian stations did very well; YM2ZF (ex-MØSDX) edged out RG9A. A long way from population centers, JR1AIB and VK4UC did outstanding jobs.

The top scorers from each continent were: North America KP3Z, Africa D44TD, Asia YM2ZF, Japan JR1AIB, Europe TM7F, South America 9Y4ZC, and Oceania VK4UC.

Jacek, CEØY/SQ9BOP, operated in the Single Op, Low Power, All Band category from Easter Island.

Multi-Single

The Multi-Single category is one of the most competitive. It entails assembling a team and months of planning. How do you set a new world MS record, a record that has stood for many years at around 23-million points? The first thought would be to plan to go to a three-point area. Yes, that makes sense. However, this time throw out that idea. The new champions and new world MS record holder is the team who placed VP2E in 11,617 logs! Since you are allowed only one run station, that figures out to be about 229 QSOs/hr for 48 hrs! Wow! Congratulations to the team.

The top three stations all finished above 20-million points! The world second spot went to the FY5KE team. Finishing a very FB third was the P3A group. The top European score came from the team operating from Bologna, IR4X (ex-IQ4A). The next four MS stations all finished above 8-million points. HG6N was second, followed by DAØBCC, OK5W, and OM7M. In the U.S., Tom's crew at K8AZ operating from northeastern Ohio took the top spot. The fine score of K1IR took second, followed by the team from N4PN. Multi-single is a real party, and if you get a chance to join a team you will find it a real learning experience.

The top scorers from each continent were: North America VP2E, Africa 3V8BB, Asia P3A, Japan JA7YAA, Europe IR4X, South America FY5KE, and Oceania YBØZDA.

Multi-Two

"It was a fun weekend and the Multi-Two operation just gets better"—*D70LW*. "Running part of our usual Multi-Multi field-day setup with less than half of the 2002 crew, the planned targets have been fully achieved (QSOs, mults, and final score). Local 'moscato passito' wine, friendship, and acquired know-how have been again the keys of another great result"—*IH9P*. IH9P is the new world Multi-Two record holder, and what a fine job

EUROPE TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
M6T	188/10/53	658/17/71	504/20/84	603/26/85	1710/34/109	828/25/103
GW4BLE	110/6/43	556/15/64	398/23/82	551/26/92	1362/26/91	1108/27/94
ES5TV	185/7/45	317/17/75	506/29/101	895/33/121	1077/34/122	745/34/130
GM7V	151/8/46	650/16/72	410/22/84	896/32/97	1318/29/101	624/26/101
TM2Y	67/6/41	330/17/62	224/21/83	425/28/96	873/32/99	1286/31/112
S57DX	106/6/37	555/16/65	512/26/90	783/32/111	1011/33/102	603/30/102
DJ5MW	126/7/42	547/12/64	138/18/65	438/24/90	1239/30/106	966/32/110
EA4KD	12/3/11	134/10/51	340/20/77	961/27/96	1005/32/95	1010/24/88
OHØB	140/7/48	245/13/56	542/26/77	1088/33/111	1195/29/94	444/25/91
DJ4PT	177/8/51	254/14/60	372/25/88	681/31/93	883/31/95	448/26/83

EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

IR4X	69/8/58	259/18/77	1045/32/118	994/38/136	1867/38/145	1815/37/147
HG1S	112/9/56	464/17/79	898/30/119	879/35/129	1581/37/139	1325/34/146
OK5W	97/8/52	441/17/76	875/30/113	959/38/143	1992/38/144	556/33/138
OM7M	183/8/58	675/19/85	739/32/116	1208/38/129	1486/37/153	684/35/143
OE2S	191/7/53	675/18/79	580/28/110	792/37/125	1244/38/142	1463/35/147
SY8A	170/9/54	662/14/74	1170/29/112	1078/35/125	1725/37/127	1563/36/128

EUROPE MULTI-OPERATOR TWO TRANSMITTER

9A7A	351/8/57	946/17/77	961/30/113	1891/39/143	1779/39/140	2083/37/150
HG6N	522/11/62	1007/19/79	853/29/120	1412/36/132	2157/39/138	1469/34/133
DAØBCC	297/8/57	672/19/81	940/32/115	1280/38/132	1929/38/147	1510/35/146
RU1A	177/9/56	923/27/100	1172/32/121	2078/39/145	2177/38/141	836/33/128
MD4K	624/11/61	969/16/75	1021/23/99	2254/37/135	2499/38/134	792/30/127
OH1F	231/8/50	555/17/73	595/32/111	2026/39/139	1450/37/134	561/32/122

EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

OT3A	764/11/64	1374/20/82	1909/33/115	2411/40/152	2334/36/137	1566/32/133
DFØHQ	947/12/65	1483/22/94	1670/32/114	2474/40/162	2021/39/162	1479/37/157
LZ9W	539/9/57	912/19/79	1512/30/113	1680/39/142	2089/36/140	1245/36/142
RW2F	407/9/60	794/18/78	1074/29/115	1700/39/136	2110/35/140	776/35/136
HBØ/HB9AON	694/7/56	1402/15/75	1306/20/96	1939/31/119	1425/27/108	1202/25/104
ISØ/DL3EW	256/9/57	729/15/69	739/22/80	2048/33/123	1561/34/118	2066/34/127

TOP SCORES IN VERY ACTIVE ZONES

Zone 3

K7RL	1,999,830
K5RR/7	1,658,435
W6PH	1,236,690
WA7LT	932,340
*N6MU	838,134
*K8IA/7	826,117
K7RI	562,424
*WN6K	521,094
WR6M	514,324
K6LRN	469,299

Zone 4

VC3AT	6,898,752
W9RE	4,872,366
N9RV	4,868,525
K9NW	3,611,608
K5TR	3,337,350
VE3PN	2,062,482
VE3SY	1,702,148
KØSR	1,694,607
N4TZ/9	1,581,888
*N5AW	1,551,930

Zone 5

VY2ZM	8,843,125
KQ2M/1	6,088,992
K5ZD/1	5,630,769
VO1AU	5,514,435
K3ZO	4,240,200
K3CR	4,021,509
W3BGN	3,456,607
N2LT	3,245,274
K1ZR	2,922,624
AA1K/3	2,508,504

Zone 14

M6T	5,518,331
GW4BLE	5,356,955
*CQØT	5,291,104
GM7V	4,948,370
TM2Y	4,376,532
DJ5MW	4,118,400
EA4KD	3,850,674
DJ4PT	3,712,885
EI8IR	3,325,350
GMØF	2,442,032

Zone 15

ES5TV	5,049,000
S57DX	4,344,600
OHØB	3,807,620
ZA1A	3,097,575
II4A	2,471,064
LY2MW	2,390,256
YL2KO	2,252,024
SN8F	2,202,860
*9A2EU	2,199,724
YL6W	2,061,720

Zone 16

RK4FD	2,853,785
*UA4FER	1,476,366
RJ1Z	1,320,304
RD4M	998,800
*RU3QW	995,687
RN3ZC	874,923
RD3A	769,698
RK3BA	711,383
RZ4FA	675,200
*RZ3DW	558,832

Zone 25

JH4UYB	3,866,265
JA6GCE	2,231,840
JA7NVF	1,424,130
JM1XCW	1,309,308
JR3NZC	720,405
JA2FSM	550,240
JA1TMG	461,121
*JE6EKC/3	417,294
JH1UAJ	373,065
JA4YHX	280,438

**Low Power*

José, YV6BTF, made a nice showing from Venezuela, Single Op, High Power, All Band.

they did. Second place went to the contesting consortium at PJ2T. Facing south and west on Curacao, this seasoned team put PJ on the map. A great job was done by the CT9L team led by the Rhein-Ruhr DX Association. Europe's top score came from 9A7A, the Radio Club Varazdin Contest Team. Second place went to HG6N, the Salgotttarjani Varosi RadioKlub. Here in the U.S., Paul's crew at K4JA reprised their win from 2002. After carefully constructing a FB station in Tidewater, Virginia, K4JA's team walked away with the U.S. Multi-Two top score and a new record. Second place went to N3RS, Sig's fine team in the Philadelphia area. Third place went to a Yankee Clipper Contest Club station, K1KI.

The top scorers from each continent were: North America VP5B, Africa IH9P, Asia UP5G, Japan JR1ZTT, Europe 9A7A, South America PJ2T, and Oceania KHØAA.

Multi-Multi

The C5Z crew arrived at their location and prepared to set up verticals on the beach. The only problem was that the Gambian government had decided to remake the beach. Getting around the problem required very long coaxial cables, but all the work paid off. The C5Z gang took home the coveted Multi-Multi crown. They were followed by Ali, A61AJ' s fine crew from Dubai. They say that 16% of the world's cranes are in Dubai; one was used to put up antennas at A61AJ. In third place was CQ9K. This all-CT3 crew did an outstanding job! Breaking into the top world six was the team at KC1XX. They felt the effect of the aurora, but not enough to dent their great multiplier total. Second place in the U.S. went to Frank, W3LPL's crew. Located in the rolling hills of central Maryland, his gang used the eight towers holding up big antennas to their best advantage. For third place you have to go much farther west to the home of the Mount Frank Contesters. There you will find K9NS. They sure do get out.

Introducing new hams to contesting and gathering together a large party is what OT3A was all about. With 50 operators, they must have had the largest crew. They took the top Europe spot. You can check-out their station at <http://www.on7lr.be>. Second place went to the Ilmenau Contest Club, DFØHQ (http://www.tuilmenau.de/~df0hq/index.html). Third place in Europe went to the LZ9W contest team.

The top scorers from each continent were: North America KC1XX, Africa C5Z, Asia A61AJ, Japan JA3YBK, Europe OT3A, South America YV4A, and Oceania DX1DBT.

Team Contesting

Get five contesters together from anywhere, form a team, and you can enter the Team Contesting category. This year's SSB winner was Contest Club Finland's Team Suana. They led the pack of 18 entries. Here is the lineup:

1. CCF Team Sauna (9,255,886 pts.): OH6NIO, OHØZ (OH4JFN), OH2RA, OHØB (OH2UA), 5WØUU (OH3UU).

2. WWYC Ragchewers (8,956,668 pts.): CQØT, GØMTN,MJ2Z, NR3X, SM3W.

3. YCCC Phone Alpha (7,589,523 pts.): W2WB, N1SV, W1RZF, KS1J, W1CTN.

4. WWYC Lids on Purpose (6,610,773 pts.): 9A7P, I3MLU, L44DX, OT3R, SP1DID.

5.YCCC Phone Bravo (5,788,668 pts.): W1ZT, K1RV, K1HT, W1KT, W1TE.

6. YCCC Phone Charlie (5,226,702 pts.): K1LD, WA1Z, WO1N, KG1E, W1DAD.

7. Minnesota Wireless Assn. Team #1 (4,391,422 pts.): LA/NØHJZ, NØFP, KØKX, ACØW, KH6/WA2HFI.

8. Aztecas Contesting Revolutions (3,868,220 pts.): XE1CQ, XE1CT, XE1KK, XE2AUB, XE2AC.

9. YCCC Phone Delta (3,812,189 pts.): W1EBI, N1UR, W1JQ, KT1V, W1EL.

Andrew, OZ1XJ, and Jan, OZ1ADL, Multi-Single at OZ5E.

10. Team Australis (3,589,836 pts.): VK2IA, VK9XD (VK2CZ).

11. CCF Team Terva (3,580,497 pts.): EA8EA (OH2MM), EA8AH (OH1RY), EA8BH (OH2BH), OH8L (OH8LQ), OHØV (OH6LI).

12.CCF Team Sibelius (1,545,699 pts.): OH4RH, OH6OS.

13. WWYC Showing Off (1,174,026 pts.): KE9R, OE8CIQ, OE8YDQ, LZ5AZ.

14. CCF Team Sisu (1,031,118 pts.): OH2LU, OH3WW, OH5DX, OH6KXL, OH6QU.

15. CCF Team Finlandia (671,565 pts.): OH5B (OH5BM), OH4A (OH9MM).

16. WWYC Singles (629,131 pts.): LX7I, LY7Z, PY8AZT.

17. YCCC Phone Echo (582,408 pts.): K1VU, K1NQ, KB1JCT.

18. Minnesota Wireless Assn. Team #2 (494,405 pts.): WBØTRA, NØKK, KØAD, WA2MNO, WGØM.

Records

On the CQ web page (www.cq-amateur-radio.com) and the cqww.com web page are the All-Time Records for each continent and country. Setting a new record is difficult and challenging. Take a look at your country's records and choose one you can shoot for. Congratulations to the following stations that set new records.

World: KP4KE (Q3.7), IH9P (M2), VP2E (MS)
Africa: IH9P (M2)
Asia: BA4RF (A7), RAØCG (A14), P3A (MS)
Europe: CQØT (CT1ILT) (LA), YU1NR (Q14)
Japan: JH7LRS (A14), JR1ZTT (M2)
North America: VP2E (MS)
Oceania: KH6WW (W8QZA) (Q14), KHØAA (M2)
South America: HC1/NP3D (L7), 9Y4ZC (AA), PY2WC (A7), PJ2T (M2)
U.S.: K4JA (M2)

Special Mention

For many, the CQ WW sure brings out the desire to travel. Thanks to the many DXpeditions and the efforts of hundreds of contesters, the contest experience is made more interesting. Here are some calls you probably worked: C6/VA3SWG, 8P1A, V31LZ, VY2ZM, ZF2AH, TO5A, PJ7/OK1BNS, PJ7/OK1NS, VP5/W9RN, KP2/K2ZZ, KP2A, EA8EA, EA8AH, EA8BH, D4B, CN2R, 9J2KC, YI3DX, 9N7MV, 9N7ET, BW4/UA3VCS, UK/JE7RJZ, OHØB, OHØV, ZA1A, T9/KG6KZK, SV9/PA9NMH, YMØT, J43J, GU5W, MJ2Z, MW/VE6WQ, 9M6A, 9M8YY, 9M6OO, 4W2A, 4W4W, V73AZ, ZL/W3SE, KHØA, YJØONM, 5WØUU, DU7/G4DUM, VK9XD, P4ØA, CEØY/SQ9BO, CEØY/SP9PT, CEØY/SP9EV, HC1/NP3D, HC8N, KH6/KØCD, KH6WW, HC1/EW1AR, PJ7/AH8DX, IH9YIT, 4U1ITU, OHØZ, P4ØW, 9Y4ZC, VP2E, TI5A, HR6/VE3BW, VP5DX, EA8ZS, CQ3T, 3V8BB, V55V, P3A, J49Z, JW5E, V63B, ZK1SSB, PJ4T, V26B, VP9I, TI8M, V47DM, 5JØX, VP5B, IH9P, MD4K, AH2R, KHØAA, PJ2T, PZ5A, V26DX, VB2C, TI5N, V47KP, VP5T, C5Z, CQ9K, 5I3A, A61AJ, HBØ/HB9AON, and ISØ/DL3EW.

Comments

As the opening comments indicated, the 2003 CQ WW SSB was a real roller coaster ride. The conditions were much better than expected and the solar flux really did hit 298! We received about 4100 contest logs, about 4000 of which were electronic! Your effort to submit an electronic log allows for a fairer adjudication process. Thanks to all the contesters around the world who sent in a log. Please send in your log, no matter how small.

Submitting an electronic log is easy. Send your SSB log and summary to <ssb@cqww.com> (CW logs to <cw@cqww.com>). Please send your log in Cabrillo format. The Cabrillo format is now a standard submission with CT, TR, NA SuperDuper, and WriteLog. Remember to name your file with your call with .cbr extension—e.g, C5Z.cbr. If you did everything okay, you will get back an acknowledgement. If there was something wrong, you will get a message telling you what to do to correct the error. The messages are presented in numerous languages. If you don't see your native language and you would be willing to help out by translating for your fellow countrymen, please send an e-mail to <questions@cqww.com> for more information.

Several problems have arisen with the use of packet. First there is using packet to help find QSOs, mostly multipliers. We have addressed this problem by checking all SSB entries for unclaimed packet use. Again we can report that very few entrants made the mistake of not claiming the correct category. There were eight entrants who were reclassified. The second problem is the use of packet to self-spot, which is against the rules. Self-spotting can be broken down into an entrant doing it himself with his call, or a participant trying to hide the fact that he is doing it by using other callsigns. The first case is almost always due to ignorance of the rules. We notify those stations of the offence. The second case is a deliberate attempt to hide the spot by the entrant or by someone associated with the entrant. Fortunately, the internet is very exact and the ISP address of every spot can be traced. We found several stations who even used Silent Key calls (not club calls) as spotting calls. There is nothing wrong with coming across a station and spotting it, but self-spotting is against the rules. The CQ WW has few requirements: write down the callsign of the station to which you are talking, claim the correct category, and do not self-spot. It's not so hard. Everyone should enter the contest to have fun, meet friends, perhaps work some new ones, and compete fairly.

The TI8M ops (l. to r.): Back row TI2KAC, K4ZJ, N5VI, K4WPM; front W4KTR, W4BD, and K4UN with Oso.

Thanks

Thanks to the CQ WW log checkers who validated the winners and provided insight into many contesting topics. The 2003 crew included: K1DG, K3WW, K3ZO, KR2Q, N2AA, N2NC, N3ED, N6ZZ, N9RV, W3ZZ, K1AR, KM3T, KT3Y, N5TJ, N5NJ, K6AW, and N8BJQ. Our DX advisors were very helpful in offering advice, providing information, and sorting out potential problems: CT1BOH, DL6RAI, EA3DU, F6BEE, G3SXW, I2UIY, JE1CKA, OH2KI, OH2MM, OK2FD, PY5EG, S50A, UA9BA, VA7RR, VE3EJ, and E21EIC.

A special thanks to Dick, N6AA, and Larry, N6TW, who once again spent countless hours to make the CQ WW database the best in contesting. The CQ WW uses the software developed by Tree, N6TR. Additional software provided by WT4I was used. The results were proofread by VE3EJ. Translations of the rules into Spanish, Japanese, German, Turkish, and French were done by EA3DU, JE1CKA, DL6RAI, TA3J, and F6BEE, respectively. The CQ WW records are maintained by John, N2NC, and K3EST. Phil, N6ZZ, put in lots of hours making sure the database was as clean as possible. Thanks also to John, K1AR, for his advice and hard work to make the CQ WW so successful.

Congratulations to all the winners! To participate and have *fun* is what contesting is all about! CU in the 2004 contest.

73, Bob, K3EST

DX QRM

Conditions were excellent the first night, but the second night there was very heavy atmospheric noise. Many QSOs were missed because of this. . . . **4X4NJ**. Thanks to Yuri, XE1UN, the 6D9X contest group is born. Contesting is alive and well in Mexico! . . . **6D9X**. Output power's only lonely 10w. MNI TNXs 4 pickin' me out! CU on my love, 10m. . . . **7K2PBB**. What a run on the first night, but soon the solar flare was in full effect here in 8P. Congrats to PX5E, who never missed a beat all weekend. I actually had to check whether my antennas were still in the air a couple of times—that's how bad it got on 15 at times on Sunday. . . . **8P2K**. Multi-Single our first attempt. Very good score for portable setup. No fatal breakdowns with equipment. . . . **9AØR**. I could enjoy this contest in Zambia. There was a power failure during the contest. . . . **9J2KC**. I enjoyed the contest in Nepal. . . . **9N7ET**. Many thanks to my old school for hosting me again. I enjoyed this one greatly. . . . **C4W**. Condx were great to Europe. Lost 1.5 hour when electricity went QRT. . . . **CN2R**. Very good propagation on 10m, but too bad in the others. Thanks for the beautiful pile-ups. . . . **CO8DM**. I am 17 years old and I enjoyed a lot this contest. . . . **CQØT**. Good DX conditions on Saturday. On Sunday evening at 17:30 all bands closed. Before contest weekend watched on TV about intense solar explodes. Was an effect of it. . . . **CX9AU**. Condx in contest changing very quickly. My thanks to everyone who called me and get with me on another bands. Special thanks to N6TJ, CT1BOH . . . **D4B**. It was a fun weekend and the Multi-Two operation gets better. . . . **D70LW**. DP1POL is located at Neumayer sta-

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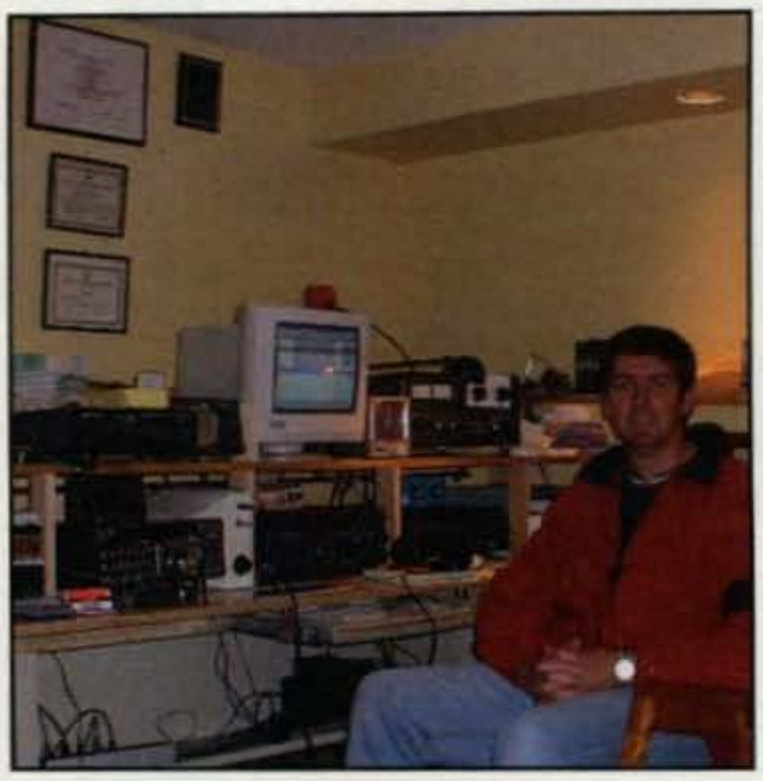
tion, a German polar research base in Antarctica. I am a member of the 23rd wintering team 2003, and have been working on the base since December 2002. It was good fun to hear "thanks for the mult" every now and then. Unfortunately, some stations were not using current country files, which led to a few lengthy discussions about the validity of my CQ Zone. Yes, I know that Germany is in zone 14, but this is not where I was. . . . **DP1POL**. I used mobile antenna at the door and power 100w. Thanks to all QSOs and thanks to CQ for support contest! . . . **E21EIC**. Thanks to "Propagation" column in *CQ* magazine. NW7US was right with his predictions. We had glorious openings on 10m! . . . **EA3ALV**.

Our first experience as Multi-Single (two operators). Too many work on Friday afternoon (we found the antenna cables cut) and we paid the first night and the whole Saturday because we were really tired, but the final score encourage us for the next CQWW. . . . **ED3SSB**. I operated from a motor home at the tip of the ring of Kerry, Ireland, one of the most beautiful places in the world. . . . **EI2VNO**. Last time was 31 years ago in 1972 with call 9C9ES, mode phone 20m. . . . **EP3PTT**. No doubt: CW is far easier for small guns! . . . **F5SGI**. For sure, if every mosquito puncture counts as QSO, we may have set a new world record! . . . **FY5KE**. Flux at 298—wow! Great conditions: amazing signals on 10, low noise on LF. Went very auroral Sunday evening on 40. . . . **G3BJ**. Once again CQWW SSB beat the propagation pundits! The sheer volume of signals on the band during CQWW must warm up the ionosphere, providing better than expected conditions (on 15m at least). . . . **G3TXF**. Conditions weren't good on Saturday, though late afternoon on 10m I was able to get a semi-decent run going. Got a bit fed up with my performance on the first day, so took the luxury of 4 hours sleep from 2320Z. Sunday was better; I could run 10m much earlier. At times when I could only just hear the W callers, they seemed to hear my 100w easily. First day's QSO total was 1052 and second day 1075, showing how much better Sunday really was. . . . **G4BUO**. Variable conditions at times leading to some excellent propagation into NA on Saturday afternoon. Increasing auroral activity on Sunday affected the length and range of the propagation. . . . **G4F**. Hard going at the start with the solar flare killing some bands. Enjoyed the contest once again this year but very tiring! . . . **GM2T**. Thanks especially to GUØSUP, GU4YOX, and GU6EFB for their hospitality. Unbelievably high solar flux (298) led to great conditions and the solar flares held off until the day after the contest. CQWW wins again! . . . **GU5W**. My first CQWW from Italy. Took one



Dave, VO1AU, relaxing after his Single Op, High Power, All Band effort.

FT-990 and a 6-band vertical out of a container on Saturday and had fun competing for a DXCC. In 14 hours I nearly made it, working 98 countries. . . . **I7/9A3A**.

First time in Multi-Two. Running part of our usual Multi-Multi field-day setup and less than half of the 2002's crew, the planned targets have been fully achieved. Local "moscato passito" wine, friendship, and acquired know how have been again the keys of another great result. . . . **IH9P**. Mr. Murphy called me. He told he will visit me during the CW contest! Nice contest in SO2R setup with homemade automatic switching. No amplifier to tune for mults' radio. Big antenna work till Friday. For me the contest period is always more than 48 hours! It lasts a full week! . . . **IT9GSF**. Congratulations for organization in CQWW. In 2002 for me the first participation in CQWW and in 2003 it's the second, but I'm a novice always. Good propagation on 15 and 10, bad in other bands. . . . **IZ7EVZ**. My first CQWW in more than 17 years. I came back on the air this year. Times have changed, but the excitement of CQWW contest has not. See you next year! . . . **JA1BPA**. It was nice to be back on Guam contesting again after 8 years off island. . . . **KG6DX**. Forty meters single band, non-serious. This is the only antenna I have still up. All others are down for shipment to the Kenai. . . . **KL7RA**. In loving memory of Pablo de Cesare, LU3VAH (SK), 1963-2003, my son. . . . **LU1VK**. My first contest. I am 16 years old. . . . **LU8EOT**. Need a Beverage for the next time. More radials made the vertical array working better. LX7I did it better again. I'll try it again next year. . . . **LX1KC**. WWYC team singles. First time operating SOSB in the CQWW. I missed some countries and zones but nice contest! . . . **LX7I**. Yup! Very hot contest. Lovely! I'm waiting next year! Thanks to all folks for QSOs and hope to contact them again! . . . **LZ5AZ**. Ten meters was amazing considering the two x-flares during the contest! Enjoyed it certainly, apart from the pile-up gotaways! . . . **MØDDT**.

After five minutes with the mult station headphones, my 7-year-old son wanted to get a novice license so he could say "Mike One Papa," too. . . . **M1P**. My first entry in CQWW. Only licensed since March 2003. Yaesu FT-817 (5 watts), Cushcraft R6000 vertical + G5RV. Delighted with the score (and a KHØ) running just 5w. . . . **M3RCV**. Great fun as always. David, M3DKG, is only 9 years old. I think he is now hooked on contesting. . . . **M4T (GØVQR)**. Great fun as usual. Started late since was still stringing out Beverage, which was bad planning but good choice since it helped work some mults later. . . . **M6T**. Interesting propagation on 10m. The gamble to do single band at fall of the cycle paid off. Always enjoy the meeting of old pals. . . . **MUØFAL**. My first contest, as I have only been licenced a few weeks. Thanks to the sponsors, and hope to be back next year. . . . **MU3GSY**. Propagation surprisingly good and enjoyed my effort; was never going to be a full-time one. This year some exceptionally strong signals from all parts of the world on all bands. . . . **MW5EPA**. My first contest. I am trapped! . . . **OA4BQE**. Nice condx most of the contest. Almost broke our record, but then the solar flare stopped everything. Still great fun. . . . **OE2S**. Low power on 40 SSB in the CQWW is sure not an easy task. Nevertheless I am very power after entering last year in the high power category. . . . **OE5CWL**. Our first try in the Multi-Two class in CQWW contest. Hard with three ops only but a lot of fun! Aurora, our faithful friend, was again present, even in visible form on Friday night. . . . **OH1F**. Two new countries on SSB. Conditions better than usual in the last few weeks. Looking forward to the CW part. I'm mostly working telegraphy. DX and WPX contests are the best competitions. . . . **OK1DVK**. To be beaten by "9a1a" (9a9a) is not a shame. Nice contest, had fun as always.

Thanks to all who called in. . . . **OK1RI**. Was great to be present again. Sometimes strange propagation. Second day heard V73AZ on 20 with nice signals. 10 minutes nobody called so wonder if everybody have zone 31 in the log. The new one-letter call in PA did give some questions (hi). . . . **PA1V**. Only operated on 20 and 40. Lost our 20m beam and tower during build up, so only the vertical and dipole remained. Propagation was poor due to the previous solar eruptions but still a good contest for us. . . . **PA6Z**. Many thanks to PZ1AP, Uncle Arnie, for his help and hospitality. Don't you love solar storms? . . . **PZ5JR**.

Condx good on short bands. No good on low. Mostly tired due to antenna work. How do big performance ops do it? Chewing pills? US not loud. Aurora on Saturday. High power didn't get my sigs to overseas. Considering go QRP for the rest of my life. What the heck! I'll sleep all the time until the CW part next month! . . . **SM6E**. We all enjoyed the contest. We were unlucky because the antennas broke the Friday and all weekend tried to repair, The amplifier never worked also and the cluster worked next day of the contest. But we did the best score in the club history and we train some new operators. . . . **SV1AFA**. Fine conditions on Sunday, but might have been better on Saturday. Best DX was 5I3A on 10m. No JA's at all, very unusual, and very few from AS at all. Great 40m opening to North and South America on Sunday morning. . . . **TF3W**. Our team members were from five countries. One-half of the crew was on the 2002 TI5N team. Members represented several major contest clubs. All enjoyed meeting old and making new friends. . . . **TI5N**. CQWW as field day operation under tents with minus 5 degrees C. . . . **TM7Z**. Dreams do come true, but sometimes it takes a lifelong effort. . . . **UA9AYA**. First ever SOAB HP effort. Glad the sun cooperated; conditions were excellent. Thanks to Kwaj club for use of the station. . . . **V73AZ**. Despite the experts' claim of pending propagation doom, a great weekend for condx on all bands. Higher bands stayed open longer and opened sooner each morning. As usual Don's wife Barb and my XYL Marg fed us well and a great time was had by all. . . . **VE3SY**. Deciding to do single band 10m with conditions that were atrocious, and then having two of the longest running electrical storms run through my area coupled with a 3-1/2 hour blackout contributed to the low score. However, taking these factors into account my overall score was not too bad and the main thing is, I had fun. . . . **VK4WPX**.I guess it is good for the soul to go from seven towers to three ground-mounted verticals! . . . **VK7GN**. Great fun from a rarer DX spot and surprised many with a larger station than the seven other ops on the island for the CQWW. But even so, missing zones 2, 13, 34, 36, and 40 was disappointing. . . . **VK9XD**. Newfoundland is a great place for radio. Marconi was right! . . . **VO1AU**. Biggest thrill almost working A61AJ on six bands. Missed only on 160m, where I heard them, but they could not hear me. 10m condx on Saturday were far better than expected. . . .**VY2ZM**. Team contesting Aztecas Contesting Revolutions running low power this time, yielded almost 400k points, less vs. last year effort (HP). . . . **XE2AC**. The greatest phone contest, five-star contest! . . . **YC2ECG**. A portable contest DXpedition from Kefken Island AS-159. Antennas are two Windoms and one 10m vertical only. Portable simple antenna operation is my hobby, but my goal is a contest station in the future. . . . **YMØT (TA2RC)**. Saturday much better than Sunday. There was some wall for me for stations from east, south, and southwest, hi. Anyhow, had a nice fun again. . . . **Z36W**. Pleased to activate ZA on SSB. Due to very bad cold I could not operate more than 36 hrs. . . . **ZA1A**. This was yet again a great contest. Pity conditions just didn't play the game! . . . **ZS5T**. Thanks to my friend Sergio, PP5JR. . . . **ZY5G**.

USA QRM

So many stations, so little time. . . . **AAØCY/3**. My first CQWW DX contest. Gave me lots of ideas on how to improve the station! Sunspots helped, too. . . . **AB4EJ**. Surprise— the sunspots are back! Who woulda thunk it! . . . **AE9B/Ø**. Went single band this year due to antenna limitations. Plenty of fun until the radio blackout happened. . . . **KØIL**. Amazing results for just 5w. I enjoyed sniping some good DX from the big pile-ups! . . . **K1DX**. A great workout for the new station. What X-class flare? Thanks to my team of great ops, and congrats to all! . . . **K1IR**. Flares! Flares? We don't need no stinkin flares! Highlight: Getting packet spot telling me to call my mom (NH7FY). Unfortunately the band (10m) had already closed to there. We did work her later on 15m. . . . **K1TTT**. Conditions were great on 15m! That major flare right before the contest seemed to seed the ionosphere with DX-friendly electrons! . . . **K2MFY**. As always, the best part was meeting so many friends on the air. My thanks to the great people all over the world who make the contest happen. . . . **K2RED**. A young contesting team: 13-year-old Sara, K3OOO, and 17-year-old Trevor, W7TDC. . . . **K3OOO**. After 12 years QRT, I wanted to remember how hard contesting was. 40m SSB from Kansas during a solar storm was just the way to do it! . . . **K3PA/Ø**. Thought conditions were going to be really poor so decided on low power. Bad move; 10m was hopping! Saturday morning was the best to Europe and Sunday evening the best to Japan. Didn't work a single SM, OZ, or LA. Didn't get KL7 until Sunday evening. Very few QSOs from Russia either! Thanks everyone. . . . **K4WI**. Very strange conditions from 48N. First day no JA's except for a few via skewed path. Same with Europe, no openings to speak of. Second day had a very small opening to Europe and good run to Japan in the afternoon. . . . **K7OX**. The local newspaper had a picture of the sun/sunspots on the front page Saturday morning. Despite the ominous predictions, I found the conditions to be better than last year. . . . **K8IR**. Bands in super good condx considering geomagnetic storm. Worked everyone I could hear and there were many to hear. . . . **K8RT**. Fun contest! Reasonably good band conditions here in Wisconsin and had a decent run of contacts on 10 and 15. Best conditions in quite a while up here, though aurora probably croaked all of my transpolar contact opportunities. . . . **K9FWH**. Interesting conditions from the West Coast. Low bands were non-existent from here. My best effort in many years. . . . **K9JF/7**. Sure ran the propagation gamut from unbelievably great to unbelievably poor! That's ham radio. . . . **K9MWM/Ø**.

Great propagation in spite of the "giant solar flare." Looking forward to next contest. This could be addictive. Peace. . . . **KA2BZS**. We were blessed with wonderful support from Christine, Sabrina, Cassandra, and Anika, capped by a post-contest Chinese food feast catered by KD1EA. AD1C had to cancel due to illness (leaving more food for John). K1EA stepped in and did a pretty good imitation of a phone op for a guy who only hears vowels. First time at XX for Mr. CQWW, and we hope he will return. . . . **KC1XX**. This was my first CQWW contest. I am new to contesting. I guess you could say I'm the new kid on the block, and I'm here to stay. Hopefully I will be able to improve my score next year. Thanks, everyone for coming back to my contest calls. Will look forward to working all of you again next year. Little gun with big hopes. . . . **KC2HLI**. In my pickup truck parked in my driveway, using RS HTX-10 25w and homebrew mobile antenna. . . . **KI7AB/5**. Hey! It ain't much but I at least found my microphone! . . . **KJ9C.** Lucky to work anybody with so many weak signals until of course 2300 on Sunday on 10 meters South Americans were suddenly S9. I strongly recommend using a pre-amp on the RX. Without it everyone for most of contest was in the noise. With it, loud and clear audio even with S-meter at S3. Geo storm hit here! . . . **KS7T**. The tough conditions on 80m just made me work harder. I always "felt" loud, but I also felt deaf despite the Beverages. I'm sure I missed a lot of callers with the low signal levels. . . . **KT1V**. The bands were in fairly good shape until the "blackout" on Sunday afternoon. I never even heard a hint of Oceania or Asia until late Sunday. Several JA's were heard on 10m but never worked. I had no idea that there were so many stations in Argentina and Brazil. The EM1 (Antarctica) station was heard many times while swishing around the bands. He was CQing away with no pile-up. Weird and very loud in Minnesota. Great fun. . . . **NØFP**. 160 phone QRP—Just do it. . . . **N2AA**. Not bad conditions, though very heavy QSB into Europe! Had terrible power-line noise to my west and never worked much in Asia except for some JA's. For once nothing broke! . . . **N3HBX**. We expected really bad conditions. Fortunately, the solar flux index was well above 200 and this overcame the high K an A indicies. Thanks to all my hardworking team members for a FB effort. . . . **N3RS**. Solar flares really messed things up on Sunday. Bands just went straight downhill. Missed the JA's that are usually there in the evenings. . . . **N4SEA/8**. It was the most fun with 100 watts and a dipole I've had in many years! . . . **N4SRT**.

Prop almost too good! 15 open nearly worldwide most of the time. Great fun. . . . **N5ID**. Condx were much better than expected, but this area was shut out from Asia for much of test. First JA was after 0130Z Saturday. Ten meters saved the day; I managed to run well in EU, even working Scandinavia and Russia along with a few Middle East stations on Sunday. The solar flare around 1740Z Sunday wiped out the bands here; I took a break. By 22Z 10m was opening well to the Pacific and by 23Z to a few JA's. . . . **N8II**. My first low power operation. What a rush. A learning experience from western Colorado. . . . **NT4TT/Ø**. Under 21 years old; I am 9 years old. . . . **W1MAT**. I couldn't get on the air until 11:00 PM EDT Friday, and when I turned on the radio on 15 meters. I immediately heard (and worked) C5Z in Gambia. Great way to start a contest! . . . **W2VU**. Fifty years of DX contesting. Thanks for all the QSOs. . . . **W3AP**. Solar flux above 250! What's up with that? . . . **W4QA**. Another great WW! The great blackout of 2003 will have two meanings, the summer AC outage, and the Sunday afternoon of WW. The RF blackout on Sunday was the strangest thing we ever saw. All three high bands went to S0 in seconds at 1751Z. After confirming the towers were still standing, we realized what had happened and at the worst possible time. We continue to improve our champagne station on a cheap beer budget. . . . **W4WS**. Interesting conditions. Solar disruptions on Sunday morning local time shut HF bands down like somebody had put a pin in my coax, but they recovered with a vengeance in short order. . . . **W5ZL**. First CQWW in 40 years as a ham and the thrill of ham radio is still there! . . . **WB2RHM/4**. Wow, what a ride! Solar flares followed by great activities and then interrupted by "RF blackouts." . . . **WN6K**.

(Continued on page 102)

The 2004 Dayton Hamvention® was much like the 2003 event. It rained most of the day Saturday, accessories dominated the product introductions, and just about everyone had a good time! The trend we noticed, though, is that the age of ever-tinier ham rigs appears to be ending.

Hamvention 2004: Big is Back

BY RICH MOSESON,* W2VU

After decades of making ham equipment smaller and smaller, several manufacturers are now going the other way, bringing "big" back into ham gear in a very big way—and with big price tags to boot.

Transceivers/Receivers

The trend actually started a few years back but moved into high gear last year with ICOM's introduction of the physically large IC-7800—with a $10,000+ list price—which was finally available this year (and sold quite well, we understand). But Vertex Standard (Yaesu) upped the ante with its introduction of the 21 1/4-inch wide (and nearly as deep) FTDX-9000. This monster radio covers HF plus 6 meters and will be available in both 200-watt and 400-watt versions. The 400-watt model requires an external power supply and will operate Class A up to 100 watts, while the power supply is built into the 200-watt version, which also has a Class A transmitter option, but only up to a 75-watt level. The radio has more dials than I could count (somewhere around two dozen) and is expected to carry a list price of over $13,000. Still, the biggest question at Dayton seemed to be, "When will it be available?"—and Yaesu's goal is to have it in hams' hands by this December.

Yaesu also introduced a new dual-band handheld—the FT-60R, with an "Emergency Automatic ID" feature that allows other hams to remotely activate the transmitter of someone who is incapacitated and have it send beep tones every 2.5 seconds and a CW ID every 10 minutes, allowing searchers to use direction-finding techniques to locate the ham in trouble.

ICOM's new entry this year (besides the availability of the IC-7800) is a high-power (65 watts) 2-meter mobile rig, the IC-2200. The radio has 200 regular memory channels, which—like many scanners today—may be organized into banks, permitting you to choose which banks you want to scan for activity. The optional UT-115 digital unit permits you to record and play back brief messages of up to 20 characters, and you can hook up a properly-equipped GPS receiver and exchange position information with other hams *(When is somebody just going to build the GPS receiver into the radio already?—ed.)*.

On the receive-only side of things, ICOM has introduced the IC-R20 handheld, which gets closer than just about anything we've seen so far to true "DC-to-daylight" coverage. It still won't do visible light, but it does provide multimode receive from way down at 150 kHz all the way up to 3305 MHz. (Being true hams, of course, instead of saying, as we should, "Oh, wow! That's amazing!" our initial response was,

One of the biggest hits at Hamvention® 2004 was this booth selling "massage beds" and offering free 5-minute samples. We don't know how many (if any) they sold, but the freebies sure were popular! (W2VU photos)

*Editor, CQ

ICOM's intent in suspending its high-end IC-7800 transceiver from an engine hoist was to convey its "power" as part of an overall racing theme at its Dayton booth, but it also highlighted the growing trend of returning to physically big and heavy ham gear.

"Gee, too bad it won't go down just a little more to 136 kHz to monitor the Canadians and Europeans on VLF, or just a little higher to include the 3456-MHz ham band. But really, that kind of coverage *is* amazing). It also includes a bandscope, over 1000 memories (in up to 26 banks), and, get this, a built-in 32-MB digital recorder to record and play back up to four hours of received communications!

A new company to the ham market, RFpace, introduced a combination software defined receiver (SDR) and spectrum analyzer. The $900 unit receives from DC to 230 MHz and uses your personal computer to do all the signal processing. The included software is available in both Windows® and Linux versions.

Antennas & Antenna Accessories

Old-timers who remember the multiband Hy-Gain 18AVQ vertical will be pleased to know it's back. The folks at MFJ, who have owned Hy-Gain for the past several years, have brought back this classic 5-band (80, 40, 20, 15, and 10 meters) antenna, with a few improvements, including three separate air dielectric traps to allow full legal power on 40–10 meters, plus up to a kilowatt PEP on 80 meters. Total height is 18 feet. In addition, there's now an 80-meter add-on kit available for the 14AVQ.

MFJ's Ameritron division has brought out a screwdriver antenna controller, a peak-reading mobile SWR/wattmeter, and a remote-control 500-watt mobile amplifier. In addition, the company has introduced the ALS-600SPS switching power supply for the Ameritron ALS-600 amplifier.

The main MFJ division also has some new antennas—two wire loops, one 12 feet in diameter for 20–10 meters and the other 20 feet in diameter for 60, 40, and 30 meters. There's a portable and a home version of the 12-foot loop, each of which is designed to include PVC supports inside the loop. MFJ has also introduced a new travel tuner and three remotely controlled automatic antenna tuners, each with a different maximum power level (150, 300, and 600 watts PEP).

SteppIR—which pioneered beams with variable length elements to match different bands—has introduced the "MonstIR," which covers 40–6 meters. Copper beryllium elements extend or retract within fiberglass supports to tune the antenna for each band, essentially giving you a 3-element

Yaesu's brand new FTDX-9000, which was displayed under glass at the Hamvention , is nearly two feet wide and will list at more than $13,000 when it hits the market later this year. Big ... is back.

monobander on each band it covers. Plus, you can reverse the beam direction without changing frequency in just three seconds, reducing the need for 180-degree rotations.

Speaking of reversible antennas, DX Engineering has a new reversible Beverage receiving antenna system. Fed with 450-ohm ladder line, you can remotely switch the direction of greatest receive sensitivity. The company also introduced a vertical antenna tilt plate, to make it easier to lower vertical antennas for service and adjustments, plus an 8-position remotely controlled antenna switch.

Yaesu is making it easier for users of its portable FT-897 and FT-957 transceivers to get good antenna matches no matter where they are. The new FC-40 will tune a wide variety of antennas, including long whips and random wires — typically in 10 seconds or less—to resonance anywhere between 160 and 6 meters.

Another new automatic antenna tuner comes from SGC. The SG-211 Mini Smartuner™ weighs one pound and runs for up to five years on a set of internal AA batteries. There are no controls, no control cables, and no power cables. The only connections are coax in and your choice of coax or balanced line out. An LED will let you know when the antenna is tuned. It operates between 1.8 and 60 MHz with up to 60 watts CW or PEP, except 30 watts PEP maximum for short antennas below 3.5 MHz, and 20 watts maximum for continuous data operation.

High Sierra has added the "Bullseye" position indicator to help users of its 1800 Pro and Sidekick antennas know how far up or down the antenna is, and to quickly retune to positions that you know provide a good match on certain bands. High Sierra has also introduced the "i-Box" for use with ICOM transceivers. It works automatically with the low-power "tune" setting and built-in SWR meters on many popular ICOM radios to let you simply tune for lowest SWR. According to the company, it will put your antenna where it needs to be in 10 seconds or less.

Tarheel Antennas has introduced the "Perfect Match"™ variable inductance matching device, which works with all brands of motorized antennas and matches any motorized antenna to virtually any situation.

Hi-Q is expanding further into the motorized home antenna market with its new tunable dipoles with 5-inch wide coils (another entry in the "big is back" category). There are two models available, one for 10–80 meters and the other for 10–160 meters.

Degen has introduced a "Vwave" antenna for 2 meters. This 3-element beam has the elements bent back at 45-degree angles (90 degrees to each other) to allow for a smaller turning radius while maintaining maximum gain. Mounting plates are pre-drilled for either vertical or horizontal polarization.

ICOM's new IC-R20 handheld receiver covers an amazing range of 150 kHz to 3305 MHz and even has a built-in four-hour digital recorder.

MFJ Enterprises President Martin F. Jue, K5FLU, holds the tuners used with the company's two new wire loop antennas—a 12-foot loop for 20–10 meters and a 20-foot loop for 60, 40, and 30 meters.

The classic Hy-Gain 18AVQ vertical antenna is back, reintroduced with some improvements after a long absence.

W3FF Antennas has a new "military-style shock-corded whip," on which sections may be added or removed in the field. There is a minimum of three sections and a maximum of seven. The new whips attach to the ends of the coils on the Buddipole antenna, replacing the previous telescoping whip and adding four feet overall to the full length of the Buddipole.

Alpha Power has a new way for you to measure your power. The Model 4510 digital HF wattmeter has both analog and digital readouts, measures 30 milliwatts to 3 kilowatts in nine power ranges, and even has a serial port for downloading data to your computer logging program.

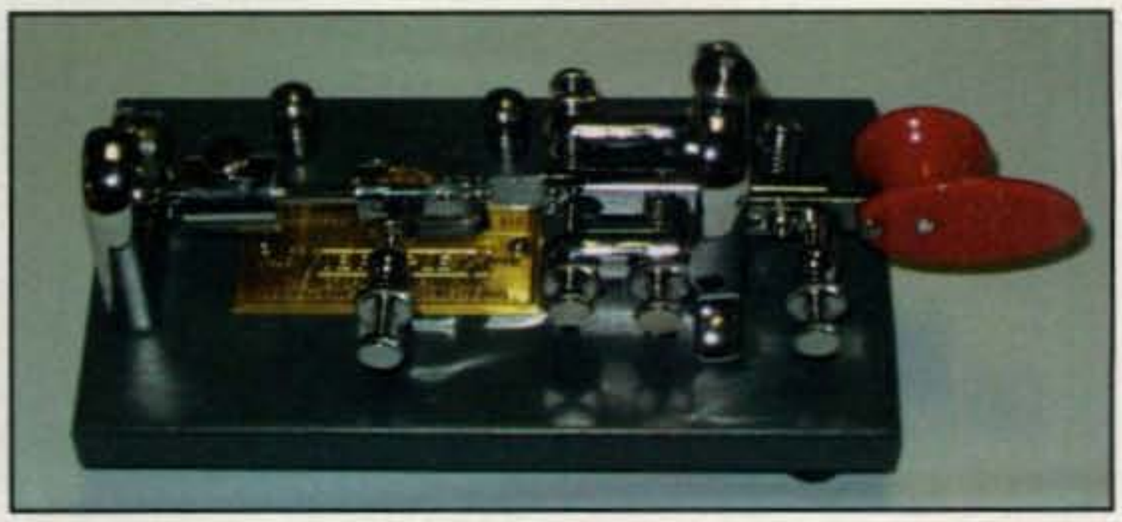
A unique accessory is Elecraft's KRC2 Band Decoder. This is a station controller that automatically directs your transceiver to switch to the correct antenna whenever you change bands. It also contains a memory keyer and other features. Designed to complement the Elecraft K2 transceiver, it will also work with most ICOM, Kenwood, and Yaesu transceivers.

Finally among antenna accessories, Palstar has three new items: (1) The ZM-30 digital impedance meter with flash memory for downloadable software updates. It reads out frequency to 1 Hz, as well as SWR and antenna resistance, and sells for $329 with battery and a sleeve balun for balanced lines. (2) The AT1KBAL is a dual ceramic inductor tuner for antennas with balanced trans-

Paul Sergi, NO8D, of DX Engineering demonstrates his new vertical antenna tilt plate, which allows you to work on vertical antennas without having to take them down completely.

Chris Drummond, W6HFP, demonstrates Buddipole's new military-style shock-corded antenna elements, which may be lengthened or shortened in the field.

SGC's new SG-211 Mini Smartuner™ has no controls! It detects your transmit frequency and automatically tunes your antenna system for the best match.



The Collins Collector's Key from Vibroplex is a classic "bug" painted to match the front panel of a Collins KWM-2 transceiver. A limited edition of 250, each will have a special engraved label and serial number.

mission lines (such as twinlead), covering 160–10 meters at up to 1500 watts PEP. Palstar notes that it designs and builds all of its own roller inductors and variable capacitors. (3) The DL5K dummy load, with two custom-made 100-ohm graphite resistors wired in parallel for a 50-ohm load, and a thermostatically controlled fan system. As the name suggests, it will handle up to 5 kilowatts, so it's useful for commercial as well as amateur applications.

Other Accessories

While antenna accessories seemed to be big items this year, there were also a few other accessory items introduced at Hamvention®.

Collins enthusiasts who also enjoy CW will love this: Vibroplex and the Collins Collectors' Association have gotten together on a limited edition Collins Collector Key. This special "bug" is painted to match the front panel of the KWM-2, and each of the 250 keys made will have a special engraved label and serial number.

If your vehicle looks like (or *is*) a mobile command post, with multiple radios, multiple microphones, and multiple speakers, New Communications Solutions may have a solution for you. Their NCS-3250 mobile multi-switcher operates on 12 VDC and allows you to bring together up to four radios and operate them all using just one microphone and two speakers (one for the active transmit radio and one for the others). There's also an output for a public-address speaker. You can switch between radios with front- panel buttons or the tone keys on your mic. You can also mute unselected radios and set up two rigs to act as a crossband repeater.

The folks at TAPR (Tucson Amateur Packet Radio) continue looking beyond packet radio in their high-tech and low-cost development efforts. This year's entry is a vector network-analyzer kit that uses your personal computer and takes this valuable tool out of the high-end-only category. It measures transmission and reflection parameters in a network, including magnitude and phase, and is, as co-developer Steve Bible, N7HPR, describes it, "the modern version of the impedance meter." Bible adds, "I want this in the hands of 14-year-old boys and girls … (to) learn by doing, with a reasonably priced analyzer."

Another example of "Big is Back"—HiQ's Charlie Gyenes, W6HIQ, shows us his new motorized antenna with a 5-inch diameter coil. Obviously not intended for mobile use, it's part of a new tunable dipole system for limited space installations.

Last but not least, our favorite product category: Books, videos, and CDs. Master Publishing/W5YI has introduced a new Gordon West General Class license manual, along with an audio CD (replacing tapes) and a new code CD, again replacing cassette tapes.

The ARRL has premiered several new books, including the *General Class Q&A Book*, a book by Echolink developer Jonathan Taylor, K1RFD, on ham radio and internet voice (VoIP), and, of course, this year's *ARRL Repeater Directory*.

Not seen at the show, but showing up at bookstores everywhere is Ward Silver, NØAX's *Ham Radio for Dummies*.

Ten-Tec has produced a 72-minute video, available on DVD or VHS, about the company and its top-of-the-line Orion transceiver. Could be a good club meeting program.

Finally, we at CQ have published a new book called *VHF Propagation*, co-authored by Ken Neubeck, WB2AMU, and Gordon West, WB6NOA. Both Ken and Gordon are Contributing Editors for both *CQ* and *CQ VHF* magazines. In addition, WB6NOA is independently offering an audio CD companion to the book, featuring the unique sounds of various VHF propagation modes, such as Aurora and meteor scatter.

The Big Picture

Overall, in this year of "big is back," the Dayton Hamvention® continued to be the world's biggest hamfest and biggest showcase of new equipment and ideas in amateur radio. The crowd appeared smaller than last year, but the big dropoff many had feared due to rising fuel prices did not materialize, and those people who did come seemed to come to buy things (a trend we've been seeing at many hamfests—attendance down but sales level or higher), and just about everyone—except the rain-soaked flea-market folks—went home happy.

Finally, next year: The Hamvention folks announced repeatedly during this year's show that Hamvention® will again be at Hara Arena next year, on May 20–22, 2005 (that seems like a week later than usual, but it is the third full weekend in May). See you there! ■

what's new

BY KARL T. THURBER, JR.,* W8FX

More Product Rollouts

This month in your "What's New" column we'll again present some noteworthy radio gear, hamshack accessories, antennas and antenna accessories, mobile and portable goodies, books, and other fascinating items that have been rolled out over the past few months. Let's dig right in.

Radio Gear

Elecraft KX1 Ultra-Portable CW Transceiver Kit. We have profiled Elecraft's radio gear and accessories, including many innovative kits, in previous columns. Now we think we have another winner from Elecraft, in terms of its newly introduced KX1 transceiver.

The Elecraft KX1 Ultra-Portable CW Transceiver Kit (see photo A) is said to be a backpacker's dream. It's a small, featherweight, multiband HF CW station with an internal battery and an automatic antenna tuner—also an excellent rig for short hikes and emergency use. The top-mounted controls and plug-in paddle are ideal for beach-chair, picnic-table, or trail-side operation. You can even use the KX1 while relaxing in bed.

The KX1, which has many "big rig" features and amenities, includes a superhet receiver with variable-passband crystal filter, receiver incremental tuning (RIT), S-meter, VFO with three tuning rates, three-digit display, memory keyer, battery voltage monitor, and LED logbook lamp, as well as a 1- to 4-watt transmitter with full break-in (QSK) capability. The VFO covers the full 20- and 40-meter ham bands, with receive-only tuning of nearby SWL segments; 30 meters is available as an option.

The KX1 is designed to be highly efficient, drawing typically only 34 mA on receive; the LED display adds only 1 to 2 mA in low to moderate lighting conditions. Thanks to the low current drain, you can operate casually for some 20 to 30 hours from internal batteries at the 1- to 2-watt level.

The radio is designed to be easy to build and align. The basic KX1 kit uses a single printed circuit board. Assembly is almost effortless, thanks in part to the use of through-hole (leaded) components; the few surface-mount parts used are professionally preinstalled. You can align and test the KX1 using nothing more than a digital multimeter and on-the-air signals.

A comprehensive assembly and user manual also is included. The illustrated, step-by-step assembly instructions include modular assembly and checkout of each control, receive and transmit stage. Extensive theory of operation and troubleshooting sections also are provided.

The KX1 Ultra-Portable CW Transceiver Kit covering 20 and 40 meters is $279; the 30-meter adapter is $29. The plug-in keyer paddle is $69,

Photo A– The Elecraft KX1 Ultra-Portable CW Transceiver Kit is a backpacker's dream. It's a small, featherweight, multiband HF CW station with an internal battery and an automatic antenna tuner. (Photo from the Elecraft website)

while the internal automatic antenna tuner (ATU) adds $79 to the price.

For further details, contact Elecraft LLC, P.O. Box 69, Aptos, CA 95001-0069 (831-662-8345; e-mail: <sales@elecraft.com>; on the web: <http://www.elecraft.com>).

Accessories for the Shack

Porta-Paddle from American Morse. New from American Morse is the Porta-Paddle (photo B), which is said to offer "incredible feel in a miniature paddle." It's an original design that features a solid feel with full adjustability in a miniature iambic paddle. Precision-manufactured from aircraft aluminum (rather than from plastic), the small, 2.5-oz.

Photo B– New from American Morse is the Porta-Paddle, which is said to offer "incredible feel in a miniature paddle." It's an original design that features a solid feel with full adjustability. It's available with an anodized blue (as depicted here) or a clear finish. (Photo from the American Morse website)

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

Photo C– The new Cadex C7400ER Programmable Battery Analyzer is the most powerful battery analyzer in its series. Each of the four stations can be programmed to charge and discharge at 6 amps, adjustable in 25-mA increments. The analyzer accommodates nickel-, lead-, and lithium-based batteries. (Photo courtesy Cadex Electronics)

Photo D– The MFJ-283 Ear-Vibration Speaker Microphone is available for ICOM, Kenwood, and Yaesu radios; the speaker and microphone are both integrated into the earpiece. The "vibration pickup microphone" in the earpiece picks up the vibration of your ear bone when you speak. (Photo courtesy of MFJ Enterprises)

paddle has an attractive and durable anodized finish, with the gap and spring force fully adjustable to individual tastes.

The unit is of very solid, reliable design, with no delicate parts to fall out of adjustment. It's drilled and tapped in the base for mounting, and various mounting accessories are available. Perhaps best of all, the paddle comes with a "no ifs and buts" lifetime guarantee. Made in the United States, the patent-pending Porta-Paddle is available either with an anodized blue or a clear finish for $69 plus $4 s/h.

Contact American Morse Equipment, San Luis Machine Company, Unit F2, 200 Suburban Road, San Luis Obispo, CA 93401 (805-5498065; e-mail: <dhauff@digitalputty.com>; on the web: <http://www.americanmorse.com>).

Cadex C7400ER Programmable Battery Analyzer.

Canada-based Cadex Electronics offers battery analyzers, chargers, and battery maintenance software. Committed to quality, Cadex combines solid engineering strength with some 23 years of manufacturing excellence. Its products are sold in some 100 countries.

The recently introduced Cadex C7400ER Programmable Battery Analyzer (photo C) is the most powerful battery analyzer in its series. Each of the four stations can be programmed to charge and discharge at 6 amps, adjustable in 25-mA increments.

The analyzer accommodates nickel-, lead-, and lithium-based batteries with voltages ranging from 1.2 to 36 volts (28.8 volts for nickel-based batteries). Batteries interface with custom and universal SnapLock™ adapters that automatically configure the analyzer to the correct settings. The optional Battery Shop™ software transfers operation to a PC.

For more information, contact Cadex Electronics, Inc., 22000 Fraserwood Way, Richmond, BC Canada V6W 1J6 (604-231-7777; e-mail: <sales@cadex.com>; on the web: <http://www.cadex.com>).

Photo E– The MFJ-390 GooseNeck™ Speaker/Microphone Holder, shown here, effectively turns your favorite handheld microphone into a desktop microphone in an instant. The MFJ-390 contains a gooseneck rod that provides excellent positioning flexibility. (Photo courtesy MFJ Enterprises)

Photo F– One of the newest Tarheel Antenna products is the Little Tarheel II, shown here. Like all the Tarheel motorized antennas, it's built to meet the highest of standards in motorized antennas, but in a smaller size. In fact, it's one of the smallest motorized antennas on the market. (Photo from the WBØW website)

MFJ Speaker Microphone and Speaker/Microphone Holder. We're pleased to report two related audio products from MFJ Enterprises. First up is the MFJ-283 Ear-Vibration Speaker Microphone (photo D), available in three different configurations for ICOM, Kenwood, and Yaesu radios.

The MFJ-283 series uses new technology to provide a state-of-the-art, high-quality speaker/mic; the speaker and microphone are both integrated into the earpiece. The highly sensitive "vibration pickup microphone" in the earpiece

picks up the vibration of your ear bone when you speak, and then translates the vibration into a signal through your transceiver.

Because the unit's mic only transmits the vibrations from your ear, it's said to be ideal for use in high ambient noise environments—reportedly great for use at hamfests, or for providing security at a community event or other large gathering. The unit's small PTT switch and earpiece let you operate discretely so that people around you may not even notice you're using your radio. Two clips on the cord allow you to position and secure the earpiece and PTT to your shirt, coat, or pants quite comfortably. Either MFJ-283 version (designated I, K, or Y, for ICOM, Kenwood, or Yaesu radios, respectively) is $39.95.

The second MFJ product is the MFJ-390 GooseNeck™ Speaker/Microphone Holder (photo E). The new accessory effectively turns your favorite handheld microphone into a desktop microphone in an instant.

The MFJ-390 contains a gooseneck rod that provides excellent positioning flexibility (left, right, straight up, etc.). The unit has a heavy-duty, all-metal base that stays put at your operating desk, and a tough and durable plastic microphone clip holds most speaker/mics tight and steady. The MFJ-390 is $14.95.

For additional information or a free 2004 catalog, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; web: <http://www.mfjenterprises.com>).

Antennas and Antenna Accessories

Little Tarheel II Antenna. North Carolina-based Tarheel Antennas enjoys a fine reputation for quality. Its motorized mobile antennas, base-station antennas, whips, stainless-steel mounts, and other accessories are designed with the most avid amateur radio operator in mind. The products are made with the best materials and top-of-the-line workmanship.

Especially popular are the flagship Tarheel series antennas. One of the firm's newest products is the Little Tarheel II (photo F). The Little Tarheel II, like all Tarheel motorized antennas, is built to meet the highest of standards in motorized antennas, but in a smaller size. It's reportedly one of the smallest motorized antennas on the market.

When properly installed on your vehicle, the antenna will provide continuous coverage from 6 through 80 meters with the supplied whip. All Tarheel antennas come with the sensors already preinstalled so if you decide to add an auto controller now or later everything is ready.

Tarheel designed the antenna especially for the person who wants to enjoy HF mobile but is not interested in a large antenna. The antenna is designed to be mounted high on the vehicle; when mounted high, you reportedly have less ground loss, which translates to higher performance. Also, because of the smaller antenna size you can use a more common type of mount.

As with other Tarheel antennas, you get the DuPont Basecoat/Clearcoat system, with standard colors of black, white, or red. You also can have the antenna custom-painted to match your vehicle. The antenna comes with the Lexan™ Weather Shield, like its big brothers.

The Little Tarheel II is designed as a package. All you need extra is a mount and an HF radio. Included as standard are the whip, 20 ft. of "plug and play" control cable, the manual control box, the ferrite decoupling core, a 3/8-24 stud, and even the Allen wrench to tighten the set screw to the whip.

The 1.9-lb. antenna covers 6 through 80 meters, with a power-handling capability of 200 watts PEP. Typical SWR is 1.5:1 or less. The antenna's total length is up to 54 in., depending on band, with a whip length of 34 in. The antenna comes with a one-year, no-matter-what warranty, plus a lifetime warranty on the coil and fingerstock, to the original owner. The price is $349.

For more information, contact Tarheel Antennas, 913 Old Honeycutt Road, Fuquay-Varina, NC 27526 (919-552-8788; e-mail: <tarheelantennas@aol.com>; on the web: <http://www.tarheelantennas.com>).

The Tarheel antennas also are distributed by WB0W, Inc., P.O. Box 8547, St. Joseph, MO 64508 (1-800-626-0834; e-mail: <wb0w@wb0w.com> or <WB0W@attglobal.net>; on the web: <http://www.wb0w.com>).

DXpedition Mark II 160–80 Preamplifier and Front End Saver. Gary Nichols, KD9SV, and Radioware have announced a new version of their popular DXpedition model Front End Saver (FES) with dual-band 80/160-meter preamplifier (photo G). Using Gary's proven variable-gain preamp and FES design, the new Mark II is designed to fill the gap with radios without a separate receive antenna input, such as the ICOM 706 and 746 transceivers. The

Photo G– Gary Nichols, KD9SV, and Radioware have announced a new version of their popular DXpedition Model Front End Saver (FES) with dual band 80/160-meter preamp. Using proven variable gain preamp and FES design, the Mark II fills the gap with radios without a separate receive antenna input. (Photo courtesy Radioware)

Mark II allows you to select one of up to four separate receive antennas or the transmit antenna for receive. It also automatically switches to the transmit antenna when keyed. The unit is controlled using the radio's accessory connector for 13.8 VDC and the send keying signal.

The Mark II features adjustable gain from 0 dB to approximately 23 dB on receive, and it has tuned input and outputs to provide the needed selectivity to reduce AM broadcast station overloading. The Mark II also has soft keying circuitry with a linear-amplifier keying relay. The unit is compatible with both QSK (break-in) and non-QSK amplifiers and is ideal for home station or portable use. The Mark II is $259.95 plus s/h.

Want to know more? Contact Radioware, P.O. Box 209, Rindge, NH 03461-0209 (1-800-457-7373; <radware@radio-ware.com>; on the web: <http://www.radioware.com>).

Portable and Mobile Goodies

FlipLite Auto from Imagine-It-Concepts. FlipLite™ Auto (photo H) is a compact, bright-white, multifunction flashlight for use when you're on the go. With an integral seatbelt attachment, you simply slide the FlipLite up or down the seatbelt—and you always know where your flashlight is! The light can be used for studying maps and repeater atlases, reading, or other activities when in your car, boat, RV, or other vehicle.

FlipLite Auto comes with five bright-white LEDs and two red LEDs. You can use the flashing read LEDs as an "eFlare" alert for an emergency situation; the flashers can be seen up to one mile. A long battery life for the three AAA cells used offers utility and dependability—some 20 hours at full brightness for white light and up to 100 hours for flashing red lights. FlipLite Auto also works as a hands-free light by rotating the cover.

The Auto model is waterproof, lightweight, and very compact. It can operate both as a flashlight or hands-free worklight, in addition to being a map, game, reading, and emergency light. The light comes on automatically when the unit is opened so there's no fumbling in the dark.

For more details, or to order, contact Imagine-It-Concepts, Inc., 5445 Oceanus Dr., Suite 116, Huntington Beach, CA 92649 (phone 714-899-2068; e-mail: <sales@imagine-it-concepts. com>; web: <http://www.imagine-it-concepts.com>).

WindowMate from Pro.Fit International. Pro.Fit International has announced WindowMate (photo I), a premium suction mount for windshield applications of various aftermarket electronics devices and equipment. The suction-cup design offers portability and is popular with travelers, sales people, and multi-car families—especially since you

Photo H– FlipLite™ Auto is a compact, bright-white, multifunction flashlight for on-the-go use. You can use the light for studying maps and repeater atlases, reading, or other activities when in your car, boat, RV, or other vehicle. The unit features an integral seatbelt attachment. (Photo courtesy Imagine-It-Concepts)

Photo I– Pro.Fit International offers WindowMate, a premium suction mount for windshield applications of various aftermarket electronics devices and equipment. You can move the WindowMate from one vehicle to another in just seconds. (Photo courtesy Pro.Fit International)

can move the WindowMate from one vehicle to another in just seconds.

The WindowMate has a strong and proven suction cup, yet is sleek in design, complementing any electronic device it holds. At the top of the WindowMate is an integrated swivel, which allows for an additional 30-degree adjustment in any direction. The swivel creates an attractive base with the industry-standard Advanced Mobile Phone Service (AMPS) hole pattern for attaching devices such as hands-free car kits, Global Positioning System (GPS) units, and satellite or other radios. The WindowMate installs in just seconds and is easy to use. It comes with complete instructions; no tools are required for installation. Contact Pro.Fit International, Inc., 1335 Eagandale Court, Eagan, MN 55121 (1-800-388-0073; e-mail: <sales@pro-fit-intl.com>; on the web: <http://www.pro-fit-intl.com>). All products can be seen and purchased at the website

From the Bookshelf

The Web Library. Information Today, Inc. (ITI) has published an interesting and very helpful new guide book, *The Web Library: Building a World Class Personal Library with Free Web Resources,* written by Nicholas G. "Nick" Tomaiuolo.

The author's primary purpose in writing *The Web Library* was to show how individuals can take advantage of free or low-cost resources to build their own personal libraries online. The idea is that if you follow his instructions, with very little effort you can build a periodical collection that would be the envy of many libraries, for next to nothing.The author's definition of "personal library," by the way, goes well beyond a basic collection of reference works on a user's desktop. Instead, he refers to a vast, rich collection of data, documents, and images that—if you follow his instructions carefully—can rival the holdings of many traditional libraries.

A readable, easy-to-use guide, *The Web Library* puts hundreds of useful resources at your fingertips 24/7, while saving you considerable time and money. The 440-page softbound book includes a wealth of website addresses (URLs), 30 helpful figures and screenshots, interviews with librarians and content providers, abundant examples of free web resources, and techniques for finding new content. The book is supported by a companion web page that features links to all the resources referenced in the book, to help you develop an extensive personal online library.

The ITI book is $24.95. Contact your local bookstore or Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750 (1-800-300-9868; e-mail: <custserv@infotoday.com>; on the web: <http://www.infotoday.com>).

Wrap-Up

That's all for this time, gang. Next time, more "What's New." See you then.

Overheard: In this sometimes unkind world, it's often said that the one who sows seeds of kindness truly enjoys a perpetually bountiful harvest.

73, Karl, W8FX

Note: *Listings in "What's New" are not product reviews and do not constitute a product endorsement by CQ or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

math's notes

Non-Timer Uses for the LM555

BY IRWIN MATH,* WA2NDM

The LM555 is well known in timer circles, but you may not be aware of other uses for this chip. This month we will describe a few.

Although most circuitry we build operates from positive voltages, occasionally the need arises for a negative supply. This is particularly true when op-amps are involved and often requires the use of a separate negative power supply, two batteries, or a charge-pump IC such as the ICL7660 and its many cousins. These methods all work well to produce negative voltages from a positive supply, but the additional cost often easily can rise into the $3.00 to $5.00 range, and the necessary components might not always be as readily available as one would like. However, there is a way to generate a negative voltage from a positive supply using the LM555. Not only is the cost minimal, but just about every "real" experimenter has at least a couple of these chips lying around.

The basic circuit of the negative inverter is shown in fig. 1. The 555 is connected as an astable multivibrator and set to operate at a frequency of about 20 kHz with a wave shape that is almost square. This near-square wave is then capacitively coupled to a simple diode voltage doubler comprised of two silicon diodes (almost any type, such as 1N914 or 1N4148, will do). These produce a negative voltage at roughly the same level as the input voltage. Finally, a simple RC filter removes the residual 20 kHz and the result is a negative voltage. Note that the current you can draw from such a supply is limited to only 5 to 10 ma, but this is often more than enough for bias purposes. Voltage regulation is not ideal, but if you are driving an op-amp, this is probably not too important. Also note that for this application the basic bipolar LM555 works better than the CMOS LMC555 version, since it has greater current-handling capabilities.

Fig. 2 is the circuit for a simple, self-excited FM modulator. Here the 555 is connected as an astable oscillator with an external control voltage determining the output pulse position. The center frequency of operation is determined by Ra, Rb, and C, and for the values shown the frequency is about 80 kHz. You can experiment with these values to achieve frequencies from a few Hz to as much as 500 kHz, the upper limit of the chip. Such a circuit is ideal for encoding audio and transmitting it by means of an LED in a free-space optical communications system.

Fig. 3 shows the additional circuitry needed for the transmitter of such a link. The final value of the 330-ohm resistor should be varied to allow the desired peak current through the transmitting LED. The value shown will provide about 20 ma to a normal visible indicator LED, but higher current LEDs will require a lower value. When choosing the resistor, do not forget the wattage rating for the current you plan to draw through it.

As we all are probably aware, AC equipment designed for use in the U.S. operates at 115 volts AC and a power-line frequency of 60 Hz. Equipment used in Europe and in much of the rest of the world, however, operates at 230 volts, 50 Hz. Therefore, trying to test foreign devices in the U.S. requires a 50-Hz power source. Fig. 4 is a simple way to produce such a source with the 555 and a common audio amplifier. In this circuit the 555 is configured as a 50-Hz oscillator with Ra used to "fine trim" the frequency. The square-wave output is then filtered to remove sharp transitions by the 10K resistor and 0.01-µF capacitor low-pass filter and applied to a common audio power amplifier with the power capability required by the device you are trying to power. A 100-watt PA amplifier would be a good general-purpose choice. The output of the amplifier is connected to

*c/o CQ magazine

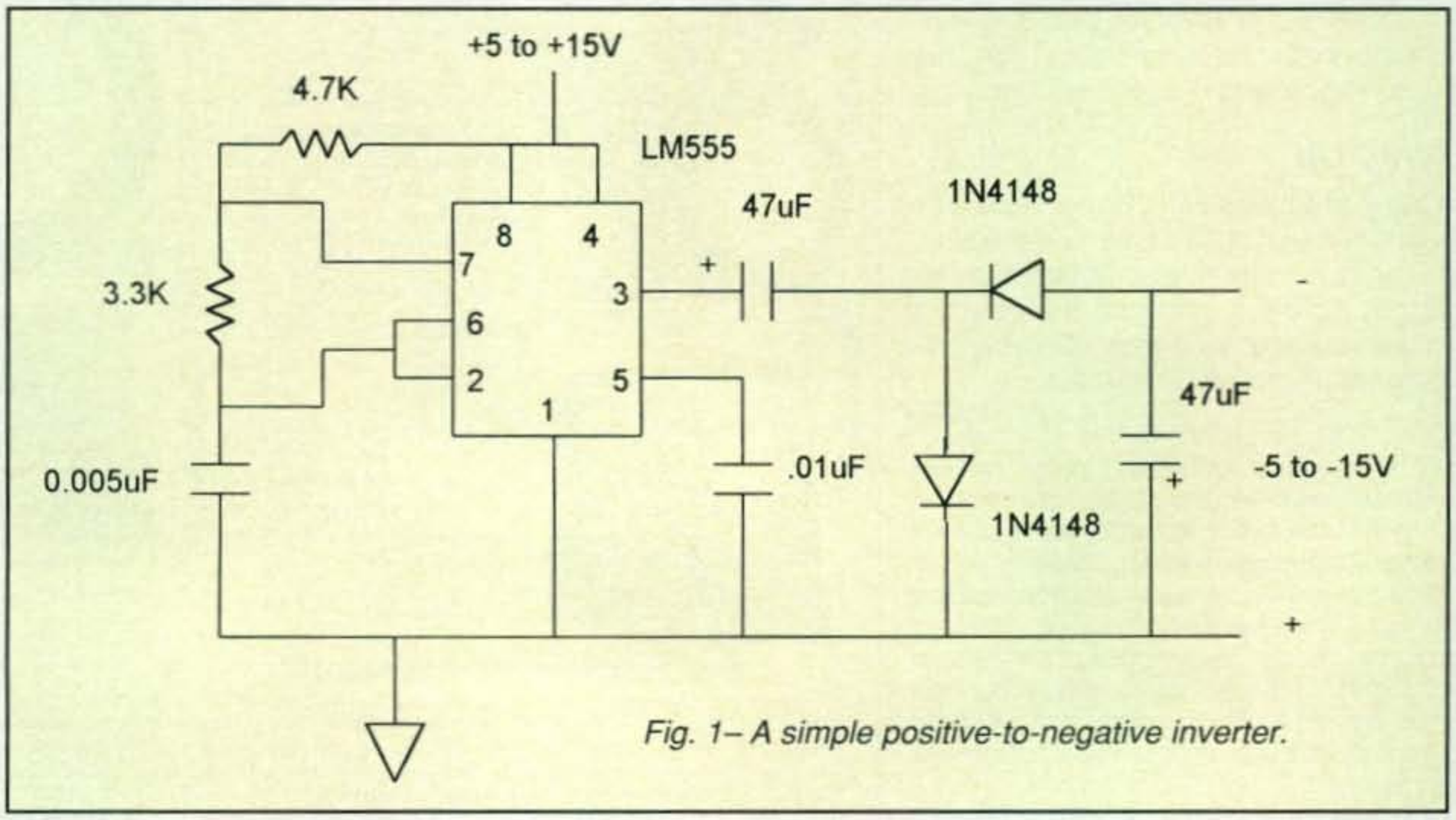


Fig. 1– A simple positive-to-negative inverter.

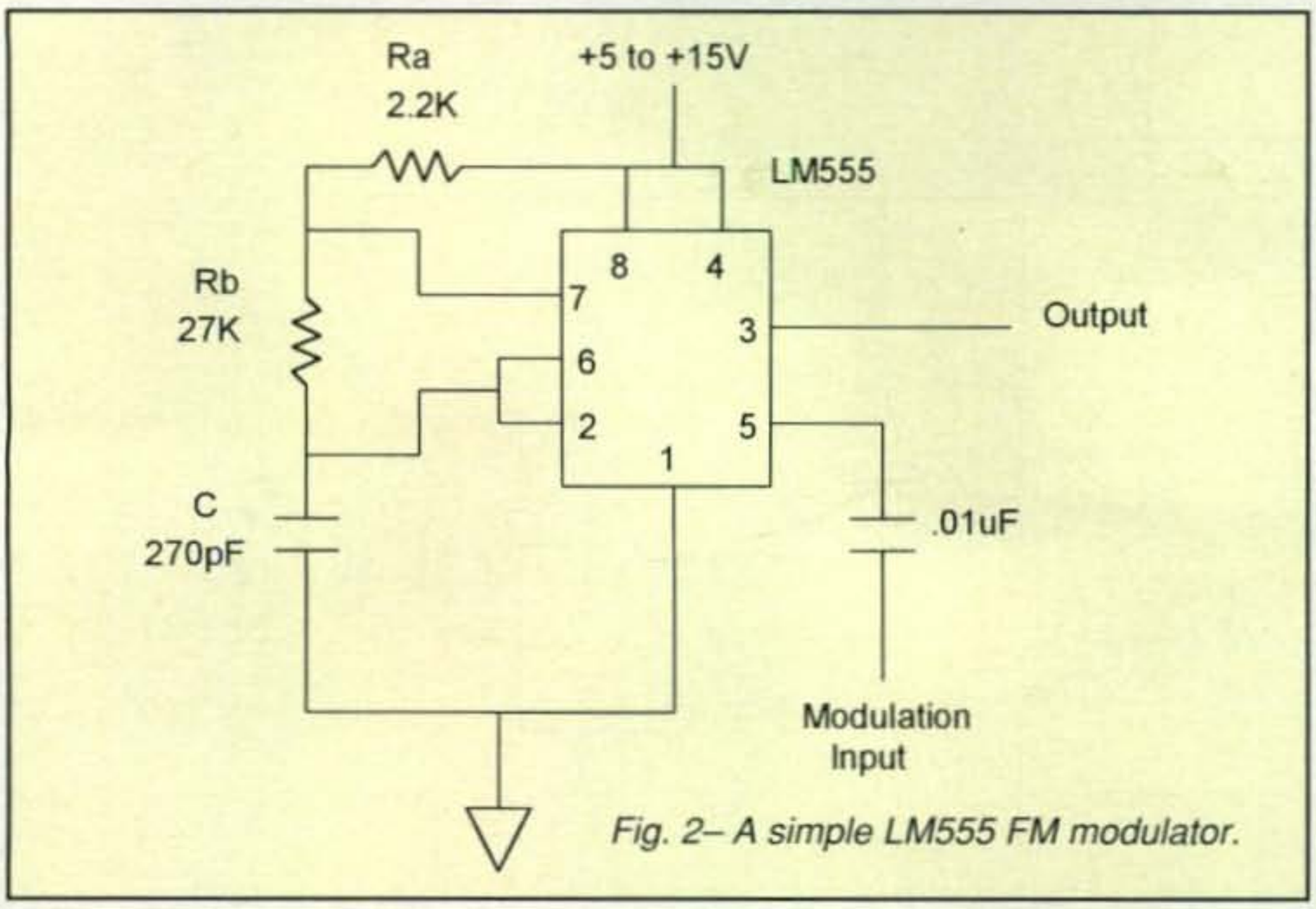


Fig. 2– A simple LM555 FM modulator.

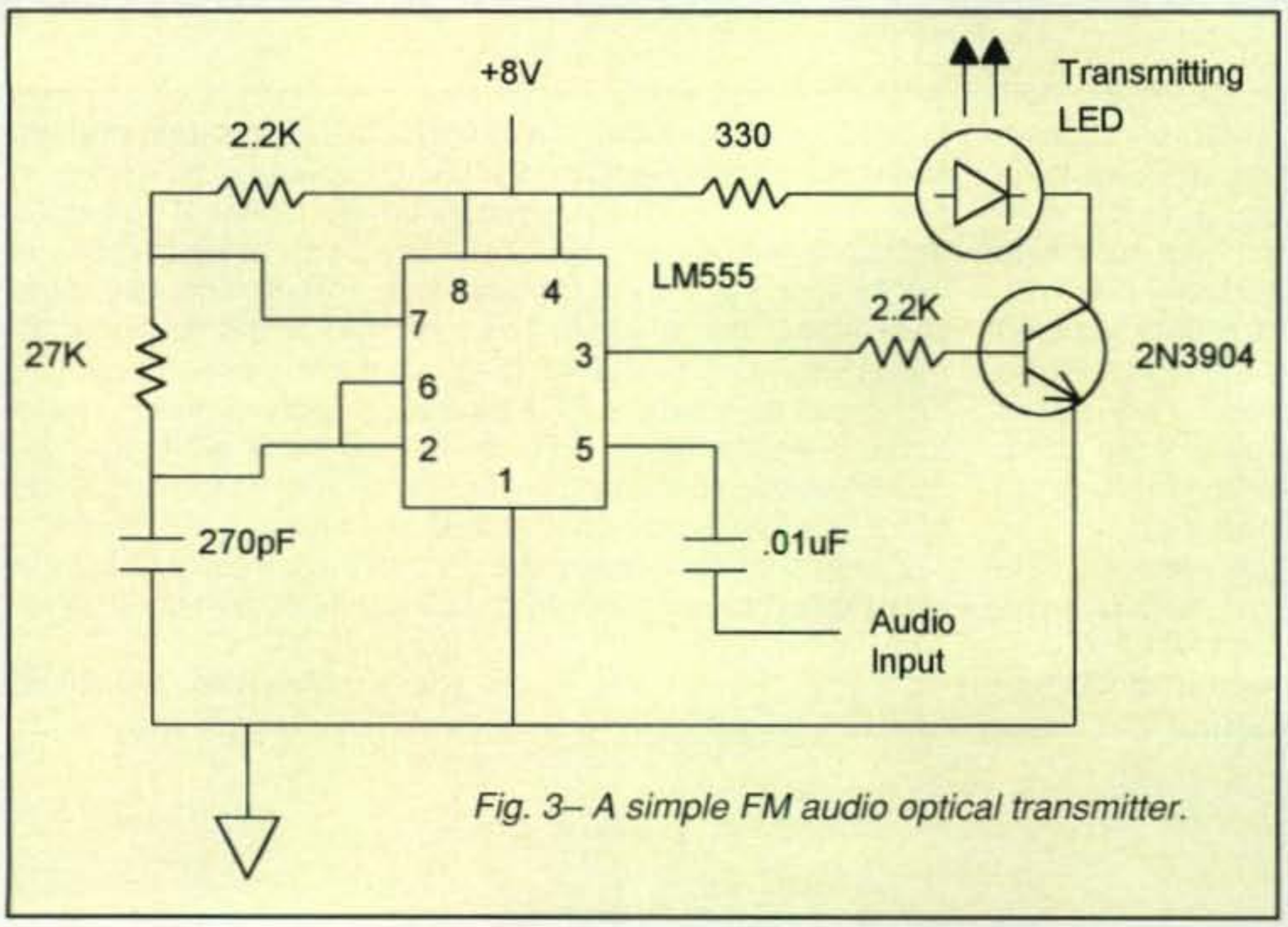


Fig. 3– A simple FM audio optical transmitter.

the secondary of a dual primary (115/230volt) 24-volt 50/60-Hz power transformer, and the transformer steps up the amplifier's output to 230 volts. The gain control of the amplifier is then used to adjust the output voltage level as required. When building such a circuit, be certain to choose a transformer with the correct power rating to match the amplifier you are using as well as the ability to operate at 50 Hz. Also be very careful, as you will be producing 230 volts at enough current to seriously hurt you (or worse) if you come in contact with the wrong leads.

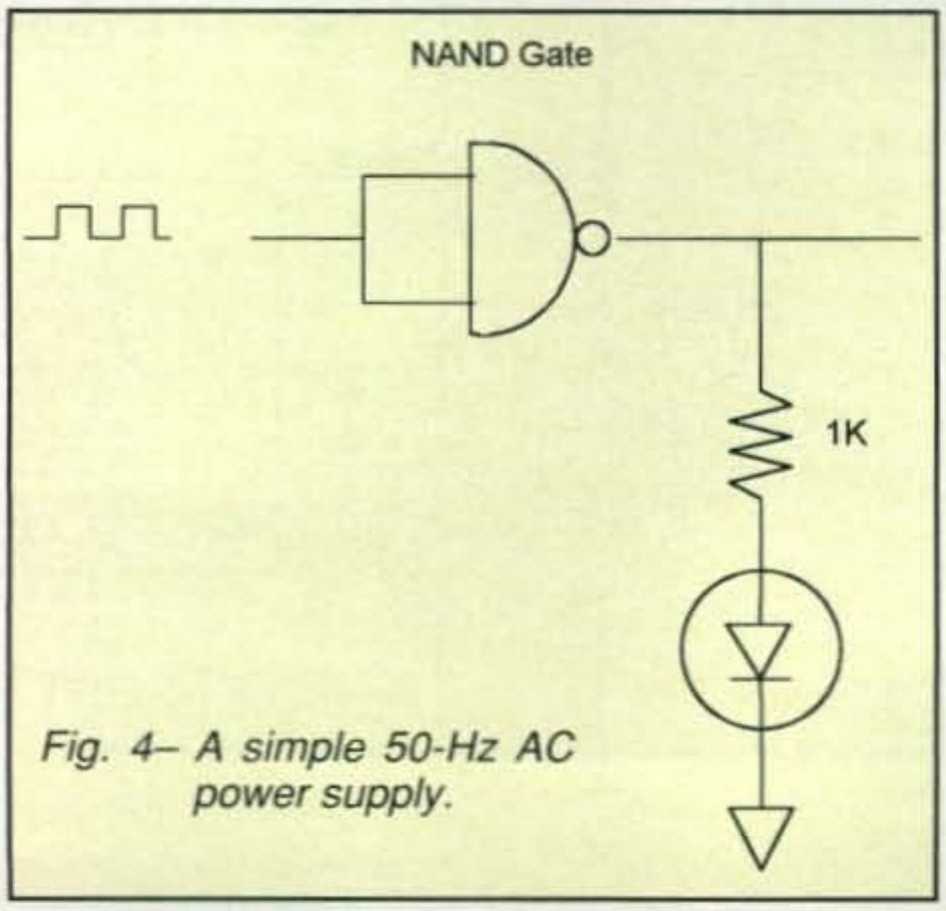


Fig. 4– A simple 50-Hz AC power supply.

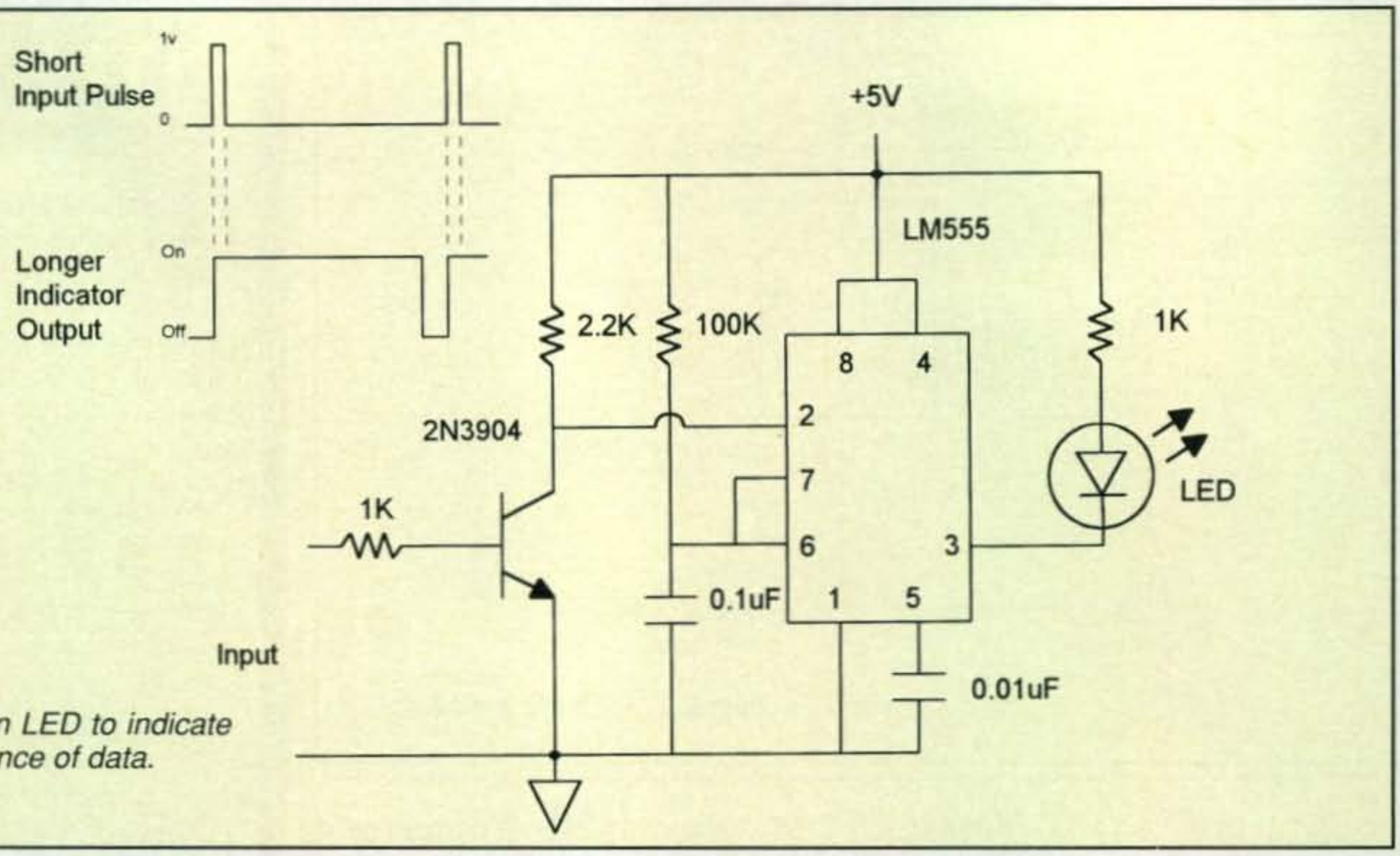


Fig. 5– Using an LED to indicate the presence of data.

Often, particularly in data-transmission systems, it is desirable to indicate the presence of valid signals. This is usually done with indicator LEDs as shown in fig. 5. In this configuration, whenever the output of the NAND gate goes high (to logic 1), the LED lights. If the output goes low (or logic 0), the LED turns off. When actual data is present, the LED "blinks" in step with the data, so as long as the high, or logic 1, time duration is long enough, light from the LED will appear to be continuously on. If the logic 1 data pulses are short, however, or if the on-to-off ratio is very wide, you may not see anything, since the light flash may be too short.

A solution to this problem is shown in fig. 6. Here the data pulses are first inverted by a transistor (since the 555 needs a negative-going pulse to trigger) then applied to a 555 configured as a one-shot "pulse stretcher." The time constant of the 555 is set such that the indicator LED lights long enough to easily be seen. Because the 555 is capable of triggering on pulses as short as 20 nanoseconds, single pulses at data rates as high as 40 Mb/sec. can be detected, which, incidentally, is well beyond the maximum continuously rated frequency of the chip. Also, since a 40 Mb/sec. logic 1/logic 0 repeating data rate is equivalent to a 20-MHz square wave, you can even use this circuit as a simple RF indicator by applying the RF input to the transistor stage in fig. 6. The transistor will trigger the 555 on positive excursions of the RF as long as the amplitude of the positive excursion is at least 0.7 volts.

These are only a few of the uses of the versatile 555. I am sure that with some thought you can come up with even more.

73, Irwin, WA2NDM

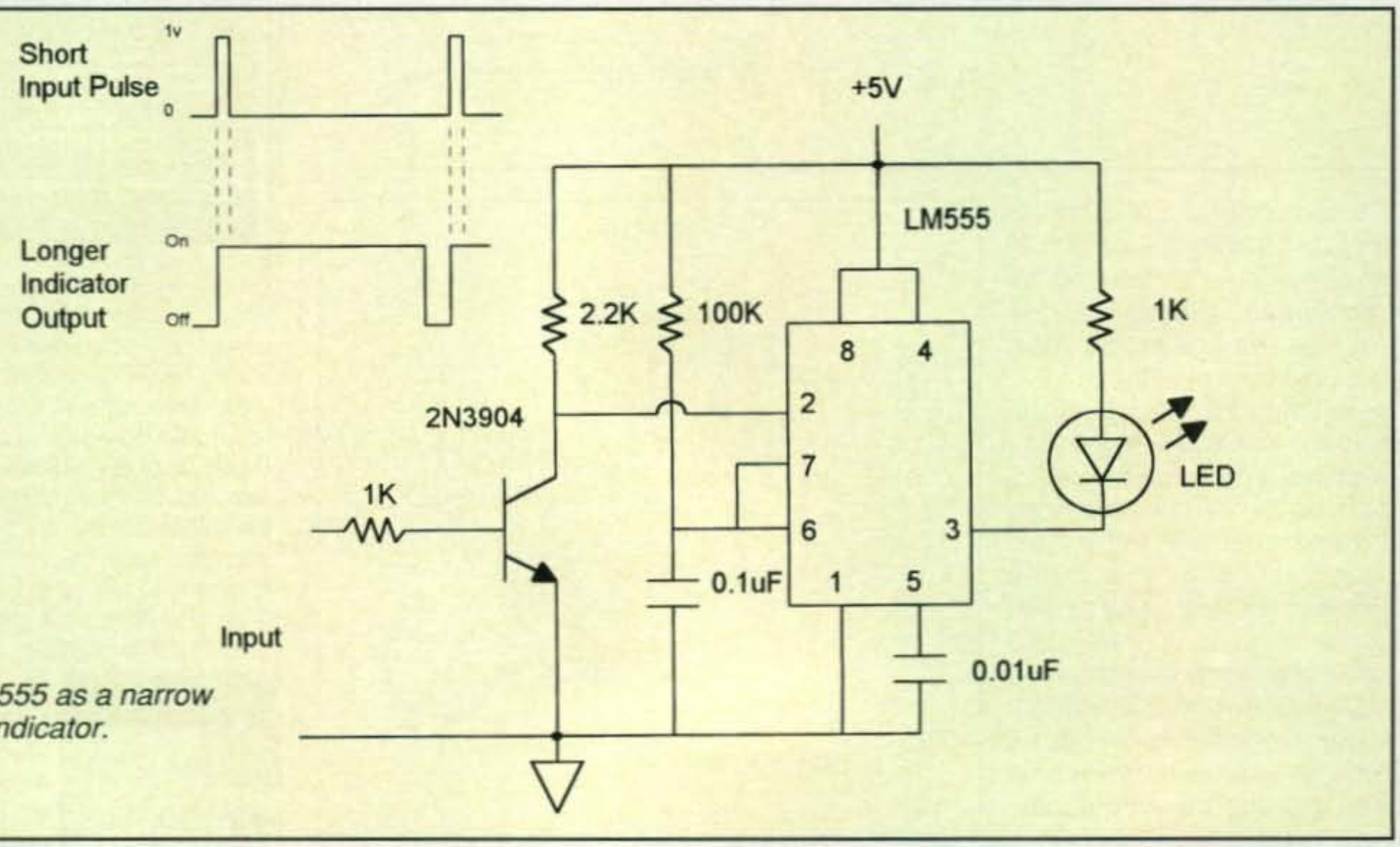


Fig. 6– Using a 555 as a narrow pulse indicator.

MFJ tiny Travel Tuner

Tiny 4½x2¼x3 inch tuner handles full 150 Watts! Covers 80-10 Meters, has tuner bypass switch, tunes nearly anything!

MFJ brings you the *world's smallest* full power 150 Watt 80-10 Meter Antenna Tuner. Extra wide matching range lets you tune nearly any antenna.

It's no toy, its got guts! Built with real *air* variable capacitors (600 Volt, 322 pF) and *three* stacked powder iron toroids to handle real power -- not just QRP. Bypass switch lets you bypass tuner when you don't need it.

You can use nearly any transceiver at full power with nearly any coax fed or random wire antenna for portable, home or mobile operation.

It's perfect for compact rigs like Icom IC-706MKIIG, Yaesu FT-100D, Kenwood TS-50, QRP rigs and others with a built-in SWR meter.

Operate anywhere, anytime with a quick easy set-up! Tune out SWR on your mobile whip from inside your car. Operate in your apartment with a wall-to-wall antenna or from a motel room with a wire dropped from a window or from a mountain top with a wire over a tree limb. Great for DXpeditions or field day. Be prepared for emergencies.

MFJ-902 is so small and handy, you'll rely on it wherever you go! It's easy to pack away in your briefcase, suitcase, backpack, glove compartment or desk drawer. It's tiny enough to slide in your back hip pocket! 4½Wx2¼Hx3D in.

MFJ-902
$79.95 **New!**

Tiny Travel Tuner with 4:1 Balun

MFJ-902H
$99.95

MFJ-902H, same as MFJ-902 *Tiny Travel Tuner* but has *4:1 balun* for balanced lines and 5-way binding posts for balanced lines and random wire. 5¾Wx2¼Hx 2¾D inches.

Tiny Travel Tuner with Cross-Needle SWR/Wattmeter

MFJ-904
$109.95

MFJ-904, same as MFJ-902 *Tiny Travel Tuner* but has *Cross-Needle SWR/Wattmeter.* Read SWR, forward and re-flected power all at a glance in 300/60 and 30/6 Watt ranges. 7¼Hx2¼Hx2¾D in.

ALL-in-one *Tiny Travel Tuner* with 4:1 Balun *and* SWR/Wattmeter

MFJ-904H
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ALL-in-one! MFJ-904H, same as MFJ-902 *Tiny Travel Tuner* but has *4:1 balun for balanced lines* and Cross-Needle SWR Wattmeter. Read SWR, forward and reflected power all at a glance in 300/60 and 30/6 Watt ranges. Has 5-way binding posts for balanced lines and random wire. 7¼Hx2¼Hx2¾D inches.

Long 10/12 foot Telescoping Whips

MFJ-1954
$19.95
10 Feet

10 foot extended, 19 inches collapsed, MFJ-1954, $19.95. 12 foot extended, 22.5 inches collapsed. MFJ-1956, $29.95. Standard 3/8 inch by 24 threaded stud for use with all standard mounts. Durable 1/2 inch diameter plated brass. Telescopes for full 1/4 wave operation 2 to 12/15 Meters. Cover 17, 20, 30, 40, 60, 80, 160 Meters with loading coil. Use two for multi-band dipoles. Replace screwdriver antenna whip for highly efficient *fixed* mobile operation.

MFJ-1956
$29.95
12 Feet

MFJ RF Isolator

MFJ-915 *RF Isolator*

MFJ-915
$29.95

prevents unwanted RF from traveling on the outside of your coax shield into your transceiver. This unwanted stray RF can cause painful RF "bites" when you touch your microphone or volume control, cause your display or settings to go crazy, lock up your transceiver or turn off your power supply. In mobile installations, stray RF could cause your car to do funny things even blow your car computer. Clear up these problems, plug an MFJ-915 between your antenna and transceiver. *Don't operate without one!* 5x1½ inches. For 1.8 to 30 MHz.

Portable Collapsible Antenna Tri-Pod

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Holds 66 pounds of antenna steady. Black *steel* base forms strong braced equilateral triangle 40 inches on a side. Non-skid feet. One inch diameter steel mast extends height to six feet. Strong base and mast locks. Easily add antenna mount or mast extension for greater heights. Collapses to 38 inches by 4 inch diameter. 6¾ pounds.

40-10M G5RV Junior
MFJ-1778M, $34.95.
Half-size 52 foot *G5RV Jr* 40-10 Meters, 1500 Watts.

1500 Watt Lightning Surge Protector

MFJ-272
$39.95

Protect your expensive transceiver from static electricity and lightning induced surges with an ultra-fast gas discharge tube. Plug between rig and antenna, attach ground. DC to 1000 MHz. SO-239s.

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Cover all bands, 160-10M with tuner. 102 ft. long, 1.5kW. Custom fiberglass insulator stress relieves 450 Ohm ladder line. Use horizontally, as inverted vee or sloper. Marconi on 160M.

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Package of six. (69 cents each)

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What You've Told Us...

Our June survey was a continuation of our hamfest questions that began in May. Once again, more than three quarters of you have been to a hamfest in the past two years. Only 14% have never been to a hamfest or have not attended one in more than 5 years.

In answer to our question about your most recent hamfest purchase(s), 38% of you had bought books, magazines, CDs or videos; 37% a new accessory; 26% something not on our list; 22% each a new antenna or a used accessory; 18% bought nothing; 8% bought a new transceiver for home use; 7% a used transceiver for home use; 7% got a new handheld transceiver (only 1% bought a used HT); 6% got a new mobile rig (plus another 3% who bought a used mobile radio); and 5% bought a used antenna.

Hamfests continue to be major points of purchase for ham gear. While 36% of our respondents made their most recent ham equipment purchases from a dealer by phone or mail order, 27% bought their most recent rig from a dealer at a hamfest and another 13% bought a rig from another ham at a hamfest (that's 40% of recent equipment purchases by our readers being made at hamfests). In addition, 14% made their most recent radio purchase from a dealer at a store; 11% bought from a dealer online; 9% from another ham in person (but not at a hamfest); 7% via an online auction site, such as eBay; 4% through an online classified ad; 3% through a classified ad in a magazine or newsletter; 2% other, and nobody bought a rig via an on-air swap net. Only 5% have made no recent purchases of ham gear.

Finally, we asked those readers who had not been to a hamfest in three years or longer why not. The main reason (12%) was "no hamfests near me," followed by "not enough interest" and "other" (11% each), "not enough free time" (6%); "better deals online" (3%), "not enough used gear" (2%), "not enough new gear" (1%) and "don't know" (1%).

This month's free subscription winner is Richard Olson, K9BWI, of Fountain, CO.

Reader Survey August 2004

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

This year marks the 20th anniversary of the Volunteer Examiner system for giving ham license exams, and in June, the first "same-day licenses" were issued to test-takers at the HamCom hamfest in Dallas (see this month's "Zero Bias" for details). This month, we'd like your views on the VE system after 20 years.

Please answer by circling the appropriate numbers on the reply card.

1. Have you taken one or more license exams under the Volunteer Examiner (VE) system?
   - Yes 1
   - No 2

2. Have you taken one or more license exams at an FCC office or before an FCC examiner?
   - Yes 3
   - No 4

3. Are you a certified Volunteer Examiner?
   - Yes 5
   - No 6

4. If you answered yes to question 3, how long has it been since you participated in a test session as an examiner?
   - Within the past 3 months 7
   - Within the past 6 months 8
   - Within the past 12 months 9
   - More than a year ago 10
   - Never 11
   - Not a VE 12

5. Overall, do you think that over the past 20 years, the VE system has been...
   - ... good for amateur radio 13
   - ... bad for amateur radio 14
   - ... neither good nor bad for amateur radio 15
   - ... don't know/no opinion 16

6. Do you think that the ability, using the Internet, to get a license issued within ours of taking a test, rather than days or weeks, will be ...
   - ... good for amateur radio 17
   - ... bad for amateur radio 18
   - ... neither good nor bad for amateur radio 19
   - ... don't know/no opinion 20

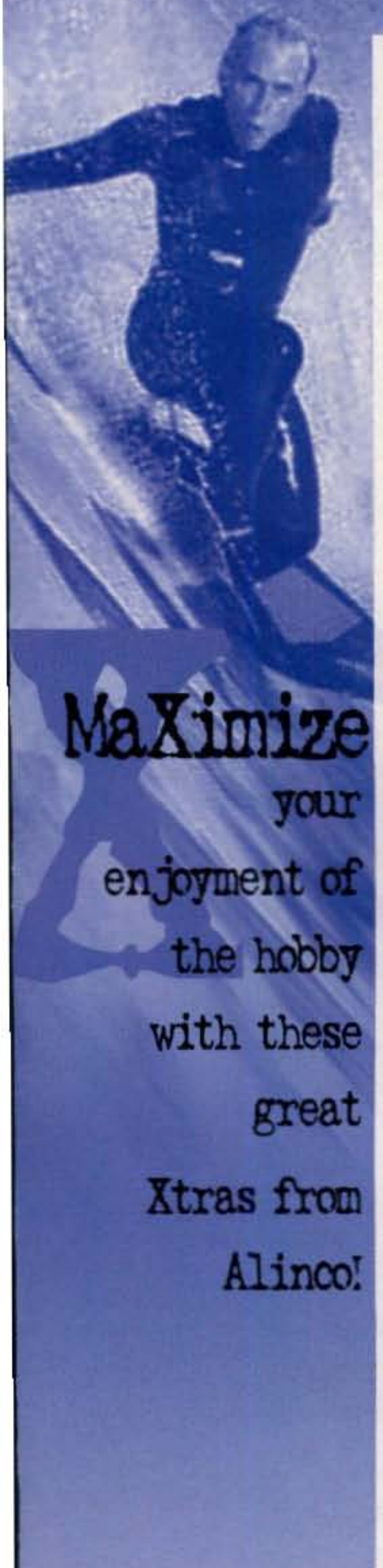
7. Do you think there is a problem with abuse of the VE system by examiners and test candidates?
   - Yes, a major problem 21
   - Yes, a small problem 22
   - No abuse problem 23
   - Don't know / no opinion 24

8. If you feel there is a problem with abuse of the VE system, do you feel that the VE Coordinators (VECs) do an adequate job of policing their teams and watching for discrepancies?
   - Yes 25
   - No 26
   - Don't know / no opinion 27

9. If you feel there is a problem with abuse of the VE system, do you feel that the FCC does an adequate job of enforcement when discrepancies are found?
   - Yes 28
   - No 29
   - Don't know / no opinion 30

Thank you very much for your replies. We'll be back with more questions next month.

Extremely Xcellent



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Tunes 160 ~ 10 meters (amateur bands) in seconds and mates with DX-70 or DX-77 HF transceivers. Can be mounted outdoors and used for base/mobile.

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BY FREDERICK O. MAIA,* W5YI

FCC Discusses Amateur Radio Rulemaking at Dayton Hamvention®

The FCC Forum at the 2004 Dayton Hamvention® featured FCC's William Cross, W3TN, as the keynote speaker. Bill Cross works in the Public Safety and Critical Infrastructure Division of the Wireless Telecommunications Bureau at the FCC's Washington, D.C. headquarters. This division is responsible for most of the rulemaking activities that impact the Amateur Radio Service. It also handles the day-to-day administration of the Amateur Service. (The staff in Gettysburg, Pennsylvania, handles most Amateur Radio applications and other licensing matters.)

Bill started out by updating everyone on the recent Amateur Service Notice of Proposed Rulemaking. "Much of what we do is to react," he explained. "The NPRM that came out April 15 addresses 20 miscellaneous petitions the amateur community filed. An additional 18 WRC-03 related petitions are also from you. There are other petitions pending, and most have come from a radioamateur or organization."

During the forum, Cross briefly discussed each of these proceedings and talked a bit about the Broadband over Power Lines (BPL) proceeding as well. The following are excerpts from Cross's comments:

Notice of Proposed Rule Making and Order (WT Docket No. 04-140)

...that was released April 15 addresses 20 petitions for rulemaking ...including one informal request. Twelve of these petitions were denied. The rest were either granted, which means we proposed what the petitioner requested, or granted in part, which means we proposed at least one rule change the petitioner requested.

The NPRM proposes to revise operating privileges for all licensees, even Novices. It also proposes to eliminate obsolete and duplicative rules, to conform the Amateur Radio Service rules to the international Radio Regulations, and to amend certain rules to reflect changes in Commission organization and practices.

There are many rule changes proposed. The major ones and the petitioner are:

- Revise the operating privileges in four HF bands. These include voice and data privileges (ARRL)
- Permit auxiliary stations to transmit on the 2 meter band (Kenwood)
- Permit amateur stations to transmit spread spectrum communications on the 1.25 meter band (ARRL)
- Permit amateur stations to re-transmit International Space Station communications (NASA John H. Glenn Research ARC)
- Allow Amateur Service licensees to designate an amateur radio club to receive their callsign, in memoriam (QCWA)
- Prohibit an applicant from filing more than one application for a specific vanity callsign (Edwards, Lynch, and Young)
- Eliminate unnecessary restrictions imposed on certain equipment manufacturers (FCC)
- Allow amateur radio stations in or near Alaska more flexibility in providing emergency communications (FCC)
- Eliminate unnecessary rules in the amateur radio operator license examination system (FCC).

*Chairman, NCVEC Rules Committee
Member, Question Pool Committee
1020 Byron Lane, Arlington, TX 76012
e-mail: <w5yi@cq-amateur-radio.com>

What the FCC Proposed

High-Frequency Phone-Band Expansion. The proposal is to eliminate the telegraphy frequency segments currently authorized to Novice and Technician Plus Class licensees, and to use that spectrum to expand the portion of 80, 40, and 15 meter bands that may be used for phone communications.

Novice and Technician Plus Class licensees would be authorized to control an amateur station transmitting in what you all refer to as the General (and Advanced) Class CW bands.

Novice and Technician Plus Class licensees also would be authorized CW, RTTY, and data emissions privileges in 28.0–28.3 MHz. Presently they have 28.1–28.3 for CW, RTTY, and data.

General Class licensees would be authorized 3800–4000 kHz, 7175–7300 kHz, and 21275–21450 kHz frequency segments for voice.

Advanced Class licensees would be authorized 3750–4000 kHz and 7125–7300 kHz frequency segments for voice.

Amateur Extra Class licensees would be authorized voice communications on the 3725–4000 kHz and 7125–7300 kHz segments.

Data Communications. The proposal is to allow an amateur station to transmit an image emission 500 Hz or less on the frequency segments now authorized for data and RTTY emission types. 500 Hz or less was requested so that the narrow bandwidth nature of these band segments is maintained.

The proposal also changes the definition of *data* to include emission types A1C and F2C (FAX) having an occupied bandwidth of 500 Hz or less. This change would allow development of new or improved communication systems.

Very-High-Frequency Privileges. Auxiliary stations are amateur stations, other than one in a message-forwarding system, that are transmitting point-to-point communications within a system of cooperating amateur stations. Auxiliary stations are used for repeater and "remote base" control links among other things. Auxiliary stations are also used when remotely controlling something ... turning on or off a remote receiver in a 2 meter network or an HF transceiver, for example.

The proposal is to allow auxiliary stations to transmit on the 2 meter band above 144.5 MHz, except 145.8–146.0 MHz. It would promote the development and use of new technology, including Kenwood's Sky Command system, and would be consistent with our flexible-use policy in the Amateur Service.

The proposal does not affect the frequency segments authorized to automatically controlled beacon stations, space stations, earth stations, or those frequency segments that amateur radio operators have voluntarily agreed to use for simplex and weak-signal work.

Spread Spectrum. SS currently is allowed on any Amateur Service frequency above 420 MHz. Proposal is to authorize SS emissions on 222–225 MHz. We also requested comment regarding whether we should allow

transmission of SS emission types on either or both the 6 and 2 meter bands.

Retransmission of Space Station Communications. The proposal here is to allow retransmission of communications between a manned spacecraft and its associated Earth stations. The basis for the request is that there are no distinctions between retransmitting space shuttle communications and ISS communications.

Vanity Call Sign System. "In Memoriam" provisions. The proposal is to allow currently licensed amateur radio operators to designate a specific amateur radio club to acquire their callsign in memoriam. As the rules are now, licensees may not express a desire as to which radio club receives their callsigns "in memoriam," but any of your relatives can. Even ones you don't know ... or admit to. A recipient club would still have to apply for the callsign before former holders and relatives of former holders, now deceased, to get the callsign.

Multiple Vanity Callsign Applications. Here you requested we amend Part 97 to prohibit acceptance of more than one application per applicant per vanity callsign. The issue is equity and fairness, according to the petitioners.

Space Station Launch Notification. This proposal doesn't affect many of you, but notification is necessary because there are many satellites orbiting the Earth. Notification is necessary so everyone knows where their bird is relative to all the other birds. You don't want these things colliding. Our proposal is to require that pre-space notification be submitted within 30 days after the launch vehicle is determined, but no later than 90 days before the space station is integrated into the launch vehicle.

Commission Proposals and Order. There were a number of Commission-initiated proposals. Most would not affect many licensees or are of an administrative nature. The ones that people seem interested in are:

HF amplifiers capable of transmitting on the 12 and 10 meter Amateur Service bands. The Rules prohibit commercial manufacturers from marketing amplifiers that are capable of transmitting on the 12 and 10 meter bands to amateur radio operators. But you can make and modify, or buy, or have modified an amp so that it is capable of transmitting on these bands.

Our proposal is to clarify and simplify the exceptions in our Rules and eliminate the restrictions imposed on manufacturers as compared to the restrictions imposed on Amateur Service licensees. The proposal would allow manufacturers to market equipment in the United States that they now may market overseas.

The intent of the current rules is to prevent commercial manufacturers from marketing to CB Radio Service users RF power amplifiers that had been approved for use at amateur stations. But Section 95.411 of our CB Rules prohibits, under any circumstances, an individual from attaching an external RF power amplifier or any device capable of amplifying the signal to a CB transmitter. Therefore, an individual who uses an amplifier at a CB station would violate a CB Radio Service rule, not an Amateur Service rule.

We also proposed to delete the definition of an external RF power amplifier kit. The current definition is so broad that an amateur radio operator would find it difficult to determine if a group of electronic parts he or she purchases or possesses will be defined by the Commission as an external RF power amplifier kit.

Public-service communications. We proposed to amend Section 97.111(a) to clarify that amateur stations may at all times and on all channels authorized to the control operator, make transmissions necessary to meet essential communication needs and to facilitate relief actions. This rule is now in Section 97.401 under operating during a disaster. There has been confusion over whether there must be a disaster before an amateur station may make transmissions necessary to meet essential communication needs and to facilitate relief actions. We believe that we should not restrict these communications, which may be instrumental in saving human life and property.

The FCC proposal eliminates the need for Sections 97.401(a) (concerning disaster communications) and 97.401(c) (concerning the priority given to disaster communications), so these sections would be deleted.

Alaska emergency frequency. Amateur stations in or within 92.6 km of Alaska are permitted to transmit communications during emergencies on 5.1675 MHz. Section 97.401(d) of our Rules does not authorize communication for training drills and tests on this frequency. The proposal is to authorize an amateur station in or within 92.6 km of Alaska to transmit communications during tests and drills on 5.1675 MHz.

Radio Amateur Civil Emergency Service (RACES). Presently, procedures for the use and coordination of the radio spectrum during national emergencies are specified, among other places, in Parts 201 and 214 of our Rules. Authority rests with the Director of the Office of Science and Technology Policy, an office that answers directly to the president. The director may issue policy guidance, rules, regulations, procedures, and directives to assure effective frequency usage during wartime emergency conditions. The Director, OSTP, has the authority to specify which, if any, frequency segments RACES stations and other amateur stations may transmit on.

The proposal is to delete the frequency bands and segments specified and to clarify that during certain emergencies the frequency segments available to RACES stations and amateur stations participating in RACES would be authorized pursuant to Part 214 of our Rules.

Qualifying examination system rules. We proposed to eliminate the requirement that a public announcement of test locations and times be made. Adequate announcement is already on club and VEC websites, in newsletters, and in other media. Public announcements could still be made; they just would not be required by the FCC.

We proposed to require that VEs give examination credit for the telegraphy examination element to an examinee who holds a Technician Class license document granted after February 14, 1991, and who has documentation showing he or she has passed a telegraphy examination element.

We proposed to eliminate the mandated ten-day time during which VEs and VECs must submit or forward applications. The VECs file applications electronically with the Commission and the rules require that they do so. We believe that a rule mandating a ten-day submission time is unnecessary in light of the current rules and actual practices in the VEC system.

We also requested comment regarding whether there are other unnecessary rules applicable to the Amateur Service qualifying examination system that we should eliminate, and whether there are other rules we should amend to conform with actual practices in the examination system.

The FCC Order. Makes minor amendments to various rule sections to clarify or eliminate duplicative language, or conform them with other rule sections.

- We revised the definition of an "amateur operator" in Section 97.3(a)(1) of our Rules to reflect that it is an entry on our Universal Licensing System (ULS) that determines whether a person is an amateur radio operator.
- We replaced the term "Engineer-In-Charge" with "District Director" in one section of the rules and deleted it from another section.
- We consolidated rules applicable to repeater stations in Section 97.205.
- We amended Section 97.307(d) of our Rules to require the mean power of any spurious emission from a new amateur station transmitter or amplifier transmitting on a frequency below 30 MHz to be at least 43 dB below the mean power of the fundamental emission. The current rule is inconsistent with the Radio Regulations.
- We revised Section 97.505(a)(9) to refer to only expired Technician Class license documents granted before February 14, 1991. There are no more unexpired Technician Class operator license documents granted before February 14, 1991. They have either been renewed or the licensee has been dropped from the database.

• We revised Section 97.507(a)(2) so that a Technician Class Amateur Radio operator may not prepare a Technician Class operator license examination.

WRC-03 Petitions

As I mentioned earlier, we have received and assigned rule-making numbers to 18 petitions that request rule changes based on the changes in the international Radio Regs that were adopted at WRC-03.

I want to briefly summarize what each petition requests so you get a flavor of what we have before us. The summaries will be brief, I do not claim they include everything the petitioner requested. They are listed in the order we put them on Public Notice.

Keep in mind that all of these petitions were developed and filed before the WT Docket No. 04-140 NPRM was released April 15, so none of them could have taken into account our proposal to re-farm the Novice bands and expand the phone bands.

• **RM-10781** addresses only operating privileges for Technician Class licensees. It requests that Technician Class amateurs be authorized the same CW, RTTY, and data privileges now authorized Tech Plus and Novice Class licensees; CW, phone, and image privileges (this would include SSTV) in 3850–3900 kHz and 7225–7300 kHz; and CW and SSB in 28.3–28.5 MHz. [CW and SSB in 28.3–28.5 MHz is what is now authorized Tech Plus and Novice Class licensees.] The petition notes that its intent is to eliminate the difference between the Tech Plus and the Technician Class license in the HF bands.

• **RM-10782** seeks the removal of Element 1—the 5 wpm telegraphy or CW exam— from the Amateur Service exam system. The petition says that removing the CW exam requirement would put CW on the same standing as other modulation techniques. Petition also requests that Technician Class licensees be authorized privileges available to Tech Plus Class licensees.

• **RM-10783** requests that we amend the rules to remove all requirements for knowledge of Morse code. It argues that because Morse code use has declined in other services there is less reason to require it in the Amateur Service, and that the requirement as it is now limits the number of people who take advantage of amateur radio as a hobby.

• **RM-10784** requests that we amend the rules to remove the CW exam requirement for the General Class license. This proposal would retain the CW exam requirement for the Amateur Extra Class license and keep the written exam elements as they are now. This petition also requests that we authorize General Class privileges to foreign amateur service licensees who have a no-code license.

• **RM-10785** proposes that proficiency in using Morse code be eliminated. It argues that Morse code proficiency as a licensing requirement is independent of making a value judgment about the utility or desirability of Morse code as a mode of communication. It also points out that no amateur radio operator is required to use Morse code for communications even though the rules require that proficiency be demonstrated to qualify for certain licenses.

• **RM-10786** is from No-Code International. It also requests that we eliminate Morse code proficiency tests for an amateur radio license. It, and others, argue that because the Amateur Service is fundamentally a technical service, a code proficiency requirement is inconsistent with the basis and purpose of the Amateur Service. NCI says it believes that the Morse code requirement has been the biggest single impediment to recruiting new, more technically inclined, and younger individuals into amateur radio. NCI also requests that the operating privileges for the Technician and Tech Plius operator licenses be made the same.

• **RM-10787** is from the National Conference of Volunteer Examiner Coordinators. NCVEC is comprised of the 14 VEC organizations that develop and administer all amateur radio operator license tests and who file the successful ones with us. It requests that we terminate the telegraphy examination requirement and that we permit Technician Class licensees the same access to HF spectrum that we permit Novice and Technician Plus Class licensees. NCVEC says that taking the Morse test is an unnecessary burden

on examinees and the VEC system, and that Morse proficiency is not an indication of operator quality.

• **RM-10805** requests that we eliminate the Morse code proficiency test from the exam requirements for the Technician Plus Class operator licenses, and leave all other classes and exam requirements as they are today. It also requests that we allow Technician Plus Class licensees access to the top 50 kHz of the General Class phone bands, except on 17, 30, and 60 meters, using a maximum power of 100W ERP.

• **RM-10806** requests that we retain and preserve, permanently, the present Morse code test requirements for licenses classes with privileges below 30 MHz. The petition states that voice communications does not diminish the vital and necessary role of more accurate and reliable CW for emergency communications. The petition argues, among other things, that removing the code requirement would result in a dramatic reduction of future skilled operators.

• **RM-10807** is a comprehensive restructuring petition. It requests that we merge the Novice, Technician, and Technician Plus Classes into a new Technician Class; authorize additional CW/data privileges on 3600–3750, additional data privileges in the 40, 15 meter Novice bands, no change to 10 meter CW/data band, additional 100 kHz to 10 meter phone, 200 watts maximum power. The petition also requests we automatically upgrade Advanced Class licensees to Amateur Extra Class.

Exam requirements: The petition requests we regard Morse code as another mode of operation equal to others. Morse exams would continue but scores would be combined with written exam. Petitioners suggest 44 questions for Technician exam, 88 questions for General and Amateur Extra written exams, 75% passing score. CSCEs (Certificates of Successful Completion of Examination) would no longer be necessary.

• **RM-10808** says it was submitted as an alternative to NCVEC petition. It requests that we amend the rules to require an examinee to demonstrate proficiency in the mode he or she wishes to operate. Basic test would cover phone privileges; test CW skill if an applicant intends to operate CW. Modes requested are RTTY, data, image, spread spectrum, pulse, RACES/ARES, and space communications.

• **RM-10809** is from the Puerto Rico Amateur Radio League. It requests that we eliminate the Morse code test as a requirement for the Technician and General Class licenses, but keep the requirement for the Amateur Extra Class license. It also requests that changes be made to the contents of the written exams, that we impose additional requirements on VECs regarding certification of VEs, and that we prohibit re-testing of examinees in the same session.

• **RM-10810** requests that we have only two operator license classes: General and Extra. The General Class would require passing a written exam; the Extra Class license would require passing a 15 wpm Morse code test, in addition to the General Class written exam. General Class licensees would have all privileges except the Extra Class CW subbands. Extra Class phone subbands would be eliminated. All licensees except Amateur Extra Class licensees would be granted General Class privileges.

• **RM-10811** is from the FISTS CW Club. It requests that we retain Morse code testing, increase technical skills required on written exams, and allow Technician Class licensees to use digital modes in the Novice subbands. FISTS argues that requiring Morse code proficiency for licensing will ensure an adequate supply of radio operators for emergency communications.

FISTS requests that we merge the Technician and Tech Plus Classes of licenses and that no Morse code exam be required. Digital privileges in the Novice bands would be authorized but not HF voice privileges. FISTS requests we retain the 5 wpm code test for General Class license and require a 12 wpm code test for the Amateur Extra Class license. It also requests an increased technical level be required on the written exams for General and Amateur Extra Class licenses.

Other requests from FISTS are that we retain the Novice subbands for narrow-band digital modes and that we prohibit re-testing of examinees in the same session.

• **RM-10867.** The ARRL requests streamlining the licensing struc-

ture ...consolidating all current licensees into three classes, Technician, General, and Amateur Extra Class.

Novice Class would be authorized HF phone privileges with no Morse code test. Current Novice licensees would be "grandfathered" into a new Novice Class ... with a 25-question written exam; no RF safety questions; limited HF CW/data and phone/image privileges on 80, 40, 15, and 10 meters; plus VHF and UHF privileges on the 6, 2, 1.25 meters, and 70 cm bands. Power would be limited to 100W output on 80, 40, and 15 meters and to 50W on 10 meters and up (to avoid the need for the RF safety questions).

Technician and Tech Plus Class licensees would be upgraded to the General Class and gain current General Class privileges without additional testing. General Class no longer would require a Morse examination. Current Element 3 examination would remain in place for new applicants; no changes in privileges for General Class licensees on 160, 60, 30, 20, 17, or 12 meters.

Current Advanced Class licensees would be upgraded to Amateur Extra since the technical level of the exams is very similar. The Amateur Extra Class written exam would be the same plus 5 wpm. There would be no changes in privileges on 160, 60, 30, 20, 17, or 12 meters.

• **RM-10868**. The Radio Amateur Foundation petition is similar to the others. It proposes a three-class license structure: Technician, General, and Amateur Extra. They request to upgrade Novices to Technician Class and Advanced Class licensees to Amateur Extra Class. Code-free Technician Class ...no change to exams for General and Amateur Extra Class licenses.

RAF would authorize Techs limited HF phone, data, image, CW privileges, all privileges above 50 MHz. Lifetime exam credit for those who have passed 5 wpm tests.

• **RM-10869.** This petition is similar to FISTS: three classes of operator license; two code examination elements. Eliminate Morse code test element for Technician Class licenses, retain Element 1 for General Class, require 13 wpm for Amateur Extra Class operator licenses. Petitioner states Morse code proficiency is a key component of community-service responsibilities under and within Department of Homeland Security. Also says Morse code will be a key backup mode for secure-coded and non-secure messages.

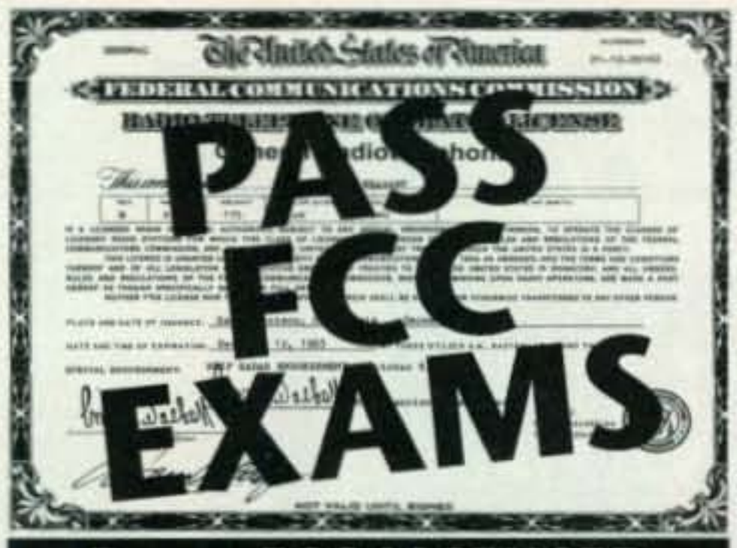
• **RM-10870.** This petition from the NCVEC also requests three classes of operator licenses: Communicator Class with distinctive callsigns (NA1AAA–NZØZZZ); General Class and Amateur Extra Class. Novices would receive Communicator Class licenses; Techs and Tech Plus Class licensees would be upgraded to General; Advanced Class licensees would be upgraded to Amateur Extra Class. No code tests for any license class. Exams for General and Amateur Extra would not change ... a 20-question test for the Communicator license would be required. Communicator Class licensees would receive privileges on the 80, 40, 15, 10, 6, 2, 1.25 meters, and 70 cm bands. Use of commercially available equipment or equipment built from a kit would be required.

7 MHz Realignment ET Docket 04-139

The band 7000–7100 kHz is allocated to the Amateur and Amateur-Satellite Services on a primary, exclusive basis throughout the world. 7100–7300 kHz is allocated to the Amateur Service on a primary, exclusive basis in Region 2, including the United States; it is allocated exclusively to the HFBC (high frequency broadcasting) service in Regions 1 and 3.

Effective January 1, 2005 the Amateur Service in Regions 1 and 3 is allowed 7100–7200 kHz on a co-primary basis with the broadcasting service. This means that amateur stations in Regions 1 and 3 will shortly be permitted to transmit in the band 7100–7200 kHz, if they can find a frequency that is not being used by an international broadcast station. Amateur Service use of this 100 kilohertz will be shared until the broadcasting service vacates the band 7100–7200 kHz on March 29, 2009. After that date, the band 7100–7200 kHz is allocated to the Amateur Service on an exclusive basis throughout the world, except in certain countries.

We anticipate that administrations in Regions 1 and 3 in the near future will authorize phone emissions in the segment 7150–7200 kHz, and we note the ARRL has requested that the frequency seg-



ment for phone emissions be expanded to 7125– 7300 kHz. These changes, if implemented, would permit transceiver operations by amateur stations *(as opposed to the "split" method currently used for most voice contacts between North/South America and other parts of the world—ed.)*.

Broadband Over Powerlines (BPL)

In ET Docket No. 04-37 the Commission is proposing to amend Part 15 of our rules to adopt new requirements and measurement guidelines for a new type of carrier current system—Access BPL—which provides access to broadband services using electric utility companies' power lines.

The Commission also is proposing to require that BPL systems and devices incorporate capabilities to mitigate harmful interference should it occur, to adopt administrative requirements to aid in the identification and resolution of harmful interference from Access BPL systems, and to clarify certain measurement guidelines for all types of carrier current systems.

Carrier current systems have existed previously. Until recently, they operated generally on frequencies below 2 MHz and with relatively limited communications capabilities.

The availability of faster digital processing capabilities and the development of sophisticated modulation schemes have produced new designs that can overcome these technical obstacles. These new designs have led to the development of new BPL systems that couple RF energy onto the existing electric power lines to provide high-speed communications capabilities.

BPL systems may operate either inside a building ("In-House BPL") or over utility poles and medium-voltage electric power lines ("Access BPL"). Electric utilities can use Access BPL systems to monitor their electric power distribution operations.

Most Access BPL systems today operate on frequencies up to 50 MHz with very low-power signals spread over a broad range of frequencies. These frequencies are also used by licensed radio services that must be protected from harmful interference as BPL systems operate on an unlicensed basis under Part 15 of the Commission's rules.

There is significant disagreement regarding the interference potential of Access BPL. A number of parties maintain that Access BPL poses the potential for new interference to a variety of radio services. ARRL contends that the potential interference from Access BPL would be so severe as to warrant its exclusion from all bands allocated for amateur use.

NTIA also states that we must ensure that Federal Government operations are adequately protected from unacceptable interference. There are over 18,000 Federal Government frequency assignments in the 1.7–80 MHz spectrum range. Commenting parties representing other services also raise potential interference concerns.

The FCC Proposal is to:

1. Define Access BPL for purposes of our rules;
2. Maintain the existing Part 15 emission limits for Access BPL;
3. Require that Access BPL devices employ adaptive interference mitigation techniques;
4. Require that Access BPL providers maintain a database of installation locations and technical information; and
5. Adopt specific measurement guidelines for both Access BPL and other carrier current systems to ensure that measurements are made in a consistent manner and provide for repeatable results in determining compliance with our rules.

There's a Lot Coming Down the Pike...

...that you need to watch and know about. First, there will be Commission items such as a Notice of Proposed Rule Making that will address the petitions I talked about. There also may be items coming out of other bureaus such as OET and the Office of Managing Director, or OMD. OMD handles matters such as the fee you pay for vanity callsign applications.

We still have to address the bandwidth limitation Petition for Rulemaking we received from Mr. Lonneke and Mr. Ladisky. This may be done on its own or as part of a larger proceeding, such as the NPRM that will address the 18 WRC-03 petitions. You may see some of these items coming out later this year.

There also is a Report and Order to be written for the NPRM in Docket 04-140 *(see beginning of article—ed.)*. My guess is this will come out sometime in 2005.

Second, planning has already started for the next World Radio Conference, WRC-07. Possibilities in that WRC include an allocation for the Amateur Service in the LF part of the spectrum, maybe access to 7 MHz sooner if the HF broadcasting transition moves along, and other changes. There seems to be something at every WRC that affects the Amateur Service in some way.

Third, there will have to be some kind of action to implement WRC-03 changes that have not been included in items we have released so far. WRC-03 did a lot more than change the requirement that you must demonstrate proficiency in Morse code to receive a license that allows HF privileges. International rules on callsign formats and third-party communications, among other things, also were changed.

Last, keep your eye on legislation that has been introduced on Capitol Hill. A couple of bills have been introduced that may be of interest to you. One could help you with antenna installation issues. Another addresses spectrum allocation or re-allocation matters. There also has been talk that Congress may want to take another look at parts of the Communications Act in the next session.

We thank Bill Cross for this update on where things stand on amateur-related issues at the FCC, and we hope this summary was useful for those of you who were not able to be at Dayton and/or attend Bill's forum.

73, Fred, W5YI

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It's *more effective* than a noise blanker! Interference much stronger than your desired signal can be completely removed without affecting your signal.

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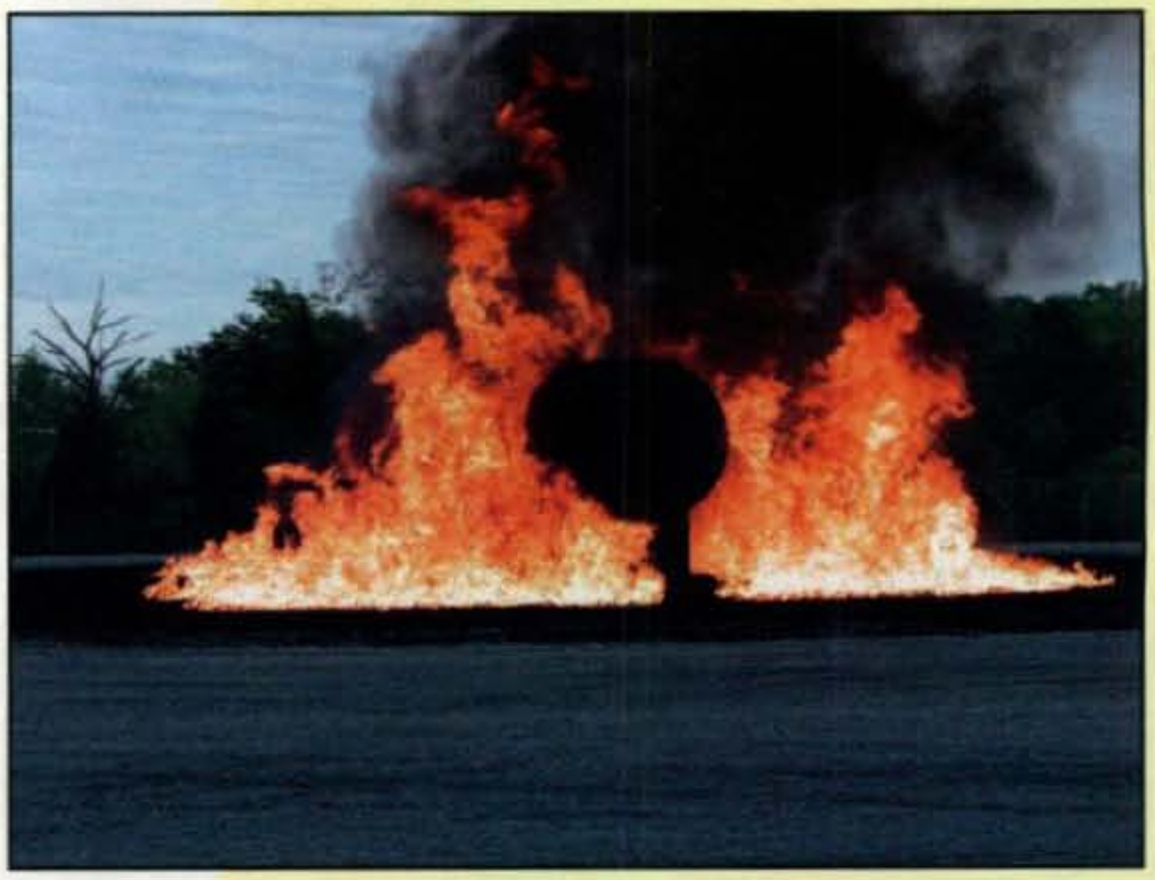
BY BOB JOSUWEIT,* WA3PZO

Hams Assist in Medical Evacuations

Amateur radio operators provided critical support at various simulated airplane crashes this spring. Just outside of Washington, D.C. more than a hundred Amateur Radio Emergency Service (ARES) members from seven counties and two states provided emergency communications support at Dulles International Airport, ten area hospitals, and other key locations.

The drill consisted of a "mock" airplane crash with a fire, and with the treatment and transport of 200 volunteer "victims" to ten area hospitals by helicopter, ambulance, and bus. In order to provide vital communications among agencies at the "crash" site, a patient staging and transportation area, and participating hospitals, local amateur radio operators set up several portable repeaters on and around the airport grounds. The repeaters made communications much easier for those hams who were "shadowing" key officials as they moved around the airport grounds.



Over a hundred hams responded to a simulated plane crash in the Washington, D.C. area. (Photos courtesy of Larry Hughes, K3HE)

Ham Technology Provides Valuable Added Information

A quick search on the internet for news stories on the drill proved useless; however, that didn't mean that the simulated crash wasn't on TV. A key component of the drill was an amateur TV (ATV) link between the crash site and the airport Operations Center. This allowed airport management to monitor the progress of the drill, which was out of view from the Operations Center.

While the Operations Center was concentrating on activities at the crash site, other officials were coordinating the movement of patients to local area hospitals. All patients were evaluated or "triaged" to determine how severe their injuries were, what hospital they should be sent to, and how they should be transported. The triage tags that were attached to the victims were color coded. Red indicated that the victim's condition was critical and that he or she was in need of immediate care and transport. Yellow was serious, but the patient could wait for the red-tag victims to be handled. Green indicated that emergency transportation was not considered necessary at the time (green-tagged victims are often called the "walking wounded"), and finally black indicated that the victim was deceased.

From the patient staging areas, the hams relayed information to the hospitals as to how

A very organized (but unidentified) ham set up an aluminum J-pole antenna on a camera tripod, a portable battery pack, and his equipment at the Red Cross station at the staging area where the volunteer "victims" were made up to look like injured persons.

*c/o CQ magazine
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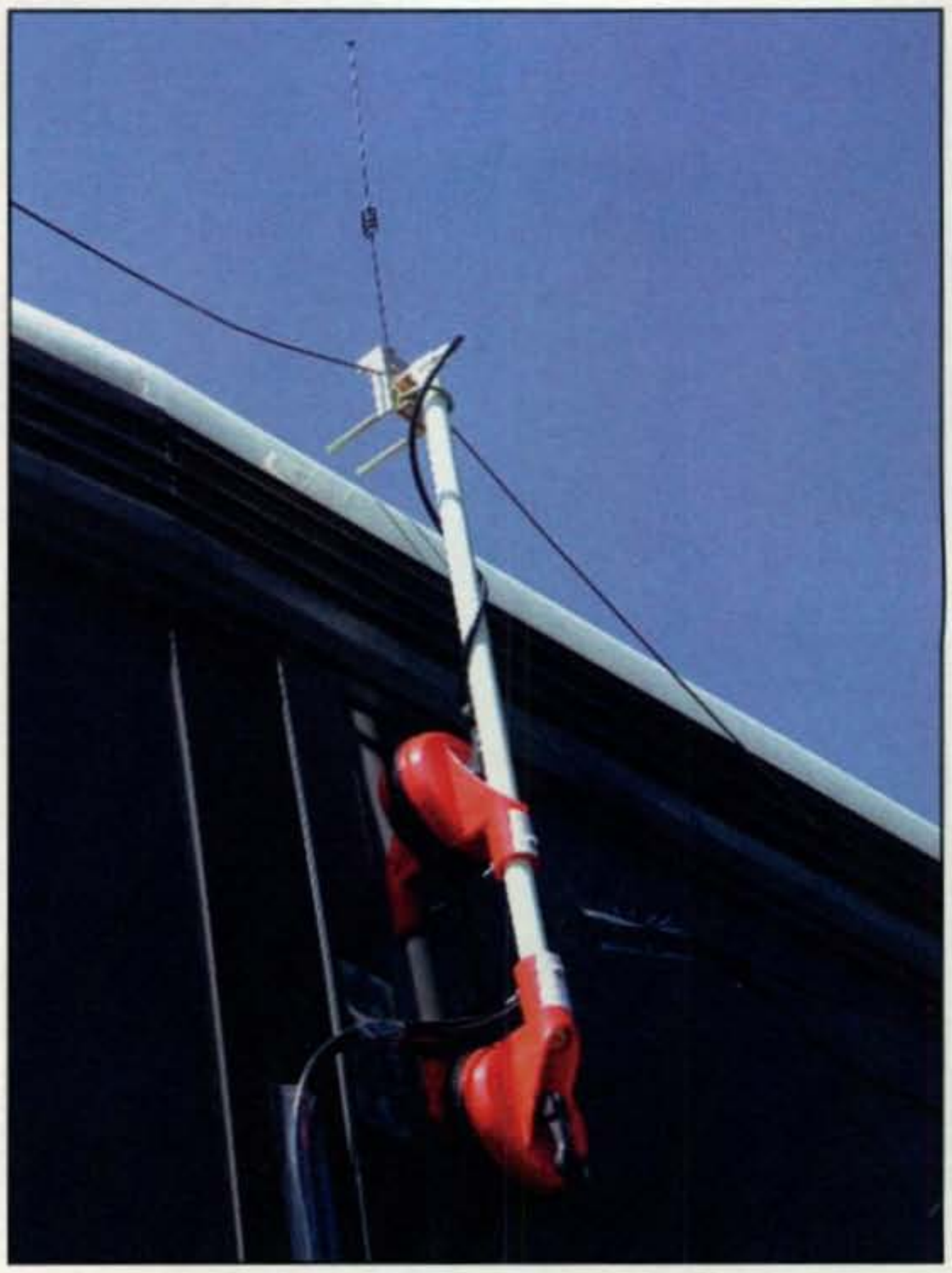
ARES Volunteer Ian Keith, N8IK, sets up and tests the APRS and voice station on one of the buses that would transport the "walking wounded" to a local hospital.



With most buses not having metal roofs, local amateurs came prepared with antennas that could be mounted with suction cups on the bus windows. ⟶

many patients and the types of injuries they would be receiving. They also indicated the estimated time of arrival. ARES member Larry Hughes, K3HE, said the red-tagged victims were flown by helicopter, the yellow-tagged victims were taken by ambulance, and the green-tagged victims were taken by bus.

Each bus had amateur radio voice communications as well as an APRS unit on board. These units provided real-time position data via the Automatic Position Reporting System. Still other hams were stationed at the ten area hospitals to help coordinate the arrival and departure of the "victims."

Drill is Repeated in Massachusetts

In a similar drill at the Worcester Regional Airport in Massachusetts, more than 30 members of the Worcester Emergency Communications Team (WECT) provided communications for 12 public-service officials, as well as the Worcester Emergency Operations Center, a feeding station, registration, victim transportation buses, and the city's three major hospitals.

ARRL Emergency Coordinator and RACES Officer Mark Rubin, WB1ARZ, told the ARRL that the hams were able to provide 2-meter repeater as well as simplex communications for the drill. "We had to deal with inadvertent interference from an open mic," he noted, "and an actual (false) fire alarm at the Worcester EOC during the drill." Both added some realism to the event. Despite the distractions, amateur radio operators were able to provide timely information, such as weather reports, to key drill participants. "It was a great demonstration of local amateur radio and emergency first responder cooperation," Rubin said.

Last-Mile Communications

Often normal communication fails over "the last mile"—the area where conventional communications, especially phone lines, have been totally disrupted or overloaded by the emergency situation.

Last year amateur radio operators in Florida tested a method to pass messages via radio e-mail. After receiving the information by voice communications, the information was keyed into an e-mail program on a laptop computer. Another ham transceiver outside of the affected area received the e-mail and sent the message via the internet to the local hospital.

While this technology may have been overkill for this particular exercise, it began to demonstrate the ability of hams to send e-mail via radio without needing a phone connection to the internet.

An American Radio Relay League committee on the Amateur Radio Emergency Service, ARESCOM, has made a recommendation for the use of a digital system to pass messages. Members of the committee have indicated that one component amateur radio is missing in providing emergency communications is traditional e-mail. Everyone uses it and there needs to be a way to send e-mail from the disaster site to a government office or relief agency across the state or across the country. "Of greatest concern," says a committee report, "would be communications within the larger states with their state government, and states on the West Coast, the Pacific, and Alaska communicating directly with Washington, D.C. or the closest federal agency responsible for forwarding communications to the national command structure." If amateur radio emergency communications is going to stay up to date, then e-mail capability is a must.

ARESCOM has recommended the use of WinLink 2000 (WL2K) software to bridge radio and internet connectivity, and the Pactor II and III controllers as the standard.

"The WL2K system provides for the movement of radio e-mail with multiple addressees, multiple copies, blind copies, and encoded binary attachments between all client e-mail applications," says the ARESCOM recommendation. "Compression is used to conserve valuable spectrum."

ARESCOM claims the move is an efficient use of spectrum that will allow more simultaneous access and provide room for the growth of data rates to better align with wired networks and future commercial wireless networks. The main idea behind the recommendation is to digitally complement existing voice communication.

"It is not meant to be a replacement for such longstanding and proven services," ARESCOM's documentation says, referring to current technologies of ARES and the National Traffic System (NTS), which are used to move amateur radio traffic.

Why Digital?

For years hams have been passing tactical voice communications, or short 25–30 word messages, from the field to an emergency operations center or agency headquarters. Today written documents may be a large list of supplies, a map, a drawing, or a picture. They may be stored on a laptop computer that an agency worker is using. The agency worker needs to get his /her information to the office to be worked on. Since we are there to provide communications on behalf of an agency, then we have to be able to meet its needs. According to the WinLink Development Team, "Let's face it, the world has adopted SMTP internet e-mail, and in order *not to appear antiquated* when assisting our served agencies, we should not disrupt their normal pattern by attempting to use any other medium. Rather, we should efficiently and transparently provide them with what they use daily, SMTP e-mail on their *own* computers, in their *own* normal operating places with their *own* familiar e-mail programs. We can do that without placing invasive software on their desktop computers or disturbing their firewall/router. We can do this simply by placing another e-mail account in their everyday e-mail program such as Outlook or Outlook Express."

Former FCC Director of Engineering and Technology Dale Hatfield, WØIFO,

spoke on the role of amateur radio in the new century. He said:

"In the past, hams have adopted more spectrally efficient technologies—for example, by migrating from double-sideband amplitude modulation to single-sideband modulation and, more recently, by shifting to more efficient modulation for digital modes. I would urge you to continue shifting towards more spectrally efficient communications techniques—especially digital techniques. Such a shift has a number of benefits:

• First of all, it demonstrates to policy makers and regulators that you are good stewards of the public's airwaves even without direct economic incentives.

• Second, by efficiently using what you have, it strengthens your case when you need to ask for additional spectrum.

• Third, by allowing more users to access the available allocations simultaneously, it improves the amateur experience and ultimately increases the attractiveness of the service to new and old users alike.

• Fourth, it provides the opportunity or "headroom" for increases in data rates to more closely match those available on wire line networks and, in the future, on commercial wireless networks as well.

• Fifth, as the rest of the telecommunications world makes the transition to digital techniques—and there are very few exceptions to that trend—the amateur service will look antiquated if it is not making progress in that direction as well.

So looking to the future of the amateur radio service in the new century, I would urge you to continue your traditional role in public service by being prepared for and providing communications in times of emergencies, conducting experiments, providing training in radio communications, and encouraging international comity. But I would also urge you to focus particular attention—for the reasons I just mentioned—on experimentation with digital techniques."

Is It Doable?

Many people are concerned over the possible cost of setting up a system. Some reports say the average ham spends between $300–600 a year on ham equipment and related activities. This might include a new HT or dual-band VHF/UHF transceiver. According to the ARESCOM report, "An amateur radio operator wishing to run Pactor III will need to spend between $850 and $1200 (PTC-II pro unit and PACTOR III license). Even the amateur radio operator with a budget of $600 per year will probably consider this a two- to three-year investment. This one piece of equipment is almost the investment cost of a new HF station." Other concerns have been raised over the proprietary software being used. The WinLink developers have indicated that this will not be a problem. Finally, some have asked whether it is more appropriate to have a "chat" mode for communication rather than e-mail. The ARRL Board of Directors is expected to take up the subject at its July meeting, which should be taking place as this issue reaches your shack.

Medical Emergency At Sea

We often report on medical emergencies at sea requiring amateur radio to be link between the ship and medical specialists. In late May, the *Motorized Vessel Brandon Travis* came onto the Maritime Mobile Service Network (14.300 MHz) stating that it needed assistance. The captain of the *Brandon Travis* was not an amateur radio operator, yet he knew that if there was an emergency on board, he could get immediate and capable help on this frequency. Under normal conditions, transmissions by non-amateur stations on this frequency are prohibited by international law. However, when an emergency occurs, anyone may use the frequency for assistance.

The captain said that there had been a fight between some crew members on the ship and that a 17-year-old crew member had been stabbed three times. He said that the crew member had been stabbed twice in the arms and once in the back. The stab wound in the back was of the greatest concern, as the knife had entered between the third and fourth rib on the right side of the back and the 7-inch blade had penetrated to its full depth.

The captain gave his position as 16º 06' north and 080º 38' west, or approximately two days east of Roatan, Honduras. The *Brandon Travis* is an 80-foot steel-hulled commercial fishing boat and is owned by a company in Honduras.

The captain requested that the net contact the United States Coast Guard (USCG) and tell them that he needed assistance with the injured person. The original call was taken by Tom Job, VE3II, near Toronto, Canada, and the necessary initial information was obtained. The Coast Guard's District 7 SAR (Search and Rescue) Center in Miami, Florida was then contacted and the information relayed to it. In turn, the center contacted the Honduran authorities and efforts were made to intercept the vessel and evacuate the injured person.

Dr. Jim Hirschman, K4TCV, Miami, Florida, was contacted and came onto the net. Dr. Hirschman is a physician with extensive experience in assisting with injuries and medical emergencies over the radio. He spoke with the captain and passed instructions on how to treat the injuries. It was determined that the person was in shock and having difficulty breathing. The injury was life-threatening and medical evacuation was of the utmost urgency. The *Brandon Travis* had been redirected from its original course to Laguna de Caratasca, Honduras. At its top speed, this port was approximately 12 to 14 hours away. In the meantime, the Honduran Navy was

launching a vessel to intercept the *Brandon Travis* and take the injured person to the hospital.

The Maritime Mobile Service Network maintained an hourly radio schedule with the *Brandon Travis* for a position report and a medical update. Dr. Hirschman was joined by another doctor, Peter Sosnow, W1KY, in Niskayuna, New York. Dr. Sosnow is an emergency-room trauma specialist. Each hour the doctors were apprised of the injured person's condition and were ready to recommend changes in the treatment. This radio schedule was maintained for over seven hours.

Shortly after midnight the net was informed by the *Brandon Travis* that the injured person had been moved onto a Honduran Naval vessel and was being taken to a hospital. His condition was stable.

Once more, amateur radio was ready, willing, and able to assist in an emergency situation. The Maritime Mobile Service Network stands ready to assist any mariner with any situation that may arise. Without the assistance of the net, this life-threatening situation could have resulted in the death of the crew member.

There were many other amateur operators and net control stations on the frequency during the time of this incident and *all* stations should be commended for their assistance in keeping the frequency clear so that the traffic could be passed rapidly.

With Thanks....

This month we took a look at amateur radio assisting with medical evacuations, whether at a mass casualty exercise or a real event on the high seas. We took a brief look at some emerging technology in amateur radio digital message handling and how we might have to change the way we respond to disasters. I'm sure we will have more on digital message handling in the future.

We can't tell the exciting stories of amateur radio public service without your help. This month we want to thank Larry Hughes, K3HE, Tom Job, VE3II, and the ARRL for their assistance. We also want to acknowledge the WinLink 2000 webpage (www.winlink.org) for providing information.

Do you have a story to tell? Sometimes the event doesn't involve a disaster, but your efforts show amateur radio helping in the public interest. Drop us a note and let us know what you are involved with. Until next time . . .

73, Bob, WA3PZO

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C4S	10/12/15/17/20/40m, 7 el	$719
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HF9VX, 9 Band Vertical	$369
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432-9WL/432-13WLA	$179/239
440-18/440-21ATV	$129/149

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2MCP14/2MCP22	$169/239
436CP30/436CP42UG	$239/279

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25AG2/3/4	$119/119/129
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AS25G/AS455G	$49/109
BPC25G/45G/55G	$89/119/129
BPL25G/45G/55G	$99/129/149
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TMM541SS	$1799
TX438/TX455	$1289/1789
TX472/TX489MDPL	$2929/7649
HDX538/HDX555	$1539/2679
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GP6, 2m/70cm Vertical	$149
GP9, 2m/70cm Vertical	$189
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SB14, 6m/2m/70cm Mobile	$59
SBB224NMO,2m/220/70cm	$69
SBB2NMO, 2m/70cm Mobile	$39
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10M4DX, 4 Element 10m	$399
12M4DX, 4 Element 12m	$399
15M4DX, 4 Element 15m	$449
17M3DX, 3 Element 17m	$399
20M4DX, 4 Element 20m	$529

MORE M2 IN STOCK–PLEASE CALL.

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H2, Aluminum Hazer, 12 sq ft	$359
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RT1832, 17 Foot, 12 sq ft	$519
RT2632, 26 Foot, 9 sq ft	$869

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9-40'/50'/60'	$759/1089/1529
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15-40'/50'	$1019/1449
23-30'/40'	$899/1339
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NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A, 2m/70cm Vertical	$129
X500HNA/X700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

MORE DIAMOND ANTENNAS IN STOCK.

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259B, Antenna Analyzer	$219
269, Antenna Analyzer	$299
941E, Antenna Tuner	$109
945E, Antenna Tuner	$99
949E, Antenna Tuner	$139
969, Antenna Tuner	$169
986, Antenna Tuner	$289
989C, Antenna Tuner	$309
1798, 80–2m Vertical	$249
1796, 40/20/15/10/6/2m Vert	$199

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COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
RG-8X, Mini RG-8 Foam	$.19/ft
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RG-8X Jumpers	Please Call

CALL FOR MORE COAX/CONNECTORS.

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LMR-400 Ultraflex	$.89/ft
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LMR600 Ultraflex	$1.95/ft

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1/2"x9"EE / EJ Turnbuckle	$18/19
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3/16" / 1/4" Big Grips	$5/6

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5 FT x .12" / 5 FT x .18"	$35/59
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19 FT x .12" / 21 FT x .18"	$129/235
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Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Eagle Guy Kit	$29
Titan DX	$329
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Voyager DX	$409
Voyager Counterpoise	$49
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9106	6m	9115	15m	9130	30m
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9112	12m	9120	20m	9175	75m

All handle 600W, 7' approximate length, 2:1 typical VSWR .$24.95

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G6-270R, 2m/70cm Vertical	$169
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Yaesu G-450A	$249
Yaesu G-800SA/DXA	$329/409
Yaesu G-1000DXA	$499
Yaesu G-2800SDX	$1089
Yaesu G-550/G-5500	$299/599

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R62 (#18)	$.32/ft.
R81/82	$.25/ft./.39/ft.
R84	$.85/ft

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HPTG1200I	$.45/ft
HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$6.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$8.50
HPTG6700I	$1.29/ft
PLP2755 Big Grip (6700)	$12.00
HPTG11200	$1.89/ft
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• MDP & MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

Now shipping from CA for west coast customers, and KS for east coast and midwest customers, to reduce freight cost!

TX SERIES HEAVY DUTY CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TX-438	38'	21'6"	355	$1,523	$1,289
TX-455	55'	22'	670	$2,107	$1,789
TX-472	72'	22'8"	1040	$3,462	$2,929
TX-472MDP	72'	22'8"	1210	$5,571	$4,699
TX-489MDPL	89'	23'4"	1800	$9,034	$7,649

HDX SERIES CRANK-UP TOWERS

• Heavy duty, handles 44.7 square feet of antenna load at 50 MPH, 35 square feet at 70 MPH.

• All models supllied with hinged T-base, anchor bolts, hand winch (except motor drive models), top plate, and rotor plate.

• MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

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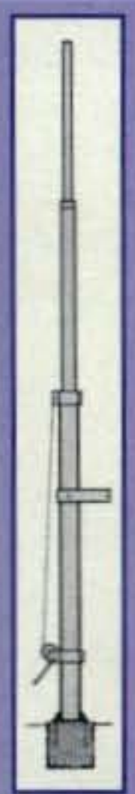
HDX SERIES HEAVY DUTY CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
HDX-538	38'	21'6"	600	$1,807	$1,539
HDX-555	55'	22'	870	$3,162	$2,679
HDX-572MDPL	72'	22'8"	1600	$8,281	$6,999
HDX-589MDPL	89'	23'8"	2440	$10,841	$9,179
HDX-689MDPL	89'	23'8"	3450	$20,943	$17,699
HDX-5106MDPL	106'	24'8"	3700	$22,791	$19,299

MA SERIES CRANK-UP MASTS



• Handles up to 22 square feet of antenna load. (See chart below)

• MDP models include motor drive.

• All models supllied with anchor bolts, load-actuated hand winch, and house bracket.

• Options include coax arms, raising fixtures, motor drives, self-supporting and rotator bases, remote control panel, and more!

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MA SERIES CRANK-UP MASTS							
MAST MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	50 MPH (sq. ft.)	70 MPH (sq. ft.)	LIST PRICE	SALE PRICE
MA-40	40'	21'6"	242	16.5	6.8	$1,209	$1,039
MA-550	55'	22'1"	435	22	9	$1,875	$1,599
MA-550MDP	55'	22'1"	620	22	9	$3,584	$2,999
MA-770	71'	22'10"	645	15.5	5.5	$3,091	$2,619
MA-770MDP	71'	22'10"	830	15.5	5.5	$4,890	$4,129
MA-850MDP	85'	23'6"	1128	15.3	6.3	$6,591	$5,549

TMM SERIES COMPACT CRANK-UP TOWERS

• Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.

• Compact design is great for areas with tower restrictions, or where a less intrusive installation is desirable.

• All models supllied with hinged T-base, anchor bolts, load-actuated hand winch, 8" steel mast, top plate, and rotor plate.

• Options include coax arms, raising fixtures, motor drives, thrust bearing, remote control panel, and more!

Now shipping from CA for west coast customers, and KS for east coast and midwest customers, to reduce freight cost!

TMM SERIES COMPACT CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TMM-433SS	33'	11'4"	315	$1,626	$1,379
TMM-433HD	33'	11'4"	400	$1,970	$1,669
TMM-541SS	41'	12'	430	$2,135	$1,799

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Keys and CW Hot in 2004! Part II

BY DAVE INGRAM,* K4TWJ

Our coverage of terrific telegraphic treats continues this month, and we have compiled some real beauties along with some always useful information to share with you. We have also noticed the more we spotlight keys in this column, the better you like it—and the more you support additional keys columns with views and details of your own special keys. Thanks! With your help, this series will continue indefinitely. Oh, if we had only kept a stack of back issues with keys columns or at least made an ongoing list of those issues. Now it seems the series has become a collectable. Have any of our readers been storing or cataloging the series? We would like to hear from you. Now let's talk Morse, keys, and CW!

More New Keys

Opening this month's showcase are, as you naturally expect, two more beautiful, new, and available-right-now keys. First in the spotlight is the little single-lever paddle from Richard Meiss, WB9LPU, shown in photo 1. We understand Richard is still buried in back orders for his small dual-lever paddle and miniature bug featured in last year's column, so you may need to join the waiting list for this one. It is worth the wait, however, as it is a real beauty. Single-lever paddles are also easier to manipulate than dual-lever paddles, as their arm can move only one way at a time.

The WB9LPU paddle has separate dot/dash gap adjustments (the red-tipped screws at the rear in photo 1), and tension is set by removing the fingerpieces and ever so slightly bending the spring brass strips on each side of the main lever. The paddle is also a "convertible": its complete brass section comprises a palm-size paddle for portable use, or the wide foot near the fingerpieces and front stabilizer can be removed and the full key mounted on its bocate wood base. The little paddle is fun to use either way.

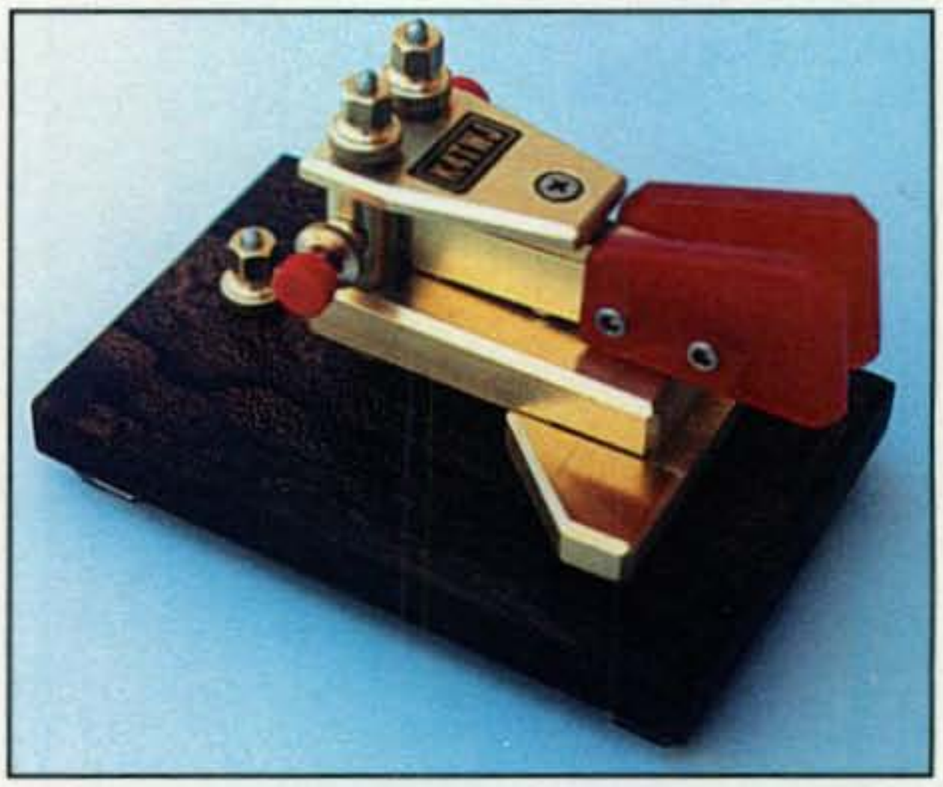

Photo 1– The new single-lever Parkwood paddle made by WB9LPU measures 2"H×2"W×3"D and sports a highly polished brass mechanism with bright-red fingerpieces and red-tipped gap-setting screws for glamour. Paddle can be used portable or the wide foot can be removed and the mechanism mounted on its bocate wood base for home station use.

Want one? Contact Richard Meiss, WB9LPU, at 2626 Parkwood Drive, Speedway, IN 46224, or e-mail him at <wb9lpu@earthlink.net> for details.

Next up is another very special, limited production key we are sure you will absolutely love. It is special in both its design and historical background (photo 2). This little beauty is hand made by

*4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

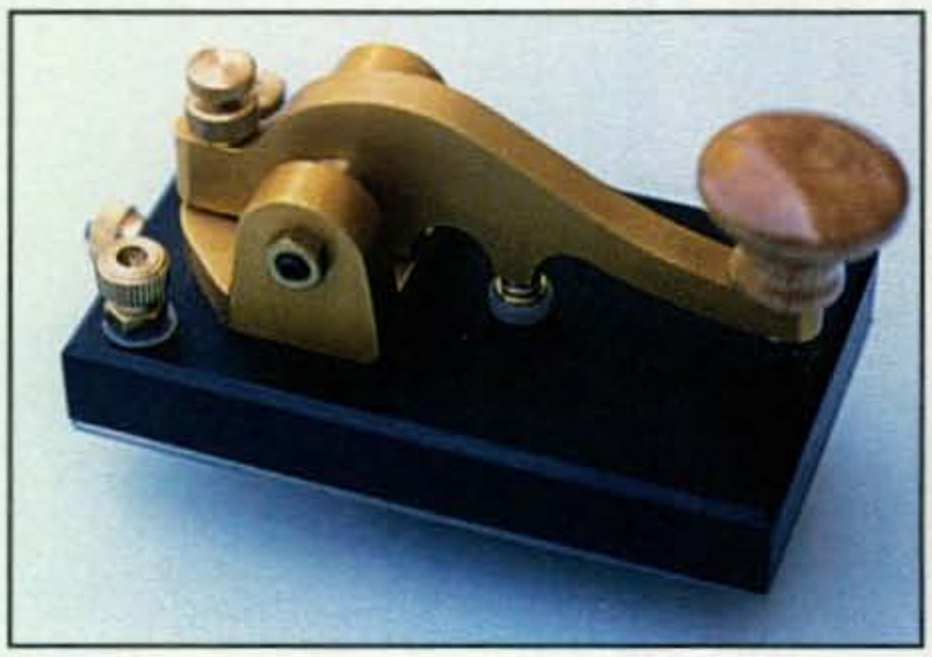

Photo 2– Combining telegraphic history with sheer artistic beauty, Englmar Wenk, DK1WE, makes this miniature Chubbock camelback replica key. It measures 1.5"H × 1.5"W × 2.75"D, has ball race bearings, fine gap and tension adjustments, silver contacts set in Teflon® insulation, and handles great. Key requires many hours to make, so it is a special-order item (available through K4TWJ).

Photo 3– The original Chubbock camelback key, which Englmar measured, studied, and used as a guide to reproduce both miniature and full-size replicas of this telegraphic treasure. Key is on display in the Post and Telegraph Museum of Germany, and a similar Chubbock is in the sealed collection of K9WDY in the USA.

Photo 4– A more familiar and conventional-design camelback is this meticulously preserved Partrick and Carter item from the 1870s. The hump was thought to be helpful in minimizing Carpal Tunnel Syndrome. (Photo courtesy master key collector, Gil Schlehman, K9WDY)

Englmar Wenk, DK1WE, in Germany, and I (K4TWJ) am serving as his North American agent so you can get one without excess fumbles. The key is a miniature replica of the most famous camelback of all times, the legendary Chubbock that dates back to the 1860s and the early days of telegraphy. Englmar's miniature is fashioned after an original Chubbock on display in the German Post and Telegraph Museum, with some upgrades for great operation. It has ball race bearings at the fulcrum, and the tension adjustment has been shifted to the rear of the base for smoother action. The changes work well, too. The miniature Chubbock is a sheer delight to use—really superb. In fact, I often use it with my Elecraft KX1 or Yaesu FT-817 switched from keyer to hand-key operation just for fun.

As I mentioned above, I am presently Englmar's North American agent, so more details (and DK1WE keys!) are available from me at <k4twj@ cq-amateur-radio.com>. As I mentioned last month, I will soon move QTH and my postal and personal e-mail addresses will also change, but my *CQ* e-mail address should work fine during this transition period.

Keys, Mice, and CTS

History often opens our eyes to some interesting situations, doesn't it? During the 1860s, for example, small towns were springing up across the country, railroads were starting to link the east and west, and the telegraph was replacing the Pony Express. When General Custer and company were massacred at Little Big Horn, keys and sounders in almost every telegraph office clattered day and night for several weeks. Poorly made keys fell apart, telegraphers' nerves were challenged, and the continuous repetitive action of using a simple hand key 16 hours a day resulted in what we know today as Carpal Tunnel Syndrome.

Camelback keys, with their different shape and feel, were the first keys designed to address minimizing CTS. Whether or not they actually were effective is anyone's guess, but Camelbacks have evolved as sheer works of art and are highly sought collectibles, especially among hand-key enthusiasts. They have also spun off other mild to wild designs and gizmos, from J. H. Bunnell's famous Double Action ("Sideswiper") key to the unbelievable Pump Handle key shown in photo 5. Yes, the latter is an authentic telegraph key with a full mechanism mounted inside its beautifully craft-

Photo 5– A number of unique items were devised to aid telegraphers with Carpal Tunnel Syndrome, but few are as wild and witty as this incredible Pump Handle Key. You pull down on its handle rather than pushing down on a knob to send Morse code, and it really works. A full key mechanism complete with gap and tension adjustments is mounted in the decorative case. (Photo courtesy K9WDY)

ed and immaculately preserved case. You send code by pulling down on the handle. It is a hoot and a rare item, but it sidesteps CTS!

In taking a closer look at Carpal Tunnel Syndrome, incidentally, I notice a striking similarity between it and modern problems with a computer mouse and tendinitis. Like many *CQ* readers, the day job of my XYL Sandy, WB4OEE, has her using a computer mouse many hours every day—point, click, point, click, point, click. Eventually, her thumb became quite painful. The injury was first addressed with a splint or brace provided by Worker's Comp insurance, but it basically did not help. Hand surgery followed. We are hopeful it will correct the injury. Time will tell.

Photo 7– We call this intriguing little item a "door latch key." It was homebrewed by James Butler, KB4LJV, and uses a small door or cabinet latch for its main pivot point. The mating arm is half-inch steel stock fitted with screws for gap and tension adjustments plus a round ceramic cabinet pull with wood skirt for a knob. Clever!

During Sandy's surgery, I noticed the outpatient waiting room was filled to capacity and overflowing into hall areas. I also overheard doctors talking with other spouses of patients, and I learned that they, too, were undergoing hand surgery from problems with a computer mouse. Obviously, this is a serious problem that will continue escalating until next-generation (voice-recognition) computers evolve.

A few days later, a very bright, new amateur who considers me his "helping Elmer," Brent Cantrell, KI4DYA, introduced Sandy to the wireless and multifunction trackball controller (photo 6). The trackball functions like a mouse, but it does not move. It works with your right or left hand and includes extra buttons you can set to access often-used functions. You drive or "navigate" it with the flat of your hand or thumb rotating the

Photo 6– In the same manner that camelback keys offered relief for Carpal Tunnel Syndrome, modern wireless and multifunction trackball controllers are viable alternatives to a computer mouse for sidestepping tendinitis. It is a switch worth considering! (Discussion in text.)

Photo 8– We are unsure if this KB4LJV-homebrewed item is a top-hat key or a can key (the cover is a cat-food can lined with hold-down magnets). Either way, it is a killer! Round keys rock!

Photo 9– Under the can . . . err, top . . . we find another neat steel stock arm and door-latch pivot point. I have used this key on the air, and I must say it handles very well.

Photo 10– KB4LJV made this neat little treat from an inexpensive MFJ hand key. He cut the arm to the length of the base, moved the knob forward on the arm, and emerged with a clever QRP key for toss-'n-go use.

ball, and click with your fingers or thumb, depending on which hand you use and if the trackball controller is positioned forward or backward, so to speak. Since it is wireless, it can sit on a desk, a keyboard shelf, or your leg to minimize stretching, which also aggravates tendinitis. A word to the wise should be sufficient: alternate hands and consider switching to a trackball—today!

Code Talk

In the same manner that our previous columns highlighted tips for sounding good on the air, we now offer a few helpful notes for operating CW like a pro. You may or may not know these facts, but reviewing them from time to time is always beneficial in maintaining good operating skills.

Three of the most common pitfalls I notice every day are haphazardly sent and challenging-to-decipher code, omitted or neglected callsign exchanges, and exceptionally slow-sent Morse. Please, friends, visualize how your transmitted CW sounds to others and strive for perfection. Just because you

Photo 11– Notice the pilot light on this classic J7A flameproof key owned by Jack Hornsby, W0NQ. The key was used with a rotary spark-gap transmitter on an airplane during the 1920s. Engine noise drowned out sidetone buzz, so the light extinguished with key closures for monitoring transmitted Morse. (Photo and info courtesy W0NQ)

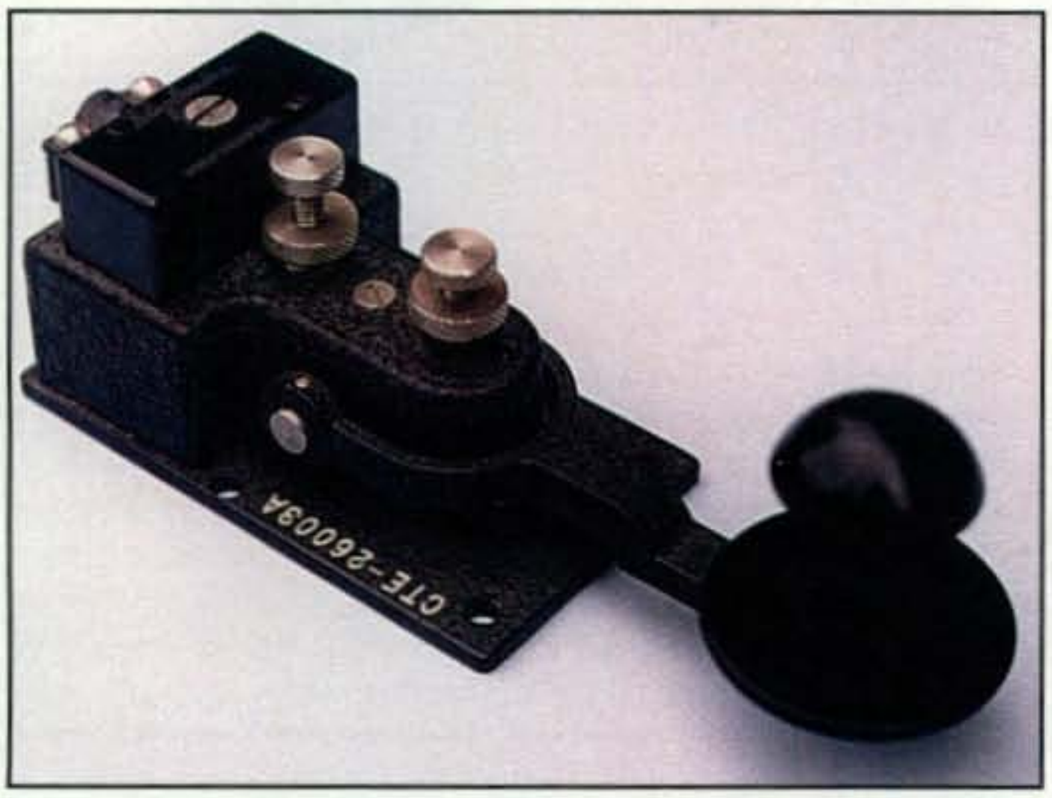

Photo 12– Precious l ittle information was available on this little pumper, but we are sure you will find it interesting to study. Like the J7A, it is also an enclosed/flame-proof key. Ships often carried volatile cargo, and arcing contacts on keys used with spark or tube transmitters were potential igniters, so their mechanism was covered for safety. Interesting, eh?

know what you are sending does not guarantee other operators understand it. Minimize choppiness. Aim for a classic 3:1 dot-to-dash ratio (a dash is 3 dots long). If ratios and spacing are a problem, switch to an electronic keyer with dot-dash memory (it follows behind you and sends perfect code even if you have shaky hands). If mastering iambic action with a twin-lever paddle is difficult, change to a single-lever paddle. You can send good CW with it even when wearing thick mittens—really!

While transmitting callsigns at each and every "over" during a QSO is no longer mandatory, including station calls when band conditions are less than ideal and at the end of a QSO is most beneficial. Why? Even when signals fade, operators can recognize their call letters. Hearing even part of a call helps each station know (or judge) when to transmit or listen. Furthermore, a good friend may tune across the frequency and never realize you are there unless you add your call at the end. We all are justifiably proud of our call letters. Use them! Often!

Practice copying Morse in your head and increasing your code speed. This simple step makes CW ten times more enjoyable. A vast number of QSOs follow similar "RST, name, QTH, and rig" formats, so mentally "filling in the blanks" works well for any speed or for contesting. One final tip: Learn to concentrate on a single tone while ignoring all the rest on frequency or in a pile-up (it is easier if you use RIT to tune the desired signal for a very low-pitch or bassy tone). Optional IF filters are great, but "mental filtering" is a special asset and skill to admire. As I always say, the operator rather than the rig makes the difference—especially in copying CW!

Closing Views

Have you ever considered homebrewing your own keys from readily available parts? James Butler, KB4LJV, did precisely that, and he came up with some quite interesting items in the process (photos 7, 8, 9, and 10). Making good use of door latches, drawer pulls, and small food tins, James produced some good examples of what one can devise with a creative imagination. Thanks for sharing the views, James! Hopefully they will encourage others to also share details and photos of their own favorite keys, bugs, and paddles via this ongoing series. Regular 35 mm color photos still reproduce great in *CQ* (if you shoot them in focus!). Digital images in tif or jpg format also work, provided they are in the 250k to 300k or 300 dpi range. However, do not e-mail me such high-resolution views; just show me a low-resolution, quick view and I will tell you where to send the big file.

On that note, our curtain closes on another year's tour of magical Morse treats. Thanks for your continuing support, and I look forward to exchanging key clicks with you on 30 meters one weeknight soon! 73, Dave, K4TWJ

KEYS III Book Coming!

A number of friends and CW aficionados have asked if we are putting together a *Keys III* book to follow our extremely popular *KEYS II* and *Keys, Keys, Keys* books, and the answer is a hearty "yes, indeed!" It includes views and details of rare and exotic keys like few have ever seen. It will be in both book and CD form, and we hope to make it available during the first half of 2005. More details soon!

—Dave, K4TWJ

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SS-30M*	25	30	3¾ x 7 x 9⅛	5.0

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SRM-30	25	30	3½ x 19 x 9⅛	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅛	6.5
SRM-30M	25	30	3½ x 19 x 9⅛	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30-2	25	30	3½ x 19 x 9⅛	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅛	11.0

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GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
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SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

A Day in the Life of A Communications Volunteer

The clock radio on my nightstand springs to life. I groggily open my eyes to see what time it is, since it's still dark outside. The green digital readout says 3:00. I wonder what is happening so early on a Sunday. My eyes open wide and I remember: I am a Huntington Beach Radio Amateur Civil Emergency Service (RACES) "bicycle mobile" for a fund-raising 10k run/walk event today.

I get a little nervous, since I still need to add some lights to my bicycle. I really like the bicycle-mobile assignment, because it is a great way to get some exercise, you get to see a lot more of the event, and you are able to maneuver quickly to respond to anything that may happen. The bike can move quickly and quietly through the crowds to lend assistance in any situation, including relief to other RACES positions along the route. It's also just plain fun.

Photo A– One of the nice things about bicycle mobile is having the chance to rove along the event. My bicycle-mobile station is almost invisible, leaning against the railing next to the traffic-signal post. RACES team members Tim Sawyer, WD6AWP, and Marilyn Brandon, KH6FL, are in this photo, making notes of the front- and rear-runners at this post along the Huntington Beach shore.

I head for the shower, then finish my "wake-up procedures," and remember again that I still need to attach lights to my bike. I am glad that everything else has been ready for at least a week, and I even have a long-lasting gel-cell battery pack for my radio, fully charged and ready to go (see "Beginner's Corner," February 2004). All I have to do is "suit up" with my 2-meter gear, ID badge, and RACES jacket.

The race starts at 7 AM, but the RACES team members need to be in place by 6 AM to make sure we get decent parking close to each post and get a chance to check our gear. Meanwhile, the Net Control station is being set up in a police substation somewhere along the course.

Since I am not too far from the course, I decide to bicycle my way down to the rendezvous location, check in with the race officials, and get my credentials. This eliminates any vehicle parking issues, but also complicates matters a bit, since I will not have a "home base" in which to store any additional gear or work on the bicycle if something goes wrong. It's still dark outside, so I make sure my head- and tail-lights are working. I put on my helmet and gear and pedal down to the course. The cool pre-dawn air is invigorating, and the streets are very quiet and empty, making me feel safe, despite the darkness.

The repeater is already filled with spontaneous chatter as other RACES team members leave their homes and proceed to the check-in table. Everyone already has their assignments, so as soon as they get their credentials, they will move into position. I keep my rig in the receive mode, since I am just a little out of breath and am puffing already.

I get in line with the other volunteers for the race. Medical personnel, race officials, and the RACES team are checking in to grab their "goodie bags" and credentials. I grab a donut and coffee to energize me for the morning, and I pedal my way to my first post.

The Net Control Station (NCS) announces to the repeater users that the machine will be in use for RACES emergency and health-and-welfare communications for the next eight to ten hours, and repeater communications should be limited to the closed net, unless any emergency communications is needed.

It's 6:45 AM, and the NCS initiates roll call. It's still early, but the NCS wants to make sure everyone is in place and each post is covered with a working radio. Sometimes things can go wrong at the worst possible moment, and we want to avoid this as much as possible.

Since the net is officially "on," we are operating with tactical callsigns. Tactical calls are more efficient and also describe the station by function, increasing efficiency. Besides, tactical calls are cool. I am Bike Mobile One, since there is a second bicycle-mobile station, covering the second

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The Bicycle-Mobile Grab-'n-Go Kit

After doing bike mobile for public-service events for a little while, I've developed a "minimalist" version of the Go Kit for roving on a bicycle. First, everything must be safe, and anything attached to the bike must not become a hazard to the rider, participants, or spectators. This includes protruding antennas.

The bicycle mode adds some complications to your preparation list, since something can go wrong with either your bicycle or your radio. If your bike breaks down someplace, you will have to find a way to get rolling again. Even if you take your bike out for a "little spin around the block," you should take your bike tool kit with you. I once thought that I could get away with not taking the tool kit on such quick trips, but just last weekend I took the bike out with only an HT and a bottle of water. After only a few block, the seat post bolt somehow worked its way loose, and the seat slammed all the way down after going over a bump in the road. Since I didn't have my bike tools with me, I had to go back home just to tighten the bolt. It took less than five seconds to perform the "repair."

Don't forget head- and tail-lights, even if you think you will return before dark. It is always better to be safe than sorry, and you do not want to get stopped for violating any traffic laws in any case. Photo C shows my simple, but effective bicycle-mobile setup. It's basically an HT attached to the handlebar with Velcro® straps. I made a handlebar extension with one-half-inch PVC pipe, caps and Ts. The first T is sliced with a hacksaw and attaches to the handlebar with a pair of hose clamps. (Heat the PVC T with a hot-air gun, and, wearing gloves, "open up" the cross section to form around the handlebar. Then use the hose clamps to secure the T to the handlebar. Plug in a short, straight section, and plug another T into that. Make small extensions to the left and right for your HT and your boom/microphone control unit. There is also room for my portable GPS unit, not shown in these photos. Make sure that the bracket and wiring for the radio do not interfere or bind with brake and derailleur cables, or the steering action and pedals, chain and gears.

A headset/boom microphone is used for "almost hands-free" operation. The VOX (voice-operated transmit) feature is disabled, and manual PTT (push-to-talk) is enabled to prevent wind and ambient noise from triggering the transmitter.

Include a personal first-aid kit as well as food and water. Water is a necessity on hot days, since the heat will increase your sweat output, and you must replenish water in your body. A standard water bottle and carrier are used on the bike, while a fanny sack holds my snacks, spare keys, and coins.

Of course, all this liquid intake will increase the likelihood of the need to get rid of it. You will need to have a way to secure your bike as well as your radio equipment if you need to take a break. My radio system is based on the HT, so I actually wear most of my radio gear. The bike will need to be locked to a stationary object. Another very useful item when you are bicycle mobile is a metal mesh bag, designed to secure backpacks. You can enclose your radio, antenna, GPS, and other gear in this metal mesh bag and lock it to your bike. Of course, as a good friend advises, the only way to prevent theft is to take everything with you.

The bicycle-mobile operator must also be aware of the communications capability of his or her equipment. For casual work, some amazing contacts are possible, depending on the frequency range used and propagation conditions. For local work, as used in public-service communications, VHF and UHF FM repeaters and/or simplex are usually used. Experiment and verify and know what you can and cannot do (both radio-wise and physical ability-wise) before you volunteer for a bicycle-mobile roving position.

half of the course. Tactical calls are assigned for all stations, from Net Control and Start-Finish to Rest Stop One and all the way to Rest Stop Six. There are also "shadow" positions for race officials. A RACES shadow operator walks with another person, usually an event management or other official person. This way, the event management team can have instant communications to other officials or positions along the entire course.

The HB RACES group uses tactical calls because they define the operator by function in the operation, rather than by personal name or callsign. This is very useful for long events, and avoids confusion when radio operators are changed; the same tactical (functional) call remains constant. Of course, FCC Rules [Section 97.119] on station identification still apply. Thus, as we use a tactical call such as "Bike One," we add our ham radio call along with the tactical callsign. For example:

Bicycle Mobile One station: "Net Control from Bike One."

Net Control Station: "Net Control."

Bicycle Mobile One: "There is a runner down near Rest Stop Seven."

Net Control Station: "Understood. Paramedics are on the way. KG6CNL Net Control."

Bicycle Mobile One: "Bike One clear. KH6WZ."

I lean my bike against a railing to snap a quick picture as the sun rises, capturing the silhouette of my radio and bike

Photo B– Both sides of a four-lane highway (Pacific Coast Highway, or PCH) are filled with human bodies rather than automobiles during the run, an unusual sight.

against the multi-colored sky. My HT comes to life as the race starts. It will be a few minutes before the runners come into my view, so I relax and take a sip of water. I double-check my bike and my radio. Everything is still in place and functioning.

I listen to the smoothly running net, with communications limited to runner status and where the leaders are on the course. The runners should be appearing soon. I get my notepad out, preparing to take notes on the front-runners. My camera is in hand, in case a picture opportunity happens (photo A).

The runners pass by, all bunched in clusters. Both sides of the major ocean side street are filled with human bodies rather than automobiles, and this is an unusual sight. I take a few shots of the runners going by and take another photo of the RACES members at their post (photo B).

Several hours have gone by and radio traffic is routine. This is a good thing, because as one of the RACES senior officers always says, "We need to always prepare for the worst, and expect the best" during any emergency or public-service event.

Photo C– The KH6WZ bicycle-mobile station consists of an HT attached to the handlebars with a PVC bracket. Scrap half-inch PVC pipe and parts are used to make the radio/GPS support bracket. Similar, but nicer, handlebar accessories are available at your local bike shop. Not shown is the small GPS unit that clamps on to the right of the HT. Make sure that no part of the setup gets in the way of safe bicycle operation.

The Net Control takes roll call again, since most of the positions may be a bit tired and, yes, a little bored, since nothing "exciting" has happened. Each station checks in. It is always interesting to listen to all stations and their signal strengths, making notes on who is the loudest and clearest as well as which stations are weaker. This note-taking is important for the post-event critique. We need to make sure all stations are aware of what they sound like on the receiving end, since when we transmit, we hear nothing.

The background noise at the start-finish line is particularly loud, since the band and the public-address system are blaring all the time, and the rest of the net has to hear the noise whenever "Start-Finish" clicks the PTT button. Several rest-stop positions seem to have weaker signal strengths, probably due to the terrain. This is definitely something to bring up at the critique session, and something to improve for the next event.

The end of the race is near. The NCS asks each location to report on the race leaders and the race stragglers so that we can get ready to close the net. The bicycle mobiles are to "sweep the course" looking for the last runner. This is my cue to watch for the last group of runners (identified by the bib number and description of the runner) and to "follow them in" as they get to the finish line. I stay a respectful distance away from the stragglers and stay in touch with Net Control. Finally, the NCS lets me know that they have the last runner in sight, so I can be excused from the net. My assignment is finished.

It's nearly noon now. My water bottle is almost empty, and I ran out of energy bars a while ago. At the end of this very long but fulfilling day some of us gather at the Net Control location to check out and get a race T-shirt as a memento of our public service.

At a recent family gathering, a relative asked me why I do these things—get up really early in the morning and put all that expensive radio gear on a bicycle, and all I get is a T-shirt. I just said, "I do it because it's fun, I get some exercise, and I help out my city. I am a RACES volunteer." The next question is, predictably, "Are you going to do it again?" The answer is always, "Of course, because it's really a lot of fun."

As we enjoy the summer season, I hope I have inspired you to try some of these outdoor public-service ham radio events if you have not done so already. Public service and mobile-portable ham operations go well together in the summer months.

73, Wayne, KH6WZ

References

A quick Google inquiry generated 10,500 results on ham radio and bicycling. Here are some of the more interesting sites to visit:

Bicycle Mobile Hams of America: <http://www.lafetra.com/bmha>
WB9GIE's Bicycle Amateur Radio Page: <http://community-2.webtv.net/WB9GIE/WB9GIEsBicycling>
Bicycle Mobile Antennas: <http://www.arrl.org/tis/info/pdf/9303052.pdf>
A good reference on public service communications is posted on the ARRL website: *The Special Events Communication Manual*, By Steven R. Ewald, WV1X, published by the ARRL, <http://www.arrl.org/FandES/field/spevman/>

qrp

BY DAVE INGRAM,* K4TWJ

Quick-Brew Fun: The Super Mite

Our quest to help newer amateurs discover the unlimited fun and excitement of QRP continues this month with a special quick-brew project with widespread appeal: a mini-transmitter with some really unique features. As I have mentioned in previous columns, dinking with simple circuits and occasionally building one or two pieces of radio gear just for fun has always been one of QRP's top attractions. Indeed, nothing compares to the thrill and exhilaration of contacting other amateurs with a small rig built by your own hand. That, dear friends, is the sheer essence of amateur radio!

Our featured "Super Mite" is an ideal first project in this respect. It can be assembled for 40, 30, or 20 meters; its circuit is simple and well proven; and it includes some very special mods, such as *VXO frequency control and a wireless BFO mode for transceiver-type operation with a portable AM shortwave receiver.* I have even put together some low-cost

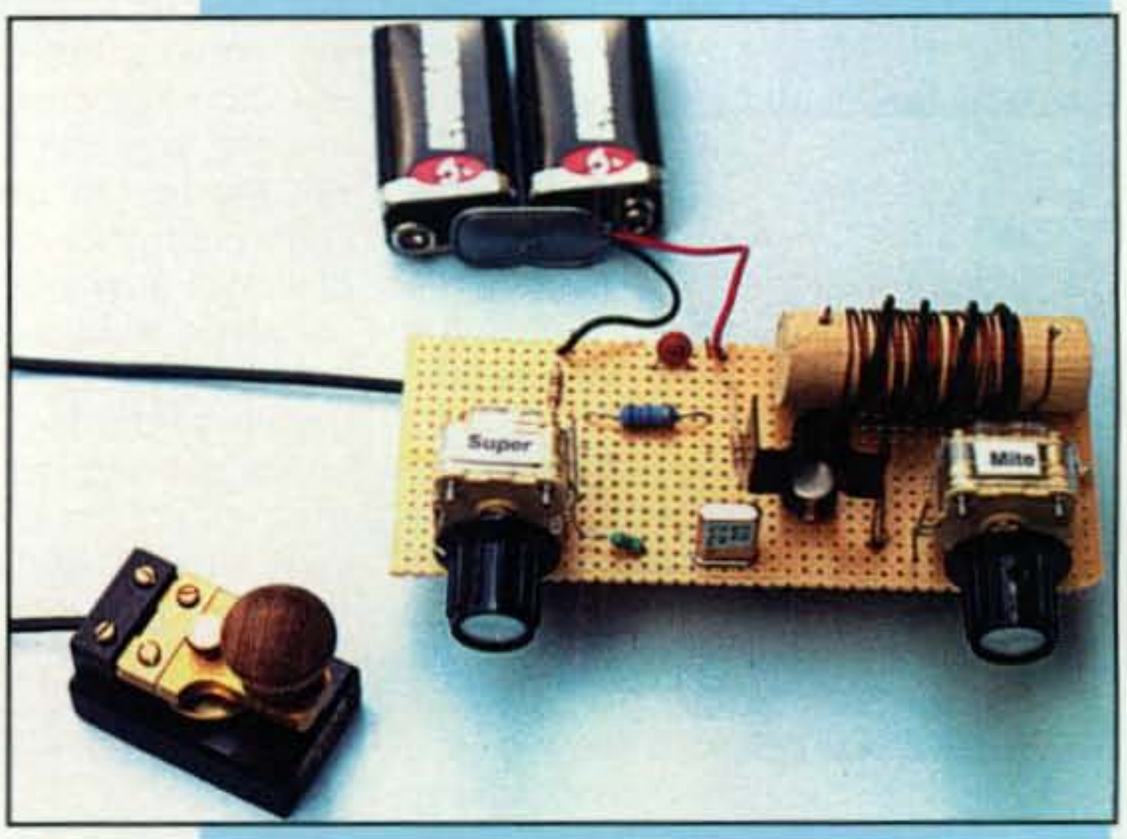

Photo A– Meet the Super Mite, a quick-brew, one-transistor transmitter for 40, 30, or 20 meters with VXO frequency control and "no connection required" BFO function for transceiver-type operation with an external AM/FM/shortwave radio. The little delight is powered from readily available 9-volt batteries and pumps out a clean 900-milliwatt signal.

*4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

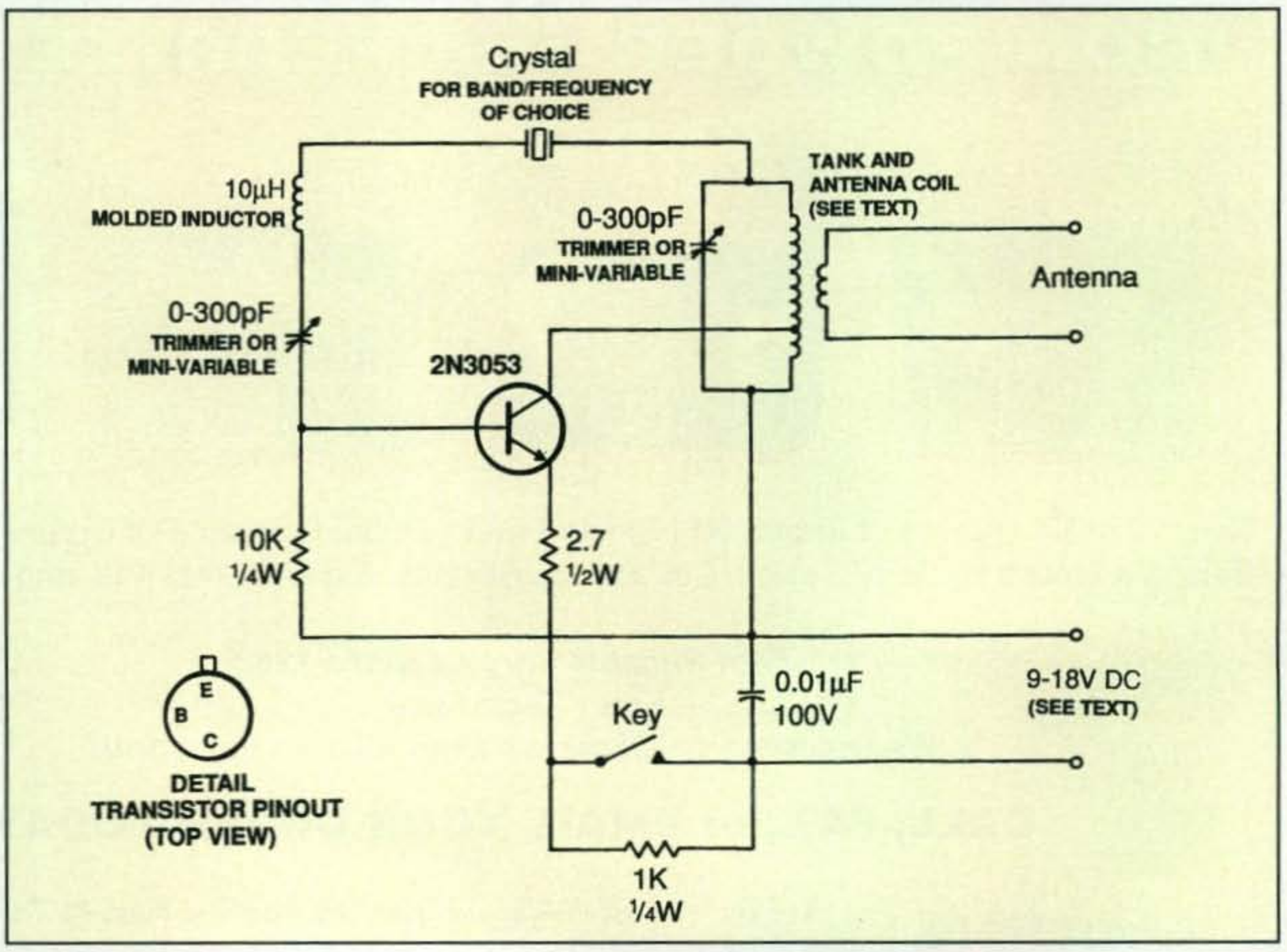

Fig. 1– Circuit diagram of the full-featured Super Mite transmitter. Value of emitter resistors can be juggled to fit your specific needs. (Discussion in text.)

1 1/4" Diameter Coil Form			5/8" Diameter Coil Form	
Band	**Tank Coil**	**Antenna Coil**	**Tank Coil**	**Antenna Coil**
40m	26 turns	4 turns	44 turns	4 turns
30m	16 turns	4 turns	25 turns	4 turns
20m	14 turns	4 turns	18 turns	4 turns
All coils tapped at 5 turns. All coils wound with No. 18 solid, insulated hook-up wire.			Tank coils tapped at 6 turns. Tank coils wound with No.22 enamel-coated copper wire. Antenna coil wound with No. 18 solid insulated hook-up wire.	

Fig. 2– Coil data for the Super Mite mini-transmitter.

parts packages of the Super Mite for your homebrewing convenience.Sound enticing? Read on.

Meet the Super Mite

A number of QRP friends asked me to devise or highlight a simple transmitter project they could whip together in three or four hours and use to make a few special contacts and show their colleagues. They wanted a battery-powered unit that could be assembled "breadboard style" on perfboard so they could plan their own layout, run their own wires, and modify them as desired. Our Super Mite meets those needs in high style, plus you can package the finished transmitter in several cool ways to fit your own preference.

If you look at the Super Mite's full circuit diagram in fig. 1 plus check out our quick-brewed version in photos A and B, you will notice the elegant simplicity of this little gem. A cylindrical coil, tapped to match the transistor's collector, is used in the tank circuit. It is tuned to resonance (minimum emitter current and maximum output power) with a small 300-pFd compression-type trimmer capacitor or plastic-case variable capacitor such as that used in a pocket AM radio. A second variable capacitor is paired with a 10-µHy inductor and used VXO style to shift the crystal's frequency between 5 and 15 kHz (the exact range depends on the crystal and band of operation).

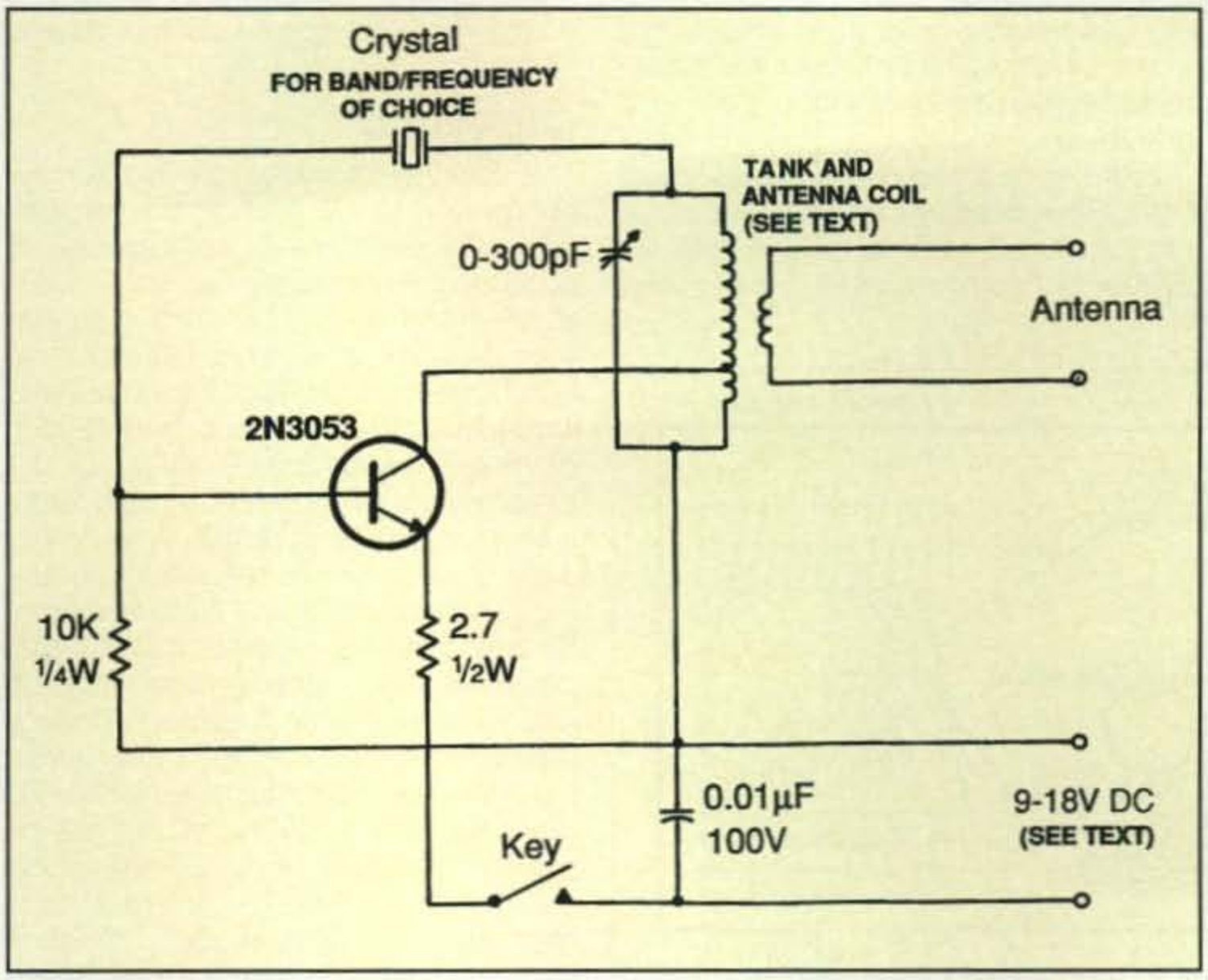

Fig. 3– Circuit diagram of the basic Super Mite. Assemble this "bare bones" circuit first, ensure it works smoothly, then add the special "frills" included in fig. 1, and your homebrewing success is eminent.

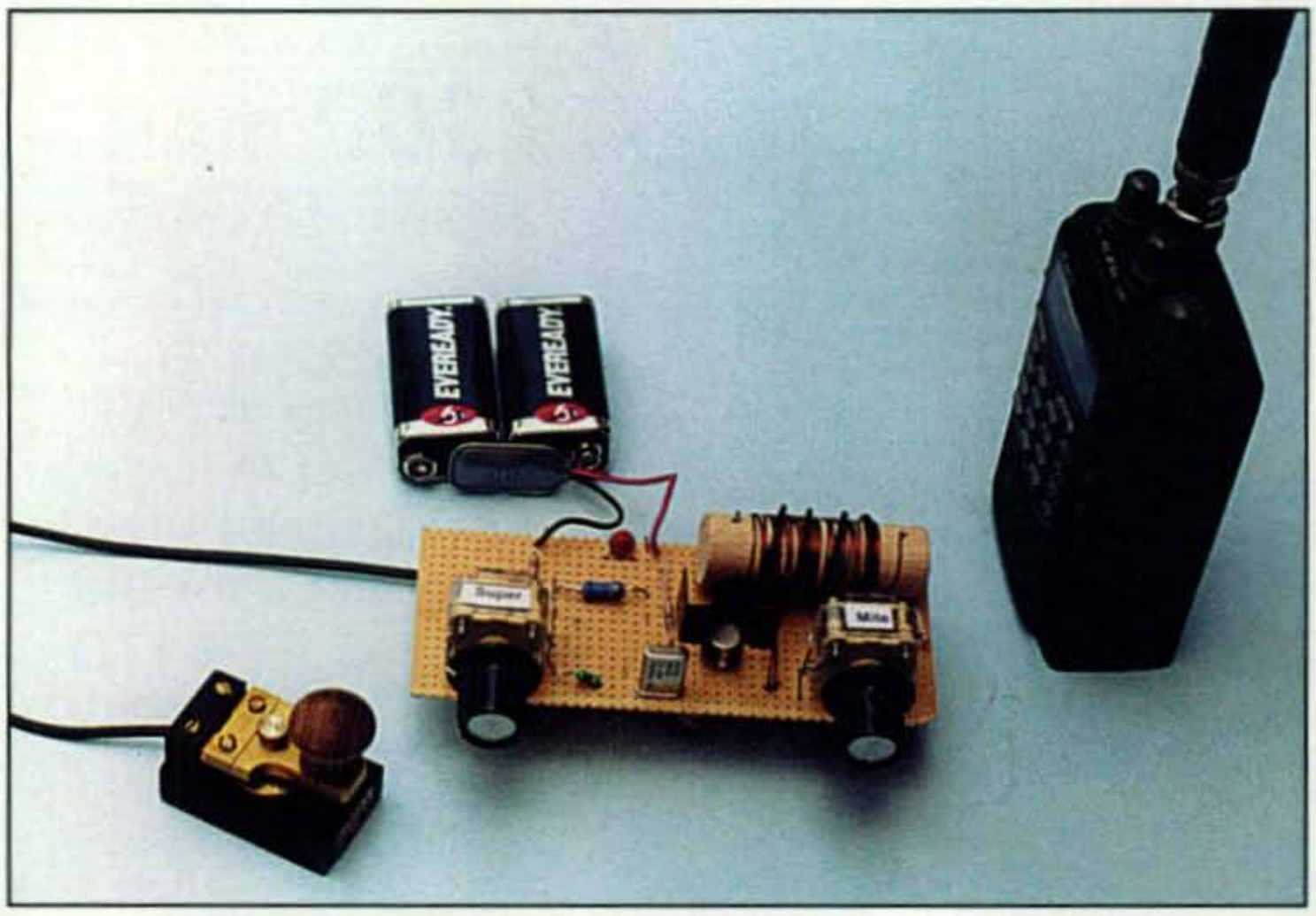

Photo B– The Super Mite's wireless BFO function works with almost any portable shortwave radio or VHF/UHF/HF receiver for on-the-spot survival communications and emergency preparedness, important considerations during these uncertain times. It is a neat, fun project for setting your own QRP records, too!

Two resistors are wired in series with the transistor's emitter. The 2.7-ohm resistor limits current flow during transmit/keydown to prevent transistor overheating. The 1K-ohm resistor allows the transmitter to function as a wireless BFO for its mated receiver during receive/keyup time. Say what? Notice the key connects in parallel with the 1K-ohm resistor. When the key is up, it limits its emitter current to less than 10 ma and output is only a couple of milliwatts—just strong enough to radiate to a nearby receiver and act like a BFO to beat or heterodyne with incoming signals. Closing the key shorts out the 1K-ohm resistor so emitter current increases to between 100 and 140 ma and output increases to maximum. As an extra benefit, the change of voltage between receive/keyup and transmit/keydown causes a very slight shift in frequency—a bare offset so you can copy another signal zero-beat with your signal. I sense your next question, and no, there is no resultant chirp on the transmitted signal. It sounds clean, pure, and marvelous.

If the mated receiver includes good CW/SSB reception capability and does not require an external BFO to heterodyne with incoming signals, incidentally, just remove or delete the 1K-ohm resistor. Be sure, however, to leave the emitter's 2.7-ohm resistor wired in series with the key. If you use the external BFO idea, only coarse frequency tuning (roughly within 5 or 6 kHz) will be required at the receiver. Fine frequency tuning of both the Super Mite and its mated receiver is handled "transceiver style" with the VXO capacitor. Wild, eh?

If a 9-volt battery is used for power and output coupling is light, power output will be around 400 milliwatts. Preferring a bit more power, I threw caution and transistor ratings to the wind and connected two readily available 9-volt batteries in series. Yes, indeed, a hearty 18 volts total and a rompin' 900 milliwatts of band-blasting power! Oh the pleasures of unrestrained dinkin! This measure is "pushing" the little 2N3053, however, so a few words of advice (caveats?) warrant mentioning. Use a big heat sink on the transistor and avoid holding the key down for extra long dashes. Touch a fingertip to the transistor within its heat sink. If it is hot, reduce the voltage or increase the 2.7-ohm emitter resistor's value to 10 or 15 ohms. If higher power is still your goal, try substituting a more heavy-duty (and more expensive) RF transistor such as a 2N3553, 2SC799, or 2SC2166. Changing the coil's tap point and turns count by two or three may be necessary to achieve oscillation with these transistors, so dink, experiment, learn, and enjoy! That's the purpose of this project!

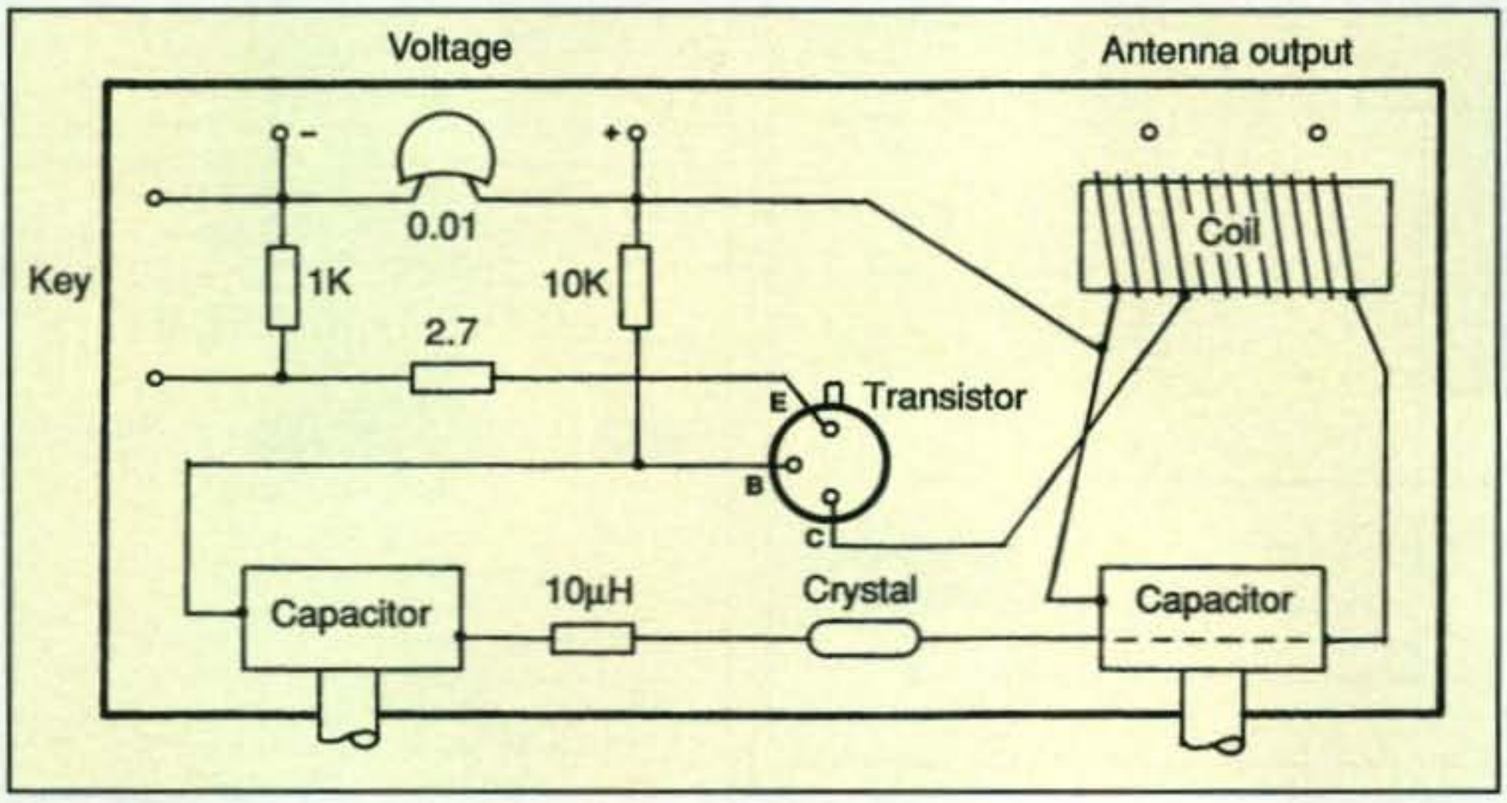

Fig. 4– Diagram of the Super Mite illustrating typical layout of parts and wire runs for easy assembly.

Coil Details

The coil plays a major role in this mini-rig's performance, so I built two versions with different sizes of coils to ensure good flexibility in assembly. The first coil was wound on a $1^1/4$ -inch diameter form (a pill bottle) with No. 18 solid, insulated hook-up wire. The second coil was wound on a Wal-Mart-obtained $^5/8$-inch diameter wood dowel using No. 22 enamel-coated copper wire (both forms were 2 inches long, or tall). A few more turns of wire were necessary for obtaining resonance with the smaller diameter coil; otherwise operation and output power was the same. Drill two holes in each end of your selected form to hold/secure tank-coil ends after winding. The antenna coil for either form uses more No. 18 insulated wire. It is wound over (and with its turns spaced evenly along) the tank coil. The antenna coil is held in place by threading its ends through holes in the perfboard (for wood form) or by a single twist of its leads (for pill-bottle form). Coil winding counts for each band are shown in fig. 2. Adding or

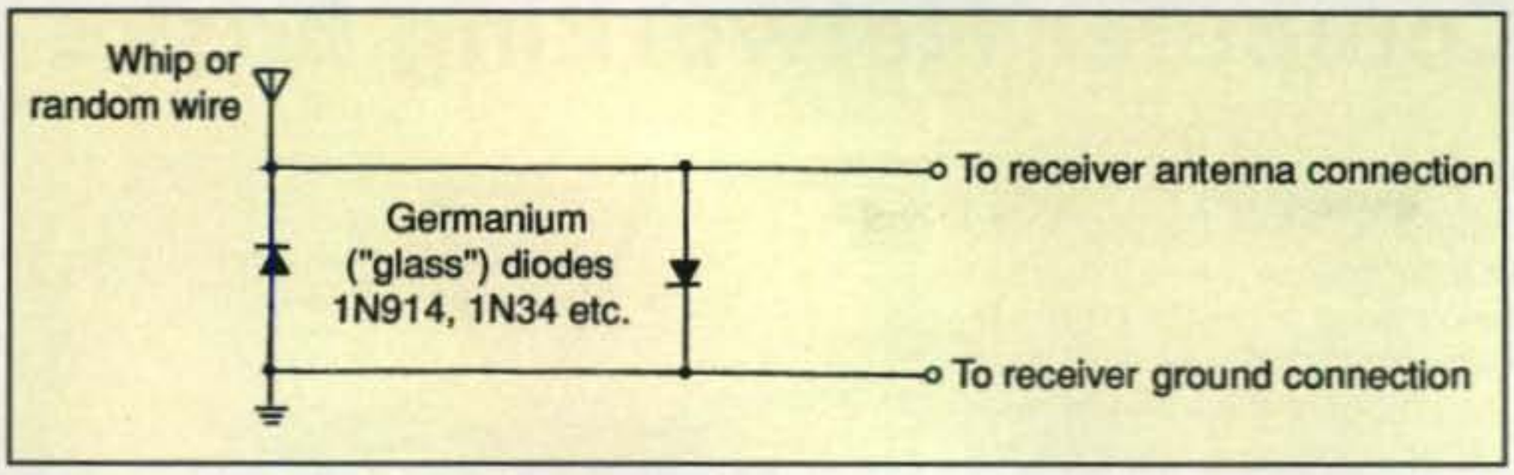

Fig. 5– Arrangement for connecting dual germanium diodes back-to-back for receiver "front end" protection. When a strong signal (above .3 volts) is sensed, diodes conduct and short antenna wire to ground. (Discussion in text.)

unwinding one or two turns to achieve oscillation or peak output may be necessary in a few cases, but be sure your wiring is correct before experimenting with coil turns or taps.

Assembly Tips

As a success-ensuring measure, I suggest starting by building the basic circuit first (less VXO and antenna pickup coil and using a single 9-volt battery as shown in fig. 3). After proper operation is confirmed and you are familiar with how the Super Mite acts, add (one at a time) the VXO, antenna coil, and dual battery mod. Should the rig stop working, you will then know where to check first for problems. The wood-dowel-type coil lies in the horizontal position. Its wire leads are threaded through the perfboard and pulled tight to hold it in place. The pill-bottle coil will stand vertically half on and half off the perfboard. Small dabs of Super Glue® are used to secure the pill bottle and plastic-case tuning capacitors to the perfboard.

A general parts layout and wiring guide is included in fig. 4. Strive for accuracy during assembly. Remember the "short" (5-turn) side of the coil connects (along with the 10K-ohm resistor) to positive voltage, the "long" side (most turns) connects to the crystal, and the tap connects to the transistor's collector. The most common error folks make is interchanging these three wires and/or not scraping enamel from copper wire. Scrape it shiny clean!

Check Out and Operation

After assembly carefully recheck your wiring, looking not for what's right, but for what's wrong. Then apply power. Listen for the Super Mite's signal on a nearby receiver, bearing in mind that even without a VXO, it may be 5 or 10 kHz above or below its crystal's frequency if the variable capacitor is not tuned to resonance. If necessary, jump or short out the 1K-ohm emitter resistor (use only one 9-volt battery, do not hold down the key for more than 5 seconds, and install a heat sink on the transistor). Once the circuit is oscillating, re-tweak the tuning capacitor for the cleanest sounding signal consistent with high output (as read on an SWR bridge or FSM) and then compliment yourself on a job well done.

Earlier I mentioned pairing the Super Mite with a low-cost AM-type shortwave receiver for portable hamming. The "easy approach" here is using a dipole or Delta Loop (think *big*!) with the transmitter and a whip or random wire with the receiver. Remember to protect the receiver's "front end" during transmit by shorting its antenna and ground connections, or by adding a diode limiter circuit as shown in fig. 5. The germanium diodes will not affect normal reception, but will shunt signals above 0.3 volts to ground. Finally, remember you can raise or lower the BFO's receiver injection level by changing the value of the 1K-ohm emitter resistor. Each case may differ, but values between 800 (a high BFO level) and 4700 ohms (a low BFO level) work for all, with 1K ohms being a good "general" or "starting" value.

The Parts Pack

As you probably surmised, our Super Mite is more of a homebrew fun project than a formal kit (you route wires and alter/modify resistor values to fit your needs rather than insert component leads in marked holes). Bearing that fact in mind (and also sensing many amateurs will consider assembling a Super Mite as their first QRP project), I expanded on several fine points in this discussion to help ensure your first-time success.

I have also gathered a bundle of required components and put together some parts packs both with and without perfboard and/or coil forms to help you get started homebrewing at the lowest possible cost. Be aware I am also planning to move farther south toward the land of sand and sun during the next few months, so my postal and personal e-mail addresses will soon change. Meanwhile, drop me an e-mail at <k4twj@cq-amateur-radio.com> and I will forward more details (and my new addresses) to you. May the force of good signals always be with you!

73, Dave, K4TWJ

digital connection

BY DON ROTOLO,* N2IRZ

Home-Computer Networking Basics

Digital operating modes are an important part of amateur radio, and we've had some in-depth looks at a number of these modes in the past months. One purpose of this column is to expand your knowledge and understanding of all things digital: operating modes, the internet, theory, and even computer hardware. This month we'll take a practical look at getting computers to talk with one another.

As the price of computers continues to sink, many households find themselves with two or more computers. Now the general public can afford to enjoy the benefits of networking. Although the possibilities extend well beyond amateur radio, one of the most common uses for networking is to share resources, such as a broadband internet connection, printer, or just about any device with an Ethernet or USB port. Sharing is a powerful tool, allowing you to leverage your computer hardware to best advantage. One obvious ham usage is allowing multi-operator contest stations to share a single log database, but the advantages are myriad even for the casual user.

Ah, yes, but don't you need a Doctorate in Computers and the Dark Arts to build a network? Hardly. Today, the folks who sell networking gear have made it easy.

This, then, is the task for today: A clear and simple explanation of networking hardware, and the process of connecting it all together so that it works. There's really not much to it, but an understanding of what's involved will definitely lessen the anxiety of starting on any project in an unknown area. For this column, we're going to restrict our discussion to the two major types of network: Wired Ethernet and Wireless 802.11b/g.

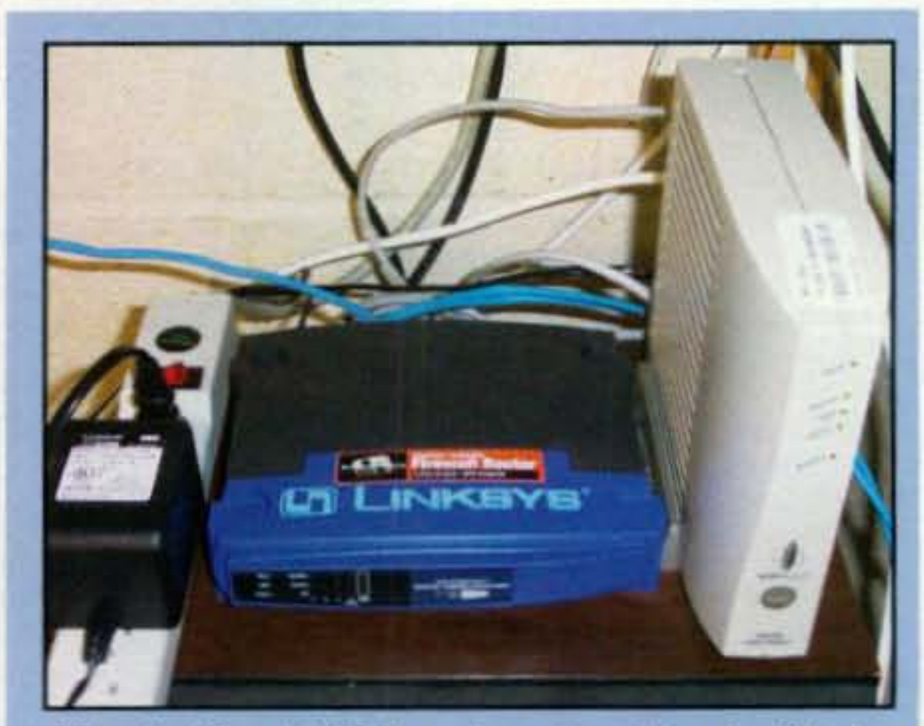

Fig. 1– The N2IRZ main networking facility in a corner of the basement. On the right is a cable modem, in the middle is my four-port router with firewall, and on the left is the outlet strip that powers it all. Ethernet, cable TV, and power wires are scattered in the background. This is about all you need for a wired network.

Wired Ethernet

Wired Ethernet most commonly uses "Category 5" unshielded twisted-pair wire, available for well under $80 per thousand feet. You might hear of "better" versions (e.g., Enhanced Cat 5, Cat 5e, or Cat 6), which might do no harm to use, but for a typical reader's needs plain old Cat 5 is just fine. All of it is four pairs (eight conductors) of what looks like telephone wire. However, beware: Lower categories of this kind of wire (such as Cat 3) look the same and are fine for telephones, but are not quite good enough for high-speed data. The network wiring is universally terminated with an RJ-45 connector, an 8-pin version of the "modular" telephone connectors introduced many years ago.

To connect the computer to this wire, you need a Network Interface Card, or NIC. Many modern computer motherboards have a built-in NIC, or you can buy one for under $25. Popular network speeds today are 10, 100, and 1000 Megabits per second. In my opinion, even the 10 MB/s standard is plenty fast for home use, although these older NICs are getting hard to find. The NIC will come with driver software, but newer versions of Windows® can usually detect what you have and manage it.

To connect all of the computers together, you need a *hub*, a *switch*, or a *router*. These pieces of hardware all are similar, but they differ in exactly what they can do for you. In general, spend the $40 and buy the most versatile piece, the router, and be done with it. All of these items are used to connect a number of Ethernet wires together.

A hub is like an FM voice repeater; only one person (computer) can talk at a time, and everyone else can hear its transmissions. A switch is like a bunch of simplex channels under the control of a Net Control Station, who assigns pairs of people wanting to talk to their own channels. A router is much like a switch, but imagine that the simplex pairs are on different bands, allowing a larger number of computers to join the network. These, of course, are simplifications, but you get the general idea. Again, the most versatile of these is the router, and these are amazingly inexpensive, so why even bother with hubs and switches? Finally, a router is the only device that will allow you to share a single IP address among many computers, an essential part of sharing a broadband (Cable, DSL) internet connection.

Wireless 802.11b/g

While Ethernet is extremely inexpensive and very fast, it does require that you run a wire to each device. In some cases that can be either inconvenient or impossible to do. For these cases we have 802.11 wireless devices. The 802.11b standard has a data rate of 11 Mb/s, while the newer 802.11g standard has a data rate of 54 Mb/s, both on the 2400 MHz (13 cm) "Part 15" band. In practical use, the actual data rate is about half the channel capac-

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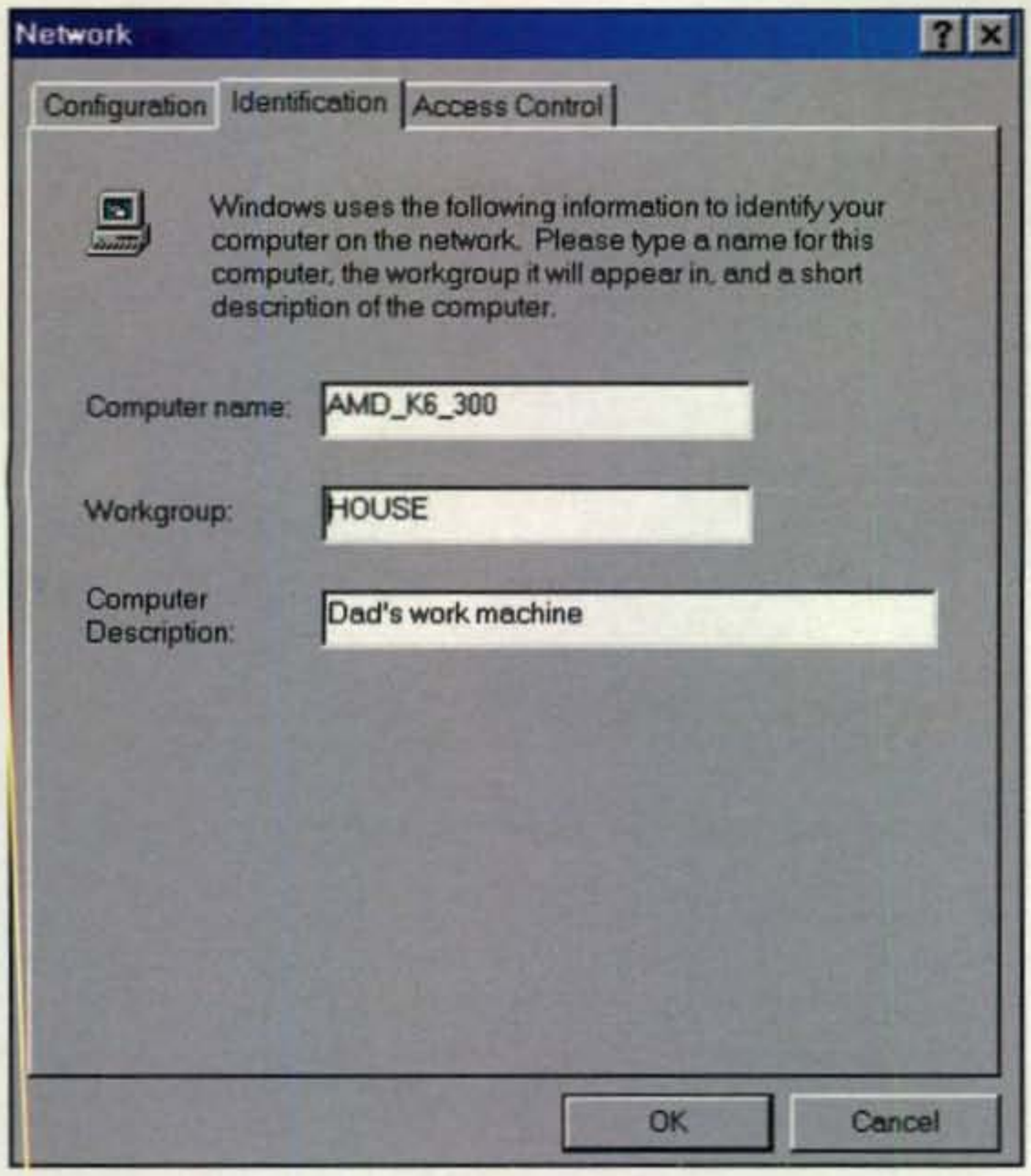

Fig. 2– Configuring Windows® for a network. In this step you need to name your computer and network. The computer's name must be unique, and the network name must be the same for everyone connected.

ity, which is still more than enough. Also, wireless devices tend to cost somewhat more than their wired equivalents.

Just as with Ethernet, your computer needs a NIC. Most wireless network adapters use either the USB port or the PCMCIA port (commonly found on laptop computers) to connect to the computer, and radio waves to connect to the wireless router. To bridge between the wired and wireless world, you can connect a *Wireless Access Point* (WAP) to the wired network.

As far as costs go, an 802.11b USB NIC can be had for under $40, with a faster 802.11g (which is backwards-compatible with the slower 802.11b) card available for about $60. A Linksys 802.11g four-port wireless router was on sale this week at Best Buy for the same $60.

One obvious advantage of a wireless network is the flexibility to bring your computer wherever you prefer while remaining connected to the network. You can be working out by the pool and print a document on the laser printer in the den.

Planning the Network

Whether you decide to go with the wired route (as I chose) or with wireless *(it's possible to do a mix of both, depending on your needs—ed.)*, the first order of business is planning the network. Decide where to put the router, remembering that you'll need AC power and a convenient central location. For wireless, consider antenna placement for good coverage. If you want to share a broadband connection, consider a location near the cable or DSL modem.

Now you'll need a NIC for each computer. Some computers, especially newer ones, have one already built in; look for the RJ-45 port. If you're going with a wired network, buy some Cat 5 wire and RJ-45 connectors, along with a crimp tool ($25 at RadioShack) or you can get pre-made cables. For a neater, built-in look, you can get wall plates in which you can mount RJ-45 receptacles, as well as a wide variety of other connectors (such as RCA jacks for audio and speakers, F connectors for TV, and RJ-11 jacks for telephone).

Consider any other hardware you might want, such as a print server, which allows every computer on the network to use the printer (printers connected to networked computers may also be shared; see setup info below for details). Take a look online, or in a better computer store, to see the many options available.

Finally, hook up all of it according to the instructions you get with the router and/or NICs. In nearly all cases, the router comes with a CD of software which is first used to configure the router and then to configure each computer in the network. Detailed tutorials are given, explaining how to activate the NIC in software and make all the settings for sharing printers and files. One note: If you're planning on sharing a broadband connection, first get that working with a directly connected computer and then introduce the network to the equation.

Macintosh Configuration

Before we conclude with setup info for Windows® users, let me describe the software configuration process for any device you may want to connect to a network using Macintosh computers:

1. Connect the device to the network and allow it to self-configure.
2. Umm . . . there's no step 2. You're done.

Maybe those Mac people have something there. . . .

Windows® Configuration

While I can't describe every possible situation for every vari-

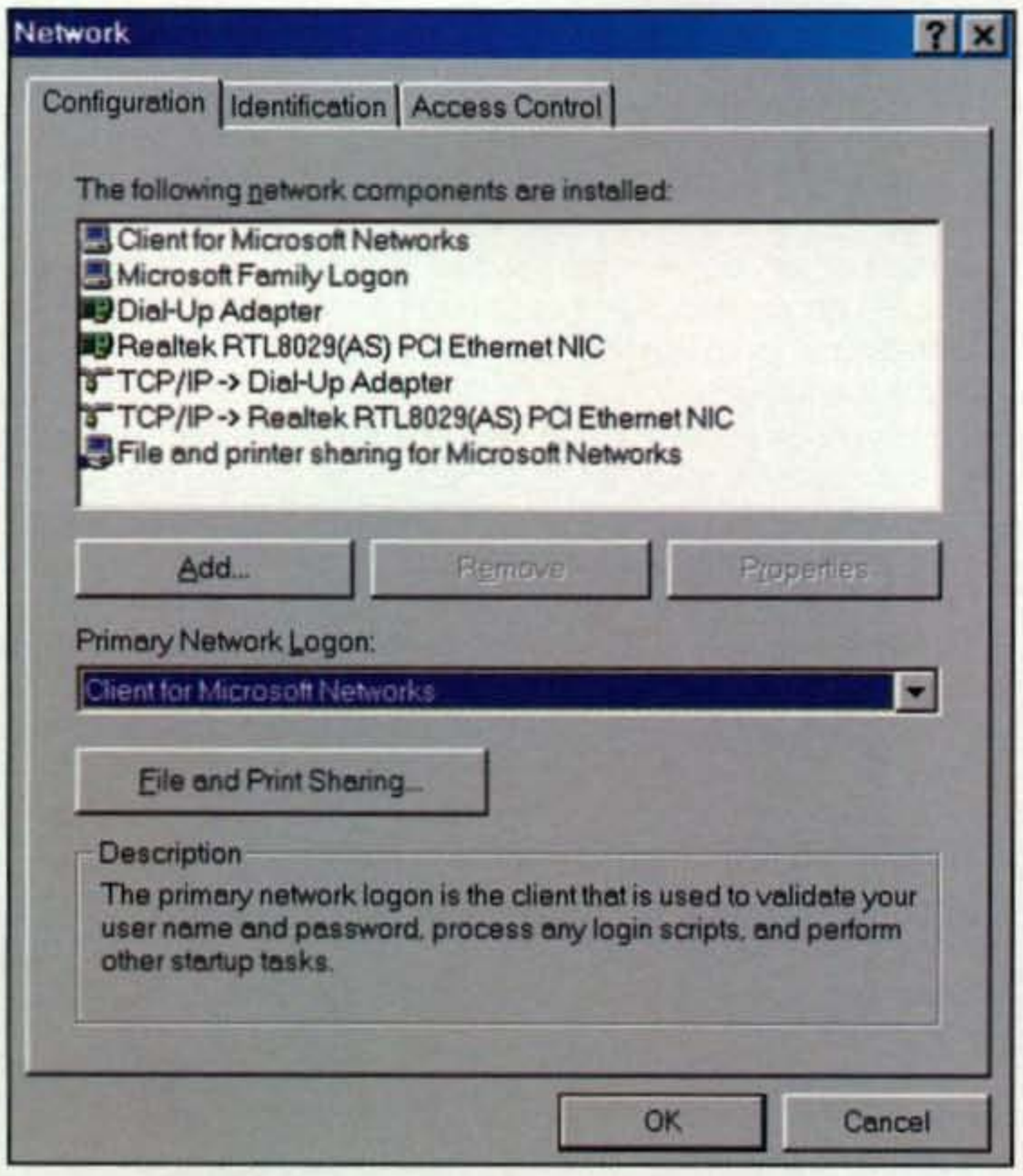

Fig. 3– Installing the correct Network Client, Protocol, and Adapter is essential for your network to function. You also need to enable Printer and File sharing here, as well as the level of log-on security you desire. Only basic security is included with home versions of Windows®; industrial-strength versions are readily available.

ation of computer you may encounter, here's some information on the basic process that applies to Windows® users. The following assumes that you have installed your NIC (if necessary) in your computer and loaded its driver. Follow this process for each computer in your network.

Configuring. Open Windows® Control Panel and double-click on "Network" ("System" for Windows® XP). Under the "Identification" tab, type in a name for this particular computer and a name for your "workgroup." Each computer must have a unique name. I usually use the processor type and speed, but you should use something that helps you remember which computer is which. Also select a short, simple name for your workgroup. Computers in different workgroups cannot communicate with one another, so make sure you use the same workgroup name in all your computers. Refer to fig. 2.

In the Network window, click on the "Configuration" tab. Be sure the "Client for Microsoft Networks" is installed. If not, add that "client." You should also see your NIC listed (add "adapter" if not) and, scrolling down, be sure that "TCP/IP" for your NIC is also installed (add "protocol" if not). See fig. 3.

Click on "File and Print Sharing," and assuming you agree, check off both "Allow others access to my files" and "Allow others access to my printer." Click OK, and then select the "Access Control" tab. I recommend selecting "Share-level access control," but in a larger network you may find "User-level access control" more useful. Unfortunately, this last option requires you to set up users for each computer, which is a little beyond our scope today. It's not difficult; there is a wizard that starts when you open the "Users" icon in Control panel that should help you through it.

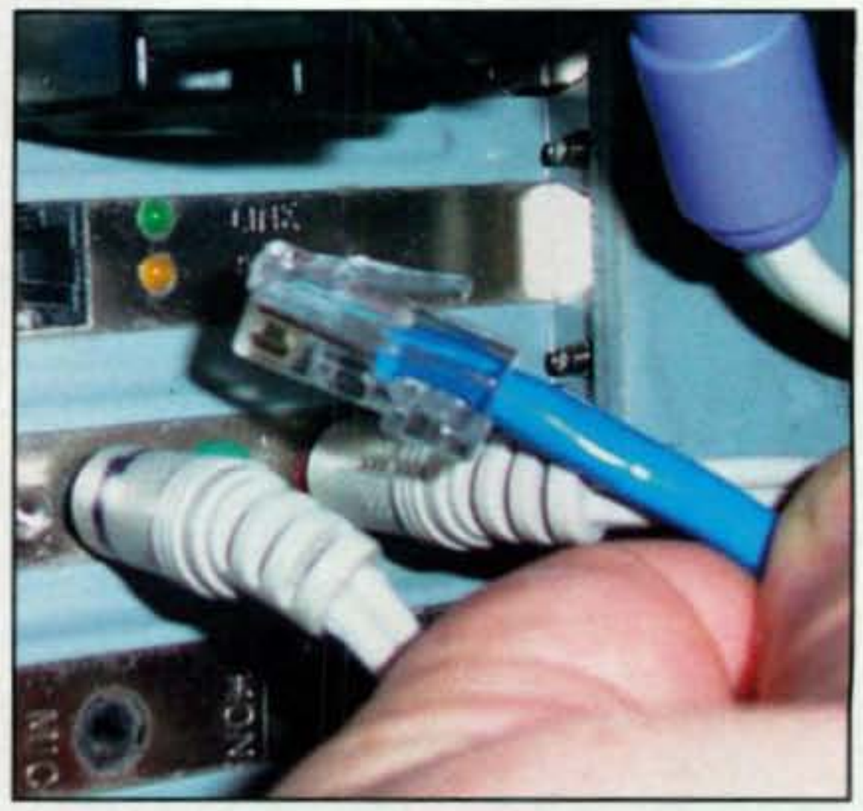

Fig. 4– A close-up of a 100BaseT Ethernet connector, also known as an RJ-45, on the back of my computer. This is the standard connector used for most wired networking.

File Sharing. Now we need to set which file folders can be accessed by the network, as well as any restrictions on that access. Open "My Computer" and select a drive or folder that you want to share. Right-click on it and select "Properties." Select the "Sharing" tab, set the "Share Name," and select the type of access. "Read-Only" is just that—data can be read from that location, but not written to it. "Full" access allows everything, and "Depends on Password" allows read-only or full access, depending on the password used when the drive or folder is accessed. Repeat this for any other drives or folders you want to share.

Once all other computers have their file sharing set up, you can again open My Computer and click on the "Map Drive" button, allowing you to see all the available drives or folders on the network (assuming they're all on!). Select a drive letter, and the network drive or folder, and check off if you'd like that drive to always try to reconnect when you start your computer. Note that if the other computer is not found, you'll get an error message when your computer starts up.

Printer Sharing. Select the "Printers" icon in Control Panel, right-click on a printer, and select either "Sharing" or "Properties" and then the "Sharing" tab. Give your printer a name, set the security password if you like, and remember that all the other computers on your network will need the driver installed if they want to use that printer.

Fig. 5– My main computer setup—one for me, one for the kids. The cabinets hide supplies and printers, and servers for hard-disk storage and other functions are in the cellar. Note the neat look the wall plate provides for both Ethernet connections and a phone jack.

Fig. 6– A wireless router located at the CQ offices. The antennas can (and often must) be oriented to provide a good signal in the right places. It's a trial-and-error process to find the right "sweet spot," reminiscent of adjusting rabbit ears for your television. (Photo by Dick Ross, K2MGA)

Once all computers have their printer sharing set up, select the "Printers" folder and start the "Add Printer" wizard to set up a network computer on your local machine. Again, the other computer needs to be on for this to work!

Internet Sharing. The last task is optionally sharing a high-speed internet connection. If you are using a router, then follow the instructions that came with the router, or on its software CD, to connect all networked computers to the router. When I did this, it took about 15 minutes for the first computer and about 3 minutes for each of the others.

If you're not using a router—that is, you have a hub and one machine has an internet connection (even a dial-up connection)—you can still share using a utility available with Windows® 98 and later named Internet Connection Sharing (ICS). You only run ICS on the one computer with the internet connection. If you need the details on this, either use Windows® Help, or write to me.

Anti-Virus Software

This is a no-brainer. A virus spreads rapidly on a network, so you really need anti-virus software. At home I run both McAfee Anti Virus and Norton Anti Virus for virus protection, on different machines. I like Norton's automatic update feature much better, but McAfee's control panel is easier to use. Both offer plenty of virus protection. My suggestion is to see which one is on sale and buy that. Invest in the subscription for regular updates as well.

Firewall

If you have an internet connection, don't just rely on your router's firewall. Get a software firewall as well. I tried both the McAfee and Norton firewalls and hated them both. In my opinion, the best firewall is ZoneAlarm, which can be downloaded for free from Zone Labs. They also offer ZoneAlarm Pro, as well as an Anti Virus program that I have not yet tried. If either is anywhere near as good as the free version, it's well worth whatever they charge.

In Conclusion

I hope you enjoyed our whirlwind tour of computer networking—advantages, hardware, setup, and more.

Every time I sit down to write a column, I always find myself at this point—the end—with another few pages of information I'd like to share but just don't have the room. I have to go back through what's already on paper and edit out all the fluff, bringing it down to the bare bones. For this column I had to remove about a third of what was written to make it fit. You may have noticed that I tend to fit a lot of information into a small space, but I'd like to hear from you: Is it too much or not enough? Let me know.

73, Don, N2IRZ

BY JEFF REINHARDT,* AA6JR

Is Your Next Car a Voltswagen?

Okay, it was an old joke from the '60s, remember? "The Germans are making a new electric car; they're calling it the *Voltswagen*." (Drum roll, muted cymbal.)

We've seen a run at all-electric cars in the past and it was a bust. Both GM (with its EV-1) and Toyota tried all-electrics, but they just didn't have much range. A lot of money and research were devoted to developing newer, high-capacity batteries, but getting the vehicle beyond 100 miles on a single charge was an insurmountable obstacle. The range also dropped dramatically with the use of climate-control systems and headlamps. An inability to serve anything but short, urban trip needs doomed the all-electric car.

Photo 1– Direct from Detroit, the sign says it all!

The Hybrids are Coming!

Phase Two is now bringing your charging system along for the ride in the form of a gasoline engine/electric-motor hybrid vehicle that combines a lot of technology in a small package. If the demand for hybrid (gas/electric) cars in California is any measure of things to come, the next vehicle you buy could well be this new blended technology. With Toyota and Honda already in the market, and Ford about to introduce a hybrid SUV, manufacturers are getting a good read that there's a powerful demand for more fuel-efficient vehicles. Aided by the run-up of gasoline prices, hybrids have created long lists of customers waiting for delivery. Is it a fad or is it for real? I believe they're here to stay and will garner a significant portion of the market, due to higher fuel costs and tighter emission requirements, mixed with a genuine concern about larger issues such as global warming and uncertain fuel supplies from the Middle East.

What lies in the future for ham radio operations from your new hybrid vehicle? Happily, it would appear they can coexist, but it's still early. I have driven a first-generation Prius and found it to be okay for hand-held radio operations. As it isn't mine, I could not install a 50- or 100-watt transceiver in it to test it for noise generation and ability to power the transceiver. Another ham I know has had a hybrid Honda, and he found it to be an acceptable platform for operating the HF bands.

There are many possible noise generators in a hybrid vehicle. The engine drives a large generator as well as the drive wheels, at least some of the time. In most hybrids a large electric motor gets the car up to speed and hands the load over to the gasoline engine. There are circuits handling hundreds of volts, and there are some pretty large magnetic fields flying around. Braking is done in part by the regeneration of electricity, slowing the car with an electrical load in addition to friction brakes. There's also a very large battery (or an array of batteries) to power the electric motor. Wiring patterns differ greatly. Public-safety agencies are being advised to be careful with cutting hybrid cars apart to extract accident victims, as there are high-voltage/high-current wires running all over the place, including up and down the windshield pillars in some models!

If you are considering the purchase of a hybrid, be sure to discuss your ham radio concerns with the dealer or a qualified representative from the manufacturer *before* you commit to a purchase. Don't forget to ask if there are recommended locations for antennas, or more specifically, places to

Photo 2– Chevrolet's new dream car looks even better with a ham antenna attached!

*5904 Lake Lindero Drive, Agoura Hills, CA 91301
e-mail: <aa6jr@cq-amateur-radio.com>

Photo 3– A simple mag-mount and "stick" antenna can get the job done!

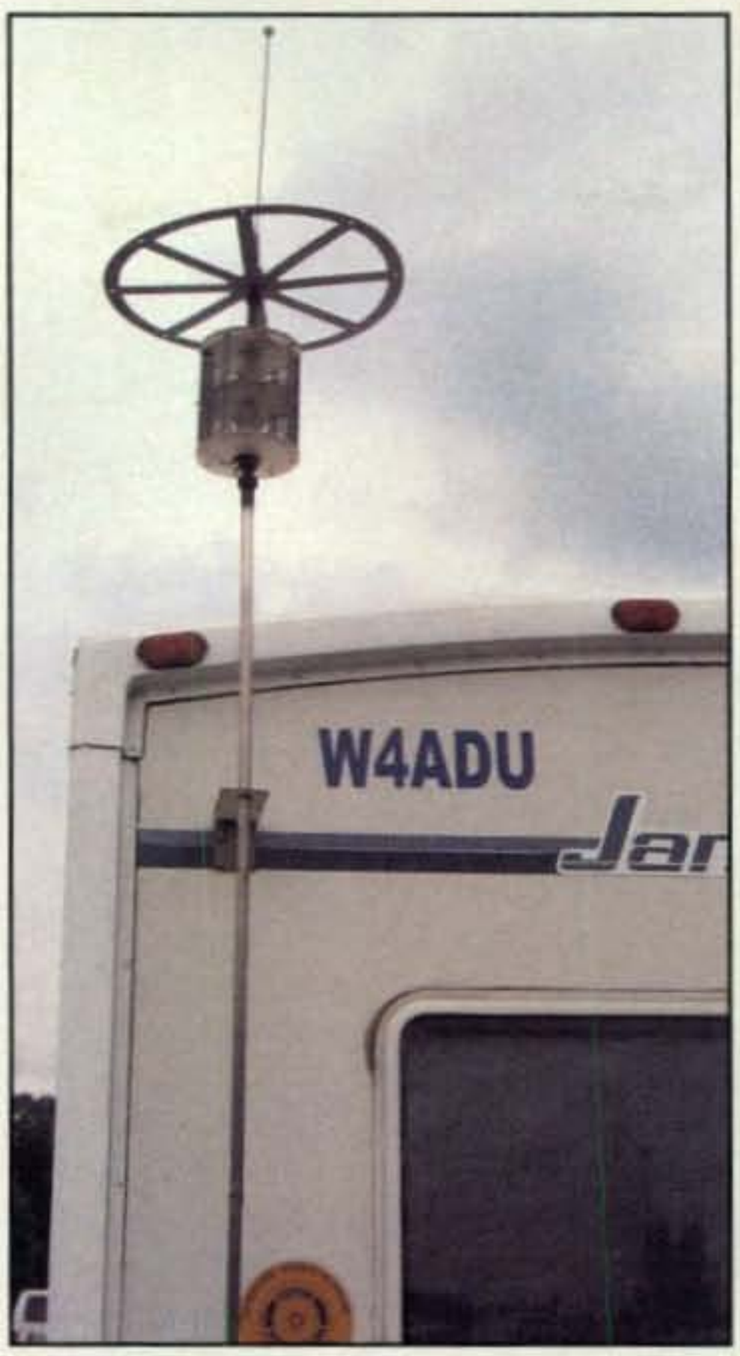

Photo 4– This "bug-catcher" seems at home on an RV.

avoid when considering the drilling of holes for antennas or radio mounts.

Dayton and Mobile Operations

The Dayton Hamvention® was again a great place to chat with vehicle manufacturers about integrating two great hobbies—radios and vehicles of all descriptions. There was an SUV that was a virtual showcase of how to stuff radios into a functional command/communications response platform.

Chevrolet was showing off its sporty new convertible pickup truck, which also had a nifty antenna mount at the rear (see photo 2). I also had the pleasure of speaking with Bob Vitale, a GM electrical-system research engineer who's a ham, about a wide variety of topics, including what the future may hold for radio operations in new, space-efficient vehicles.

There's good news, at least for now. Cars and light trucks will continue to be "radio friendly" in that they won't be too different in the foreseeable future, with of course the exception of the above-mentioned hybrids.

Whither 42 volts?

What's up with the 36/42-volt systems that were being discussed just a short time ago? Industry insiders are now saying those higher voltage systems are some time away from becoming a standard, as there are a number of issues in the way. Some of the reasons given for developing newer high-voltage systems include smaller, lighter weight starter motors, high-voltage headlamps, cooling fans, climate systems, rear-window heaters, and the like. However, there are disadvantages, including high voltages in the car, new battery technologies to be developed, and legitimate concerns about the use of accessories. There's a lot of 12-volt equipment out there, and changing the platform to support up to 50 volts is quite a departure.

When might we see 12/14-volt cars start to fade away? The earliest projection I'm hearing is 2008, if not later. If and when that day comes, it will be interesting to see how the radio manufacturers, along with other accessory providers, will react. . . . or will the vehicle manufacturers still maintain a 12-volt "subsystem" in high-voltage cars for all those cigar-lighter accessories, including portable computers, cell phones, and yes, ham radios?

At the other extreme, most modern microcircuits, such as logic modules and engine management systems,

Photo 5– Sturdy is the word for this SUV "screwdriver" antenna mount

Photo 6– A big antenna requires a strong support system. This one is connected to a trailer hitch.

require lower (e.g., 5 volts), not higher voltages.

We're already beginning to see some cars come equipped with a 120-VAC outlet. Could that be the answer? Will you buy a mobile power supply for your 12-volt radio gear? Or maybe a DC-to-DC converter?

Incidentally, the reference to dual voltages is not meant to be confusing. Current cars operate at a 12-VDC standard but are charged at a nominal 13.8- to 14.2-volt rate. Triple those values to get 36/42-volt systems. Would manufacturers install three 12-volt batteries in series or opt for a single 36-volt battery? Probably the latter, as the constant push for fuel efficiency typically has looked at reduced vehicle weight as the easiest way to gain miles per gallon. That's why the "real" spare tire and wheel will soon become a thing of the past; it's dead weight, not to mention that eliminating it represents a reduced cost for the manufacturer.

Antennas

One other aspect of Dayton is the opportunity to peruse the parking lots and look at the wide variety of antennas and mounting systems employed by hams. I don't think any two installations are identical. Take a look at some of the photos I snapped while walking around; perhaps you'll see an idea worth noting as it pertains to your specific needs.

Hit The Road!

With summer weather upon us, get out there and get on the air! Mobile operations have always been a challenge, from the days when a motor driven generator was necessary to power tube-type transceivers to the present, when placing the radio and antenna are more challenging with each new model. Through it all, hams have invoked their creativity and ingenuity to make mobile operations an ongoing pleasure. Once you get it right, there's nothing quite like working a great contact while engaged in the daily commute or putting a rare county on the air for an avid audience. You can help by sending in photos of your mobile installation. We'll be glad to share your ideas with others. After all, hams helping hams is what we're all about, right? 73, Jeff, AA6JR

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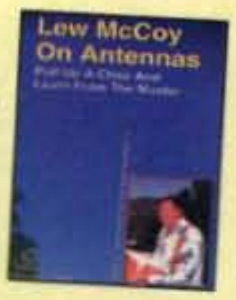

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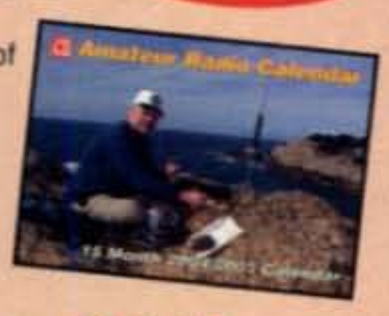

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BY JOE LYNCH,* N6CL

The *Perseids* – Caffeine Time

It was Esko Lyytinen who successfully predicted the *Leonids* meteor storms a few years ago. Now, using the same modeling, Lyytinen has predicted a possible short-lived peak for this year's *Perseids* meteor shower and a possible storm in 2028.

According to Lyytinen (see: <http://www.metaresearch.org/solar%20system/perseid/perseids.asp>): "In 2004, August 11 at about 21h UT, the one revolution dust trail of the *Perseids* parent comet Swift-Tuttle is calculated to pass within 0.0013 AU [about 180,000 km] from the Earth's orbit, and we expect this to cause a moderately strong, short outburst of mainly visually dim meteors." While Lyytinen admits that the prediction of around 2100 UTC is a bit uncertain, he adds: "Using techniques that have had considerable success in predicting the times, locations, and rates for meteor storms and shower peaks for both *Leonids* and *Ursids*, we expect that even the annual activity of the *Perseids* may be better than normal this year. Observations possibly confirming this or rejecting this will be valuable." For those of us in the Western Hemisphere, the predicted peak occurs in daylight. Visually, the most favored part of the world will be in the Eastern Hemisphere.

Even with Lyytinen's prediction, the International Meteor Organization is sticking with its predictions of dual peaks. It states on its URL (<http://www.imo.net/calendar/cal04.html#July>) that there may be a primary peak time around 1100 UTC on August 12, which will coincide with the most probable maximum time of the "traditional" peak always found previously. It adds: "Another feature, seen only in IMO data from 1997–1999, was a tertiary peak at sol = 140.4°, the repeat time for which would be shortly before 21h UT on August 12."

With predictions for this year's *Perseids* spread out all over the calendar, it would serve the meteor-scatter operators (ping jockey) well to be alert both days, which doesn't allow for getting much rest.

VHF Plus Calendar

Aug. 1	Moderate EME conditions.
Aug. 6–8	The 11th International EME Conference. See text for details.
Aug. 7	Last Quarter Moon.
Aug. 7–8	ARRL UHF and Above Contest. See text for details.
Aug. 8	Poor EME conditions.
Aug. 11	Moon Apogee.
Aug. 11–12	*Perseids* meteor show predicted peaks. See text for details.
Aug. 15	Good EME conditions.
Aug. 16	New Moon.
Aug. 21–22	First weekend of the ARRL 10 GHz and Above Cumulative Contest. See text for details.
Aug. 22	Moderate EME conditions.
Aug. 23	First Quarter Moon.
Aug. 27	Moon Perigee.
Aug. 29	Moderate EME conditions.
Aug. 30	Full Moon.

—EME conditions courtesy W5LUU.

BPL and the Math

The time for commenting on the FCC's Notice of Proposed Rulemaking regarding Broadband over Power Lines (BPL) is now over. It will be several months before the FCC separates the relevant from the non-relevant comments in the hundreds of filings that occurred during the permitted periods.

Assuming that the FCC gives BPL some sort of green light in the next year, the major question for the industry remains: Will it be profitable?

The following internet posting on MSN Money (http://moneycentral.msn.com/content/P81685.asp) by Michael Brush provides some insight into that question. Before I get to the posting, however, I first need to introduce Mr. Brush.

Michael Brush is an award-winning New York-based financial writer who has covered business and investing for the *New York Times*, *Money* magazine and the Economist Group. A series of columns reminding readers of the many ways that insiders and unfair play still held sway at the highest echelons of Corporate America earned him a "Best in Business" award from the Society of American Business Editors and Writers.

Michael studied at Columbia Business School in the Knight-Bagehot Fellowship program. He is the author of *Lessons From the Front Line*, a book offering insights on investing and the markets based on the experiences of professional money managers.

The following is excerpted from his May 24, 2004 article in MSN Money:

How the utilities may get into BPL

The most profitable way for utilities to offer BPL is to set up a telecom division to run the service outright. That's what PPL in Pennsylvania is doing. At the other extreme, utilities wary of getting tangled up in a new consumer service will passively offer access to their networks for a fee, says Henry Quintin of Fine Point Technologies, which sells software that helps users install BPL. They'll make less money, but the risks of getting bogged down in customer service are lower. Pepco is going this route, he points out.

The middle road—both for profits and risk—is a joint venture with a service provider. The marriage between Cinergy and Current Technologies is a great example. But can a joint venture like this produce enough profits to move the earnings needle at a giant utility like Cinergy? A quick back-of-the-envelope calculation raises some doubts.

Cinergy hopes to offer BPL service to 250,000 homes within three years, and it expects that 15% to 20% of customers will sign up. That suggests 50,000 customers will be paying $40 per month, or $24 million per year. If the service produces 20% profit margins, Cinergy's 50% split of profits with Current Technologies would give the util-

e-mail: <n6cl@sbcglobal.net>

ity $2.4 million from BPL. With 180 million shares outstanding, that works out to 1.3 cents per share.

Cinergy's take, however, could get bigger once VoIP [Voice over Internet Protocol] is added—not to mention video further down the road. Plus, Cinergy will soon start reaching out to more customers in Indiana and Kentucky. So, potential profits could be higher.

Even if it takes a few years to generate meaningful profits, utilities believe they can gain from BPL right away because it helps with automated meter reading and network monitoring. "It is like having an intelligent distribution grid sitting out there," says Leif Ericson, a business development manager at Southern Company, the big regional power company in the Southeast. "I can tell exactly where that tree fell on the line."

Potential roadblocks

As good as BPL sounds, it faces several obstacles. Despite exceptions like Cinergy and PPL, for example, many utility companies are notoriously slow to adapt to new ideas. Next, a variety of "last mile" internet-access technologies compete with BPL—from DSL and cable to more cutting-edge options like fiber to the premises and WiMAX, a wireless network that transmits signals over as much as 30 miles.

And despite the warm glow from the nation's capital, there are several regulatory issues that could snag BPL, says Andy Lipman, a Washington, D.C. lawyer and telecom regulation expert of the law firm Swidler Berlin Shereff Friedman in Washington, D.C.

First off, ham radio operators hate BPL. A vocal group that's raised lots of money for the fight, they're concerned that BPL interferes with their radio transmissions. Next, regulators have yet to decide whether VoIP should be treated like regular phone service. If so, that will push up costs and reduce interest among consumers. What's more, state utility regulators may slap BPL with surcharges to cover the cost of power lines.

Lipman believes upcoming technical studies will prove the ham radio operators wrong. And most of the other potential regulatory snags will be resolved, he says. So if more utilities get on board and consumers go for the service, the future could be bright for BPL companies. After all, the field is still wide open—given that 80% of internet users still haven't made the transition from dialup to any form of broadband at all.

Brush's analysis is very insightful for one very important reason—VoIP. He points out that Cinergy hopes to substantially increase its profit margin with the addition of VoIP service to the BPL equation. Unfortunately, VoIP is far from being a viable alternative to twisted-pair telco service for three reasons. First, the quality of VoIP is still inferior to that of other available voice communications. According to W. David Gardner, TechWeb News (see "InternetWeek.com" News for June 14, 2004 at <http://www.internetwk.com/ breakingNews/showArticle.jhtml?articleID=21800184>), "Potential subscribers to internet phoning services are still hesitating to sign up for Voice over IP (VoIP) service due to 'inferior sound quality and service reliability'..." He adds: "Although VoIP service has improved dramatically in recent years, subscribers can still experience poor fidelity and their service fails when broadband connections fail—a still common occurrence."

The second reason is law enforcement's problems with monitoring VoIP communications. Ryan Singel, writing on June 17, 2004 for Wired News (see: <http://www.wired.com/news/politics/0,1283,63884,00.html?tw=wn_2polihead>) reported: "Deputy Assistant Attorney General Laura Parsky told the Senate Commerce Committee [on June 16, 2004] that unregulated VOIP would be a 'haven' for terrorists unless the government forces connected providers to build special wiretapping capabilities into their systems.

"'If legal loopholes allow criminals to use new technologies to avoid law enforcement detection, they would use

these technologies to coordinate terrorist attacks, to sell drugs throughout the United States, and to pass along national security secrets to our enemies,' Parsky said."

The third reason, which Brush alludes to above and gets to the heart of the profitability of VoIP, is state and local governments' huge interest in taxing VoIP communication. Add a tax on VoIP service to the franchise fee that may be charged to the utilities for BPL and what you have, in effect, is a tax on a tax, not to mention a revenue loss to the BPL provider.

In considering these caveats, it would be very advantageous for Cinergy and others to take a long, hard look at the economic sense of BPL—even with the potential add-on services.

The Last Mile Versus The Last 30 Miles

As Brush indicates above, BPL is not without competition from other "last mile" providers. What may be the sleeper competitor, however, is WiMAX, the potential last 30-mile provider. Furthermore, here is where ham radio operators have the golden opportunity to look like heroes.

For more than a year we ham radio operators have been beating up utility companies and the FCC over BPL. On June 10, 2004 something happened at the FCC that, for me, makes it look like the FCC has heard our concerns. Seemingly off our radar screen because it is not on our frequency allocation was the creation of the Broadband Radio Service (BRS). For a press release on this FCC ground-breaking ruling, see: <http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-248267A1.doc> for a MS Word document, and <http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-248267A1.pdf> for a pdf file of the same. You might also look at each of the commissioners' positive comments on the ruling. They are fascinating reading. You can find them at: <http://www.fcc.gov> under the June 10, 2004 date. Ironically, what they have written about BRS are very similar comments to what they previously wrote about BPL—their interest in enabling the development of broadband internet access for the entire country and how BRS will be yet another way to bring about this development.

Assistant HSMM Working Group Chairman Walt DuBose, K5YFW, received a Certificate of Merit from the ARRL at HamCom in June for his outstanding accomplishments on behalf of the HSMM Working Group.

HSMM Webmaster Dr. Gerry Creager, N5JXS, Texas A&M University Network Infrastructure Specialist, also received a Certificate of Merit from the ARRL at HamCom for his outstanding accomplishments on behalf of the HSMM Working Group.

What does BRS have to do with ham radio? With regard to our future and BPL's threat, everything! It is within BRS that WiMAX will find a home.

What does WiMAX have to do with ham radio? We can develop the technology on our frequency allocations. That is great for utilizing unused amateur radio frequencies. It is also great for incubation of commercial systems, which brings me to my most important point: There is something far more important for us hams in WiMAX than a new toy. It is a venue for good public relations.

Let's face it. Our image in the media right now is not the best. We appear to

be a bunch of crybabies complaining about how the utility companies are trying to play fast and easy with the truth and claiming that government agencies such as NTIA and FEMA are not showing backbone in their weak stances concerning BPL interference issues. Granted, there is some truth to these complaints. However, our days of being the canary in the mine are over—mainly because the utility companies keep hiding the mines. Furthermore, our days of being David against Goliath are over as well. We have thrown more than enough rocks at those giant utility companies. Now it is time to borrow a 15-year-old movie title—that being to focus on the building of our own *Fields of Dreams*. While the original field of dreams was limited to a cornfield in Dyersville, Iowa, ours could have many 30-mile perimeters.

Here is how: There is a small, but fast-growing interest in HSMM technology, our using 802.11 technology under Part 97 regulations as opposed to under Part 15 regulations. This past June, Walt DuBose, K5YFW, of the Texas Roadrunners Microwave Group and Ron Cole, N5HYH, of the North Texas Microwave Society, gave a presentation to the Roadrunners at their meeting in San Antonio, Texas. They explained what High Speed Multi Media is all about and how one can put together a home station and an access point (AP). They also explained the difference between operating under Part 97 and Part 15 regulations.

As I write this column, I am in my hotel room in Arlington, Texas, awaiting the start of HamCom. During this convention around ten different HSMM forums will be presented. In addition, Walt DuBose, K5YFW, Assistant HSMM Working Group Chairman, and Webmaster Dr. Gerry Creager, N5JXS, of Texas A&M University, Network Infrastructure Specialist, will receive Certificates of Merit from the ARRL for their outstanding accomplishments.

Here is where the "Fields of Dreams" come into play. There are huge transferable skills between WiFi and WiMAX. Therefore, hams who are developing WiFi systems can also be in on the ground-floor development of WiMAX systems. Amateur radio frequencies can be used for incubation of WiMAX systems, which then can be transferred to commercial application on the new BRS frequencies. Hams can get together and form micro industries for profit (since this will be a commercial operation on commercial frequencies) and set up rural systems for the purpose of supplying broadband internet access to their neighbors. Imagine this: Hams being perceived as good neighbors for a change!

There is a fascinating ancient story of a king, his queen, the prime minister, and the queen's uncle. In that story the prime minister gets angry with the queen's uncle for his failure to give proper homage to him as the prime minister. In retaliation, he gets the king to issue an irrevocable decree to destroy the tribe to which the uncle belongs. The uncle intercedes with his niece over his concerns for the future of their tribe, warning her of her responsibility and the consequences if she fails to intercede with her husband concerning the future of the tribe, and concluding with this prophetic rhetorical question: "What's more, who can say but that you have been elevated to the palace for just such a time as this?"

In the end the queen is successful in getting the king to issue another decree that allows the tribe to defend itself,

which effectively negates the king's former decree. For his part in the shenanigans, the prime minister is hung on the gallows that he had prepared for the queen's uncle.

What does this ancient story have to do with ham radio? With the FCC's June 10, 2004 ruling the FCC has given ham radio the opportunity to defend itself in a positive way against the BPL threat. It is now up to us to use our creativity to make it happen. Are we going to be a part of the problem or are we going to be a part of the solution? Perhaps a bit of rewording of the uncle's question might be in order for us and our hobby: "What's more, who can say but that we are active in our hobby for just such a time as this?"

Echo In the Air?

As this column is being prepared, we are a couple of weeks away from launch of AMSAT-NA's Echo satellite. Assuming a successful launch during late June or sometime during July, now is the time to start looking for the bird to come to life. For more information, see: <http://www.amsat.org>.

Current Contests

There are two important contests this month: The **ARRL UHF and Above Contest** is scheduled for 7–8 August. Complete rules can be found in the July issue of *QST*. The first weekend of the **ARRL 10 GHz** and above cumulative contest is scheduled for August 21–22. The second weekend is September 18–19. Complete rules for this contest also can be found in the July issue of *QST*. Rules for the contests can also be viewed at <www.arrl.org>.

EME Conference

The 11th **International EME Conference** will be held on the campus of the College of New Jersey, in Ewing, NJ, August 6–8. For more information, go to: <http://www.qsl.net/eme2004/>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. To date this year the following organizations or conference organizers have announced calls for papers for their forthcoming conferences:

The 2004 **TAPR/ARRL Digital Communications Conference** will be held September 10–12 at the Airport Holiday Inn in Des Moines, Iowa. You'll find more conference information on the web at: <http://www.tapr.org/dcc/>. Please send your submission by August 10 to: Maty Weinberg, ARRL, 225 Main St., Newington, CT 06111, or via e-mail to: <maty@arrl.org>.

The **Microwave Update** conference will be held October 14–16 in the Dallas-Ft. Worth area of Texas. The contact person is Kent Britain, WA5VJB, at <wa5vjb@cq-vhf.com>. Submissions are to be sent to him no later than August 16. For more information, see the North Texas Microwave Society's URL: <http://www.ntms.org>.

The 2004 **AMSAT Space Symposium and Annual Meeting** is scheduled for October 8–10 in Arlington, Virginia. The symposium will be held in conjunction with the ARISS International Meeting, which is planned for October 10–13. Camera-ready copy of submissions on paper or in electronic form are due by August 1 for inclusion in the printed symposium proceedings. Papers should be sent to: Daniel Schultz, N8FGV, 14612 Dowling Drive, Burtonsville, MD 20866, or by e-mail to: <n8fgv@amsat.org>. For more information, please see the AMSAT URL pertaining to the symposium at: <http://www.amsat.org/amsat/news/ans.html#03>.

Dayton and Me

For those of you who looked for me at the Dayton Hamvention® VHF Forum, you did not see me because on the way to the forum I was in an automobile accident. While transitioning on the US 35 West to I-75 North freeways, my new Saturn VUE began hydroplaning on the wet pavement. As a result, I lost control of the vehicle and crashed into two retaining walls, one after the other. The accident was a total loss with regard to the vehicle. My wife, Carol, W6CL, and I sustained bumps and bruises, with Carol getting most of the injuries. We are healing, but it will take time—more time for Carol. For those of you who have known about the accident and have expressed your concern to us, we appreciate your kind words, thoughts, and prayers very much. Perhaps next year's Dayton will be a bit less eventful.

This is a wrap for another column. Thank you for your continuing support of this, your column. As usual, next month there will be more news than there is allocated space. Even so, we want to print your news, so let us hear from you. Until next month...

73, Joe, N6CL

BY JOHN DORR,* K1AR

The 2004 Contest Survey

August's Contest Tip

Now that the good weather is here, it's time to "sweat" the details on some of your outside projects. If you're like many hams, there are examples throughout your contest station where compromises were made. Perhaps it was a connection you didn't bother to solder or a connector that wasn't prepared properly. Remember that those situations will eventually cause problems. It is much easier to fix them now in the comfort of summer than in the middle of an ARRL DX contest in February. Take some good, old-fashioned advice: Sweat the details and do it right!

Calendar of Events

July 24–25	Russian RTTY WW Contest
July 24–25	RSGB IOTA Contest
Aug. 1	SARL HF Phone Contest
Aug. 7	European HF Championship Contest
Aug. 7–8	North American CW QSO Party
Aug. 7–8	ARRL UHF Contest
Aug. 14–15	Maryland-DC QSO Party
Aug. 14–15	WAE CW DX Contest
Aug. 21–22	North American SSB QSO Party
Aug. 21–22	New Jersey QSO Party
Aug. 21–22	SARTG WW RTTY Contest
Aug. 21–22	SEANET Contest
Aug. 28–29	YO DX Contest
Aug. 28–29	Ohio QSO Party
Sept. 4–5	All Asian SSB DX Contest
Sept. 8–10	YLRL Howdy Days
Sept. 11–12	WAE SSB DX Contest
Sept. 11–13	ARRL September VHF QSO Party
Sept. 12	North American CW Sprint
Sept. 25–26	**CQ WW RTTY DX Contest**
Oct. 30–31	**CQ WW DX SSB Contest**
Nov. 27–28	**CQ WW DX CW Contest**

One of the traditions I've established over the years is to solicit your input via an annual contest survey. Well, it's that time again! *(See page 90 for the survey form.—ed.)*

When I began running these surveys over ten years ago, I was interested in using them as a vehicle for focusing on timely contesting topics as well as a tool for helping me understand what subjects you wanted covered in future columns. This is still the case, and as participation has continued to grow with each passing year, I've been pleased with the interest and effort that many of you have taken to complete the survey.

As has been the case in the past, I have quite a variety of questions in this year's survey. There's something for everyone, whether you own a monster contest station or have concerns about the impact of contesting on the hobby as a whole. In many cases, the survey topics come from the questions and comments I receive from you. In addition, there are the hot topics of the day which always make their way into the analysis. However, keep in mind that this is not a scientific process. We'll leave the real surveying up to the professionals.

I hope you'll benefit from the work that takes place as part of the survey process. At the very least, when the results are published in a future column you'll get an idea of what's on people's minds and perhaps determine how we can make contesting and ham radio a better hobby for everyone.

How about you get right to it? I encourage you to take a few minutes and voice your opinion. You'll find that in addition to being published in *CQ*, I'll be making this survey available on most of the popular internet e-mail reflectors and other electronic sources. An on-line response is strongly preferred, as it makes for much easier tabulation. With the assistance of Tom Roscoe, K8CX, your responses can be submitted this year by logging on to <http://hamgallery.com/survey/>. By the way, Tom has a very cool website, so after you've completed your survey, be sure to take a drive through his gallery of photographs and news. Of course, if you must, you can still "snail mail" your replies in the conventional (is snail mail conventional anymore?) manner to: John Dorr, K1AR, 2 Mitchell Pond Road, Windham, NH 03087.

Enjoy the survey! If all goes according to plan, we'll have results in a few months.

Contesters Show Their Stuff!

What follows is a very touching story that was published by George Wagner, K5KG, on some of the internet e-mail reflectors. It's a true testament to the generosity of hams, and contesters in particular. Be sure to read on.

At the time I posted my request on May 5th, 2004 on the CQ Contest and FCG reflectors I did so with a great deal of hesitancy, not knowing what kind of response I would get. Here is what I asked for:

"Please excuse the bandwidth for this message, but I am looking for a wheelchair and funds to ship it to Dominica, J7. This is for my close friend Lambert Charles, J73LC, who needs it immediately for his ailing mother. Lambert is not able to find a wheelchair locally in Dominica. I know that many of you have worked J7 operations over the past several years—J7OJ, J75KG, J7A, J75KG, J79JRC, J79APS, and J79MM. It is Lambert who has made these trips possible. It was also Lambert who, on a moments notice, got the J7OJ callsign for the ARRL DX CW contest in February in memory of Jim White, K4OJ.

"If anyone can donate a used chair, I know he would be most appreciative. I can buy a new or used chair and ship it via airfreight out of Miami. I don't know the prices of chairs, either new or used, but I can easily find that out. Shipping will probably run on the order of $200.

"If any of you are so moved and can donate a wheelchair, or would like to make a cash contribution for a chair or its shipping, please contact me. This is an urgent matter; even if I somehow acquired a chair today, it would be another week or so before I could get it to Dominica. Please respond to me by e-mail.

"Thank you so much for your consideration.—73, George, K5KG/J75KG"

(Continued on page 111)

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

2004 CQ Contest Survey

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

1. Do you spend more time on the radio (including contests) or the internet?
   A) Radio
   B) Internet

2. How do you envision contesting in 10 years?
   A) Forget about contesting; ham radio will not even be around anymore
   B) Contesting will be better than now with more activity and interest
   C) Things will remain pretty much the same as they are today

3. In addition to your contest club, do you belong to a local club?
   A) Yes
   B) No
   C) I don't belong to any clubs
   D) I only belong to a local club and not a contest club

4. Do you believe packet radio is an asset or a detriment to contesting?
   A) Asset
   B) Detriment

5. What has been your favorite radio (including current rig)? _____

6. Apart from contesting, what is your second favorite activity within ham radio?
   A) DXing
   B) Public Service
   C) Ragchewing
   D) Local club involvement
   E) Antenna experimentation
   F) Homebrewing/technical endeavors
   G) Other _____

7. How would you rather spend your time when involved in contesting?
   A) Operating your own station by yourself or with others
   B) Station construction and being a host operator
   C) Operating someone else's station
   D) Helping someone else build his/her station
   E) Other amateur radio activities altogether; I don't operate contests

8) What is your favorite contest?
   A) CQ WW DX
   B) CQ WW WPX
   C) ARRL International DX
   D) ARRL SS
   E) NA Sprint
   F) Other _____

9) On average, how many hours per week do you operate your radio and what % of that is on CW?
   A) Number of hours _____
   B) % using CW _____

10) Have you recently built and completed a working homebrew project for your station?
   A) Yes
   B) No

11) If yes to Question #10, what did you most recently build?

_____

Additional Comments (use extra paper if necessary):

_____

_____

Return your survey responses to:
John Dorr, K1AR, 2004 Contest Survey, 2 Mitchell Pond Road, Windham, NH 03087 USA
or submit via the internet at: **http://hamgallery.com/survey**
Deadline: September 30, 2004

BY CARL SMITH,* N4AA

DX Cluster Activity; DXCC/DXAC Ten Years Ago

For some time now, I've been watching the "spots" on the DX Summit cluster and making some observations. During the daylight hours in the U.S., the vast majority of the reports are coming from European stations. Just this morning (at around 1300Z, June 10), of the 50 showing at one time, I counted 30 spots from EU stations, 10 from the U.S., 7 from Asia, and the remaining 3 scattered in other areas.

While I realize that these daylight hours are "working hours" for those in the U.S., they are also the afternoon hours in Europe, and yet there are three times as many reports from EU as there are from the U.S. What is the reason for this discrepancy? Could there be that many more DXers in EU than there are in the U.S., or is there another reason? Could it be that EU DXers are more willing to report DX activity than U.S. DXers? Surely, at any given time there are hundreds of DXers in the U.S. scanning the bands for DX. However, they are not putting out any spots for that DX. Even if they don't want to work the DX they hear, they could spot it for others. Has the fascination of the spotting network lost its attraction for U.S. DXers?

There are those DXers who steadfastly refuse to use the cluster networks to locate DX, but I know there are countless others who use it all the time. They leave their computers running 24/7 just to make sure they don't miss anything, yet they rarely push the button to put out spots themselves. It seems a little selfish to benefit from the efforts of others and not reciprocate. Some up-and-coming DXer just might need that ZD7 or 5B4. A little food for thought!

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

Antonio, EA9BO, at his operating position. Rick, NE8Z, visited with Antonio while he was in Ceuta and found that Antonio also enjoys deep-sea fishing. (Photo courtesy of Rick, NE8Z)

DXpedition Activity Falls

DXpeditioning seems to have dropped off for whatever reason. Is it the solar cycle? Is it that DXpeditioners can't find a place to go? I know there are some trips "in the works," but the timing

Bill, W4WX, and William, N2WB, visited Sardinia in March. Here (left to right) are Bill, W4WX; two sons and a daughter of their host, Gianni Vincis, ISØVSG; William, N2WB; Gianni's XYL; and Gianni. Bill says they enjoyed the wine and fine food. (Photo courtesy of Bill, W4WX)

Bill, W4WX, and William, N2WB, were guest ops at the T70A station. Here Bill takes a break from the action. (Photo courtesy of W4WX)

Advertiser OUTLINE

ALINCO

Evelyn Garrison, WS7A
Russell Dudley, KW5O
www.alinco.com

Alinco is distributed in North America by Ham Distribution, Inc.

Evelyn Garrison, a familiar face at ham shows across the country has been representing Alinco for over ten years. Along with Alinco's new North American distributor, Russell Dudley, Evelyn will continue to greet hams, answer questions and demonstrate the many new additions to the Alinco product line. Both Evelyn and Russell know that amateur radio operators appreciate value.

Alinco's tagline, "Simple, Clean, Dependable" really describes the product line, notes Evelyn. Russell adds, "Throughout my years in the amateur radio industry, I have noticed that whether you're talking about working VHF and UHF bands or concentrating on HF and DXing, hams still want a dependable radio at a great price. That's what makes Alinco such a great choice!"

"It's also what makes *CQ* a great choice to advertise Alinco products", adds Evelyn. *CQ*'s straightforward style of editorial really appeals to hams who want to get the most enjoyment out of the hobby without getting caught up in too much jargon.

CQ readers are active hams who turn to the magazine for news of the latest developments in equipment as well as for entertaining columns that showcase amateur radio "fun". It's a great combination that reaches a diverse group of amateur radio enthusiasts. That's why Alinco relies on *CQ* as a key component of its advertising.

"We know that advertising in *CQ* is a smart move!" notes Evelyn. When something works well, you stick with it. Alinco plans to stick with *CQ* now and in the future.

CQ may be over 60 years old, but it shows no signs of slowing down. Let *CQ* put its years of experience to work for your company!

The WPX Program

CW

3138.....CT1EEN

SSB

2906.....K3QDV 2907.....YB0IR

CW: 600 KE6FQC. 3950 N4NO. 4050 K9QVB.
SSB: 600 KE6FQC, KL7FAP. 800 K3QDV, IZ0BNR. 850 VE3NQK. 1500 HB9DOT. 2400 CT1EEN. 3350 N4NO.
MIXED: 750 KL7FAP. 800 KL7FAP. 1050 WB0WAO. 1300 G4PWA. 2050 AA1KS. 3950 N4NO. 5350 W2FXA.

10 Meters: WB0WAO
15 Meters: WB0WAO
20 Meters: WB0WAO
40 Meters: DS4DRE

AWARD OF EXCELLENCE: CT1EEN, G4PWA
AWARD OF EXCELLENCE WITH 160M BAR: G4PWA

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SM0AJU, N5TV, W6OUL, AB0P, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, ONL-4003, W5AWT, KB0G, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YB0TK, K9QFR, 9A2NA, W4UW, NX0I, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, W0ULU, K9XR, JA0SU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, K0DEQ, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UA0FZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RA0FU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4BP, K4LQ, K0KG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX.

160 Meter Endorsement: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SM0DJZ, DK3AD, W3ARK, LA7JO, SM0AJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KB0G, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YB0TK, K9QFR, W4UW, NX0I, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WB0DD, I0RIZ, I2MQP, F6HMJ, HB9DZZ, K9XR, JA0SU, I5ZJK, I2EOW, KS4S, KA5CLV, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, K0DEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RA0FU, UA0FZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP, DL6ATM, W2OO, RU3DX.

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 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.

is not for months to come, even into next year. World travel to many places of interest to DXers is limited nowadays, but not impossible to a determined group. There will, however, be DXpeditions for us to work in the future.

CQ DX Awards Program

SSB

2435.....N8TMW

CW

1060.....K0KG

SSB Endorsements

320 DU9RG/335
320 ...I8LEL/335
320EA3EQT/333
320....K9IW/331

CW Endorsements

320.....K9IW/331
320.....W4UW/330
275.....WA4DOU/281
200.....K0KG/228

RTTY Endorsement

310.....N5FG/318

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

Vlado, ZA/Z35M, has been active from Tirana, Albania since June 2002. Since then about 50,000 QSOs have been made on the HF bands, mostly CW and SSB. The only antenna in use is a G5RV multiband dipole between two tall buildings. Inside the shack are an IC-746 PRO transceiver, Ameritron AL-811 amplifier, MFJ antenna tuner and memory keyer, etc. Vlado's first operation from Albania was in 1994 and 1995 when he signed ZA/Z32KV and also was a guest operator at ZA1MH (station of Mike, K5KWG), ZA1B (Geni), and ZA1AJ (Vit, OK2ZV). In 2003 he was part of Project Goodwill Albania and joined the multi-national operation at ZA1A and ZA1UT. ZA/Z35M QSL via Z35M: Vladimir Kovaceski, Box 10, Struga 6330, Macedonia. (Photo courtesy of Vlado, Z35M)

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

5264 ..... 9A2AA	3808 ..... N6JV	3237 .. WB2YQH	2944 ..... IT9QDS	2510 ..... K9UQN	2070 ..... I2EAY	1697 ..... Z35M	1369 .. KW5USA	738 ..... AK6I
4646 ..... W2FXA	3768 ..... YU1AB	3234 .... JH8BOE	2824 ..... W2ME	2422 .... W8UMR	2018 ..... HA9PP	1674 ..... YBØAI	1226 ... EA2BNU	710 ..... KØCF
4257 ..... W1CU	3668 ..... N4MM	3175 ..... KØDEQ	2772 .. YU7GMN	2399 ..... W6OUL	2005 ..... VE6BF	1587 ..... W2EZ	1220 ..... K6UXO	697 ..... KL7FAP
4211 ..... 9A2NA	3589 ..... N5JR	3166 ..... K9BG	2720 ..... K2XF	2385 ..... K5UR	1976 ..... DJ1YH	1561 ..... N1KC	1130 .. PY1NEW	
4149 ..... EA2UA	3548 ..... N9AF	3140 ..... I2EOW	2701 ... WA1JMP	2369 .... JN3SAC	1958 .... CT1EEB	1560 ..... KX1A	1090 ..... W2OO	
4111 ..... F2YT	3489 ... SM3EVR	3121 ... PAØSNG	2650 ..... 9A4W	2287 ... OZ1ACB	1837 ..... AA1KS	1535 ..... AI6Z	933 ..... SM7GXR	
3960 ..... N4NO	3379 ..... I2MQP	3082 ..... IK2ILH	2642 ..... W9IL	2212 ... PY2DBU	1773 ..... W7CB	1521 ..... NG9L	865 ..... N5DD	
3822 ..... VE3XN	3291 ..... KF2O	3011 ..... W2WC	2598 ..... W9OP	2203 ..... W4UW	1772 ..... VE9FX	1487 ..... WI3W	803 ..... VE3NQK	
3816 ..... I2PJA	3281 ..... S53EO	2987 ..... HAØIT	2550 ..... W7OM	2175 .. WB3DNA	1765 ..... KØKG	1472 .. OK1DWC	742 ..... K5IC	

SSB

4509 ..... IØZV	3234 ..... N4MM	2782 ..... KF2O	2350 ..... IN3QCI	2014 ..... K2XF	1806 ..... K3IXD	1533 ..... KI7AO	1190 ..... K4CN	903 ..... N9DI
4027 ..... ZL3NS	3226 ..... EA2IA	2741 .. PAØSNG	2325 ..... CX6BZ	1994 ..... W4UW	1721 .... DK5WQ	1520 ..... DF7HX	1162 ... EA5DCL	822 ..... K1BYE
4018 ..... VE1YX	3215 ..... I2MQP	2734 ..... 4X6DK	2289 ..... HAØIT	1973 ..... I3ZSX	1704 ..... IT9SVJ	1460 ..... NG9L	1148 ..... AG4W	822 ..... W8UMR
3793 ..... I2PJA	3101 ..... N4NO	2646 ... LU8ESU	2259 ..... K5RPC	1969 ... CT1EEB	1701 ..... K8MDU	1385 ... JN3SAC	1083 ... VE7SMP	812 ..... KU6J
3649 ..... F6DZU	3049 ..... F2VX	2618 ... OE2EGL	2143 ..... W2WC	1954 ... CT1EEN	1698 .... W6OUL	1384 ... LU3HBO	1078 ..... EA3KB	793 ..... KU4BP
3373 ..... 9A2NA	3036 ... CT1AHU	2594 ..... I8KCI	2094 ..... LU5DV	1942 ..... W7OM	1669 ..... W2FKF	1259 ..... I2EAY	1048 ... EA3EQT	733 ..... AK6I
3353 ... EA8AKN	3004 ..... N5JR	2538 ..... KF7RU	2028 ..... K5UR	1937 ..... I8LEL	1562 ..... W2ME	1238 ..... LU4DA	1043 ..... AI6Z	670 ..... VE6BF
3307 ..... OZ5EV	3000 ..... I4CSP	2516 ..... EA1JG	2027 ..... NQ3A	1933 ..... W9IL	1562 ... SV3AQR	1218 ..... WT3W	990 ..... HA9PP	601 ..... K7SAM
3260 ..... CT4NH	2807 ..... I2EOW	2509 ..... EA5AT	2021 ..... N6FX	1862 ..... EA7TV	1538 ..... VE9FX	1194 ..... N1KC	934 ..... KX1A	

CW

4297 .. WA2HZR	2959 ..... 9A2NA	2386 ... EA7AZA	2146 ..... N6FX	1893 ..... EA5YU	1834 ..... W9IL	1439 .... EA2CIN	1158 ..... YU1TR	767 ..... VE9FX
3655 ..... K9QVB	2948 ..... LZ1XL	2380 ..... KF2O	2112 ..... OZ5UR	1882 ..... W7OM	1718 ..... I2EAY	1342 ..... WO3Z	1132 .. WA2VQV	642 ..... PP6CW
3532 ..... N4NO	2694 ..... N5JR	2268 .... W8UMR	2043 ..... K2XF	1867 ..... VE6BF	1712 ..... I2MQP	1337 ..... AC5K	1047 ..... KX1A	
3361 ..... VE7DF	2476 ..... W2WC	2260 ..... I7PXV	2040 ... JN3SAC	1847 .... IK3GER	1584 .... IK2ECP	1235 ..... AI6Z	998 ..... T94GB	
3229 ..... EA2IA	2389 ..... KA7T	2149 ..... K9UQN	1939 ..... K5UR	1841 .... W6OUL	1520 ..... 4X6DK	1203 ..... K6UXO	898 ..... WT3W	

Twenty meters is the mainstay for DXing here in the U.S. in early June. Although 17 and even 15 meters show signs of life, it is 20 that attracts the most attention. We've always been able to count on this band for DXing, regardless of the state of the solar cycle. Most of us "old folks" remember what it was like back in the mid-'50s, late 60s, etc. Ten meters was a shadow, 15 sometimes was good, but 20 was "where it was" in those days. Oh, yes, equipment

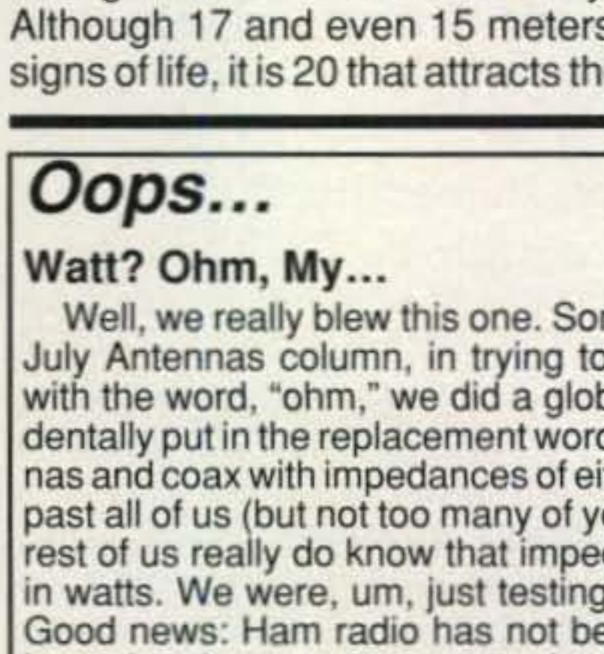
Oops...

Watt? Ohm, My...

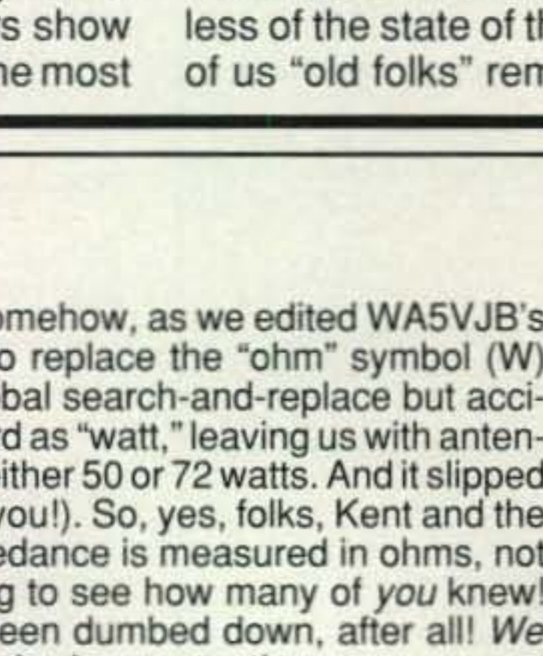
Well, we really blew this one. Somehow, as we edited WA5VJB's July Antennas column, in trying to replace the "ohm" symbol (W) with the word, "ohm," we did a global search-and-replace but accidentally put in the replacement word as "watt," leaving us with antennas and coax with impedances of either 50 or 72 watts. And it slipped past all of us (but not too many of you!). So, yes, folks, Kent and the rest of us really do know that impedance is measured in ohms, not in watts. We were, um, just testing to see how many of *you* knew! Good news: Ham radio has not been dumbed down, after all! *We* have, but then we were pretty dumbed up to start!

Missing Link

The schematic in June's first installment of the "Phoenix Transceiver" article had two values missing, both at the lower left. The coil labeled **L3** should have a value of **9 µH, 39 turns**; and the **100k** resistor to the left of Q5 should be labeled **R10**. We apologize for any confusion.



Full view of schematic



Enlarged view of corrections

The WAZ Program

10 Meter SSB

565 .....AI6Z 566 .....LU7DW

15 Meter SSB

611 .....YC9WZJ

17 Meter SSB

36.....W7FP

20 Meter SSB

1130 .....JA1BDF

40 Meter SSB

103 .....YBØAI

10 Meter CW

189 .....NIØG

15 Meter CW

321 .....NIØG

20 Meter CW

543 .....JI1BJB 544 .....NIØG

30 Meter CW

59 .....W5ODD

40 Meter CW

238 .....NIØG

80 Meter CW

62 .....KF2O

160 Meters

197 .....NX4D (30 zones) 198 ..RA2FBC (38 zones)

All Band WAZ

SSB

4916 .....IK7VKD 4919 .....K3KO
4918 .....NZ3O 4920 .....4X6ZQ

Mixed

8310 .....UR7CA 8313 .....WD8QKQ
8311 .....NZ3O 8314 .....WA5KBH
8312 .....VE3IC

All CW

421 .....NZ3O 425 .....N3ZN
422 .....DL1AMQ 426 .....K3KO
423 .....DK5HZ 427 .....W1EBI
424 .....W6YOO

RTTY

146 .....IN3MQT 147 .....K3KO

EME

1 .....OK1MS

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 Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

5 Band WAZ

As of June 1, 2004, 655 stations have attained the 200 zone level and 1398 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

DL1AMQ

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K5MC, 199 (22)
W1JZ, 199 (24)
K2UU, 199 (26)
W1WAI, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
N4MM, 199 (26)
DL2KQ, 199 (31)
JA5IU, 199 (2)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
N4XR, 198 (22, 27)
N4PQX, 198 (24, 26)
RU3DX, 198 (1, 6)
UT5JAJ, 198 (12, 30)
N6HR/7, 198 (34, 37)
OE2LCM, 198 (1, 31)
EA7GF, 198 (1, 27)
W7SX, 198 (18, 23)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
HA9RT, 198 (1, 31)

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

I8PND (155 zones)
I5ZGQ (190 zones)
N5ID (151 zones)
WA2NPD (195 zones)
JA5IU (199 zones)
JJØKDW (170 zones)

Endorsements:

DL2KQ (199 zones)
JR2KDN (200 zones)
KF2O (200 zones)
DL1AMQ (200 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

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 Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

and antennas are better now than they were back then, and we can hear better with the new digital radios. One can make the argument that we can create our own propagation, but that only goes so far. We have to be flexible and have the capability of going where the DX is if we are to have any enjoyment in DXing. Bigger antennas, higher towers, and low-noise receiving antennas all are things that we can use in our attempt to create propagation, and all these things certainly will improve our chances of working that elusive DX.

The number of DXers achieving the goal of "worked 'em all" has been climbing each year. Hams are growing older and "new blood" seems to be in short supply. Who is going to follow us as we age and pass from this life? We really need to cultivate younger hams and educate them in the wonderful world of chasing DX. A recent licensing class in my town had several teens in the class. It was especially interesting, because their teacher, a YL, brought them to the class. At the end of the class she passed the tests, but unfortunately the youngsters missed by only a few questions. I was assured that they would be back to try again, and I hope to be there to observe. There were a number of others in the class, ages from mid-30s to late 60s. Several of them passed the tests, some even passing the code test (not everyone wanted to take the code exam).

Last month I had a review of Ward Silver's book *Ham Radio for Dummies*. Believing that the book might inspire some of these students, I acquired several copies of it and went to the exam session. As each student had his or her exam graded, I stood back and watched. When one passed the test, I took the opportunity to present him/her with a copy of Ward's book and ended up presenting a total of six books. I can't do as much as I would like these days to give back to ham radio, but I just felt this was an opportunity I couldn't pass up. Perhaps this small contribution to these new licensees will make a difference in what they do with that license and how they operate in the years to come.

Do You Remember?

Ten years ago, the late Chod Harris, VP2ML (former editor of this column) wrote in *The DX Magazine* about DXCC and DXAC news. I thought I would share with you his comments from ten years ago . . .

As expected, the DX Advisory Committee voted to delete both the Penguins (ZSØ) and Walvis Bay (ZS9) from the DXCC countries list, effective March 1, 1994. The Awards Committee concurred on April 27, voting unanimously to accept the deletion recommendation. This reduces the number of current DXCC countries to 326.

In other DXAC news, the DXAC voted down a proposal to add additional single band awards to the DXCC program. The vote was 13 to 2 against the idea of adding 30, 20, 17, 15, and 12 meter single band awards. The DXAC felt this would increase the workload of the DXCC desk at a time when the backlog was once again growing.

The DXAC also voted 15 to 1 against a proposal to add a 10 meter DXCC Honor Roll to the existing program, again citing DXCC desk workload.

The vote to reconsider the addition of Mt. Athos (SY) to the DXCC countries list (in essence to remove the country from the list) will be re-balloted. There were concerns over the wording of the question on the ballot.

The DXAC voted 15-1 to accept the QSLing guidelines as per subcommittee

QSI Information

4A2Q via WD9EWK
4D2B via G3OCA
4D2C via UA4SKW
4D70VDG via DU1VDG
4D71X via NZ7X
4G1A via N2NL
4G6A via VE7DP
4J1S via UA3FDX
4J3DGF via DK6CW
4J4AF via EA7FTR
4J6ZZ via UT3UY
4J85YGA via UT3UY
4KØGNY via GM0GNY
4K1QAV via W3HC
4K1V via UA3FDX
4K3MA via DK6CW
4K5ØV via UA3FDX
4K51V via UA3FDX
4K1QAV via W3HC
4K1V via UA3FDX
4K3MA via DK6CW
4K5ØV via UA3FDX
4K51V via UA3FDX
4K52V via UA3FDX
4K53V via UA3FDX
4K60AA via UA3FDX
4K6DI via W3HNK
4K7ØDWZ via UA3FDX
4K7DWZ via UA3FDX
4K7Z via UA3FDX
4K7Z/F8LPX via F8LPX
4L1BR via DL2RMG
4L1DX via OZ1HPS
4L1FX via DJ1CW
4L1MA via ON4RU
4L1R via W3HNK
4L1RK via RW6HS
4L8A via OZ1HPS
4M5X via W4SO
4N1A via YU1YV
4N1X via YU1AI
4N2ØØA via 4N1A
4N25K via YU1SB
4N4MX via DJ2MX
4N5ØA via YU1YV
4N7N via YU7BPQ
4N7ZR via VE3EXY
4N9A via YU1YV
4N9C via YU1JU
4N9T via YU1JU
4O8AA via UA3DX
4S7AQG via 7J3AOZ
4S7ARG via JA3ARJ
4S7CHG via JA3CHS
4S7CWG via DK7PE
4S7DA via W3HNK
4S7DBG via JA3DBD
4S7DLG via DK7TF
4S7DUG via JQ3DUE
4S7DXG via UR9IDX
4S7FAG via JH3FAR
4S7FBG via DL9GFB
4S7FDG via JA5FDI
4S7FPG via DL4PG
4S7GGG via JA3ART
4S7GXG via JH3GXF
4S7JKG via JG3JKG
4S7JWG via DL9MS
4S7KJG via JA1KJK
4S7LHG via DJ3FK
4S7LSG via JH3LSS
4S7OCG via JR3OCS
4S7QIG via JN4QIN
4S7RO via DJ9ZB
4S7UJG via JA3UJR
4S7VK via DJ9ZB
4S7WAG via DL9MS
4S7YHG via JA3HXJ
4S7YJG via JM3INF
4T4V via DL5SE
4U1UN via HB9BOU
4V2ØØYH via DL7CM
4V2PK via N3SL
4V4H via N3SL
4W1BK via WA2MOE
4W1DN via JR2KDN
4W1SW via JI1NJC
4W2A via JR2KDN
4W2AQ via OM2AQ
4W2DN via JR2KDN
4W3CW via G3WQU
4W4JEG via JR6ETW
4X/NP3D via W3HNK
4XØIS via 4X1GA
4X1UH via W3HNK
4X55I via 4Z4SZ
4X6FR via 4X6OM
4X6HP via EA7FTR
4X75TA via 4X6LM
4ZØTA via 4X6LM
4Z8ØTA via 4X6LM
4Z85TA via 4X6LM
4Z8EE via OK1EE
4Z8GZ via OE1GZA
4Z8OTA via 4X6LM

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

report. This report has not yet been made public.

Active agenda items as of late April (1994) included Pratas Island, Aldabra Island, Scarborough Reef, minimum size for a DXCC country, working by call areas, the Turkish Republic of Northern Cyprus, and Mt. Athos.

DXCC Processing Status

The DXCC desk made a little progress on the backlog in April, at least in terms of applications processed. They received 644 applications in April (down from 1127 in March) and processed 723, leaving 541 unprocessed at the end of the month. In terms of QSL cards, they continued to fall behind. The 644 applications received in April included 53,843 cards. They processed 52,115, leaving a backlog of 63,665 unprocessed, up slightly from the 61,937 at the end of March. Turn-around time has also slipped slightly, and in late April was about four weeks for those whose DXCC records were computerized. Some applications still await entry from paper records, and these take longer to process. DXCC applications are up 19% from last year, and the number of QSL cards in those applications is up 38%."

Just a walk down memory lane – from ten years ago. Things certainly have changed since 1994, haven't they? We now have 335 current DXCC countries, for example. For comparison purposes, in early June 2004, the DXCC desk reported receiving 570 applications with 63,056 "credits" in March 2004 and only 209 applications with 26,266 "credits" in the April 2004. Turn-around time for applications was reported as approximately three weeks. These numbers further indicate a substantial decrease in the DXCC workload from that of ten years ago. When I asked about paper records, I was told that they now only exist for DXCC holders prior to 1991 who have not submitted an application since then. Those records have *not* been computerized, but all others have been. Gee, I hope they keep a backup of that computer file!

Until next month, good luck in your DXing efforts. Whether it's on 20 meters or 6 meters, enjoy the chase and remember to have fun! 73, Carl, N4AA

awards

BY TED MELINOSKY,* K1BV

Olympic Countdown on the Air

The 2004 Summer Olympic Games are scheduled for August 13–29 in Athens, Greece. Greek amateurs have been active on the sub-committees working on publicity, and they have developed a great series of certificates requiring contacts with regular SV stations as well as a large number of special-prefix stations.

A special, interesting "Countdown on the Air" program will be activated by many Greek radio amateurs in the 99 days preceding August 13, 2004, the starting day of the Olympic Games. Nine multi-operator, special-event stations (SX9A, SX8A, SX7A, SX6A, SX5A, SX4A, SX3A, SX2A, and SX1A) from the nine Greek regions will be active from May 6 until August 12. These stations will be on the air on all bands and modes every ten days, one by one, to celebrate the games. All contacts made with these special calls will automatically be QSLed via the bureau. There is *no* specific QSL manager for them. QSL via the Greek Bureau *only*. For more information, go to: <http://www.qsl.net/sv2ngct/sx.htm>.

In addition, the Greek Communications Authority has announced that Greek radio amateurs may use the optional SX2004 or SY2004 callsign prefix from June 1, 2004 until November 15, 2004 to commemorate the Athens Olympic Games and Paralympic Games 2004. QSL via the individual operator's instructions. Also, foreign radio amateurs, as visitors to Greece from CEPT countries or from countries with reciprocity (U.S., Canada, Cyprus, Switzerland, and Australia), may use the special prefix J42004 from August 2004 until November 15, 2004 without any license from the Greek Communications Authority. All others need to contact the Communications Authority for special permission. QSL via each individual operator's instructions.

The official website of the 2004 Olympics is <http://www.athens2004.com>.

Athens 2004 Olympic Games Awards

These awards, sponsored by the Greek national radio organization, Radio Amateur Association of Greece, are issued to radio amateurs or SWLs who have confirmed contacts with Greek stations during the period May 15 to September 30, 2004.

A. Special prefixes J4, SX, and SY count 10 points.

B. SV prefixes count 5 points.

C. RAAG's club station SZ1SV or SX1O counts for 50 points.

D. Club station SZ1SV or SX1O can be worked on more than one band to give an extra 50 points per band.

The awards are available for contacts made on CW, SSB, RTTY, or Mixed Mode and are offered in three categories:

Gold—contacts with Greek stations, collecting 500 points. The certificate shows a Kouros statue depicting the ancestors of hockey, 510 B.C.

Silver—contacts with Greek stations, collecting 350 points. The certificate shows a Kouros statue of wrestlers, 510 B.C.

Bronze—contacts with Greek stations, collecting 250 points. The certificate shows a Kouros statue of runners, 510 B.C.

A GCR list with all QSO information is required, and the award manager of a national society (an IARU member) or two licensed radio amateurs must certify it. Cost of the certificate for all categories is 10 IRCs or 10 Euros. Send list (or cards) to RAAG,

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

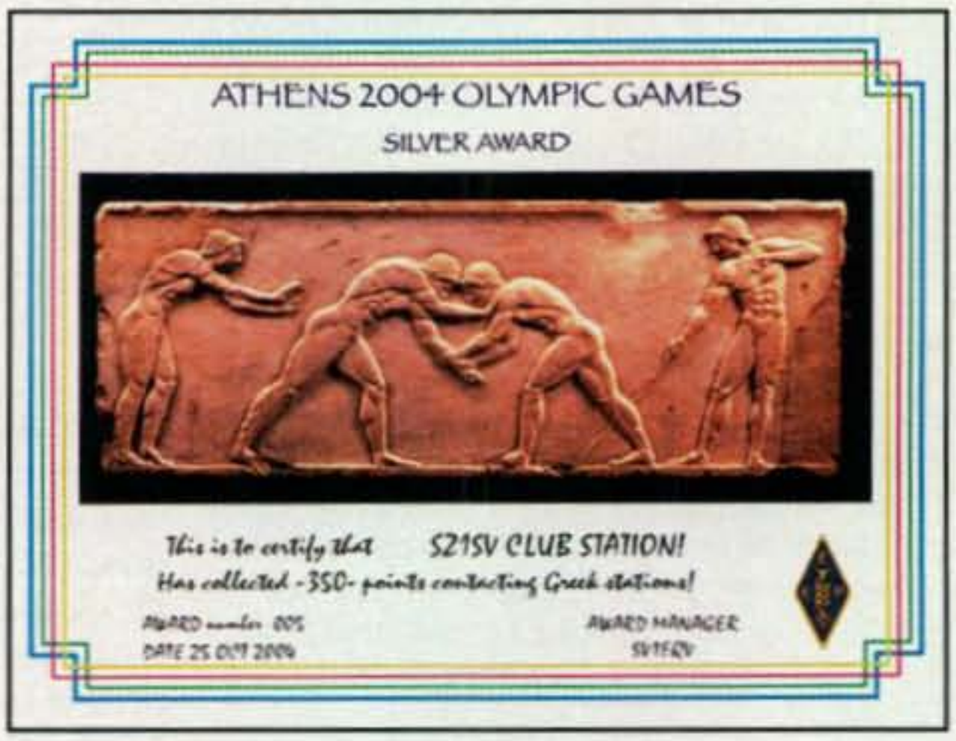
USA-CA Special Honor Roll

Robert T. Woody, N8KIE
USA-CA All Counties #1093
May 24, 2004

USA-CA Honor Roll

500	1500	2500
WZ3AR ...3300	K2RP.....1388	N8KIE.....1205
NEØP 3301	N8KIE.....1389	
N8KIE.....3302		3000
	2000	N8KIE.....1115
1000	N8KIE.....1286	
K2RP.....1659		
N8KIE.....1660		

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. 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 June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.



The Athens 2004 Olympic Games Awards are issued to radio amateurs or shortwave listeners who have confirmed contacts with Greek stations from May 15 to September 30, 2004.

Award Manager, P.O. Box 3564, 102 10 Athens, Greece.

Great Lakes Lighthouse Awards

The Great Lakes have played a major role in the economic development of the United States, especially in the transportation of coal, iron ore, and grain products. Aids to navigation, such as lighthouses, were built early in U.S. history to protect lake shipping. The Michigan DX Association sponsors an award for contacting or activating these lighthouses, and the certificate features a stunning satellite photo of the Great Lakes surrounded by a representative selection of lighthouse images. The Contact Award is for any licensed amateur or SWL who can verify contacts with a minimum of seven Great Lakes lighthouses/lightships. The Activators Award is for any licensed amateur who activates ten Great Lakes lighthouses/lightships.


Michigan DX Association - Great Lakes Lighthouses Award

This certifies that W8TTS has successfully worked seven Great Lakes Lighthouses.

And, is awarded this basic award issued this 1st day of June 2004

Issued to Ted Sarah - W8TTS

The Great Lakes Lighthouse Awards are issued for contacts with or activation of lighthouses/lightships on the Great Lakes.

The five Great Lakes are Erie, Huron, Michigan, Ontario, and Superior. The following bodies of water *do not count* for these awards unless they are where these bodies of water meet one of the five Great Lakes: Lake St. Clair, St. Lawrence River, St. Marys River, St. Clair River, and Georgian Bay.

Great Lakes states and provinces that have lighthouses are New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, and Ontario.

The Basic Contact Award. To earn this award, work at least seven lighthouses/lightships on any two of the five Great Lakes. The lighthouse/lightship *must* be on one of the Great Lakes. To claim an endorsement to the Basic Contact Award, work an additional five lighthouses/lightships on the Great Lakes.

The Activators Award. To claim the Activators Award, activate at least ten

On the Cover

This station with the magnificent view of Vail and the Colorado Rockies does *not* belong to the man sitting in the operator's chair, Phil Krichbaum, NØKE. But Phil, a well-known contester and DXer, lives in a part of Vail that could almost be called an RF black hole. Even though his own QTH is at 8,000 feet above sea level, he describes it as "3,000 ft. HBAT," or Height *Below* Average Terrain, since it's surrounded by 12,000 and 13,000-foot peaks. So Phil does a lot of guest operating, most frequently in contests as TI5N from TI5KD's station in Costa Rica.

The station on our cover this month belongs to Gary Yantis, WØTM, another well-known contester and DXer. And while it's "only" at 8,700 feet above sea level, its location on Bellyache Ridge, 20 miles west of Vail, provides 40-mile line of sight in most directions. On his QRZ.com bio, Gary—a transplant from Kansas—notes that "all hams from Kansas dream of a ham station on a mountaintop somewhere," and wonders, "Do hams born in the mountains all dream of a ham station in the middle of a flat-as-a-board wheatfield?" We doubt it, Gary.

Phil, by the way, is celebrating his 50th year as a ham. He was first licensed as WN8TTN in 1954 (he's a transplant from Ohio), and has been a contester ever since he discovered it was easier to work DX in contests than at any other time. He splits his operating between phone and CW, HF and VHF, high power, and QRP. During the winter, Phil teaches skiing and snowboarding and in the summer, he leads 4WD tours in the Colorado backcountry. More photos of WØTM's shack and the surrounding area may be viewed at <http://www.w0tm.com>. *(Cover photo by Larry Mulvehill, WB2ZPI)*

lighthouses/lightships. All of the activated lighthouses/lightships must be on the Great Lakes, as stated above. Include a QSL card from each operation with your application. To claim an endorsement to the Activators Award, activate an additional ten lighthouses/lightships on the Great Lakes.

The fee for the Basic Contact or Activators Award is $5.00 for U.S. or $6.00 for DX (in U.S. funds). The fee for any endorsement seal is $2.00 for U.S. or $3.00 for DX (in U.S. funds). Send the signed application form, confirmation QSLs (copies only), and fees to: MDXA Awards Manager, Ted T. Sarah, W8TTS, 239 Bermont Ave., Munroe Falls, OH 44262-1105. (For more information, go to: <http://mdxa1.org/GLLAMAINPG.html>.)

Worked All Virginia Award

The latest state to offer a worked all counties award is Virginia. The Worked All Virginia Award is sponsored by the Rappahannock Valley Amateur Radio Club of Fredericksburg to promote radio activity in the state of Virginia and to encourage contacts with Virginia amateurs. It is available to amateurs worldwide for making contact with at least 50 Virginia counties and independent cities. The club's website lists of all the

The Worked All Virginia Award is sponsored by the Rappahannock Valley Amateur Radio Club to promote radio activity in the state of Virginia and to encourage contacts with Virginia amateurs.

counties and independent cities in Virginia and provides PDF copies of the application form. Contacts may be made from any QTH.

Virginia is a state that has 39 cities that aren't included in the boundaries of a county. Read the rules carefully, as the basic level allows you to work a mixture of counties and independent cities, the Golden Endorsement allows the substitution of an independent city for a bordering county, and the Virginia Presidents Endorsement requires a contact with each county *and* each of the independent cities. (*Hint:* The annual Virginia QSO party is an excellent way to contact many of the rarer counties. It is held in mid-March every year and has good participation, with both fixed and mobile stations.)

Basic Award—contact 50 counties or independent cities.

Golden Endorsement—contact all 95 counties or an independent city bordering the county claimed. If using the independent city to claim credit for working a county, you may use that independent city credit for only *one* county (for example, if you work a station in Richmond, you can't claim credit for working Henrico County *and* Chesterfield County).

Virginia President's Endorsement—requires communication with a station in each of the 95 counties (not a bordering independent city) *and* each of the independent cities.

All bands and modes okay. No use of repeater, phone patch, or cross-mode QSOs allowed. Applications must be submitted on the WAV application form, along with a county record sheet showing callsign and county of station worked, date, time (UTC), and mode. Applications and county record sheets can be obtained by sending a legal-size SASE, via e-mail file attachment, or by download from the website: <http://www.qsl.net/w4mhq/rvarc/rvarcwava.html>.

Send application and fee of $US5 for the Basic Award; SASE for the endorsement stickers. Apply to: Rappahannock Valley Amateur Radio Club, c/o Worked All Virginia Award, P.O. Box 1496, College Station, Fredericksburg, VA 22402.

(Thanks to Bob Hollcombe, AF4UU, the current president of the club, for supplying this information.)

Robert Woody, N8KIE
USA-CA All Counties #1093

Bob, N8KIE, received CQ's USA-CA All Counties on May 24, 2004. Following is his story:

I was first licensed in 1976 as WD8CMT. It took the FCC 14 weeks to issue that first license. By the time I got it, my wife and I were on our way to Hawaii for Christmas with the inlaws. My wife bought me a Wilson 800 two-meter rig, so I had to go to the FCC field office in Honolulu to upgrade to Technician so that I could use it. I studied really hard in several night spots in Waikiki the night before, and I somehow passed.

When we were granted 10-meter operating privileges, I got out the Heathkit SB-104 that I had built but never used and started having real fun until the sunspot cycle went into the tank. With the new code requirements I upgraded to Extra and achieved Worked All States (WAS), DXCC, and 75 meter WAS in the Extra band (the Geratol Award).

I retired from DaimlerChrysler at age 54 in 2001 and discovered the joys of county hunting in April 2002. My XYL Jaclyn, N8RLJ (Tech), and I have since put out about 1000 counties, including Kalawao, Hawaii twice. It's a lot more fun to give than to receive, I have found. I got a lot more excited about going to Indiana and Ohio for W9JL to give him his last two than when I got my last one. This last weekend we happened to be in the right place at the right time for KB9ER for his fifth time.

The best part of county hunting is meeting the other operators at the gatherings we have gone to. I use an ICOM 706 on the road with a Hustler antenna, and an ICOM 756 Pro II at home with a 9-element tribander at 60 feet.

My other hobbies include flying my Cherokee 6 and collecting "muscle" cars.

—73, Bob, N8KIE

U.S. Counties

NEØP's 500 county USA-CA award is endorsed All 6 Meters, the first I've seen for VHF accomplishment. Are there any earlier all-VHF award holders out there?

Is your club or special-interest group sponsoring an award? Send me samples or a link to the information, and I'll get you the publicity that will encourage award hunters to apply. 73, Ted, K1BV

The Dog Days of Summer?

BY TOMAS HOOD,* NW7US

A Quick Look at Current Cycle 23 Conditions

(Data is rounded to nearest whole number)

Sunspots
Observed Monthly, May 2004: 42
Twelve-month smoothed, November 2003: 57

10.7 cm Flux
Observed Monthly, May 2004: 100
Twelve-month smoothed, November 2003: 122

***Ap* Index**
Observed Monthly, May 2004: 9
Twelve-month smoothed, November 2003: 20

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for August 2004

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 1, 6-7, 10, 15-17 24, 28	**A**	**A**	**B**	**C**
High Normal: 2-5, 8, 11-14, 18-21, 23, 25-27, 29-31	**A**	**B**	**C**	**C-D**
Low Normal: 9, 22	**B**	**C-B**	**C-D**	**D-E**
Below Normal: none	**C**	**C-D**	**D-E**	**E**
Disturbed: none	**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 S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, 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 August 1st, good (B) on the 2nd through the 5th, excellent (A) on the 6th and 7th, etc.

Late August and early September are dog days for propagation forecasters. This is a time when many of us go around in disguise so that we will not be recognized. It is the most difficult time of year for which to make accurate band predictions, because conditions can change drastically from day to day.

On many days typical summertime conditions will continue much as they were during June and July. On the other days conditions may sound typically fall-like, with somewhat higher daytime usable frequencies and somewhat lower nighttime usable frequencies, then add to this *equinoctial* conditions, which can begin as early as late August. This often can result in optimum openings between the Northern and Southern Hemispheres on the one hand, but periods of active to stormy conditions on the other.

Since this is a period of transition, this month's DX Propagation Charts cover only the one-month period from August 15th through September 15th, rather than the usual two-month period. Short-Skip Charts for use during this period appeared in last month's column.

During the daylight hours good DX conditions should be possible on several bands—15, 17, and 20 meters. Expect signals on the 17- and 20 -meter bands to peak approximately during the two-hour window immediately following sunrise and again during the late afternoon. These two bands, and to a lesser degree the 15-meter band, will see openings for DX throughout the daylight hours. Fairly good DX openings should occur along an arc extending across central Africa, Latin America, and into the far Pacific area. Peak conditions should occur during the afternoon hours, but an increasing number of earlier openings should be possible by early September.

Between sundown and sunrise 20 meters is expected to be the best DX band. However, with lower solar activity, the band in general will suffer compared with the past few years. Openings might be possible to many areas of the world, some with surprisingly strong signal levels. Until midnight good DX conditions should be found for openings toward Latin America, the far Pacific, and into Asia. You might even catch some activity on 17 or 15 meters. Fairly good conditions are also expected on 30, 40, 60, and 80 meters despite the high static level at times. Openings should be possible before midnight along an arc extending from northern Europe, through Africa, and into Latin America, the far Pacific, and Asia after midnight.

By late August it should be possible to work some DX on 160 meters during the hours of darkness. Conditions on this band—as well as on 40, 60, and 80 meters—will tend to peak just as the sun begins to *rise* on the *light*, or easternmost, terminal of a path.

For *short-skip* openings during August and early September, try 80 meters during the day for distances less than 250 miles, with 60 and 40 meters also usable. During the hours of darkness, both 80 and 160 meters should provide excellent communications over this distance. For openings between 250 and 750 miles, use 30 and 40 meters during the day for distances up to 500 miles, and 20 and 17 meters between 500 and 750 miles. At night, 40 and 30 meters should be the best bands for this distance until midnight, with 80 meters optimum from midnight to sunrise. Try 60 meters, as well. For openings between 750 and 1300 miles, try 20 and 17 meters, as they should provide optimum propagation during the hours of daylight. Optimum conditions should continue on these bands for this distance range after sundown and until midnight. Between midnight and sunrise the best band should be 40 meters, but check 60 meters, too. For openings between 1300 miles and the one-hop short-skip limit of approximately 2300 miles, try 20 and 17 meters during the day, with 15 meters also usable. After sundown try 30, 40, and 60 meters, with 80 meters also providing good propagation conditions for this distance range.

VHF Conditions

Sporadic-*E* propagation usually tapers off during August, but it should continue to occur fairly fre-

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

quently. Some 6-meter sporadic-*E* openings are expected during the month over distances of approximately 750 to 1300 miles. During periods of intense and widespread sporadic-*E* ionization, two-hop openings may be possible considerably beyond this range. Also check the 2-meter band for an occasional sporadic-*E* short-skip opening between approximately 1200 and 1400 miles. While sporadic-*E* short-skip openings may occur at any time, there is a tendency for them to peak between 8 AM and noon, and again between 6 PM and 9 PM local daylight time.

The *Perseids* are not expected to be a major optical storm this year, even though some are predicting it. Others have come to conclude, based upon forecasts, that it might play out more as a radio event rather than a visual event, since radio observation is more sensitive than visual observation. These forecasters call for observers to be particularly vigilant between August 11 and 12, and even before and after. For more on the *Perseids*, see N6CL's "VHF" column in this issue.

Aurora? You would think that aurora would not be a frequent player at this point in the decline of Cycle 23, but as I write this column during June, we are observing moderate auroral activity. There are occasional coronal mass ejections (CMEs) as well as the coronal holes that continue to send massive clouds of plasma toward the Earth. Auroral-scatter-type openings, on both 6 and 2 meters, can range from a few hundred up to about a thousand miles, and they are usually characterized by very rapid flutter and Doppler shift on SSB signals.

For the very patient, check the 6-meter band for possible trans-equatorial (TE) openings between 8 and 11 PM local daylight time. This type of propagation favors openings from the southern tier states into deep South America, with the signal path crossing the magnetic equator at a right angle. TE openings during August are rare, but they can occur. Very weak signals and severe flutter fading usually characterize them.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for May 2004 is 42, up a bit from April's 39, but still down from March's 49. The 12-month running smoothed sunspot number centered on November 2003 is 57, just one point down from October. The lowest daily sunspot value during May 2004 was recorded on May 7, with a count of 16.

HOW TO USE THE DX PROPAGATION CHARTS

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

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

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a 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.

August 15 - September 15, 2004
Time Zone: EDT (24-Hour Time)
EASTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	Nil	09-11 (1) 14-16 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	19-21 (1) 21-22 (2) 22-01 (3) 01-03 (2) 03-04 (1) 21-23 (1)* 23-01 (2)* 01-03 (1)*
Northern Europe & European CIS	Nil	09-11 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	20-22 (1) 22-00 (2) 00-03 (1) 22-02 (1)*
Eastern Mediter-ranean & Middle East	Nil	11-13 (1) 13-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	19-21 (1) 21-23 (2) 23-00 (1) 22-00 (1)*
Western Africa	14-16 (1)	09-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	20-23 (1) 23-02 (2) 02-04 (1) 22-02 (1)*
Central & East Africa	Nil	11-14 (1) 14-16 (2) 16-17 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	21-01 (1)
Southern Africa	12-14 (1)	08-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-20 (1) 23-01 (1)	21-23 (1) 23-01 (2) 01-03 (1) 23-02 (1)*
Central & South Asia	Nil	17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 20-23 (1)	05-07 (1) 18-21 (1)
Southeast Asia	Nil	108-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-22 (1)	Nil
Far East	Nil	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1)
South Pacific & New Zealand	16-19 (1)	13-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-02 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 04-08 (1)*
Austral-asia	17-19 (1)	16-17 (1) 17-19 (2) 19-20 (1)	06-08 (1) 08-10 (2) 10-12 (1) 15-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	03-04 (1) 04-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	13-15 (1) 15-17 (2) 17-18 (1)	08-12 (1) 12-14 (2) 14-16 (4) 16-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-02 (1)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-08 (1) 22-02 (1)* 02-04 (2) 04-07 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-16 (1) 16-17 (2) 17-18 (1)	08-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1)	06-08 (1) 14-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-00 (2) 00-02 (1)	21-23 (1) 23-01 (2) 01-03 (1) 03-06 (2) 06-07 (1) 04-06 (1)*
McMurdo Sound, Antarctica	Nil	15-18 (1)	07-09 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-01 (1)	01-06 (1)

Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	Nil	09-11 (1) 13-15 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	20-22 (1) 22-01 (2) 01-04 (1) 22-02 (1)*
Northern Europe European CIS	Nil	10-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-14 (3) 14-16 (2) 16-17 (1) 21-23 (1)	20-02 (1) 22-01 (1)*
Eastern Mediter-ranean & Middle East	Nil	10-15 (1)	07-14 (1) 14-16 (2) 16-18 (1) 21-23 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Western Africa	12-14 (1)	09-11 (1) 11-14 (2) 14-16 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	20-22 (1) 22-01 (2) 01-02 (1) 23-01 (1)*
Eastern & Central Africa	Nil	12-15 (1)	13-17 (1) 17-19 (2) 19-21 (1) 07-09 (1)	21-00 (1)
Southern Africa	11-14 (1)	08-10 (1) 10-14 (2)	07-09 (1) 12-15 (1)	20-21 (1) 21-23 (2)

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

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

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

**Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a 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.

Propagation charts prepared by George Jacobs, W3ASK.

The highest daily sunspot count for May was 73 on May 16. A smoothed sunspot count of 31 is expected for August 2004.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 100 for May 2004, down just a point from April. The 12-month smoothed 10.7-cm flux centered on November 2003 is 122, two points below October. The predicted smoothed 10.7-cm solar flux for August 2004 is about 89, give or take about 17 points.

The observed monthly mean planetary *A*-index (*Ap*) for May 2004 is 9, down one point from April, showing a steady decline in geomagnetic activity, and smoother sailing on the HF bands. The 12-month smoothed *Ap*-index centered on November 2003 is 20, also one point down from October. Expect the overall geomagnetic activity to be quiet to unsettled during most days in August.

You may e-mail me, write me a letter, or catch me on the HF amateur bands. I also have an EchoLink node where you might find me; look for node number 152783, NW7US-L. Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. I look forward to hearing from you. Happy DXing!

73, Tomas, NW7US/AAMØEWA

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 bold. (All country terminology reflects the DXCC list at the time of the contest.)

SSB RESULTS

SINGLE OPERATOR

NORTH AMERICA

UNITED STATES

KQ2M/1	**A**	**6,088,992**	**3611**	**143**	**513**
K5ZD/1	*	**5,630,769**	**3450**	**131**	**470**
					(OP: N5RZ)
K1ZR	*	2,922,624	2261	109	407
					(OP: W1GQ)
KG1E	*	1,785,852	1483	97	355
K5MA/1	*	1,740,256	1414	103	354
W1AO	*	1,734,600	1330	100	390
K1KD	*	1,577,840	1309	99	341
K1ZZ	*	1,159,657	1099	80	293
W1WEF	*	1,132,750	1140	99	295
N1RR	*	972,770	980	106	339
W1RY	*	948,703	871	93	340
N1BCL	*	629,694	714	87	264
AK1N	*	594,363	645	94	247
K1BD	*	486,072	592	81	233
AA1ON	*	484,623	663	64	215
K1CN	*	450,585	588	78	259
K1NQ	*	230,144	426	65	191
K1KU	*	176,880	354	48	153
K1YA	*	157,454	331	52	135
N1GS	*	134,106	261	58	159
K1BV	*	96,013	291	36	112
KK1L	*	94,317	238	38	111
N8WXQ/1	*	94,288	240	48	118
KA1ZD	*	72,086	207	40	93
KA1VMG	*	60,676	188	44	110
WC1M	*	37,050	115	38	92
K1EU	*	26,676	98	37	77
KM3T/1	**21**	**1,304,015**	**2759**	**37**	**142**
WA1JMP	*	236,612	733	31	105
K1RU	**14**	**559,586**	**1364**	**36**	**138**
K1QS	*	112,770	337	28	98
W1QA	*	351	10	4	9
KT1V	**3.7**	**158,930**	**535**	**24**	**91**
AA1BU	*	**119,674**	**430**	**19**	**87**
***N1SV**	**A**	**1,458,500**	**1177**	**101**	**399**
***W1TE**	*	**1,405,829**	**1169**	**93**	**344**
***N1UR**	*	**1,399,680**	**1234**	**95**	**337**
***KS1J**	*	**1,281,336**	**1189**	**90**	**316**
*W1CTN	*	1,235,728	1046	102	355
*W1KT	*	1,212,825	984	105	366
*W1JQ	*	1,052,374	1022	87	307
*K1HT	*	993,487	889	95	312
*WA1Z	*	941,528	910	84	307
*N1DD	*	890,724	896	86	287
*N1PGA	*	831,000	843	83	292
*WS1A	*	796,146	832	75	279
*W1EQ	*	676,359	755	76	261
*WG1Z	*	483,120	565	78	252
*N1LW	*	446,976	582	67	221
*KX1X	*	443,966	625	68	210
*W1ZS	*	435,232	621	55	213
*W1EL	*	433,944	569	67	220
*WS1L	*	366,444	508	59	202
*WA1EHK	*	341,296	491	58	199
*N1PA	*	326,555	494	66	205
*W1DAD	*	232,505	361	64	181
*KA1ZEX	*	221,096	397	53	179
*KA1EKR	*	170,040	356	48	147
*K1VU	*	118,300	261	45	137
*W1AW	*	109,620	256	51	138
					(OP: N1ND)
*KB1LN	*	92,856	223	42	117
*N1HTS	*	71,622	205	35	103
*KY1B	*	65,512	184	43	109
*N1DS	*	63,360	197	52	124
*KB1FWN	*	44,196	200	33	83
*N1VI	*	38,509	147	27	70
*K1SND	*	34,164	139	33	84
*W1LZ	*	32,235	120	27	78
*WA1S	*	26,117	113	29	62
*KG1V	*	25,652	105	30	76
*N1QXV	*	14,832	112	38	65
*W1OH	*	14,707	77	24	53
*KJ1J	*	8,640	59	19	41
*K1WCC	*	8,514	53	25	41
*AE1D	*	576	15	8	10
*K1QE	*	10	3	2	1
*W1MAT	28	5,104	54	15	29
*K1VSJ	21	30,532	134	22	81
*W1CRK	*	1,564	44	10	24
*NS1Z	14	5,170	48	11	36
N2LT	**A**	**3,245,274**	**2283**	**127**	**395**
N2MR	*	**1,185,080**	**1003**	**94**	**336**
N2NL	*	980,352	883	98	316
W2OO	*	771,784	795	84	278
W2LU	*	697,760	772	102	290
K2SX	*	656,373	789	70	261
KC2HLI	*	505,161	626	79	254
K2TW	*	476,720	633	65	230
K2NV	*	431,964	569	66	218
K3QDV/2	*	254,464	472	45	179
KB2M	*	240,436	412	69	208
WR2V	*	220,932	387	48	180
K2AF	*	125,060	261	51	134
W1GD/2	*	113,274	233	58	145
K2UT	*	99,750	201	55	135
W2FUI	*	61,739	177	47	109
WA2BKN	*	60,094	180	51	110
WB2JEP	*	59,136	179	37	95
N2SQW	*	46,189	143	50	93
KD2NE	*	32,643	135	36	81
N2QOR	*	16,830	111	25	65
K2QPN	*	5,546	44	20	39
N2VM	*	2,622	31	15	23
NG2X	**21**	**688,152**	**1568**	**34**	**125**
KR2Q	*	175,140	594	20	85
N2GM	*	151,855	499	23	98
NA2X	*	95,348	284	25	96
N2BZP	*	2,360	40	12	28
WA2ONW	**14**	**296,904**	**806**	**28**	**111**
WQ2M	**7**	**98,000**	**300**	**26**	**99**
N2GC	*	**55,620**	**201**	**19**	**84**
WB2ABD	*	27,600	131	19	73
***WB2ZTH**	**A**	**911,070**	**742**	**114**	**363**
***W2RDS**	*	**795,872**	**841**	**77**	**275**
*WB2DVU	*	711,843	736	81	282
*K2CS	*	560,068	653	78	248
*WA2JQK	*	476,748	586	67	256
*N2MUN	*	339,020	555	48	182
*K2SZ	*	307,258	495	58	180
*N5MM/2	*	190,734	412	66	183
*KA2BZS	*	189,600	367	58	179
*KV2M	*	180,294	355	42	157
*WA1FXK/2	*	145,122	293	54	147
*K2PH	*	110,188	250	41	122
*AA2TM	*	99,994	227	44	129
*N2MTG	*	99,912	237	46	135
*KC2KWK	*	98,301	264	45	106
*NS2P	*	88,234	207	44	113
*W2MKW	*	79,050	222	39	111
*KC2KGZ	*	71,651	204	33	104
*N2UZK	*	68,850	178	47	103
*K2HT	*	67,922	193	55	113
*N2LK	*	65,255	177	47	108
*K2TV	*	58,558	182	38	96
*W2RLK	*	55,759	185	41	96
*W2VU	*	53,196	156	38	94
*K2YLH	*	52,260	197	37	93
*W2TZ	*	51,732	171	25	83
*WB2OQQ	*	49,640	141	34	102
*W2MC	*	46,949	142	37	96
*WE2A	*	45,195	154	28	87
*N2CK	*	43,401	152	34	77
*KM2O	*	42,952	144	35	83
*W3TB/2	*	30,081	124	39	72
*KV2X	*	26,208	120	32	72
*WK2W	*	20,790	110	25	52
*N2LQQ	*	20,544	122	34	62
*K2DL	*	20,500	100	31	71
*N2WRD	*	17,195	109	30	65
*KB2OXR	*	9,240	53	24	46
*K3GYS/2	*	7,889	59	12	37
***KC2LLM**	**28**	**207,438**	**672**	**31**	**123**
*KS2G	*	80,723	334	19	70
*K2PAL	*	25,875	172	16	59
*W3EH/2	*	13,340	90	17	41
*N2KJM	*	6,888	71	12	29
*KA6WBQ/2	*	496	15	5	11
*KA2BXH	*	175	14	5	10
***K2MFY**	**21**	**200,245**	**515**	**29**	**116**
*WB2BXO	*	24,436	125	16	66
*K2HVE	*	12,141	95	13	44
***KD2RD**	**14**	**241,098**	**631**	**31**	**112**
*KX2S	*	86,184	297	22	92
*K2RED	*	43,521	197	16	73
***W2MF**	**7**	**58,512**	**217**	**20**	**86**
***N2KX**	*	**30,150**	**140**	**19**	**71**
*K2UF	*	17,487	103	14	53
K3ZO	**A**	**4,240,200**	**2769**	**122**	**433**
K3CR	*	**4,021,509**	**2633**	**128**	**435**
					(OP: LZ4AX)
W3BGN	*	**3,456,607**	**2171**	**132**	**451**
AA1K/3	*	2,508,504	1904	122	386
WA2C/3	*	1,190,680	1126	101	311
K3PN	*	1,145,520	1117	86	301
K4VV/3	*	846,855	824	98	307
N3UM	*	813,165	887	81	264
N3NR	*	793,100	803	92	293
KB3TS	*	555,218	564	77	284
N3RJ	*	532,950	670	72	251
W3PT	*	505,680	583	75	261
N3KR	*	500,202	639	69	245
W3BYX	*	488,280	580	65	247
K4JLD/3	*	487,577	572	96	295
K3ZO	*	412,936	559	68	216
					(OP: W9GE)
K3JG	*	373,828	546	69	247
W3AP	*	351,135	485	74	215
K3VA	*	186,048	364	50	142
AD8J/3	*	133,518	277	46	141
K3FMQ	*	111,875	224	50	129
K2TZ/3	*	87,850	200	56	119
W3RJ	*	59,682	182	44	103
W4PBG/3	*	58,135	179	44	107
W3KV	*	56,042	186	34	99
W3IZ	*	33,705	126	30	77
W3BEN	*	17,808	106	35	71
KM3J	*	4,650	36	20	30
N3HBX	**21**	**554,510**	**1534**	**27**	**115**
WA3AAN	*	51,888	227	19	73
***W3LL**	**A**	**629,018**	**704**	**75**	**262**
***WK3H**	*	**428,778**	**543**	**71**	**216**
*K3DSP	*	400,656	558	66	206
*K1EFI/3	*	202,248	353	52	160
*N2US/3	*	153,792	315	52	140
*WA1LWS/3	*	144,921	297	54	147
*WR3H	*	140,220	294	42	138
*WR3Y	*	135,604	324	41	126
*K3IE	*	113,094	257	53	130
*WB3CJU	*	112,085	300	32	113
*NA3M	*	105,957	239	44	149
*W3XG	*	66,740	186	34	108
*WA3G	*	56,771	189	41	102
*N3FNE	*	50,022	165	38	88
*W3EFH	*	45,264	188	20	72
					(OP: K3EGE)
*K3VY	*	40,896	124	46	96
*NY3C	*	39,298	150	21	77
*AA3YV	*	38,376	142	34	83
*W3OK	*	36,146	150	29	77
					(OP: W3CE)
*K3NK	*	29,920	124	40	70
*N3XL	*	22,200	104	38	73
*W3TT	*	16,020	84	32	58
					(OP: N9GG)
*N3ME	*	12,684	75	23	61
*AK3E	*	4,895	39	20	35
*N3JH	*	1,750	27	16	19
*AB1P/3	*	1,518	35	19	27
*N3WZR	*	1,275	24	8	17
***KT3RR**	**28**	**250,617**	**661**	**30**	**109**
*WR3L	*	18,349	121	16	43
WA4TII	**A**	**1,650,584**	**1297**	**111**	**361**
N4PQX	*	**1,579,790**	**1198**	**107**	**371**
NX9T/4	*	1,274,994	1265	95	283
KZ2I/4	*	1,221,260	1019	106	348
NR3X/4	*	1,142,064	1145	89	307
					(OP: N4YDU)
K4WX	*	861,169	1159	66	217
N4CW	*	845,705	847	79	286
K4SV	*	711,138	720	92	274
W2YE/4	*	631,301	735	76	243
KD5M/4	*	595,712	670	91	267
KG4NYV	*	534,006	649	72	247
N4DW	*	506,890	566	83	263
K8XS/4	*	462,075	620	97	208
W9WI/4	*	452,200	610	71	209
N4MM	*	449,771	565	91	267
KU4FP	*	438,944	566	78	241
KA8Q/4	*	358,556	497	65	216
W4YE	*	321,210	492	55	194
W4ARM	*	319,303	470	66	203
K4RFK	*	272,340	427	66	189
N8PR/4	*	259,032	389	62	196
K4JNY	*	242,202	485	67	155
W1MO/4	*	187,542	342	54	153
K4OH	*	184,448	422	76	186
W4UFO	*	180,496	350	65	167
NE8J/4	*	159,964	393	55	148
W4TE	*	150,000	243	58	192
WA4OAB	*	148,960	312	50	140
W4RK	*	110,349	247	56	127
W4SI	*	101,728	237	54	133
W4TC	*	100,926	245	57	121
WA2JDV/4	*	97,825	223	53	122
N4AA	*	84,762	218	48	105
W7QF/4	*	81,164	217	57	140
K4BP	*	64,326	176	45	97
KC4D	*	60,384	191	45	103
N4TL	*	42,681	132	38	85
W4JN	*	27,466	120	30	72
KY1V/4	*	25,248	107	28	68
KØCOP/4	*	24,734	114	23	60
AA3VA/4	*	22,339	101	30	59
N4GI	*	18,135	100	15	50
KG4UVU	*	15,895	106	27	58
W4KJD	*	6,600	70	15	35
W4OGG	*	4,748	51	16	30
W4KP	*	4,420	86	29	56
K4PR	*	1,041	22	7	19
AK4XX	*	455	12	5	8
W4ZV	**28**	**896,636**	**1906**	**35**	**137**
N4BP	*	**455,225**	**1256**	**29**	**110**
WB2LEZ/4	*	39,780	177	23	62
KI4CFM	*	240	8	6	6
AG4W	**21**	**166,455**	**451**	**28**	**109**
N4CC	*	147,584	412	28	100
K4XS	**7**	**169,176**	**471**	**28**	**105**
KE4SCY	*	45,885	182	26	79
AA4MM	3.7	11,020	87	14	44
K1UM/4	*	720	83	15	33
***N4IG**	**A**	**844,362**	**869**	**83**	**283**
***K4GKD**	*	**743,855**	**770**	**98**	**273**
***K4IE**	*	**606,454**	**736**	**88**	**265**
*WN4M	*	583,212	705	74	244
*NS4T	*	576,290	739	83	258
*KT4ZB	*	515,442	626	78	239
*WO4O	*	461,680	625	73	217
*N4NX	*	445,560	461	96	280
*W4MY	*	412,347	568	69	222
*AC4PY	*	369,963	495	78	225
*N4QV	*	348,612	450	76	202
*N4EK	*	348,570	495	68	202
*KI3O/4	*	338,706	479	63	216
*WA4NRQ	*	331,926	644	76	218
*KK4TA	*	324,615	490	74	181
*W4RQ	*	315,900	463	59	201
*KO4BB	*	303,249	467	73	198
*NJ2F/4	*	295,536	427	75	187
*N4JED	*	286,599	460	62	187
*K4HV	*	283,920	438	67	206
*KG4NWS	*	273,775	466	54	179
*KK4RV	*	223,635	386	67	188
*W4KAZ	*	216,435	399	66	169
*AB4GG	*	209,034	402	68	169
*W4DHE	*	206,640	347	69	183
*K4GHS	*	204,666	334	57	174
*WB2RHM/4	*	184,527	372	56	147
*N4CVO	*	184,032	349	59	154
*K5DXR/4	*	178,164	333	54	148
*K7SV/4	*	171,350	300	69	161
*W4YA	*	161,465	295	56	159
*K4AMC	*	157,304	294	59	153
*AB4EJ	*	138,785	320	62	143
*K4JAF	*	132,430	255	60	145
*W4PFM	*	130,092	259	69	153
*KE1F/4	*	129,690	302	52	146
*W4EE	*	126,720	273	48	144
*W4EBA	*	124,077	286	48	129
*K3HE/4	*	121,783	252	51	142
*KI4VB	*	120,771	261	49	140
*WN2R/4	*	119,515	252	58	147
*KG4OJT	*	119,260	272	50	128
*WA2UPK/4	*	115,700	299	48	130
*KG4UHP	*	114,848	258	56	138
*N4SRT	*	113,378	279	47	119
*KG4KZZ	*	105,846	273	45	132
*K4EU	*	102,410	234	57	133
*WX8V/4	*	90,746	239	46	111
*W4WNT	*	89,586	217	55	134
*NO4S	*	84,530	215	41	117
*KV4CN	*	78,671	199	40	111
*N4JAH	*	69,836	186	48	110
*K4NVJ	*	60,828	165	44	104
*N4NTO	*	49,875	167	39	94
*KE4NHP	*	42,558	160	34	89
*KK4Z	*	39,325	129	45	98
*WF1L/4	*	39,125	141	38	87
*AB4RL	*	38,868	123	39	84
*K4YJ	*	37,296	111	43	101
*N7DLS/4	*	36,565	138	35	68
*K1TZD/4	*	33,984	143	46	98
*W4TIJ	*	29,040	117	38	72
*KE4MIL	*	27,666	103	29	77
*KE4PJW	*	27,100	123	36	64
*AA4GA	*	26,400	103	40	60
*WA4OSD	*	22,230	109	30	65
*KF4ZEO	*	21,854	102	35	63
*AE4EC	*	21,771	135	38	85
*W9NWY/4	*	21,408	96	32	64
*WA4FXX	*	20,331	107	24	57
*KD4TDR	*	17,220	79	29	55
*W4WLF	*	16,767	126	18	51
*N4TKD	*	15,886	118	28	66
*KG4WMP	*	12,218	74	28	54
*KS4XN	*	11,400	73	30	45
*K4FTO	*	9,600	78	20	40
*NN4DF	*	8,382	55	27	39
*N9JLE/4	*	7,500	77	26	49
*KC4URW	*	6,612	51	19	38
*KV4DJ	*	6,099	50	21	36
*N8IK/4	*	4,743	48	19	32
*KG4MWO	*	4,737	80	20	35
*KO4OL	*	4,233	42	23	28
*W2EIU/4	*	100	32	12	16
***K4WI**	**28**	**422,279**	**1115**	**31**	**112**
***K5EID/4**	*	**113,407**	**356**	**26**	**93**
*N4HXI	*	27,720	138	20	64
*K4TSU	*	26,828	147	17	59
*W9CNF/4	*	3,129	36	13	29
*WB9BSH/4	*	612	15	8	10
*KF4YOQ	*	338	10	6	7
***N4MO**	**21**	**174,230**	**495**	**27**	**104**
***W4LC**	*	**163,457**	**456**	**29**	**104**
*KF4VTT	*	45,264	209	19	73
*NQ4K	*	25,428	130	18	60
*K4AGT	*	2,331	40	13	24
***WØYR/4**	**14**	**68,234**	**256**	**27**	**82**
***K9AW/4**	*	**54,752**	**173**	**25**	**91**
*KZ5OH/4	*	27,456	155	18	60
*KF4CQS	*	3,237	39	14	25
*AA4KD	*	1,716	27	9	17
K5TR	**A**	**3,337,356**	**2692**	**142**	**428**
N5DO	*	**1,164,298**	**1052**	**108**	**314**
N5ZO	*	1,017,830	975	112	306
N5ZK	*	552,720	788	72	222
					(OP: W5ASP)
K5YAA	*	447,174	610	74	220
N5ER	*	383,980	566	68	195
W5EKF	*	323,300	481	71	194
AB5C	*	317,440	450	71	185
W5GM	*	291,297	708	70	197
K5WAF	*	162,150	318	66	164
N5ITO	*	147,628	346	61	160
KS5V	*	143,165	313	60	149
N5VK	*	127,786	312	53	128
KE5C	*	98,484	235	61	113
N5PU	*	38,007	127	41	82
WT5U	*	26,085	112	40	71
K5KNS	*	24,000	154	21	54
K5MLC	*	22,436	121	23	56
N5EG	*	19,295	103	28	57
W5XD	*	2,088	24	15	21
K5RX	**28**	**459,033**	**1210**	**33**	**126**
N2IC/5	**21**	**436,443**	**1157**	**33**	**114**
W5GN	*	249,366	896	28	111
K2BA/5	*	179,694	513	28	106
W5FO	**14**	**154,956**	**431**	**34**	**114**
W5ZO	*	26,820	151	23	67
N5JB	**7**	**55,144**	**208**	**25**	**88**
W5PR	**1.8**	**2,673**	**181**	**18**	**23**
***N5AW**	**A**	**1,551,930**	**1158**	**131**	**379**
***WD5K**	*	**796,620**	**823**	**93**	**281**
*KK5MI	*	199,870	318	67	186
*KC5LK	*	178,711	333	69	164
*KD5LNO	*	167,776	322	67	157
*K5LAD	*	154,593	339	52	141
*WØJJ/5	*	152,234	300	63	143
*W5OT	*	135,207	315	50	131
*W9DX/5	*	126,380	262	51	127
*KM5WR	*	119,274	253	64	129
*KØCIE/5	*	114,750	279	45	108
*WA5SOG	*	103,600	230	56	129
*WK5K	*	103,020	261	49	121
*KU5S	*	88,858	232	50	104
*N5ID	*	76,616	247	42	115
*KA5EYH	*	71,940	229	54	111
*NI5F	*	69,892	192	59	114
*N5PD	*	48,762	159	43	86
*W5WZ	*	46,018	168	49	84
*WB5IZD	*	34,992	167	37	71
*K7RB/5	*	22,500	108	35	55
*WN5T	*	22,032	105	40	62
*W5RW	*	21,000	108	34	66
*AA5ZZ	*	15,708	74	29	55
*AB5XZ	*	13,608	70	33	51
*K5PAX	*	12,634	73	30	51
*KA5GLX	*	9,108	113	27	65
*AB1R/5	*	2,652	29	17	22
*KD5YIL	*	837	34	14	17
*KI7AB/5	28	5,811	82	13	26
*WB5BYO	21	594	21	8	10
W6PH	**A**	**1,236,690**	**1207**	**107**	**283**
WR6M	*	**514,324**	**686**	**89**	**195**
K6LRN	*	469,299	598	95	216
W6IXP	*	406,368	606	89	183
W6QEU	*	388,722	662	93	216
W6FRH	*	258,912	419	82	166
N6TW	*	190,152	323	74	154
WA6ST	*	168,296	341	58	135
K6XJ	*	143,190	297	56	129
NN6XX	*	109,550	244	61	114
KG6ENA	*	48,048	183	33	79
WØYK/6	*	43,216	116	52	96
W7SW/6	*	42,108	145	39	82
NF6V	*	27,968	115	36	56
K6ST	*	25,520	120	40	70
NR3Y/6	*	25,207	103	34	57
WB6QVI	*	25,099	115	65	39
AI6O	*	21,012	106	39	64
NO6X	*	19,019	90	41	50
AJ6V	*	4,100	42	19	22
W6OUL	*	3,420	38	11	25
K6FQ	7	2,628	34	13	23
W6MVW	*	2,156	31	12	16
W6KW	**3.7**	**42,000**	**271**	**27**	**53**
K6SE	1.8	156	14	6	6
***N6MU**	**A**	**838,134**	**824**	**111**	**263**
***WN6K**	*	**521,094**	**740**	**84**	**182**
*N6NF	*	315,256	466	79	172
*KG6NDO	*	133,566	273	71	126
*W6ZL	*	127,968	301	60	112
*W6RCL	*	84,429	208	58	101
*W6RFF	*	78,276	232	48	84
*N6AJR	*	67,050	246	63	86
*AA6EE	*	59,861	208	53	87
*KD6PQF	*	58,410	198	43	75
*N6QQ	*	52,000	199	53	107
*AA6DX	*	42,588	148	50	76
*W6HYK	*	20,568	85	36	59
*K6CSL	*	14,095	96	33	43
*N6AZR	*	11,400	115	32	44
*N6LL	*	8,526	58	26	32
*WA6OGO	*	7,395	57	24	27
*WB6NL	*	850	29	13	12
*NC6P	*	240	7	6	6
*N6RV	28	30,317	177	23	48
***W6EUF**	**21**	**53,061**	**224**	**26**	**75**
*NK6A	*	6,552	63	13	26
***WA6WPG**	**7**	**6,862**	**68**	**15**	**32**
*KU6T	*	2,492	41	12	16
K7RL	**A**	**1,999,830**	**1859**	**128**	**317**
K5RR/7	*	**1,653,435**	**1440**	**117**	**318**
WA7LT	*	932,340	1010	105	274
K7RI	*	562,424	795	97	210
K7WP	*	329,807	559	87	184
NE9Z/7	*	302,202	422	82	227
K7VI	*	291,695	522	78	149
K6TIM/7	*	235,718	438	92	206
N7K7C	*	198,860	344	85	159
W6AEA/7	*	179,960	373	63	157
K7KJ	*	169,290	318	63	135
N7RO	*	156,702	403	55	92
AF7Y	*	145,644	377	65	147
W7QN	*	138,093	294	62	129
KØJJ/7	*	111,186	248	59	115
KI7AO	*	107,610	199	66	145
KC7UP	*	105,910	235	50	128
W7WK	*	100,300	234	51	119
W7LGG	*	99,978	227	59	138
N7TL	*	90,470	226	56	110
KD7OY	*	51,729	168	36	93
KS7T	*	35,098	124	42	67
NF7E	*	34,882	132	38	69
W8QX/7	*	30,096	93	46	86
KX7J	*	28,599	88	42	71
W7SV	*	1,813	30	15	22
W7LKG	*	667	16	11	12
KK7AC	28	3,278	49	15	29
W7AYY	*	1,266	23	11	13
N7DD	**21**	**680,340**	**1711**	**38**	**132**
W7UT	*	313,707	756	35	124
K7KR	*	100,182	326	28	90
W7WA	**14**	**327,288**	**770**	**35**	**121**
W7MD	*	84,480	274	29	103
K7ZZZ	**3.7**	**11,115**	**133**	**18**	**27**
					(OP: K7ZM)
***K8IA/7**	**A**	**826,117**	**885**	**109**	**258**
***K7HBN**	*	**339,090**	**480**	**81**	**186**
*N7BK	*	319,476	506	65	172
*K7TR	*	181,812	396	68	150
*AA7PM	*	178,808	339	60	146
*N7TT	*	178,640

***K8IR**	**21**	**149,898**	**422**	**25**	**104**
*NG3Q/8	*	143,706	424	25	104
*N8RY	*	122,248	390	24	94
*KA8WQL	*	106,587	330	23	94
*WD8LQB	14	320	17	8	12
W9RE	**A**	**4,872,366**	**3022**	**148**	**481**
N9RV	*****	**4,868,525**	**3155**	**133**	**442**
K9NW	*****	**3,611,608**	**2354**	**131**	**441**
W9OP	*	1,009,528	850	104	338
K9SG	*	599,200	673	84	266
W9JA	*	405,900	507	94	316
K9ZO	*	375,396	516	84	203
KF9TI	*	216,667	426	54	173
AC9S	*	216,040	403	58	162
K9DJ	*	191,310	332	56	154
WW9R	*	169,200	351	52	148
N9GH	*	148,332	301	49	139
WØHED/9	*	124,226	282	48	131
AA9U	*	120,960	302	46	134
K9IDQ	*	114,632	240	56	128
W3HDH/9	*	113,488	255	49	124
N9KO	*	55,008	177	48	96
NA9D	*	12,496	78	28	43
K9BGL	**28**	**481,200**	**1199**	**32**	**118**
AB9H	*	80,036	295	23	84
W9IL	*	79,768	294	24	80
W9YYG	*	72,240	299	27	78
WB9Z	**21**	**533,876**	**1385**	**33**	**128**
K2AAW/9	*	22,022	117	21	56
K9CAN	**14**	**51,557**	**209**	**22**	**88**
W9SE	**7**	**21,300**	**120**	**17**	**58**
N9QX	*	20,020	107	17	53
***N4TZ/9**	**A**	**1,581,888**	**1269**	**110**	**352**
***W9HPJ**	*****	**334,508**	**552**	**55**	**186**
*KA9F	*	332,544	500	66	190
*K9JE	*	314,760	499	59	185
*K9YC	*	181,008	376	54	162
*KB9YEY	*	179,014	345	51	155
*AC9X	*	175,617	321	65	172
*KA9JAC	*	148,830	301	57	148
*N9MSG	*	145,885	306	51	128
*KC9ARR	*	140,715	333	50	127
*K9JIG	*	137,956	301	47	135
*W9XYL	*	126,762	305	59	163
*KB9OWD	*	124,148	308	47	117
*N9DR	*	113,685	261	62	133
*KD9AC	*	112,896	250	54	142
*KB9KCT	*	102,550	287	40	135
*W9VQ	*	100,400	215	60	140
*WT9U	*	92,332	241	52	112
*WD9FEN	*	76,583	264	34	103
*W9CEO	*	74,340	224	41	85
*W9LYN	*	74,240	199	45	100
*K9MI	*	73,112	196	51	101
*W9AEM	*	72,069	222	39	113
*K9FWH	*	61,347	211	43	100
*WI9M	*	48,008	178	39	97
*N9TF	*	45,885	150	33	82
*W9JJT	*	30,039	145	32	66
*N9OY	*	27,233	134	39	74
*KJ9C	*	26,269	98	41	68
*K9MDO	*	24,752	103	26	65
*N9LYE	*	21,432	129	31	63
*W9THD	*	21,070	105	28	58
*W9LYA	*	20,090	116	38	60
*KA9RZL	*	14,400	84	36	54
*KB9STQ	*	6,960	57	26	32
*K9PLX	*	4,752	51	17	27
*WX9D	*	4,274	45	20	31
*K9OH	*	4,165	32	20	29
*WR9A	*	1,305	18	12	17
*WI9TOM	*	540	18	6	14
*N9OI	*	462	29	13	20
*KC9BLJ	28	325	10	6	7
***KE9R**	**21**	**47,104**	**217**	**21**	**71**
***W9IND**	**3.7**	**7,440**	**74**	**13**	**35**
KØSR	**A**	**1,694,607**	**1382**	**113**	**390**
NRØX	*****	**1,547,228**	**1155**	**121**	**382**
AE9B/Ø	*	507,870	539	110	308
K9MWM/Ø	*	411,000	592	91	209
KBØENE	*	350,840	500	73	207
KØGAS	*	328,941	502	81	198
K4VX/Ø	*	305,778	469	69	177
WØBH	*	209,280	501	77	163
K9WIE/Ø	*	188,352	340	58	158
ABØMV	*	106,029	272	60	129
WAØDCB	*	103,250	267	51	124
K4IU/Ø	*	100,646	244	42	116
WØZQ	*	85,860	227	50	109
WØNUH	*	72,708	216	56	110
KØCOM	*	71,230	166	55	115
WØPPF	*	70,419	216	42	115
KØFC/Ø	*	58,275	156	67	108
AAØA	*	20,394	99	27	72
KFØOH	*	10,354	71	26	36
KØUH	*	5,500	42	15	35
AEØQ	*	925	13	12	13
KØDAT	21	14,390	87	19	57
WØPJ	*	8,631	61	17	46
NØUU	**14**	**60,495**	**223**	**25**	**84**
WØID	*	10,962	78	20	38
NØMJ	*	6,480	69	13	35
N2WW/Ø	**7**	**49,788**	**184**	**27**	**81**
WØGJ	*	39,663	182	28	85
***KVØQ**	**A**	**1,476,291**	**1179**	**130**	**359**
***ACØW**	*****	**946,220**	**928**	**95**	**296**
*KØGEO	*	465,972	572	85	224
*KEØUI	*	453,230	568	79	226
*NØYO	*	449,448	575	80	227
*NØFP	*	406,656	559	74	214
*KØSQ	*	385,308	539	67	211
*AAØMZ	*	383,205	513	79	216
*WØRK	*	381,108	558	71	202
*ACØX	*	312,472	429	68	213
*KIØY	*	311,969	432	79	208
*KØJJM	*	257,908	462	64	180
*AAØMQ	*	176,833	332	63	164
*NØKK	*	158,670	299	62	143
*KØVM	*	142,048	313	50	134
*KBØBUV	*	125,442	257	60	147
*NØAB	*	119,566	292	51	140
*KØCF	*	110,124	256	49	122
*WAØMHJ	*	109,862	274	48	115
*KØMPH	*	103,191	256	51	126
*AAØAW	*	100,980	216	55	132
*ACØN	*	88,228	264	38	99
*WBØTRA	*	81,797	229	50	107
*NT3R/Ø	*	75,504	227	44	112
*WGØM	*	74,620	198	48	116
*KØVSV	*	70,290	210	44	98
*WBØIEL	*	63,485	177	47	115
*KØHW	*	63,280	196	45	95
*NØPO	*	55,042	148	45	101
*KCØIGY	*	52,170	160	46	95
*WA2MNO/Ø	*	51,212	192	39	85
*WØAMT	*	49,178	153	49	85
*KØHB	*	47,302	154	45	89
*NØVO	*	41,316	194	44	88
*WØRXL	*	36,349	149	34	77
*WAØBNX	*	28,156	128	28	66
*KAØDAQ	*	25,400	110	32	68
*NØWY	*	13,328	82	21	47
*N6BXO/Ø	*	7,169	56	29	38
*WØZC	*	3,304	38	27	32
***KU1CW/Ø**	**28**	**116,616**	**338**	**28**	**101**
*KØRH	*	90,640	335	25	85
*WØETT	*	49,770	217	24	66
*KAØZIA	*	7,830	65	14	31
*N8QQF/Ø	*	2,432	35	12	20
***WØAH**	**21**	**160,020**	**487**	**31**	**109**
*K7RE/Ø	*	37,401	187	19	72
*NØLZ	*	2,139	29	15	16
*KAØZPP	*	345	10	7	8
*AGØM	14	684	16	9	12
		ALASKA			
KL7RA	**7**	**69,912**	**418**	**23**	**49**
***KL7FAP**	**A**	**134,640**	**515**	**52**	**68**
*NL7AU/4	*	75,762	182	53	130
*AL7KC	*	29,705	145	37	51
*KL1JF	*	4,095	67	17	18
		BAHAMAS			
*C6A/VA3SWG	A	22,310	303	19	27
***C6ALZ**	**14**	**60,819**	**627**	**18**	**39**
		BARBADOS			
8P1A	**A**	**14,413,170**	**9463**	**139**	**506**
					(OP: W2SC)
8P6EX	*	1,382,075	2138	72	223
8P2K	**21**	**515,328**	**1929**	**26**	**96**
					(OP: 8P6SH)
8P6SH	**7**	**11,193**	**130**	**13**	**28**
		BELIZE			
***V31LZ**	**28**	**496,702**	**2116**	**30**	**96**
		CANADA			
VY2ZM	**A**	**8,843,125**	**5659**	**129**	**496**
					(OP: K1ZM)
VO1AU	*****	**5,514,435**	**3979**	**109**	**422**
VO2WL	*****	**4,329,360**	**4682**	**94**	**325**
					(OP: VE3JM)
VE9MY	*	357,168	418	72	264
VE9GLF	*	143,594	287	54	160
***VO1BC**	**A**	**538,322**	**992**	**51**	**172**
*VE1YDX	*	441,258	701	58	193
					(OP: VE1JS)
***VE1SKY**	**3.7**	**17,358**	**358**	**12**	**21**
VE2IM	**A**	**6,534,052**	**5058**	**107**	**411**
					(OP: VE3DZ)
VE2AYU	*	1,331,092	1596	79	268
VE2RA	*	17,157	166	21	36
***VE2AWR**	**A**	**518,035**	**718**	**66**	**221**
*VA2AAB	*	96,390	290	49	113
*VA2IC	*	7,160	115	15	25
*VE2DSK	*	2,115	35	19	26
*VE2AZJ	*	418	25	9	10
VC3AT	**A**	**6,898,752**	**4972**	**131**	**445**
					(OP: VE3AT)
VE3PN	*****	**2,062,482**	**2010**	**104**	**313**
VE3SY	*	1,702,148	1682	106	328
VE3NE	*	1,225,296	1362	95	286
VE3XN	*	747,666	968	85	258
VE3/W1AJT	*	528,528	814	62	224
VE3MM	*	281,748	623	55	157
VE3AD	*	107,880	232	51	135
VE3OBU	*	21,534	101	34	63
VE3KZ	**21**	**812,475**	**2019**	**30**	**127**
VE3CFK	*	148,473	585	24	93
VE3XL	**14**	**353,990**	**1403**	**26**	**104**
***VE3XD**	**A**	**966,443**	**1111**	**92**	**281**
***VE3CR**	*****	**914,596**	**967**	**87**	**286**
*VE3KP	*	545,645	715	78	227
*VE3DXP	*	344,500	637	67	198
*VE3OM	*	281,415	433	58	199
*VA3XRZ	*	240,584	424	64	168
*VE3SHL	*	211,717	452	62	147
*VE3XAT	*	190,365	453	48	137
*VE3KPP	*	186,390	452	54	136
*VE3TW	*	182,358	382	47	151
*VE3NOM	*	151,905	319	58	137
*VE3BDN	*	140,952	306	37	131
*VE3ZDC	*	139,476	330	49	148
*VE3CLN	*	124,135	298	43	142
*VA3GD	*	123,291	298	43	128
*VA3MAH	*	99,008	262	55	127
*VE3BHI	*	82,720	235	54	106
*VA3PL	*	62,020	184	49	91
*VE3RER	*	59,356	184	37	105
*VE3RCN	*	42,212	146	38	84
*VE3URL	*	20,400	97	33	67
*VE3QIP	*	7,874	59	25	37
*VE3BNO	*	7,102	55	29	38
*VE3RGG	*	6,158	46	28	41
*VE3EDY	*	1,788	108	5	7
*VE3UKR	28	10,761	88	16	35
*VA3SPN	*	1,700	39	14	36
***VA3FP**	**21**	**41,359**	**217**	**17**	**64**
*VA3HUN	*	3,380	47	11	25
***VA3EC**	**14**	**41,118**	**217**	**19**	**70**
***VE3MGY**	**1.8**	**5,764**	**296**	**5**	**6**
*VE4VID	A	9,800	104	25	31
*VE4RA	*	621	16	11	12
VE5CPU	**A**	**1,016,779**	**2078**	**71**	**170**
***VE5SF**	**A**	**841,984**	**1625**	**68**	**185**
*VE5HF	*	17,933	130	32	47
VA6ZZZ	**28**	**19,632**	**223**	**17**	**31**
VA6MA	**14**	**224,910**	**889**	**30**	**89**
					(OP: VE6MAA)
VE6JY	3.7	3,564	52	13	20
***VE6ZT**	**A**	**209,330**	**338**	**68**	**174**
*VE6CBS	*	111,942	337	59	103
*VE6ZC	*	43,230	222	44	66
*VA6MM	*	29,768	149	43	79
VE7KET	**A**	**164,025**	**313**	**59**	**166**
VA7JW	*	93,818	360	37	85
VE7XO	*	30,526	156	36	53
VA7XX	**28**	**78,784**	**549**	**19**	**45**
VE7XR	**14**	**306,802**	**1119**	**38**	**101**
VE7CT	*	60,143	247	28	84
***VE7XF**	**A**	**328,304**	**458**	**78**	**194**
*VA7TK	*	176,182	685	54	83
*VE7UQ	*	78,765	395	39	50
*VE7IN	*	37,070	329	23	32
*VA7DP	*	33,098	254	30	37
*VA7MJR	*	2,310	47	15	18
*VA7ST	28	3,192	46	11	13
*VE7FO	*	126	7	4	5
*VY1MB	A	12,276	150	21	23
		CAYMAN ISLANDS			
ZF2AH	**A**	**2,490,900**	**3488**	**88**	**273**
					(OP: W6VNR)
		COSTA RICA			
*TI3MAO	28	10,000	232	16	30
		CUBA			
CO2II	**3.7**	**45,332**	**632**	**13**	**31**
***CO8DM**	**A**	**531,598**	**1695**	**58**	**127**
*CO2VE	*	35,640	274	27	63
*CM6LPB	*	16,016	222	29	48
*CO2UG	*	6,241	77	33	46
***CM8WAL**	**28**	**384,462**	**1758**	**27**	**79**
*CO2TK	*	294,228	1401	25	74
*CO2CW	*	192,420	1141	22	68
***CO8HF**	**21**	**91,080**	**721**	**19**	**50**
***CO2OJ**	**14**	**93,200**	**591**	**19**	**61**
***CO2JO**	**7**	**64,970**	**396**	**24**	**65**
*CM7NO	*	120	55	12	28
		DOMINICAN REPUBLIC			
***HI3TEJ**	**A**	**270,544**	**907**	**51**	**97**
***HI8ROX**	**21**	**73,752**	**404**	**21**	**63**
		HONDURAS			
***HR1AAB**	**A**	**289,680**	**1168**	**42**	**94**
*HR1AGC	*	11,786	74	27	44
		JAMAICA			
***6Y4Y**	**A**	**83,096**	**273**	**48**	**88**
		MARTINIQUE			
TO5A	**A**	**5,553,171**	**4908**	**111**	**396**
					(OP: F5JHJ)
***FM5FJ**	**14**	**326,616**	**1871**	**24**	**100**
		MEXICO			
XE1MM	**A**	**676,200**	**1592**	**74**	**122**
XE1V	*	224,440	420	72	176
XE1L	**14**	**309,669**	**1505**	**31**	**78**
***XE2AC**	**A**	**1,441,561**	**2182**	**92**	**227**
*XE2AUB	*	595,792	1528	62	122
*XE2K	*	356,328	875	77	125
*XE1MEX	*	278,384	456	74	180
*XE1XOE	*	167,475	530	60	105
*XE2MX	*	143,728	306	65	143
*XE2ML	*	31,672	135	40	67
***XE1CQ**	**21**	**691,680**	**2117**	**33**	**127**
*XE1CT	*	235,635	894	26	89
*4A1AC	*	78,624	737	20	34
					(OP: XE1BEF)
		NICARAGUA			
***H7A**	**A**	**1,935,322**	**2946**	**101**	**239**
		PANAMA			
HP3XBS	**28**	**505,127**	**2076**	**27**	**86**
***HP1BYS**	**21**	**192,654**	**981**	**23**	**76**
		PUERTO RICO			
***WP3GW**	**A**	**70,574**	**196**	**44**	**98**
***WP4EDD**	**7**	**29,309**	**346**	**16**	**63**
		ST. LUCIA			
***J69EN**	**A**	**10,883**	**183**	**13**	**20**
		ST. MAARTEN			
***PJ7/OK1BNS**	**A**	**992,838**	**2011**	**63**	**168**
*PJ7/OK1NS	*	5,751	86	28	43
		TURKS & CAICOS ISLANDS			
VP5/W9RN	**7**	**173,124**	**798**	**23**	**85**
		U.S. VIRGIN ISLANDS			
KP2/K2ZZ	**A**	**145,265**	**816**	**20**	**65**
KP2A	**14**	**1,105,955**	**3038**	**36**	**127**
					(OP: N6TJ)
***KP2BH**	**A**	**617,760**	**1355**	**70**	**150**

AFRICA

		CANARY ISLANDS			
EA8EA	**21**	**1,342,440**	**2814**	**34**	**131**
					(OP: DH2MM)
EA8URA	*	412,160	1252	27	101
					(OP: EA8BU)
EA8LS	*	395,369	1166	31	107
EA8AH	**7**	**844,606**	**2022**	**33**	**128**
					(OP: OH1RY)
EA8BH	**3.7**	**194,820**	**695**	**19**	**83**
					(OP: OH2BH)
***EA8AJO**	**A**	**2,952,600**	**2967**	**90**	**290**
*EA8JA	*	171,808	320	57	167
*EA8AZM	*	126,310	318	51	119
*EA8AO	*	56,575	326	30	43
*EA8BMP	*	33,462	130	34	65
*EA8IK	*	27,450	112	26	64
***EA8ARG**	**14**	**43,953**	**201**	**20**	**71**
*EA8BMH	*	41,710	175	22	75
		CAPE VERDE			
D4B	**A**	**20,119,968**	**8956**	**159**	**634**
					(OP: 4L5A)
		CEUTA & MELILLA			
***EA9BO**	**A**	**44,080**	**155**	**39**	**106**
		EGYPT			
***SU9NC**	**A**	**6,812,478**	**4364**	**117**	**426**
		MADAGASCAR			
5R8FU	**A**	**402,480**	**582**	**76**	**184**
		MOROCCO			
CN2R	**A**	**18,743,250**	**8682**	**152**	**594**
					(OP: W7EJ)
		NIGER			
5U7JB	**A**	**3,118,848**	**2925**	**93**	**291**
					(OP: N4HX)
		NIGERIA			
5NØNHD	**A**	**1,495,422**	**1463**	**87**	**275**
		SOUTH AFRICA			
ZS5T	**A**	**309,120**	**649**	**60**	**124**
					(OP: ZS5BBO)
ZS6DDX	*	71,585	327	45	94
					(OP: ZS6HWC)
ZS5NK	**28**	**477,048**	**1227**	**30**	**109**
ZS1EL	*	46,935	262	18	45
ZS9Z	**21**	**92,308**	**440**	**18**	**76**
***ZS6JM**	**A**	**196,032**	**366**	**51**	**141**
*ZS4BS	*	17,098	92	34	49
*ZS6RAE	*	14,664	81	31	47
*ZS6IL	*	14,661	73	28	53
*ZS4JAN	*	11,242	84	30	43
		ZAMBIA			
***9J2KC**	**A**	**1,405,666**	**1799**	**70**	**228**
					(OP: JL1NKC)
		REPUBLIC OF GUINEA			
*3XY8B	A	20,898	101	30	51

ASIA

		ASIATIC RUSSIA			
UA9CLB	**A**	**2,814,960**	**2356**	**101**	**343**
UA9PC	*****	**1,876,995**	**1811**	**119**	**358**
UA9JDP	*	953,672	1400	66	218
RV9XO	*	686,712	805	66	246
RA9DA	*	509,379	612	90	263
UA9KJ	*	401,380	746	63	181
UA9FM	*	319,774	514	64	187
RZ9SR	*	287,325	494	54	171
RV9JE	*	253,184	436	59	197
RU9CZD	*	244,971	446	48	163
					(OP: UA9CDC)
RV9FQ	*	73,870	174	54	124
RA9ST	*	55,845	242	37	116
RA9UV	*	53,985	234	64	119
UA9HN	**28**	**64,056**	**293**	**23**	**79**
RA9JR	**21**	**388,121**	**1381**	**31**	**106**
RZ9UN	**14**	**132,011**	**497**	**32**	**89**
UA9YAB	**7**	**54,944**	**385**	**24**	**77**
UA9OS	*	8,684	91	15	37
RL9F	**1.8**	**37,170**	**244**	**9**	**50**
***UA9AYA**	**A**	**3,829,947**	**2505**	**127**	**434**
					(OP: UA9BA)
***RX9AM**	*****	**1,158,850**	**1233**	**97**	**288**
*UA9ACJ	*	532,980	710	61	221
*RK9CR	*	436,506	683	60	206
*RA9XF	*	405,369	703	44	175
*RU9AC	*	370,986	665	54	177
*RZ9UGN	*	344,418	631	77	197
*RK9XX	*	253,342	497	41	156
*RV9AZ	*	248,880	404	55	189
*UA9MC	*	244,150	364	59	198
*UA9LAU	*	196,452	391	58	156
*UA9MQR	*	190,848	390	46	146
*RV9WP	*	157,325	315	60	157
*UA9XL	*	145,111	360	30	121
*RX9CEL	*	138,185	374	31	114
*UA9OUU	*	112,144	355	54	118
*UA9AX	*	110,370	237	52	143
*RA9XU	*	107,088	311	30	108
*RA9FF	*	98,365	307	29	112
*RX9SN	*	97,395	282	38	113
*RW9IM	*	84,150	246	61	109
*UA9DD	*	68,162	185	43	130
*RV9BI	*	67,639	182	34	109
*RA9AC	*	52,345	144	35	110
*RU9CI	*	45,486	133	29	104
*RA9FLW	*	36,162	141	25	73
*RA9KM	*	29,256	149	24	68
*UA9FGJ	*	11,124	77	11	43
*RZ9IB	*	9,968	92	21	35
*RX9WN	*	4,770	37	19	34
*UA9XF	*	4,240	41	11	29
*UA9OSV	*	2,808	33	13	23
*UA9OAL	*	136	16	4	4
*UA9XRV	*	100	33	8	23
*RA9FR	21	35,532	204	13	50
***UA9OFA**	**14**	**109,489**	**454**	**26**	**77**
*RA9AU	*	103,224	385	25	77
*RX9FG	*	54,868	267	17	69
*RX9UKF	*	9,499	70	22	37
*UA9OQ	*	3,268	40	12	26
***RA9MJ**	**3.7**	**39,329**	**263**	**14**	**55**
RMØA	**A**	**1,093,496**	**1400**	**113**	**311**
					(OP: UAØANW)
UAØCW	*	407,213	544	100	213
RWØCF	*	397,120	616	111	229
UAØAZ	*	392,337	603	87	210
UAØSR	*	255,460	601	69	172
UAØSMF	*	76,340	509	38	72
RWØUU	*	64,998	333	52	105
UAØAGI	*	44,776	147	76	117
RAØBA	*	2,849	47	13	24
UAØCA	*	1,591	25	20	23
UAØAPV	**21**	**108,563**	**713**	**20**	**71**
RTØQ	**14**	**145,627**	**671**	**32**	**75**
					(OP: RZ3BY)
***RAØFF**	**A**	**271,445**	**658**	**81**	**152**
*UAØSJ	*	173,160	397	72	150
*RUØLL	*	170,699	369	72	139
*UAØACG	*	143,318	466	70	133
*RAØLE	*	52,451	274	58	84
*RWØAR	*	48,750	173	44	86
*RØUT1EO	*	43,125	198	41	84
*UAØAKY	*	34,944	193	30	74
*RAØFU	*	29,631	128	49	70
*RWØUM	*	23,316	183	35	52
*UAØQNV	*	23,114	167	33	58
*RUØAW	*	21,297	128	34	59
*RWØLZ	*	4,176	39	23	35
*UAØZGA	*	3,205	62	13	22
*RAØAKL	*	3,024	44	21	27
		ASIATIC TURKEY			
TA5FA	**A**	**232,674**	**612**	**37**	**120**
TA2IJ	**7**	**137,280**	**551**	**18**	**78**
***YMØT**	**A**	**596,400**	**1420**	**70**	**280**
					(OP: TA2RC)
		AZERBAIJAN			
***4K9W**	**A**	**78,470**	**225**	**36**	**97**
		CHINA			
***BG4ALC**	**A**	**236,557**	**719**	**80**	**149**
*BD8HD/4	*	222,176	925	77	135
***BA7NQ**	**21**	**83,187**	**455**	**31**	**86**
*BG4AKC	*	40,050	492	24	51
		CYPRUS			
C4W	**A**	**10,174,500**	**5796**	**133**	**513**
					(OP: 5B4WN)
		GEORGIA			
4L1W	**A**	**607,248**	**48**	**51**	**181**
4L4AJ	*	60,116	401	24	89
4L8A	*	150	5	5	5
4L6AM	**14**	**1,227,132**	**2827**	**37**	**141**
***4L2M**	**3.7**	**97,680**	**537**	**13**	**61**
		HONG KONG			
VR2BG	**A**	**436,868**	**812**	**105**	**193**
		INDIA			
*VU2NXM	A	18,870	92	38	64
*VU3PVN	14	1,880	35	14	26
		IRAN			
***EP3PTT**	**14**	**13,440**	**113**	**12**	**44**
		IRAQ			
***YI3DX**	**14**	**15,040**	**123**	**15**	**49**
					(OP: W3ICM)
		ISRAEL			
4X/AA4V	**A**	**3,445,780**	**2958**	**109**	**348**
4Z1GY	*	864,848	1193	67	216
4X4NJ	**1.8**	**78,440**	**413**	**12**	**62**
***4X/KC8FS**	**A**	**509,971**	**1178**	**43**	**136**
*4Z5MO	*	19,760	78	35	60
***4Z5QQ**	**28**	**80,278**	**369**	**21**	**68**
*4Z5LZ	*	34,860	196	17	53
		JAPAN			
JM1XCW	**A**	**1,309,308**	**1421**	**125**	**239**
JA1TMG	*	461,121	660	90	191
JH1UAJ	*	373,065	536	94	191
JR1LEV	*	137,020	299	81	140
JA1QOW	*	71,554	220	54	79
7J1ABD	*	48,008	154	57	79
JL1ANP	*	42,837	180	44	65
JA1ANA	*	27,522	93	55	83
JA1ISJ	*	14,268	76	32	50
JH1ACA	*	11,704	70	33	55
7M4QNP	*	3,486	39	17	25
JJ1RDX	**28**	**103,075**	**433**	**32**	**63**
JH1OCC	*	83,946	352	31	71
JE1LFX	**14**	**173,173**	**504**	**36**	**107**
JH1AZO	*	73,260	310	31	79
JR1VAY	*	19,520	98	30	50
JA1ELY	**7**	**106,680**	**375**	**32**	**88**
***JE1OHL**	**A**	**195,963**	**319**	**88**	**161**
***JA1GYO**	*****	**179,712**	**337**	**70**	**138**
*JG1TVK	*	164,188	330	85	153
*JG1OWV	*	161,139	285	104	153
*JA1RKI	*	140,295	324	72	127
*JA1GLE	*	127,997	297	81	127
*JA1XUY	*	101,360	243

JH2BTM	*	15,196	110	21	37
JA2VQF	3.7	72	6	4	5
***JA2GHP**	**A**	**56,956**	**227**	**43**	**73**
*JA2KPW	*	55,970	191	58	87
*JA2VZL	*	15,900	101	32	43
*JR2NTC	*	4,335	44	22	29
*JO1RUR/2	*	2,640	31	18	22
*JI2VLM	*	2,304	32	15	17
*JA2KCY	*	36	6	6	6
***JG2SON**	**28**	**95,216**	**416**	**31**	**57**
*JG2TKH	*	10,885	112	16	19
*JQ2EAN/2	*	74	5	3	5
***JQ1AHZ/2**	**21**	**40,824**	**212**	**26**	**58**
*JA2KKA	*	22,440	139	21	47
*JA2JTN	*	14,280	122	22	34
*JF2FKJ	*	760	25	9	11
*JG2REJ	14	459	12	7	9
***JA2DLM**	**7**	**7,682**	**80**	**22**	**33**
***JE2OTM**	**3.7**	**1,012**	**20**	**11**	**12**
JR3NZC	**A**	**720,405**	**893**	**104**	**211**
JA3ETD	**21**	**30,441**	**178**	**28**	**56**
JH3DMQ	*	22,388	119	21	38
JS3CTQ	**14**	**337,875**	**830**	**35**	**124**
JA3ORD	*	5,898	53	15	35
JR3UIC	7	4,368	47	12	27
***JE6EKC/3**	**A**	**417,294**	**604**	**105**	**186**
*JR3RIY	*	300,888	566	75	141
*JA3AOP	*	215,604	400	85	141
*JK3GWT	*	121,002	278	71	130
*JA3UWB	*	94,809	285	55	111
*JA3LEZ	*	53,502	189	44	67
*JH3OXM	*	40,356	190	47	71
*JA3QOS	*	14,213	85	28	33
*JL3RDC	*	7,000	69	23	33
*JJ1BDX/3	*	3,864	46	18	24
*JR3EOI	*	2,940	26	19	23
*JR3XEX	*	2,633	42	17	22
*JN3MUC	*	1,793	31	17	25
*JM3HYL	*	838	19	11	13
*JF3EBO	28	13,113	110	19	28
*JA3PYH	*	2,072	33	11	19
***JF3BFS**	**21**	**188,748**	**586**	**35**	**91**
*JN3DRB	*	94,615	305	33	94
*JI3VUB	*	30,420	188	23	42
*JR3KAH	*	2,407	49	12	21
*JR4FLW/3	14	25,075	135	28	57
*JA3AYX	*	13,852	97	26	44
JH4UYB	**A**	**3,866,265**	**2659**	**154**	**431**
JA4YHX	*	280,438	409	102	179
			(OP: JA4CZM)		
JA4ESR	*	49,435	163	57	80
JH4UTP	**7**	**11,859**	**109**	**22**	**45**
***JA4BAA**	**A**	**30,599**	**143**	**45**	**61**
*JA4AQR	*	30,195	119	37	62
***JA4ETH**	**28**	**11,407**	**100**	**21**	**40**
*JA4DWG	*	7,728	60	23	33
***JR4GPA**	**21**	**39,578**	**203**	**23**	**54**
***JM4WUZ**	**3.7**	**1,995**	**37**	**15**	**20**
JA5APU	**21**	**136,641**	**513**	**33**	**78**
JA5CPO	7	1,980	33	13	17
***JA5EO**	**A**	**111,750**	**310**	**54**	**96**
*JG5CBR	*	8	2	2	2
*JA5ATN	28	8,428	74	16	27
*JF5FGY	21	2,402	28	20	23
*JG5VIA	14	4,035	38	35	17
JA6GCE	**A**	**2,231,840**	**1958**	**132**	**332**
JJ6WYS	14	1,824	22	14	18
***JA6SRB**	**A**	**141,980**	**284**	**91**	**138**
*JS6GIM	*	21,996	98	39	55
***JA6EFT**	**28**	**23,885**	**151**	**48**	**28**
*JA6PL	21	600	14	9	11
JA7NVF	**A**	**1,424,130**	**1612**	**120**	**250**
JA7DOT	**21**	**41,018**	**174**	**33**	**74**
JH7XMO	**7**	**35,700**	**199**	**31**	**53**
***JF7PHE**	**A**	**144,786**	**345**	**66**	**111**
*JA7BME	*	91,348	240	59	105
*JR7LVK	*	29,857	141	37	58
*JK1AJX/7	*	7,810	58	25	30
*JI7WPV	*	3,833	44	22	30
***JH7XGN**	**21**	**157,206**	**510**	**33**	**81**
*JP1JIP/7	*	37,506	236	28	58
*JA7ADV	*	2,961	42	17	19
*JA7JNF	*	2,738	93	16	20
*JF7GDF	*	120	6	4	6
***JA8CSY**	**A**	**131,800**	**294**	**75**	**125**
*JA8IJI	28	6,960	64	19	29
*JL8AQH	21	3,997	41	22	29
*JI8BUR	*	1,647	30	8	19
JA9XBW	**21**	**62,370**	**273**	**26**	**64**
***JA1ALX/9**	**A**	**103,455**	**279**	**66**	**99**
*JA9TQY	*	44,977	190	43	77
*JO2SLZ/9	*	2,356	36	15	23
*JF9KGV	*	35	3	2	3
*JA9EJG	28	1,248	20	10	14
***JH9URT**	**21**	**50,474**	**244**	**25**	**67**
*JH9VJW	*	3,420	49	16	23
*JA9SCB	*	3,328	58	13	19
***JR9NVB**	**7**	**9,130**	**81**	**24**	**41**
JAØGZ	A	2,080	29	16	24
JAØQNJ	**28**	**9,925**	**150**	**12**	**13**
***JAØBMS**	**A**	**95,160**	**295**	**57**	**99**
*JAØRCK	*	5,050	35	17	33
*JGØGGI	*	828	18	8	10
*JFØVMJ	*	171	10	4	5
*JAØIOF	28	7,056	62	18	30
*JAØGEY	*	3,388	57	15	22
***JAØIAA**	**21**	**81,432**	**301**	**32**	**76**
*JHØMXV	*	34,550	160	28	69
*JJØACA	*	27,825	181	27	48
*JHØSGG	*	26,752	154	24	52
*JJØAEB	*	7,964	82	18	26
***JHØEPI**	**14**	**116,549**	**426**	**35**	**91**
		JORDAN			
***JY4NE**	**A**	**2,126,412**	**2481**	**76**	**248**
		KAZAKHSTAN			
UN2E	**A**	**449,955**	**628**	**72**	**225**
UP9L	*	206,172	358	72	177
UNØL	*	112,832	284	44	120
UN5J	*	63,273	204	50	111
UN6LN	**14**	**132,775**	**502**	**27**	**86**
UN7TO	*	73,832	402	23	65
UP4L	*	43,977	176	25	82
			(OP: UN7LZ)		
***UP6P**	**A**	**870,585**	**1079**	**101**	**280**
(OP: **UN6P**)					
*UN8GU	*	490,152	654	85	227
*UQ1D	*	78,840	214	41	105
			(OP: UN7DA)		
***UN7JJ**	**21**	**186,560**	**1084**	**23**	**87**
*UN7JX	*	123,876	541	25	83
*UO7DG	*	30,366	209	14	49
***UN7SW**	**7**	**46,814**	**231**	**20**	**69**
		KOREA			
HL9DX	**A**	**360,876**	**729**	**75**	**169**
HL5UOG	*	147,987	429	80	135
HL3GOB	14	2,400	29	15	25
***HL2FDW**	**A**	**298,511**	**736**	**86**	**153**
*DS2QJS	*	79,056	256	53	109
*HL9TY	*	37,072	190	43	69
*DS5KJR	*	7,332	127	25	27
***HL5AP**	**21**	**124,122**	**151**	**17**	**39**
		KUWAIT			
9K2HN	**A**	**41,496**	**274**	**12**	**45**
		KYRGYZSTAN			
EX8O	**A**	**203,490**	**474**	**97**	**188**
***EX7ML**	**21**	**108,200**	**495**	**27**	**73**
		MACAO			
***XX9AU**	**21**	**9,880**	**165**	**16**	**36**
		MONGOLIA			
JT1BV	**A**	**802,674**	**1613**	**113**	**229**
JT1CN	*	573,603	1842	85	178
JT1DA	*	317,200	1617	67	133
JT1CO	**7**	**12,558**	**256**	**17**	**25**
JT1JA	1.8	49	9	4	3
			(OP: JT1CO)		
*JT1AS	A	10,000	124	26	32
***JT1CH**	**21**	**38,332**	**449**	**21**	**53**
		NEPAL			
***9N7MV**	**A**	**178,285**	**844**	**63**	**118**
				(JABUMV)	
***9N7ET**	**21**	**45,056**	**392**	**15**	**49**
				(OP: JI1LET)	
		OGASAWARA ISLAND			
*JD1BIA	3.7	978	108	4	5
		OMAN			
***A45WD**	**A**	**4,267,708**	**3064**	**111**	**397**
				(OP: YO9HP)	
		PAKISTAN			
*AP2ARS	A	57,715	300	41	78
		SINGAPORE			
9V1UV	**A**	**182,245**	**487**	**69**	**136**
***9V1GO**	**3.7**	**4,387**	**54**	**18**	**23**
		SRI LANKA			
***4S7FBG**	**A**	**53,728**	**226**	**53**	**93**
*4S7WAG	7	3,220	60	16	30
		TAIWAN			
***BW4/UA3VCS**	**21**	**155,001**	**827**	**35**	**86**
		TAJIKISTAN			
***EY7AV**	**21**	**49,677**	**257**	**23**	**64**
		THAILAND			
HSØZEE	**A**	**571,340**	**910**	**102**	**283**
***HS1PDY**	**A**	**298,768**	**534**	**89**	**195**
***E21EIC**	**21**	**48,510**	**208**	**28**	**77**
*HS1JNB	*	4,488	56	16	28
		TURKMENISTAN			
*EZ8CW	A	14,448	93	30	57
		UZBEKISTAN			
UK/JE7RJZ	**A**	**306,440**	**840**	**68**	**167**
		WEST MALAYSIA			
9M2/G4ZFE	**14**	**131,760**	**563**	**32**	**90**
***9M2TO**	**A**	**494,125**	**1137**	**88**	**287**

EUROPE

		ALAND ISLANDS			
OHØB	**A**	**3,887,620**	**3654**	**133**	**477**
				(OP: OH2UA)	
OHØV	**21**	**656,143**	**1989**	**38**	**129**
				(OP: OH5LI)	
		ALBANIA			
ZA1A	**A**	**3,097,575**	**3461**	**109**	**476**
				(OP: OH2PM)	
***ZA/Z35M**	**A**	**155,806**	**503**	**47**	**170**
		ANDORRA			
C31WP	A	7,276	96	19	49
*C33CT	A	9,559	108	20	59
		AUSTRIA			
OE2G	**A**	**926,590**	**1503**	**87**	**347**
				(OP: OE2BZL)	
OE6CIQ	*	702,228	1079	99	322
OE1WWL	*	21,696	115	35	78
OE1TKW	*	19,947	129	31	78
OE3WMW	**28**	**96,625**	**413**	**30**	**95**
OE6Z	**7**	**535,734**	**2186**	**35**	**127**
				(OP: OE5CLD)	
***OE1AZU**	**A**	**62,458**	**330**	**40**	**127**
***OE3JIS**	**14**	**30,885**	**345**	**18**	**69**
***OE5CWL**	**7**	**75,144**	**712**	**14**	**79**
		BALEARIC ISLANDS			
***EA6XQ**	**A**	**336,500**	**877**	**67**	**183**
*EA6TU	*	63,954	266	46	152
*EA6AZ	*	1,584	24	16	20
*EA6EA	28	705	17	6	9
***EA6DD**	**21**	**81,000**	**419**	**20**	**80**
		BELARUS			
EU1PA	**A**	**534,688**	**1278**	**72**	**269**
EU4LY	*	217,250	710	57	218
EU1UN	*	109,729	408	56	141
EU7SA	*	5,985	45	20	37
EW4MM	**28**	**313,123**	**1017**	**35**	**128**
EU1SA	**21**	**81,427**	**500**	**25**	**82**
EW8MW	**14**	**297,182**	**1682**	**31**	**108**
EW6AF	*	130,936	1010	22	82
EW8WA	3.7	2,640	85	6	27
EU6EU	**1.8**	**47,124**	**684**	**9**	**59**
***EW1GA**	**A**	**385,344**	**984**	**64**	**224**
*EW1CQ	*	261,040	687	57	194
*EW8FU	*	22,644	179	23	79
*EW6MM	*	6,460	71	20	48
*EW6DX	28	21,052	174	17	59
*EW1ABF	*	11,289	144	13	40
*EV6M	21	2,688	73	8	24
***EU2MM**	**14**	**149,864**	**830**	**30**	**101**
***EU4EU**	**3.7**	**6,027**	**163**	**6**	**35**
		BELGIUM			
OR3N	**14**	**345,648**	**1540**	**36**	**116**
				(OP: ON6UQ)	
***OT3R**	**A**	**1,446,640**	**1861**	**88**	**340**
				(OP: ON4CCP)	
*ON7BS	*	222,642	716	62	204
*ON4ON	*	191,310	457	52	158
*ON4XG	*	120,117	432	53	177
*ON4MGY	*	105,984	361	45	162
*ON5SY	*	95,669	326	51	122
*ON6LO	*	81,312	376	36	118
*ON7VZ	*	60,465	255	31	114
*ON4HAM	*	52,545	211	43	112
			(OP: ON4LWX)		
*ON4CIN	*	29,751	204	34	107
*ON4CHK	*	14,255	185	15	40
*ON4TNB	*	7,488	120	20	52
*ON4KVA	*	4,324	90	10	36
*ON5SPA	*	1,870	104	27	58
*ON5CZ	*	1,383	43	7	26
***ON4ADZ**	**21**	**119,062**	**594**	**24**	**94**
***ON4APU**	**14**	**69,996**	**407**	**28**	**86**
***ON4ACA**	**1.8**	**9,200**	**228**	**5**	**41**
		BOSNIA-HERZEGOVINA			
T99W	**7**	**391,426**	**1829**	**32**	**114**
T9/KG6KZK	**1.8**	**73,632**	**1035**	**12**	**66**
***T95MMX**	**21**	**130,754**	**830**	**24**	**83**
***T95A**	**3.7**	**17,752**	**311**	**8**	**48**
*T97M	*	3,772	90	6	35
***T94LW**	**1.8**	**13,992**	**301**	**7**	**46**
		BULGARIA			
LZ1BJ	**A**	**1,030,467**	**1552**	**93**	**324**
LZ5ZI	*	36,387	115	48	69
LZ1NG	**28**	**478,292**	**1558**	**38**	**143**
LZ1YG	*	93,056	436	29	99
LZ9V	**21**	**54,724**	**566**	**26**	**60**
LZ3UA	**14**	**277,704**	**1425**	**34**	**118**
***LZ2SX**	**A**	**534,888**	**1331**	**72**	**234**
*LZ1AQ	*	326,239	769	73	238
*LZ3SM	*	96,005	275	56	155
*LZ5AZ	*	91,020	497	28	136
*LZ2DB	*	80,511	282	43	98
*LZ1ZC	*	42,799	262	30	97
*LZ4UU	*	27,266	143	33	110
*LZ1MC	*	10,800	64	30	45
*LZ4BU	*	9,450	81	24	51
*LZ1FJ	*	8,052	105	18	48
*LZ1GU	*	1,870	19	15	19
***LZ2JA**	**21**	**197,532**	**1059**	**30**	**94**
*LZ1GD	*	18,816	236	19	37
		CRETE			
*SV9/PA0NMH	A	23,690	176	31	84
		CROATIA			
9A9A	**21**	**1,594,264**	**3701**	**39**	**157**
9A5E	**14**	**1,866,164**	**3279**	**39**	**158**
9A6K	**7**	**301,098**	**1494**	**30**	**104**
***9A2EU**	**A**	**2,199,724**	**1793**	**137**	**531**
*9A7P	*	1,474,653	2067	87	360
*9A3ZO	*	23,331	158	26	75
*9A2GA	*	2,176	62	5	29
*9A5YY	*	666	47	13	24
***9A4W**	**21**	**273,222**	**1328**	**28**	**101**
*9A4CD	*	123,240	599	25	79
***9A7D**	**14**	**350,838**	**1644**	**32**	**114**
*9A4RV	*	74,970	529	24	81
*9A3GX	*	3,234	75	7	35
***9A7ZZ**	**1.8**	**24,708**	**421**	**8**	**50**
		CZECH REPUBLIC			
OK1EP	**A**	**1,518,072**	**1772**	**109**	**407**
OK1AVY	*	1,154,805	1274	101	360
OK2ABU	*	762,468	1159	84	322
OK1DUG	*	420,912	1105	61	272
OK1DVK	*	139,037	313	72	244
OK1TFH	*	127,670	371	45	125
OK1RI	**21**	**1,397,964**	**3242**	**48**	**154**
OK1FHI	*	62,292	297	26	90
OK1XC	**14**	**65,824**	**367**	**28**	**93**
OK1IE	**7**	**38,213**	**250**	**21**	**82**
OK1TP	**1.8**	**28,864**	**425**	**11**	**57**
***OK1TN**	**A**	**1,170,094**	**1204**	**99**	**350**
***OK2MBP**	*****	**633,075**	**1151**	**71**	**296**
*OK2BMT	*	566,368	838	79	273
*OK2SGY	*	481,915	955	74	269
*OK1KZ	*	351,734	763	75	262
*OK1VD	*	305,175	584	76	237
*OK2TCW	*	297,262	678	49	189
*OK1VVW	*	291,192	764	54	210
*OK2DU	*	248,952	664	61	215
*OK2FB	*	193,496	505	62	206
*OK2BEN	*	193,180	627	50	210
*OK1JOC	*	189,888	499	55	221
*OK2PTS	*	175,336	460	58	190
*OK2PMS	*	153,846	502	53	178
*OK2BQL	*	96,086	335	54	160
*OK1CJN	*	75,582	201	50	121
*OK2BJ	*	60,600	211	44	106
*OK2PHI	*	59,040	262	34	89
*OK1WWJ	*	57,996	197	41	121
*OK1BA	*	17,160	94	26	52
*OK1HGM	*	8,200	84	21	61
*OK1VHV	*	7,030	78	19	55
*OK1FCA	*	3,348	64	12	42
*OK1TVL	*	980	28	15	20
***OK1ES**	**28**	**93,297**	**267**	**31**	**106**
*OK2PCL	*	18,642	81	25	53
*OK1BLU	*	3,526	63	13	30
***OK2FNG**	**21**	**162,476**	**583**	**34**	**117**
*OK2NN	*	140,847	570	30	103
***OK1DXR**	**14**	**39,000**	**268**	**20**	**80**
*OK1FID	*	23,738	248	19	64
*OK1KT	*	18,620	217	14	62
*OK1MMN	*	11,895	190	11	50
*OK1CAZ	*	11,484	165	13	53
***OL6T**	**7**	**51,168**	**425**	**18**	**78**
				(OP: OK1DCF)	
*OK1DTC	*	37,179	380	16	65
*OK1HMP	*	11,505	176	9	50
***OK1FFU**	**3.7**	**73,416**	**923**	**14**	**62**
*OK1FPS	*	45,440	616	9	62
		DENMARK			
OZ5EV	**A**	**297,549**	**530**	**82**	**317**
OZ3SK	**1.8**	**51,612**	**835**	**9**	**57**
OZ1HXQ	*	51,027	737	11	62
***OZ1ACB**	**A**	**287,076**	**632**	**57**	**225**
*OZ4RT	*	32,184	152	30	78
*OZ1EO	*	18,480	124	29	91
*OZ5DX	28	2,723	39	11	18
***OZ8AE**	**21**	**70,434**	**270**	**31**	**95**
*OZ5WQ	1.8	2,318	70	6	32
		DODECANESE			
***SV5RDS**	**A**	**316,360**	**1145**	**50**	**170**
		ENGLAND			
M6T	**A**	**5,518,331**	**4491**	**132**	**505**
				(OP: G4PIQ)	
GØMTN	*	1,573,994	2015	90	389
G4DBL	*	733,365	1333	87	292
G4FAL	*	488,520	857	75	270
G3ZXD	*	235,980	698	50	180
G3UFY	*	170,180	385	61	193
G7NRO	*	9,718	70	28	58
GØAEV	**28**	**499,446**	**1417**	**32**	**130**
G4F	*	240,932	887	29	105
				(OP: G4DHF)	
G3TXF	**21**	**679,448**	**1961**	**33**	**121**
G3RAU	*	445,848	1308	38	118
M7Z	**14**	**839,160**	**2412**	**39**	**146**
				(OP: G3VHB)	
G3AB	*	551,520	1991	35	125
G4Z	*	140,662	891	24	82
***G4BUO**	**A**	**2,050,815**	**2112**	**99**	**408**
*G4IIY	*	553,518	863	75	307
*MØDDT	*	199,449	500	60	189
*MØBKV	*	197,554	513	50	156
*MØAOM	*	195,692	631	41	162
*G4GOY	*	173,400	582	47	153
*MØCOP	*	121,638	331	47	147
*M5RUN	*	110,334	346	46	167
*G3RSO	*	110,121	359	48	165
*MØGEB	*	39,772	217	33	89
*G7BRZ	*	31,570	281	26	84
*G7UGC	*	22,454	123	36	73
*2E1MBO	*	11,524	112	19	48
*GØMRH	*	8,378	110	16	55
*M3PHP	*	8,127	92	17	46
*MØMAT	*	4,428	64	17	37
*MØBQC	*	70	7	3	7
***G4PCI**	**28**	**91,913**	**371**	**23**	**84**
***G3PJV**	**21**	**109,466**	**707**	**20**	**78**
*GØEYO	*	12,428	136	13	39
***G4WSE**	**14**	**118,000**	**796**	**23**	**77**
*M/N3EYB	*	9,158	106	9	29
***M4R**	**7**	**11,904**	**181**	**10**	**54**
				(OP: G4AXX)	
		ESTONIA			
ES5TV	**A**	**5,049,000**	**3726**	**154**	**594**
ES1QD	*	115,344	415	42	136
ES2DJ	*	40,736	178	40	94
ES1BH	*	36,144	225	35	109
ES1BA	*	2,847	29	11	28
ES1AC	**21**	**84,006**	**572**	**26**	**91**
ES5RW	**14**	**829,540**	**2558**	**48**	**150**
ES5MC	**7**	**262,842**	**1234**	**31**	**111**
***ES6KW**	**A**	**186,150**	**548**	**58**	**197**
*ES7FU	*	71,508	330	35	142
*ES6PA	*	67,424	350	45	151
***ES5RY**	**21**	**220,545**	**733**	**36**	**133**
*ES7GM	*	61,974	488	23	76
		EUROPEAN RUSSIA			
RK4FD	**A**	**2,853,785**	**3326**	**128**	**455**
RJ1Z	*****	**1,320,304**	**2351**	**99**	**362**
				(OP: RW1ZA)	
RD4M	*	998,800	1421	103	351
				(OP: UA4LU)	
RN3ZC	*	874,923	1487	100	327
RD3A	*	769,698	1871	80	286
				(OP: RD3AF)	
RK3BA	*	711,383	1692	78	301
RZ4FA	*	675,065	1095	91	354
UA1OMZ	*	419,558	934	74	288
RZ3AV	*	350,546	770	72	271
RW3GU	*	267,680	664	56	183
UA4SU	*	240,548	604	61	223
RU4HU	*	131,719	406	54	163
RX3OM	*	112,812	403	50	187
RK6BZ	*	104,920	437	43	172
RX3AEX	*	97,520	431	42	170
RA1TV	*	65,598	339	39	135
RX4HX	*	57,904	297	31	123
UA4NC	*	43,326	217	43	131
RA3RK	*	42,161	215	33	100
RZ3TZA	*	41,307	211	40	107
RU6FA	*	26,934	127	50	84
RU4CO	*	20,570	135	26	84
RV1CC	*	19,565	98	29	62
UA1AKE	*	19,118	87	44	77
RU3DX/6	*	10,658	123	19	54
RN1CW	*	7,228	68	19	33
UA3BM	*	5,104	37	23	35
RV1AT	*	5,082	84	17	49
RA3ZZ	**28**	**51,175**	**232**	**29**	**86**
RW3VZ	21	4,558	81	10	43
UA3DPX	**14**	**533,364**	**2017**	**38**	**131**
RU6LG	*	204,150	977	34	116
RZ6LG	**7**	**204,254**	**990**	**31**	**115**
RZ3QU	*	159,594	943	28	106
RN1AW	*	2,331	55	8	29
UA1OMS	**3.7**	**49,053**	**451**	**15**	**68**
RA6AFB	*	25,920	355	11	61
UA6AKD	*	4,736	110	7	30
RW4PI	1.8	2,226	104	8	34
***UA4FER**	**A**	**1,476,366**	**2133**	**105**	**377**
***RU3QW**	*****	**995,687**	**1580**	**100**	**369**
*RZ3DW	*	558,832	824	89	335
*UA6HON	*	532,170	964	81	284
*RA6CT	*	410,058	897	67	260
*RW3DL	*	400,728	742	77	277
*UA4WEM	*	328,692	886	63	238
*RU3DM	*	319,284	537	80	282
*RX3DCN	*	298,320	610	76	263
*RK3DH	*	260,480	446	82	288
*UA3DQ	*	255,040	677	61	259
*RA3AUM	*	249,745	711	50	201
*RV3LO	*	243,916	622	62	227
*RW1AI	*	241,264	598	58	214
*UA4FRL	*	212,265	579	58	209
*RZ3AED	*	190,620	594	55	215
*UA3FDX	*	190,512	671	51	192
*RU3WR	*	187,068	561	56	206
*U1BA	*	176,101	597	43	186
*RA4AOR	*	147,528	514	47	169
*RZ3EC	*	143,752	478	51	187
*RW3FY	*	143,127	357	54	189
*RU3DNN	*	128,895	491	40	155
*RA6XNR	*	120,840	532	47	165
*RV3YR	*	118,668	417	41	133
*RW6AH	*	117,914	390	50	164
*RW3VI	*	115,628	488	38	173
*RZ6HN	*	112,210	484	43	186
*RA3RHA	*	97,858	329	52	174
*UA3RAW	*	90,798	275	47	175
*UA3LEO	*	85,848	353	47	149
*RX3MM	*	84,180	317	39	144
*RA3XT	*	72,930	280	36	134
*RZ3DA	*	69,495	232	57	148
*UA4CCC	*	66,102	421	36	102
*RA6DE	*	65,790	281	40	113
*UA1WBV	*	60,454	239	40	141
*UA4HY	*	51,495	300	36	122
*RA3XAU	*	47,652	309	34	98
*RV3IC	*	46,565	229	39	100
*UA3MOM	*	43,450	219	37	121
*RN3FA	*	31,510	204	32	105
*RW4FX	*	29,920	195	23	62
*RA9CO/3	*	29,025	114	38	97
*RA3AMG	*	27,930	186	29	118
*UA1AFZ	*	25,680	197	26	94
*RZ3DH	*	23,620	112	43	71
*RW1AU	*	23,600	114	33	67
*UA4FEL	*	23,541	131	37	96
*UA4FEN	*	23,504	161	29	84
*RW4LQ	*	22,248	84	37	66
*RZ3VA	*	21,122	148	27	91
*RV6LFE	*	21,079	81	40	67
*RA3NZ	*	20,007	133	34	83
*RA3VGD	*	18,424	80	39	59
*RZ3OV	*	17,184	111	29	67
*RA3MB	*	17,013	119	32	75
*RZ1AZ	*	16,986	107	25	89
*UA3QCB	*	11,881	116	22	87
*RD3DD	*	11,704	85	28	60
*RX1AX	*	9,656	56	27	44
*RW4NH	*	9,600	66	23	52
*RX3DD	*	9,310	118	19	51
*RA3TYL	*	8,692	97	19	63
*UA3AKI	*	8,316	86

*OH2BPA	*	96,170	309	57	186
*OH2MO	*	76,320	309	131	44
*OH3AD	*	10,780	140	23	75
			(OP: OH3HY)		
*OH6KXL	*	5,959	79	14	45
***OH3WS**	**28**	**15,664**	**97**	**19**	**69**
*OH6RC	*	5,519	59	15	41
*OH3R	*	120	6	4	6
***OH5ZZ**	**14**	**73,323**	**672**	**23**	**70**
		FRANCE			
TM2Y	**A**	**4,376,532**	**3205**	**135**	**493**
F2JD	**"**	**1,843,450**	**2204**	**95**	**363**
F5AMH	*	837,699	1625	69	240
F6FYD	*	717,514	1123	80	291
F5VHY	*	574,443	852	63	186
F5RAB	*	555,373	838	74	285
F5CQ	*	248,240	463	61	229
F5UTN	*	162,162	390	57	132
TM9R	**21**	**1,843,784**	**2949**	**38**	**133**
			(OP: F5FLN)		
F6CTT	**7**	**618,562**	**2149**	**37**	**124**
F5NBX	*	39,193	356	17	60
F6CWA	**1.8**	**5,355**	**118**	**5**	**40**
***F6DZU**	**A**	**1,588,074**	**2206**	**90**	**276**
***F8AAN**	**"**	**743,046**	**1242**	**81**	**273**
*F6FTB	*	694,707	1015	81	298
*F6KZC	*	641,918	1184	79	307
			(OP: F8CUG)		
*F5DRD	*	550,712	1194	71	257
*F5INJ	*	177,216	521	47	161
*F5AXG	*	148,526	438	46	160
*F5VHN	*	137,800	321	50	215
*F8DNX	*	105,370	383	49	156
*F8DFN	*	92,565	346	47	140
*F6BAT	*	78,973	296	40	111
*F5VIO	*	70,524	530	40	122
*F5RPB	*	63,867	246	38	131
*F5SGI	*	35,960	160	35	81
*F6FRA	*	400	12	7	9
***F5KSE**	**28**	**21,488**	**155**	**17**	**51**
			(OP: F5IJT)		
***F5JY**	**21**	**109,620**	**494**	**30**	**96**
*F5PRR	*	12,090	150	15	50
***F8BJI**	**14**	**83,655**	**505**	**25**	**92**
*F5AJG	*	60,528	377	24	80
*F5RVO	*	4,705	110	7	40
***F5LEN**	**7**	**21,252**	**240**	**14**	**63**
*F8AKS	*	14,616	211	12	60
		GERMANY			
DJ5MW	**A**	**4,118,400**	**3454**	**123**	**477**
DJ4PT	**"**	**3,712,885**	**2815**	**135**	**470**
DL4NAC	*	907,410	1093	90	316
DL2DX	*	761,504	825	111	338
DK3KD	*	598,120	899	84	296
DL2APJ	*	516,402	843	82	311
DL1DTC	*	497,448	643	91	301
DJ8UV	*	496,736	1135	75	269
DJ9HX	*	442,303	535	89	312
DJ3HJ	*	414,994	715	68	253
DL2QT	*	349,778	563	71	215
DK1MAX	*	307,812	450	98	241
DJ1TU	*	300,312	534	65	226
DF1DV	*	280,908	682	61	228
DJØIF	*	269,850	509	70	187
DL8OBF	*	258,441	598	63	248
DF3IS	*	241,300	562	55	199
DK6CQ	*	238,209	431	72	199
DF5AN	*	194,171	352	71	210
DL1PT	*	183,400	489	65	197
DK2DQ	*	166,808	395	57	175
DL4SKF	*	162,595	492	48	107
DF5BX	*	136,276	470	47	170
DL9HD	*	118,575	316	55	170
DJ2RB	*	118,144	256	59	149
DJ8OG	*	66,759	212	52	135
DL2KCK	*	64,525	235	42	103
DL6UYA	*	48,900	224	43	107
DF5AU	*	40,050	135	42	108
DJ3WE	*	29,590	118	30	80
DL4LH	*	27,040	108	36	68
DK8RE	*	22,356	114	30	62
DL3TF	*	17,072	131	20	68
DL9NEI	*	1,870	25	13	21
DL3TYA	*	1,296	33	7	9
DJ1ZU	**28**	**120,392**	**628**	**22**	**79**
DL5RBR	*	3,306	38	15	23
DF9XV	**21**	**397,686**	**1120**	**36**	**122**
DL9ZWG	*	19,575	146	21	54
DL4WA	**14**	**176,612**	**850**	**30**	**104**
DL2ARD	**7**	**287,806**	**1566**	**32**	**119**
DF8AE	*	41,912	340	19	85
DM3ML	**1.8**	**4,224**	**146**	**7**	**37**
DK7ZT	*	702	34	4	22
***DF7YU**	**A**	**1,009,424**	**1196**	**89**	**333**
***DF3KV**	**"**	**833,796**	**1082**	**85**	**352**
*DL1EFD	*	646,878	1011	76	317
*DF5ZV	*	549,320	703	95	348
*DM5JBN	*	538,350	883	77	293
*DL3EA	*	516,212	668	90	272
*DL1YAW	*	490,854	642	92	285
*DH8AF	*	477,958	791	87	316
*DF3QG	*	463,888	661	84	283
*DL8HCO	*	436,527	762	77	292
*DL8ULO	*	292,878	681	66	241
*DL3APO	*	291,450	401	94	241
*DL6GV	*	288,445	506	74	221
*DJ1CW	*	280,098	514	69	204
*DF6WE	*	279,984	664	63	241
*DL1DUO	*	252,540	561	62	214
*DK5DS	*	238,630	620	56	189
*DH2MA	*	238,349	563	57	184
*DLØDWD	*	235,850	692	54	211
			(OP: DF6QC)		
*DK3JW	*	234,960	490	67	200
*DJ2QV	*	232,416	384	70	218
*DL4MFP	*	215,250	397	60	186
*DF1ZN	*	213,044	462	60	181
*DJ6OZ	*	204,600	599	51	197
*DH5WB	*	202,635	532	57	180
*DK6AY	*	191,750	527	55	195
*DH9KR	*	191,672	520	56	191
*DJ3DQ	*	191,252	450	62	212
*DJ3GE	*	189,420	462	55	176
*DK8AX	*	184,705	351	63	202
*DL8YR	*	177,480	441	54	207
*DK3WJ	*	174,549	415	57	192
*DK7FP	*	169,911	431	54	163
*DL6RBH	*	167,175	417	57	168
*DF1QQ	*	164,082	365	59	167
*DL1CWI	*	161,500	420	56	194
*DL6ZNG	*	123,750	368	48	150
*DL9SXX	*	120,904	328	56	182
*DL8ZAJ	*	120,669	347	47	172
*DH2PL	*	112,784	323	55	157
*DF2FM	*	111,155	309	52	163
*DL1DBR	*	108,932	285	63	163
*DB8NI	*	108,864	386	52	191
*DJ1WQ	*	108,145	380	42	173
*DL1FZZ	*	105,984	232	62	145
*DJ1OJ	*	102,762	296	45	128
*DK5JM	*	97,680	239	51	171
*DH1DA	*	96,084	302	50	154
*DL5EBS	*	82,502	204	52	114
*DL2MIH	*	79,120	277	45	127
*DM2AWM	*	72,446	277	45	133
*DL8UVG	*	67,645	268	42	121
*DK5NAD	*	65,274	283	38	100
*DK4DS	*	56,108	181	43	123
*DL6ATI	*	54,080	241	37	123
*DC2LF	*	53,900	218	40	135
*DF6LQ	*	53,582	200	42	104
*DL4KUG	*	52,496	206	35	101
*DG8DBW	*	52,221	186	40	129
*DG2MIC	*	44,897	210	42	97
*DL4ZBC	*	43,216	241	35	111
*DL8UAT	*	38,645	123	43	88
*DH6DAO	*	37,386	112	50	84
*DL3DRN	*	33,033	135	38	83
*DH4BM	*	30,666	178	36	78
*DL8SDI	*	28,209	132	41	87
*DL4DRA	*	25,953	164	37	86
*DL2YET	*	25,516	176	31	100
*DL2YCA	*	25,086	145	36	75
*DL4JTW	*	24,900	136	30	70
*DJ2UB	*	21,620	139	32	83
*DL2VB	*	21,251	150	22	57
*DK3WN	*	20,910	167	22	80
*DF3HS	*	20,178	102	36	78
*DGØCC	*	19,550	190	32	83
*DL3ZAI	*	15,576	103	23	43
*DL5KMS	*	13,056	99	28	74
*DL3SCN	*	12,408	119	22	66
*DL7VRG	*	12,126	81	26	60
*DL2ASK	*	11,932	101	25	51
*DC9AM	*	11,600	139	15	65
*DL7CU	*	10,230	91	21	41
*DL8NCR	*	8,600	80	29	57
*DL5ANS	*	7,920	83	18	54
*DG1BQC	*	7,076	87	16	42
*DL3KDC	*	6,926	99	15	60
*DL5MHR	*	6,426	48	24	39
*DB6ZH	*	5,510	56	21	37
*DL7MAT	*	5,184	70	24	57
*DK8AP	*	5,032	74	19	49
*DL3HWF	*	4,959	33	29	28
*DL1ARD	*	4,399	46	23	30
*DL3HWM	*	4,150	38	21	29
*DL6OZ	*	1,872	31	16	23
*DL4VAB	*	1,583	58	6	28
*DL1ARJ	*	1,369	31	11	26
*DL2VSF	*	858	27	11	22
*DL2MJW	*	100	11	5	8
*DL1NKS	*	7,875	103	12	51
***DL1DWR**	**28**	**12,844**	**108**	**15**	**37**
*DJ6XB	*	2,976	42	14	17
*DF5RF	*	495	16	5	6
***DH9SB**	**21**	**134,208**	**524**	**31**	**113**
*DJ2XC	*	81,282	392	27	87
*DL3BRA	*	80,676	435	25	83
*DL3LBA	*	4,510	89	9	32
***DL1LH**	**14**	**325,950**	**1225**	**38**	**121**
***DL1XX**	**"**	**255,060**	**1058**	**35**	**121**
*DJ1MS	*	97,234	551	26	96
*DL4JYT	*	20,999	216	17	66
*DL3WB	*	2,638	66	8	32
*DL2RTJ	*	2,210	50	9	25
*DL2SHR	*	1,435	33	9	26
***DL3LE**	**3.7**	**85,946**	**807**	**18**	**80**
*DH5AO	*	17,690	295	8	50
*DL3ARM	1.8	2,394	95	5	33
*DL2AL	*	1,452	50	4	29
*DL2RZG	*	616	29	3	19
		GREECE			
J42T	**21**	**522,611**	**2427**	**34**	**117**
			(OP: SV2BFN)		
*SV2YC	28	3,069	44	12	21
***SV1BJW**	**21**	**122,592**	**1055**	**20**	**76**
***J43J**	**14**	**235,728**	**1302**	**32**	**112**
			(OP: SV3/DJ5JH)		
*SV1GE	*	201,628	1359	31	102
*SV1GSK	*	8,379	152	13	50
		GUERNSEY			
GU6RWD	**A**	**85,852**	**365**	**36**	**133**
GU5W	**21**	**675,396**	**2304**	**32**	**114**
			(OP: G4JVG)		
***MUØFAL**	**28**	**62,890**	**322**	**18**	**77**
		HUNGARY			
HG8W	**A**	**217,308**	**348**	**75**	**198**
			(OP: HA8ZD)		
HA3OU	*	171,348	459	59	159
HA9RU	**28**	**251,140**	**954**	**31**	**114**
HA3FT	*	62,539	329	24	68
HG8R	**14**	**657,728**	**2477**	**36**	**136**
HA8IB	*	531,168	2107	38	138
HA9PP	**7**	**256,733**	**1088**	**30**	**109**
HA8A	*	86,655	463	21	88
HA8BE	**3.7**	**95,040**	**996**	**15**	**73**
HA8FW	*	68,632	764	17	75
***HG1Z**	**A**	**957,220**	**1363**	**101**	**357**
*HA6IAM	*	220,174	614	59	224
*HA3LI	*	171,810	297	68	181
*HA9MDP	*	11,128	94	28	79
***HG8I**	**21**	**510,300**	**1739**	**35**	**115**
*HA3NU	*	316,096	1007	35	141
*HA1ZN	*	36,126	339	19	62
***HG4F**	**14**	**282,264**	**1444**	**36**	**116**
*HA1RS	*	29,016	334	17	65
		ICELAND			
TF3MM	A	7,018	90	14	44
		IRELAND			
EI8IR	**A**	**3,325,350**	**3508**	**112**	**413**
EI4BZ	*	740,064	1134	90	326
EI4DW	*	155,520	303	65	205
EI8GS	**14**	**379,379**	**1730**	**32**	**111**
EI5GM	**7**	**146,475**	**1041**	**29**	**85**
EI6JK	*	9,079	159	9	51
***EI6HB**	**A**	**134,260**	**418**	**52**	**144**
*EI5FQB	*	9,079	113	20	55
*EI9ES	*	6,666	90	17	49
***EI2VNO**	**21**	**64,974**	**576**	**20**	**71**
		ISLE OF MAN			
***GD4GWQ**	**A**	**20,979**	**141**	**34**	**77**
		ITALY			
II4A	**A**	**2,471,064**	**2678**	**115**	**341**
			(OP: IK4ADE)		
IR4T	**"**	**1,621,590**	**1857**	**95**	**287**
			(OP: IK4UPB)		
IZ8EFI	**"**	**1,158,928**	**1545**	**91**	**361**
IZ8DPL	*	849,848	1436	77	251
IZ4CRE	*	384,916	774	63	170
I02C	*	356,384	775	72	224
			(OP: IK2WZV)		
IR4B	*	354,515	645	66	179
			(OP: IK4AUY)		
IK3OII	*	239,360	458	67	189
I6FLD	*	217,440	937	41	139
IZ7EVZ	*	211,259	535	76	213
IZ4DYQ	*	195,747	495	54	159
IK2AOO	*	154,998	459	53	165
IN3IZT	*	13,130	96	30	71
IK8URC	*	11,564	145	22	76
IZØBPI	*	9,272	96	19	57
IQ2MG	**28**	**601,809**	**1480**	**36**	**133**
			(OP: IK2YSA)		
IK2PTR	*	487,202	1400	36	106
IKØOER	*	207,360	900	27	81
IK2UCK	*	146,864	497	28	106
IZØBEE	*	111,754	395	30	112
IZ5ASZ	*	66,543	219	29	94
IK4MHB	*	19,140	360	9	11
IQ5PO	**21**	**475,082**	**1660**	**34**	**123**
IU3A	**"**	**447,853**	**1546**	**30**	**107**
			(OP: IV3HAX)		
IR3Z	*	251,532	936	37	116
IZØDXI	*	34,272	273	23	73
IR5T	**14**	**597,625**	**2229**	**39**	**136**
			(OP: IK5ORP)		
IQ3P	**"**	**528,000**	**1868**	**36**	**140**
IR2C	*	373,440	1574	35	125
			(OP: IW2HAJ)		
IR7G	**7**	**554,996**	**1853**	**38**	**131**
			(OP: IV3TAN)		
IQ4C	*	256,968	1366	28	101
			(OP: IZ4DPV)		
I5FCK	*	141,718	927	25	93
IV3OWC	*	117,376	943	28	100
I8KPV	*	112,350	874	19	88
IZ2ABI	*	30,030	244	17	74
I5WVI	*	5,130	78	11	43
I4AVG	**3.7**	**141,086**	**1113**	**21**	**85**
IU3X	**1.8**	**58,900**	**856**	**13**	**63**
			(OP: IV3SKB)		
***I3MLU**	**A**	**1,742,503**	**1555**	**125**	**428**
***IV3SDE**	**"**	**259,191**	**553**	**62**	**217**
*IU4F	*	255,373	584	61	202
			(OP: I4FGG)		
*IK7RVY	*	251,538	656	55	171
*I7/9A3A	*	224,510	469	64	222
*IZ4DIG	*	208,737	461	61	182
*IK2THN	*	195,840	503	67	189
*IK2WZQ	*	191,055	398	64	171
*IZØEHL	*	180,090	579	41	166
*IK7WPD	*	177,876	423	58	186
*IKØXBX	*	169,070	494	57	208
*IZ6CST	*	130,032	467	44	128
*IØYQV	*	129,232	359	48	149
*IK4QJF	*	124,644	336	54	167
*IZ2ABN	*	119,400	277	62	138
*IK5PWN	*	107,004	292	53	188
*IK1TTD	*	104,832	423	42	166
*IK5ZTT	*	103,785	406	40	147
*IZ8CEV	*	103,777	484	38	119
*IZ2ACG	*	103,554	311	58	140
*IZ7EDQ	*	100,466	341	51	140
*I8TWB	*	93,991	383	47	146
*IK8IFW	*	77,349	319	42	135
*IK2UVR	*	69,865	218	43	114
*IN3FHE	*	68,816	235	43	144
*IZ1ANK	*	67,320	641	62	193
*I4JED	*	59,148	189	42	82
*IZ1DFL	*	57,266	229	37	100
*IK8NRW	*	55,918	239	43	103
*IZ8FOV	*	54,978	391	42	145
*IK4MGJ	*	48,006	194	43	83
*IKØOTJ	*	39,543	224	32	115
*I07J	*	38,608	210	41	111
			(OP: IK7JWX)		
*IZ1CQZ	*	35,100	144	41	76
*IZ2EIH	*	32,750	160	40	91
*IZ1AOD	*	30,607	211	33	94
*IV3IDP	*	29,028	180	30	93
*IZØBNR	*	24,640	195	18	66
*IKØUTM	*	24,617	124	35	68
*IK2YSJ	*	20,564	136	34	72
*IK2WFN	*	19,837	115	29	54
*IK4NPC	*	19,006	146	25	61
*IK3XTY	*	17,515	160	32	81
*IZ8DMZ	*	12,600	106	28	62
*IZ7EUB	*	10,366	52	27	46
*IV3KSE	*	9,715	69	26	41
*IK4CBM	*	2,346	65	14	37
*IZØFKE	*	2,304	31	14	22
*IV3LBP	*	1,428	23	16	18
*IV3WMS	28	35,925	191	19	56
*IK3SSJ	*	31,856	177	22	66
*IK2OLJ	*	11,058	107	18	39
***IKØBAL**	**21**	**132,471**	**658**	**28**	**95**
*IK8WTM	*	108,200	649	24	76
*IK4QJM	*	65,952	413	22	74
*IK1TWC	*	30,960	209	21	69
*IK1BBC	*	9,751	97	14	35
*IZ6ASI	*	9,464	138	13	43
*IZ4DIT	*	8,320	128	12	40
***IK3UMT**	**14**	**228,642**	**929**	**34**	**125**
*IK2YGZ	*	54,219	514	18	75
*IK2WXQ	*	44,055	434	16	73
*IZ5DKF	*	10,343	185	14	54
*IZ3DBE	*	5,179	104	13	34
*IZ5CFS	*	4,428	91	9	27
*IV3BSE	*	2,550	130	10	41
***IR2G**	**7**	**32,148**	**271**	**18**	**76**
			(OP: IZ2EER)		
***IR5B**	**3.7**	**63,640**	**780**	**14**	**72**
***IZ1DGG**	**1.8**	**2,553**	**84**	**5**	**32**
		JERSEY			
MJ2Z	**21**	**266,684**	**1387**	**24**	**92**
			(OP: M5RIC)		
***GJ7DNI**	**A**	**36,256**	**163**	**43**	**133**
		KALININGRAD			
UA2CZ	**A**	**203,814**	**587**	**54**	**180**
***RU2FL**	**A**	**123,610**	**470**	**50**	**185**
***UA2FAO**	**14**	**42,328**	**384**	**18**	**70**
		LATVIA			
YL2KO	**A**	**2,252,024**	**2720**	**111**	**382**
YL6W	*	2,061,720	2394	112	428
YL7A	**7**	**97,428**	**487**	**31**	**187**
			(OP: YL2GM)		
***YL2TW**	**A**	**751,120**	**1392**	**83**	**327**
*YL2II	*	45,892	234	38	111
***YL2GTS**	**28**	**28,210**	**198**	**22**	**69**
		LITHUANIA			
LY2MW	**A**	**2,390,256**	**2420**	**131**	**463**
LY9Y	**"**	**1,983,036**	**2054**	**115**	**428**
			(OP: LY2CY)		
LY2KM	*	21,266	111	31	67
LY2LK	*	5,544	114	13	50
LY2IC	**28**	**69,000**	**316**	**27**	**98**
LY2DM	**21**	**132,923**	**637**	**27**	**92**
LY2OU	**7**	**33,197**	**350**	**16**	**76**
LY2BW	**3.7**	**16,080**	**287**	**12**	**48**
LY3UM	**1.8**	**47,736**	**691**	**9**	**59**
LY2HM	*	43,152	755	9	53
***LY2KW**	**A**	**1,092,879**	**1352**	**96**	**353**
*LY2MM	*	585,200	1040	80	300
*LY2FN	*	340,442	715	71	252
*LY2BBF	*	145,977	427	57	190
*LY2OM	*	145,605	399	59	196
*LY2OO	*	37,812	234	32	105
*LY2DX	*	27,398	178	33	100
*LY2BVB	*	20,235	104	31	64
*LY3NQT	*	17,730	157	25	65
*LY1CT	*	14,874	141	25	86
*LY3SL	*	3,268	73	9	29
***LY2NYY**	**28**	**12,586**	**123**	**16**	**46**
***LY9A**	**14**	**417,760**	**1734**	**34**	**126**
			(OP: LY3BA)		
*LY2LF	*	24,717	291	17	60
*LY1CX	*	4,760	111	9	25
***LY5A**	**7**	**197,965**	**931**	**38**	**107**
			(OP: LY2ZZ)		
*LY2TE	*	39,420	486	11	62
***LY1DT**	**3.7**	**40,650**	**513**	**13**	**62**
*LY2HK	*	11,950	236	6	44
		LUXEMBOURG			
LX9SW	**14**	**395,744**	**1498**	**32**	**117**
			(OP: LX1RQ)		
LX7I	**7**	**466,610**	**2226**	**29**	**116**
			(OP: LX2AJ)		
LX1KC	*	240,810	1484	28	110
LX5A	**3.7**	**107,268**	**1149**	**14**	**70**
			(OP: LX1AQ)		
		MACEDONIA			
Z36W	**21**	**558,187**	**2013**	**35**	**126**
Z33AA	**14**	**350,217**	**1738**	**34**	**119**
Z37M	**7**	**40,890**	**411**	**19**	**68**
Z31GX	**1.8**	**40,194**	**591**	**9**	**57**
		MOLDOVA			
ER1Q	**3.7**	**81,098**	**1008**	**13**	**69**
			(OP: ER1QQ)		
ER2G	**1.8**	**5,848**	**122**	**40**	**157**
***ER3CT**	**A**	**460,506**	**1242**	**60**	**222**
*ER5DX	*	218,268	622	56	202
***ER3MM**	**28**	**35,106**	**227**	**21**	**66**
		NETHERLANDS			
PAØIJM	**A**	**1,452,518**	**2523**	**85**	**301**
PAØJNH	*	467,784	827	76	280
PF9A	*	330,321	718	70	239
PA5TT	*	219,240	484	62	199
PAØLOU	*	112,572	287	59	177
PA4T	*	112,132	258	57	137
PAØINA	**28**	**21,301**	**110**	**20**	**70**
PA3EWP	**14**	**571,844**	**1758**	**39**	**143**
PC2T	**3.7**	**38,290**	**553**	**11**	**59**
PA2R	*	26,492	317	15	59
PA3GCV	**1.8**	**62,050**	**879**	**10**	**63**
***PA1V**	**A**	**631,698**	**1038**	**85**	**296**
***PAØABM**	**"**	**388,483**	**647**	**77**	**270**
*PA3GVI	*	182,626	472	62	192
*PAØB	*	152,950	539	51	179
*PI4VGZ	*	112,396	380	51	162
*PC4M	*	100,113	322	46	175
*PAØKDM	*	83,421	319	51	156
*PA3GBI	*	80,408	284	44	108
*PG7V	*	77,953	256	40	97
*PE2GER	*	58,135	243	43	108
*PAØLSK	*	57,682	245	43	108
*PA3EBP	*	52,345	248	35	110
*PA3HGF	*	44,588	193	41	101
*PA2ALF	*	44,064	224	35	101
*PA1PAT	*	38,318	185	34	85
*PA4A	*	27,250	151	35	90
*PA2SWL	*	22,896	102	30	75
*PA3GGW	*	19,952	347	42	130
*PAØKHS	*	15,138	141	23	64
*PB7YL	*	14,280	108	26	58
*PEØROB	*	7,980	107	15	55
*PA3CDN	*	2,665	67	19	46
*PAØDVM	*	644	22	8	20
*PA3DOQ	*	357	21	2	15
***PA5O**	**28**	**35,524**	**197**	**20**	**63**
***PA9JB**	**21**	**108,672**	**661**	**20**	**76**
*PA1RBZ	*	36,000	294	19	56
***PAØMIR**	**3.7**	**12,934**	**211**	**9**	**49**
		NORTHERN IRELAND			
GIØKOW	**14**	**1,266,660**	**3579**	**40**	**146**
***GIØKVQ**	**A**	**492,219**	**888**	**61**	**212**
*GIØVTS	*	82,500	322	42	123
*MIØAEX	*	27,930	175	33	81
*GIØOUM	21	8,213	119	14	35
		NORWAY			
LA/NØHJZ	**A**	**615,384**	**1504**	**56**	**240**
LN1B	*	63,000	272	48	132
LA1VKA	14	9,313	82	14	53
***LA3S**	**A**	**742,500**	**1214**	**77**	**319**
			(OP: LA3BO)		
*LA5LJA	*	397,072	789	69	263
*LB8AE	*	39,059	246	28	111
*LA6HJA	*	34,000	236	20	107
*LA2QJA	*	19,897	155	26	75
*LB9LE	*	14,994	131	27	71
*LA9TY	*	13,440	105	31	81
***LA5JX**	**28**	**24,509**	**160**	**20**	**74**
*LA2IJ	*	16,259	104	16	55
***LA1YE**	**14**	**32,725**	**371**	**15**	**62**
*LA8WG	7	5,323	126	7	42
		POLAND			
SP9LJD	**A**	**2,923,570**	**2757**	**112**	**411**
SN8F	**"**	**2,282,860**	**2868**	**111**	**416**
			(OP: SP8FHK)		
SP6LUV	*	1,055,488	1317	105	329
SP6IEQ	*	769,776	1058	83	323
SP5GMM	*	212,628	463	63	219
3Z2D	*	202,055	638	57	194
			(OP: SP2DNI)		
SN8R	*	121,987	343	52	147
			(OP: SP8ONZ)		
SP4HXV	*	41,470	136	52	91
SP4AVG	*	23,540	160	31	79
SPØKJU	*	9,322	109	22	57
			(OP: SP9MDY)		
SP8NR	**28**	**161,218**	**461**	**33**	**116**
SP5ENA	*	95,739	296	32	109
SP4TKR	**21**	**372,307**	**1133**	**37**	**132**
SP4DEU	*	265,200	921	34	116
SN7Q	**14**	**898,280**	**3122**	**37**	**133**
			(OP: SP7GIQ)		
SN8V	*	536,085	1927	38	133
			(OP: SP8GQU)		
SP4R	*	479,600	1925	40	136
			(OP: SP4NII)		
SP9CMP	*	245,531	1177	31	112
SP4JWD	*	230,378	1175	31	96
SN5N	*	154,365	860	28	95
			(OP: SP5KP)		
SP6AEG	*	250	9	5	5
SP6IXF	**7**	**289,507**	**1810**	**33**	**116**
SP5BNB	*	5,995	82	13	42
SP8BRQ

*SP7EXJ	*	100	12	6	10
***SP3LWP**	**28**	**130,379**	**464**	**123**	**31**
*SP5LCC	*	59,400	254	27	81
*SQ4HRN	*	57,132	337	22	86
*SQ6ILG	*	57,114	85	23	32
*SP9KJ	*	39,644	181	28	78
*SP9OJQ	*	16,531	117	18	43
*SP4DC	*	15,210	103	15	50
*SP4SAF	*	15,141	105	22	50
*SP6GZZ	*	11,715	81	22	49
*SP6RLK	*	11,658	83	18	40
*SQ5JUM	*	10,854	85	22	45
*SP6TGD	*	5,544	59	14	28
*SP9UML	*	5,400	41	17	33
*SP6BBE	*	3,132	57	14	22
*SP6FJ	*	2,912	39	13	15
*SQ5JUJ	*	2,788	28	16	25
*SP7VVB	*	378	9	7	7
***SP4PBI**	**21**	**229,653**	**637**	**37**	**134**
*SP9ODY	*	104,432	525	27	80
*SP4JCQ	*	69,113	450	23	80
*SP4ZO	*	52,900	301	23	69
*SP8EEX	*	27,452	203	21	67
*SP2HXY	*	24,790	199	20	54
*SP7FBQ	*	19,521	130	19	62
*SP4NKJ	*	14,271	152	18	53
*SP9BRP	*	11,664	95	14	40
*SP6DHH	*	5,727	107	12	33
*SP9ADV	*	18	2	1	2
***SP3PL**	**14**	**108,406**	**615**	**28**	**106**
***SP3GXH**	*****	**96,492**	**451**	**31**	**101**
*SP9OHP	*	68,655	438	28	87
*SQ9HZM	*	61,506	455	22	80
*SP9DNO	*	51,993	331	25	84
*SP4BPH	*	36,603	365	16	67
*SQ2EAN	*	34,354	347	19	70
*SP6DMI	*	24,648	252	18	60
*SP3INJ	*	10,020	183	10	50
*SP9BMH	*	9,450	170	7	43
*SP2MKI	*	9,394	113	15	46
*SN4AAZ	*	6,750	118	12	42
*SP9PTG	*	244	20	5	10
***SP3FYX**	**7**	**28,135**	**333**	**17**	**68**
*SP4SHD	*	13,731	156	12	57
*SP8GNF	*	5,724	93	11	42
*SQ7FPD	*	4,749	121	15	40
*SQ6ELV	*	3,280	73	7	33
*SP5TAM	*	2,170	67	6	29
*SP3CCT	*	418	25	2	17
*SQ3BKL	*	10	6	2	6
***SQ3GNA**	**3.7**	**4,620**	**207**	**7**	**37**
*SN4L	*	4,280	135	6	34
			(OP: SQ4MP)		
*SP5VYI	*	2,970	102	6	27
*SP8OOB	*	1,741	77	6	27
***SP4XQN**	**1.8**	**18,354**	**352**	**7**	**50**
*SQ6A	*	16,500	329	7	48
			(OP: SP6IHE)		
*SP7JOA	*	15,730	294	7	48
*SP9RPW	*	6,072	168	5	41
*SP4LVK	*	1,632	62	5	27
*SP9NH	*	1,612	54	6	25
*SP7FPU	*	1,302	62	5	26
*SP4GHL	*	465	36	5	26
*SP1RW	*	195	17	3	10
		PORTUGAL			
CQ2T	**A**	**329,672**	**958**	**49**	**154**
CT1EGH	*	172,422	347	53	153
CT1AHU	**28**	**339,930**	**1328**	**29**	**106**
CT8T	**14**	**922,922**	**3386**	**37**	**145**
			(OP: CT1DVV)		
***CQ0T**	**A**	**5,291,104**	**4070**	**127**	**517**
			(OP: CT1ILT)		
*CT1DHM	*	641,979	1093	74	329
*CT1EGW	*	320,166	516	70	224
*CT1BOL	*	266,510	582	66	224
*CT1FJO	*	245,328	469	65	204
*CT1FAC	*	103,716	295	45	127
*CT2GWZ	*	80,682	333	32	87
*CT1DJE	*	78,612	230	55	146
*CT2FQA	*	984	92	23	59
***CT1EAT**	**28**	**288,234**	**1171**	**30**	**104**
*CT2GZT	*	103,255	555	24	83
*CT2HMN	*	86,328	479	20	79
*CT1CLR	*	14,084	133	13	37
		ROMANIA			
YO5OEF	**A**	**501,787**	**934**	**88**	**289**
YO5OHZ	*	276,906	896	53	213
YO8MI	*	105,435	439	60	150
YO9WF	*	41,664	301	27	85
YO3CVG	*	4,080	58	17	34
YR2I	**3.7**	**105,562**	**1137**	**17**	**77**
YO2RR	**1.8**	**11,907**	**234**	**6**	**43**
***YO3CZW**	**A**	**365,440**	**815**	**79**	**241**
*YO6BHN	*	234,555	414	69	216
*YO3RU	*	184,888	581	53	189
*YO7LFV	*	141,120	681	44	166
*YO7LBX	*	129,468	527	47	168
*YO7ARY	*	104,533	434	42	145
*YO9FYP	*	99,450	405	46	149
*YO3FLQ	*	34,906	189	32	94
*YO7CWP	*	21,600	169	25	65
*YO8GF	*	21,022	174	35	90
*YO7BGB	*	7,488	125	14	58
*YO3III	*	2,964	49	16	36
*YO5AY	*	1,650	20	15	18
***YO2IS**	**28**	**67,044**	**298**	**27**	**84**
*YO4ATW	*	33,072	190	19	59
*YO3HOT	*	3,486	44	12	30
*YO5CRQ	*	2,997	46	10	17
***YO3JW**	**21**	**91,104**	**642**	**27**	**77**
*YO4GDP	*	22,572	270	16	50
*YO4AYE	14	2,430	67	8	28
		SARDINIA			
***IS0HQJ**	**A**	**266,728**	**500**	**77**	**231**
*IS0VSG	*	193,792	406	64	192
*IS0LLJ	*	101,188	366	40	124
		SCOTLAND			
GM7V	**A**	**4,948,370**	**4049**	**133**	**501**
			(OP: GM4YXI)		
GM0F	*	2,442,032	2582	114	440
			(OP: GM4AFF)		
GM2Z	*	444,444	715	79	285
MM0ERK	**21**	**107,223**	**612**	**20**	**83**
***GM0TGE**	**A**	**860,688**	**1331**	**84**	**333**
*GM0FET	*	582,988	1072	68	261
*MM0BRG	*	381,234	753	61	252
*MM0DHQ	*	180,348	596	51	177
*MM/YL2SW	*	149,400	608	48	118
*GM3BCL	*	122,791	424	49	130
*MM0LEO	*	52,136	227	39	113
*MM3EDZ	*	9,632	125	18	68
***GM7TUD**	**28**	**103,424**	**501**	**24**	**104**
***GM3YOG**	**14**	**24,539**	**232**	**20**	**63**
***MM2R**	**3.7**	**8,241**	**130**	**11**	**48**
		SICILY			
IT9RBW	**28**	**252,840**	**1042**	**33**	**114**
IT9SSI	*	227,920	1060	27	83
***IT9YAO**	**A**	**172,156**	**650**	**52**	**171**
*IT9AJP	*	164,590	523	49	169
*IT9ESW	*	121,260	329	63	152
*IT9ORA	*	47,433	268	32	131
*IT9VCE	*	36,448	158	39	95
***IT9JOF**	**28**	**136,764**	**649**	**20**	**67**
*IT9YSW	*	7,651	66	20	38
***IT9RYJ**	**21**	**189,557**	**998**	**32**	**99**
***IT9STX**	**14**	**375,600**	**1476**	**33**	**117**
*IT9ICS	*	92,721	957	22	71
*IT9RJE	*	54,802	410	22	84
		SLOVAK REPUBLIC			
OM3IAG	**A**	**337,700**	**710**	**77**	**230**
OM8AA	*	211,344	516	62	210
OM5M	**21**	**417,438**	**1467**	**27**	**99**
			(OP: OM4DW)		
OM3NA	**14**	**628,974**	**2202**	**36**	**130**
OM7PY	**7**	**10,017**	**183**	**11**	**42**
***OM4DN**	**A**	**487,884**	**975**	**66**	**261**
***OM6RM**	*****	**458,874**	**1035**	**66**	**267**
*OM7RU	*	298,915	775	68	245
*OM8DD	*	227,960	558	63	215
*OM6TX	*	223,395	661	54	211
*OM3YK	*	143,052	428	53	176
*OM7AG	*	79,740	354	43	137
*OM4TC	*	32,769	245	25	74
*OM4AMA	*	23,760	199	29	103
*OM7AT	*	7,734	192	29	80
***OM7YC**	**21**	**36,960**	**224**	**21**	**67**
*OM2AW	14	10,383	175	11	49
*OM3TB	*	3,655	58	12	18
***OM7AB**	**3.7**	**41,535**	**675**	**8**	**57**
		SLOVENIA			
S57DX	**A**	**4,344,600**	**3570**	**143**	**507**
S58D	**28**	**1,040,230**	**2565**	**36**	**134**
S57O	**21**	**855,680**	**2410**	**38**	**122**
S51FB	*	761,442	2075	38	128
S50R	*	656,075	1851	37	126
S53M	**14**	**600,796**	**2129**	**37**	**135**
			(OP: S51ZO)		
S57AL	*	598,429	2132	37	132
S57L	*	281,011	1318	34	117
S51OI	**7**	**98,982**	**1065**	**21**	**73**
S57J	**3.7**	**23,529**	**331**	**13**	**56**
S57M	**1.8**	**88,825**	**1031**	**12**	**73**
***S57MTA**	**A**	**653,730**	**1331**	**60**	**171**
*S54X	*	412,269	771	74	267
*S58RU	*	320,166	703	65	232
*S51DI	*	76,380	199	58	143
*S57MHA	*	48,840	214	31	79
*S51NM	*	24,970	120	42	68
*S51DX	*	11,832	148	13	55
***S51NZ**	**28**	**25,740**	**167**	**16**	**50**
*S52FO	*	10,535	105	13	36
***S55W**	**21**	**162,138**	**760**	**27**	**95**
			(OP: S57ONW)		
***S53F**	**3.7**	**63,360**	**860**	**9**	**63**
*S58J	*	58,064	703	12	64
*S51W	*	28,420	422	12	58
*S52G	*	19,272	320	9	57
		SPAIN			
EA4KD	**A**	**3,850,674**	**3462**	**116**	**418**
EA7RU	*****	**2,132,040**	**2106**	**102**	**387**
EA1AKS	*	1,018,189	1749	82	231
EA3CCN	*	628,340	1186	78	278
EA3DUM	*	606,500	1312	65	185
EA3EGB	*	386,868	716	76	285
EA7NK	*	374,031	1091	53	136
EA3BT	*	335,498	594	64	207
EA1JO	*	335,298	722	57	225
EA5OL	*	251,671	799	53	176
EA1HV	*	114,330	298	51	134
EA1ASC	*	34,716	186	32	100
EA5RM	*	4,505	71	22	31
EA5ON	**28**	**335,100**	**1173**	**33**	**117**
EA2KB	**14**	**130,872**	**985**	**27**	**87**
EA1COE	*	76,527	541	20	79
EA5BY	**3.7**	**9,794**	**148**	**9**	**50**
EA5JK	**1.8**	**17,940**	**257**	**12**	**57**
***EA4PL**	**A**	**1,328,635**	**1841**	**82**	**303**
***EA1WS**	*****	**1,097,954**	**1848**	**72**	**277**
***EA7FTR**	*****	**1,089,236**	**1671**	**72**	**235**
*EA3FCQ	*	974,292	1690	79	287
*EA3KN	*	535,002	761	77	284
*EA2AAZ	*	480,750	985	55	195
*EA5ASF	*	402,627	800	66	243
*EA1OT	*	363,069	967	51	138
*EA3AKA	*	358,852	896	53	215
*EA3EYD	*	342,210	637	70	235
*EA7EWX	*	314,496	698	62	226
*EA1CCM	*	291,682	660	53	161
*EA4DXP	*	287,832	603	58	210
*EA3AGB	*	276,208	582	64	219
*EA1AUT	*	263,048	686	58	193
*EA2BNU	*	234,360	512	56	192
*EA3EZD	*	212,812	699	45	121
*EA1APV	*	145,379	415	48	163
*EA4EJP	*	139,502	429	53	134
*EA3NA	*	139,260	383	54	157
*EA4DAU	*	136,644	379	50	143
*EA7FIQ	*	110,828	302	60	146
*EA3TA	*	106,379	397	38	129
*EA4BZF	*	93,465	313	50	151
*EA7ATF	*	93,307	362	43	144
*EA4WC	*	89,440	295	51	157
*EC3CJN	*	88,330	565	32	89
*EC7ABV	*	83,138	702	30	114
*EA2AVM	*	75,768	280	40	114
*EA7GXW	*	71,736	383	34	113
*EA1AE	*	50,949	233	34	77
*EA5AAJ	*	44,824	232	25	79
*EA1CQJ	*	35,840	200	34	78
*EA7GV	*	33,417	264	26	53
*EA7HE	*	27,416	221	39	110
*EA1VM	*	23,430	128	33	77
*EA7EUF	*	21,900	118	32	68
*EA1DPK	*	21,833	186	34	51
*EA7TG	*	20,657	152	29	62
*EA4DQX	*	20,196	159	22	80
*EA4CU	*	20,181	130	26	67
*EA2AZ	*	17,290	100	33	62
*EA3FHP	*	16,231	151	21	63
*EA1FBJ	*	12,236	122	19	57
*EA4EMC	*	11,970	62	36	54
*EC2AH	*	11,627	99	19	58
*EA7GXX	*	10,972	93	18	34
*EA3ATO	*	10,285	174	30	91
*EA4AWM	*	7,995	56	25	40
*EA1FAE	*	5,040	42	21	39
*EA1KI	*	4,592	67	19	37
*EA7FDP	*	4,154	61	14	39
*EA7FUH	*	2,968	32	25	31
*EA4UB	*	2,419	28	17	24
*EA1DGG	*	2,385	26	20	25
*EA5FWW	*	2,142	23	13	21
*EA4WH	*	1,716	36	17	27
*EA3EAN	*	1,092	128	27	64
*EA7CA	*	84	8	6	8
*EA3BAK	*	70	7	3	7
***EA5AER**	**28**	**379,488**	**1409**	**30**	**104**
***EA2CAR**	*****	**247,929**	**949**	**29**	**92**
*EA4TV	*	209,088	776	28	104
*EA3ALV	*	83,025	317	29	94
*ED2RCA	*	59,976	296	20	82
			(OP: EA2ARW)		
*EA4DIK	*	33,448	149	23	90
*EA1ZH	*	22,104	119	20	52
*EA5AOM	*	17,556	96	21	55
*EA5WX	*	16,284	118	18	51
*EA5DIT	*	12,795	90	19	53
*EA5CHT	*	9,744	89	14	42
*EA5TD	*	1,584	22	14	22
***EA5DF**	**21**	**313,608**	**1401**	**33**	**113**
*EA7RM	*	123,480	642	22	83
*EA7IA	*	109,250	605	25	90
*EA7HF	*	91,015	501	23	86
*EA1YB	*	89,880	457	23	82
*EA1BIM	*	89,816	501	22	87
*EA2BLK	*	71,604	381	22	80
*EA7HBP	*	56,952	636	15	57
*EA7FRX	*	50,960	270	20	78
*EA7KJ	*	49,764	402	16	71
*EA1EB	*	34,611	219	19	64
*EA5GFK	*	20,988	198	15	51
*EA7ANM	*	20,570	302	12	43
*EA7EYQ	*	17,706	140	17	61
*EC3DEN	*	8,976	113	17	49
*EC5CIA	*	8,928	106	18	47
*EC3CMT	*	6,579	95	12	39
***EA3GHZ**	**14**	**265,650**	**1284**	**35**	**119**
*ED1EA	*	92,400	683	22	88
*EA1UY	*	41,325	293	22	73
*EA5XC	*	23,098	248	15	67
*EA1GAR	*	22,500	246	16	59
*EA1FCR	*	17,680	160	15	53
*EA5AVA	*	5,432	95	8	48
*EA3CJZ	*	72	9	3	6
***EA5EOR**	**7**	**18,758**	**174**	**15**	**68**
*EA2BIB	*	1,600	45	7	25
*EA3KT	*	850	79	9	41
		SWEDEN			
SM5CEU	**A**	**1,041,500**	**1356**	**109**	**391**
SM3W	*****	**682,822**	**1702**	**70**	**253**
			(OP: SM3WMV)		
SJ5AA	*	623,907	1276	75	308
			(OP: SM5SIC)		
SM6E	*	445,836	981	72	246
			(OP: SM6FUD)		
SM7CQY	*	354,851	639	73	238
SM5Q	*	340,407	683	71	226
			(OP: SM5ADE)		
SM3BIZ	*	240,994	581	66	233
SM7BJW	*	197,072	446	56	162
SM6FJY	*	129,635	390	58	201
SM6IQD	*	110,556	319	53	169
SM3LIV	*	78,084	348	36	126
SM7DXQ	*	10,197	87	30	73
SM3FJF	*	2,379	35	14	25
SM3X	*	54	3	3	3
			(OP: SM3CVM)		
SM0KV	**21**	**42,389**	**240**	**28**	**87**
7S5C	**14**	**24,779**	**252**	**15**	**56**
			(OP: SM5CBM)		
7S3A	*	4,240	42	12	28
			(OP: SM3CER)		
SM6CDG	*	896	36	6	22
7S2E	**7**	**239,610**	**1028**	**33**	**114**
			(OP: SM2DMU)		
***SM6D**	**A**	**379,422**	**845**	**70**	**251**
			(OP: SM6DER)		
*SM6C	*	269,568	553	62	250
			(OP: SM6CTQ)		
*SM6NET	*	227,758	612	61	202
*7S7V	*	159,264	373	61	191
			(OP: SM6PVB)		
*SM0FM	*	77,224	233	49	147
*SM6N	*	70,152	333	35	113
			(OP: SM6NJK)		
*SM3EAE	*	54,684	315	32	115
*SK4UW	*	44,718	411	20	67
*SM5DYC	*	39,826	261	31	103
*SM6XKB	*	39,039	228	34	109
*SM7CWI	*	31,354	131	36	86
*SM4W	*	25,894	154	29	92
			(OP: SM4WGB)		
*SM5ARL	*	22,176	99	35	64
*8S0W	*	18,765	89	35	78
			(OP: SM0NJO)		
*SM6MVL	*	13,311	92	28	59
*7S7B	*	6,240	62	24	54
			(OP: SM7DHB)		
*SM5QU	*	2,451	60	11	32
*SM0Y	28	6,250	68	14	36
*SM5ARR	*	24	2	2	2
*SL5ZXR	*	6	2	1	2
			(OP: SM5ARR)		
***SM4F**	**21**	**101,140**	**420**	**27**	**103**
			(OP: SM4DHF)		
*SM7AIL	*	1,527	165	12	48
***SM7HSP**	**14**	**621**	**24**	**16**	**50**
***SM6DOI**	**7**	**40,514**	**398**	**20**	**74**
		SWITZERLAND			
HB9AUS	**A**	**1,658,160**	**1911**	**90**	**330**
HB9IQB	*	59,670	330	28	125
***HB9AAP**	**A**	**441,696**	**731**	**68**	**253**
*HB9BTI	*	318,136	700	52	214
*HB9AYZ	*	21,672	130	26	58
***HB9TNM**	**21**	**45,408**	**276**	**20**	**68**
*HB9NN	*	14,580	137	15	45
		UKRAINE			
UV7D	**A**	**2,455,200**	**2747**	**118**	**432**
			(OP: UT7DX)		
UR5ZMK	*	272,157	702	55	194
US0LW	*	253,114	692	55	216
EN1U	*	204,622	510	65	197
			(OP: UX1UA)		
UR5AKU	*	177,555	457	58	209
UX0KN	*	88,355	237	55	150
UX5UO	*	80,325	334	45	130
UR7EM	*	51,744	242	38	116
UT8EL	*	49,800	304	29	137
UT7MD	*	29,161	144	28	93
UX7LQ	**21**	**193,223**	**978**	**33**	**118**
UY5ZZ	**14**	**335,244**	**1546**	**35**	**121**
UR0UL	*	114,814	678	28	90
US8IM	*	113,460	670	30	92
UT2QT	*	51,200	399	17	63
UT4UWC	*	23,182	227	14	53
			(OP: UY2UF)		
UW5U	**7**	**66,872**	**572**	**20**	**84**
			(OP: UY2UA)		
UZ7U	**3.7**	**98,230**	**947**	**18**	**76**
			(OP: UT3UA)		
UT5IZ	*	34,254	552	10	56
UX1VT	*	17,880	288	9	51
UT8IM	*	14,326	227	8	50
EO6F	**1.8**	**35,720**	**586**	**12**	**64**
			(OP: UX0FF)		
***US0KW**	**A**	**489,552**	**824**	**85**	**287**
*UT2PX	*	411,313	1167	63	260
*UR7M	*	334,984	747	86	269
*UR5GFO	*	306,240	671	67	252
*US1MM	*	199,548	492	67	209
*UX4UA	*	175,960	386	66	199
*UT5ECZ	*	163,552	511	53	216
*UV1G	*	158,767	673	51	208
			(OP: UT7GX)		
*UU7JX	*	147,663	1546	79	389
*UR6QS	*	144,333	488	46	191
*UY7C	*	136,104	392	51	161
			(OP: UR3CMA)		
*EM0U	*	128,544	479	46	160
*UT2FA	*	108,490	423	43	147
*UY0IX	*	104,832	360	51	173
*UY5TE	*	103,020	406	39	165
*UT1UA	*	90,342	201	60	129
*UT5UKY	*	86,301	290	46	177
*UX5EF	*	82,244	335	45	162
*US7IB	*	80,340	268	48	147
*UT2IW	*	75,400	186	56	144
*UX8ZA	*	74,272	327	50	161
*US3IZ	*	61,289	264	34	133
*UR5GQB	*	49,126	325	48	155
*UT4MW	*	38,227	224	30	97
*UR5ZIB	*	33,264	203	26	100
*US5IND	*	21,794	189	30	107
*UU2JA	*	18,190	115	30	77
*US0YA	*	14,787	68	38	55
*UT5ERV	*	11,070	158	20	70
*UR2ML	*	8,514	162	18	81
*UZ2H	*	81	5	4	5
			(OP: UT5HA)		
*US5WMS	28	6,344	51	17	35
*UR5KDX	*	4,811	58	11	29
*UU5JTN	*	4,635	71	13	32
***US7IGF**	**21**	**266,124**	**1175**	**32**	**102**
*UR7IKV	*	73,656	671	23	76
*UR6MX	*	55,488	320	24	72
*US6IMA	*	47,250	433	22	68
*US9QA	*	45,525	465	20	55
*UR5RNO	*	6,962	173	11	48
***UT4MF**	**14**	**77,613**	**368**	**31**	**92**
*UT1KWA	*	13,079	153	8	45
*UY0IR	*	6,164	133	7	39
*UR8QY	*	5,150	101	9	41
***UX2MF**	**3.7**	**44,082**	**482**	**14**	**65**
*UT5UML	*	13,200	204	10	55
*UY2ZA	*	9,185	138	10	45
*UT2UB	*	1,440	49	6	26
***UT3SA**	**1.8**	**31,000**	**545**	**8**	**54**
*UR4MBI	*	5,676	149	6	38
		WALES			
GW4BLE	**A**	**5,356,955**	**4085**	**123**	**466**
MW5EPA	*	578,880	1052	70	250
MW/VE6WQ	**14**	**394,701**	**1983**	**32**	**117**
*GW0TKX	A	17,750	124	24	47
***MW5HOC**	**7**	**21,125**	**280**	**11**	**54**
		YUGOSLAVIA			
4O8AA	**A**	**455,211**	**1058**	**76**	**257**
YT7Z	**21**	**352,921**	**1454**	**32**	**107**
			(OP: YU7EE)		
YT9X	**14**	**779,976**	**2769**	**39**	**145**
			(OP: YU1ZZ)		
Y29A	*	618,603	2232	38	141
YT7A	**7**	**487,736**	**1846**	**35**	**129**
YT1AD	**3.7**	**230,845**	**1443**	**32**	**105**
4N1A	*	157,183	1368	22	85
			(OP: YU1YV)		
YU7AV	*	143,900	1322	20	80
***YU1EQ**	**A**	**276,372**	**530**	**72**	**252**
*YT1AT	*	153,450	515	48	150
*YU1PJ	*	23,587	159	28	75
***YZ1AU**	**21**	**637,956**	**1960**	**38**	**141**
*YU1EA	*	392,751	1478	35	118
*YU1IG	*	116,439	722	23	88
*YU7KM	*	30,022	229	18	60
***4N1N**	**14**	**373,490**	**1818**	**36**	**134**
***YT1LT**	**7**	**57,267**	**462**	**18**	**83**
***YZ1SG**	**3.7**	**61,884**	**704**	**12**	**69**
*YU7YZ	*	38,220	540	9	61
*YU1CC	*	23,460	329	10	59
*YU1AST	*	6,419	147	8	41
			(OP: 4N1ND)		
***YT1R**	**1.8**	**33,600**	**542**	**8**	**56**
			(OP: YT1UA)		
*YZ1GD	*	8,000	173	6	44
		OCEANIA			
		AUSTRALIA			
VK2IA	**A**	**754,614**	**901**	**94**	**224**
VK7GN	*	142,854	305	60	114
VK3IO	*	77,400	205	58	92
VK6HZ	*	69,300	225	50	100
VK4WPX	**28**	**107,909**	**645**	**22**	**39**
VK4AN	**21**	**211,888**	**613**	**34**	**102**
VK5LW	**7**	**186,878**	**711**	**29**	**77**
***VK4EJ**	**A**	**376,320**	**706**	**74**	**122**
*VK3DBQ	*	18,012	103	32	44
*VK8AV	*	14,162	69	41	56
*VK6DXI	*	3,698	39	21	22
*VK5EMI	*	1,326	20	13	13
*VK5UE	*	850	23	9	8
*VK1KMB	*	442	11	8	9
***VK4FJ**	**21**	**7,920**	**66**	**20**	**25**
*VK6KK	14	5,184	55	17	19
*VK2AAC	*	4,879	43	15	26
		EAST MALAYSIA			
9M6A	**A**	**730,597**	**1289**	**75**	**127**
			(OP: WX8C)		
9M8YY	**28**	**292,485**	**914**	**33**	**78**
			(OP: JR3WXA)		
9M6OO	*	18,432	272	12	12
			(OP: N2OO)		
		EAST TIMOR			
4W2A	**A**	**1,428,170**	**1693**	**94**	**216**
			(OP: JR2KDN)		
***4W4W**	**21**	**120,350**	**749**	**21**	**37**
			(OP: JI1NJC)		
		GUAM			
KG6DX	**28**	**788,112**	**1973**	**38**	**106**
		HAWAII			
KH7X	**A**	**8,488,048**	**6163**	**165**	**331**
			(OP: KH6ND)		
KH6/WA2HFI	*	262,946	645	58	88
AH6JR	*	168,624	878	29	43
***KH6GMP**	**A**	**813,276**	**1667**	**67**	**104**
*KH6/W4MDL	*	70,984	235	62	90
*NH6WZ	*	58,298	223	45	58
*AH6RI	*	1,457	31	15	16
***KH6QJ**	**28**	**12,213**	**132**	**17**	**26**
		INDONESIA			
YB2DGR	**28**	**128,464**	**395**	**31**	**93**
YB0ZZ	**21**	**330,756**	**981**	**29**	**100**
			(O

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*LU3HE/0	*	3,724	55	16	22
***LU2BA**	**7**	**10,956**	**85**	**21**	**45**
ARUBA					
P4BA	**14**	**1,882,925**	**4177**	**37**	**130**
					(OP: KK9A)
***P40B**	**A**	**4,841,265**	**4326**	**103**	**304**
					(OP: P43P)
BOLIVIA					
CP6XE	**14**	**112,623**	**528**	**25**	**68**
***CP1FF**	**A**	**72,494**	**260**	**45**	**89**
BRAZIL					
PS8DX	**A**	**525,279**	**758**	**83**	**228**
PV2M	**"**	**486,072**	**778**	**68**	**190**
					(OP: PT2ADM)
PY4ZN	*	473,335	1600	30	107
PY3PA	*	336,896	580	65	159
PY4RGS	*	259,204	597	52	120
PY2GA	*	245,630	605	54	100
PP7ZZ	*	178,464	391	49	127
PT2TF	*	142,069	391	38	99
PT7CB	*	79,350	223	38	112
PY5JO	*	30,039	235	21	30
PT2JC	*	7,215	52	22	43
ZY5G	**28**	**1,749,325**	**3894**	**35**	**132**
					(OP: PP5WG)
PX2W	**"**	**1,629,950**	**3275**	**35**	**140**
					(OP: PY2YU)
ZW5B	**"**	**1,597,968**	**3559**	**36**	**126**
					(OP: N5ZO)
PY1AK	*	685,377	2169	28	101
PY5NW	*	95,836	475	23	74
PY3MSS	*	3,036	39	12	21
PY1BEK	*	96	11	5	3
PX5E	**21**	**2,207,000**	**3965**	**39**	**161**
					(OP: PP5JR)
PT5A	**14**	**938,918**	**2409**	**35**	**116**
					(OP: PY2EMC)
PY5EJ	**7**	**22,854**	**198**	**21**	**57**
PY2YP	3.7	1,950	30	10	15
PP5VB	1.8	10	9	5	8
***PR2F**	**A**	**3,464,188**	**2816**	**114**	**320**
					(OP: PY2NDX)
*ZY5JP	*	597,240	1109	60	156
					(OP: PY5ZHP)
*PY7EG	*	502,434	959	57	149
*PR7FMT	*	422,636	1258	42	92
*PY2DJ	*	248,976	702	49	107
*PY2NA	*	187,625	528	44	81
*PY7IQ	*	177,156	568	38	73
*PT2TD	*	154,585	314	61	154
*PY8AZT	*	140,616	374	57	129
*PP5ZP	*	118,574	457	41	60
*PT2BW	*	96,579	293	41	106
*PR7AYE	*	60,592	232	28	84
*PY3AJB	*	26,834	78	26	39
*PY1JR	*	9,073	57	35	39
*PY2BRZ	*	8,040	109	22	45
*PY3BA	*	6,477	77	23	28
*PY5TJ	*	6,375	127	17	34
*ZV8I	*	2,294	69	23	39
*PY1EJ	*	2,058	47	17	22
*PY7GK	*	1,020	19	13	17
*PY3TIO	*	448	27	13	15
***PY2SBY**	**28**	**565,586**	**1549**	**31**	**111**
*PU2RFA	*	156,017	740	23	66
*PY4PW	*	73,289	360	22	61
*PY1NB	*	41,070	228	22	52
*PY5DL	*	39,615	356	13	44
*PY2RDS	*	32,558	199	23	50
*PU2TES	*	29,889	163	22	59
*PU5HAS	*	25,984	221	20	36
*PY7VI	*	23,296	216	18	46
*PY2SRB	*	8,008	72	21	35
*PP5FMM	*	6,627	70	18	29
*PY3ML	*	4,725	76	15	20
*PU1LGW	*	3,570	68	15	27
*PY3ASU	*	2,117	40	11	18
*PY2KGB	*	2,074	46	9	8
***PY4OY**	**21**	**321,678**	**979**	**30**	**96**
*PR7AR	*	82,089	522	17	46
*PY3FBI	*	63,595	324	23	56
*PY2ZR	*	35,154	228	19	43
***PY2NY**	**14**	**389,136**	**1055**	**34**	**100**
*PR7QI	*	52,560	287	20	53
*PT2OP	*	5,670	54	18	27
***PY8MD**	**3.7**	**14,248**	**103**	**13**	**39**
*PY3CEJ	1.8	10	10	5	6
CHILE					
CE8EIO	**A**	**319,410**	**969**	**56**	**70**
CE3BFZ	**28**	**1,015,350**	**2397**	**32**	**118**
XQ1SCQ	*	115,754	733	22	40
CE4B	**21**	**65,688**	**401**	**23**	**46**
					(OP: CE4ETZ)
CE3RLT	7	1,769	43	13	16
***CE1VLY**	**A**	**282,744**	**566**	**72**	**126**
*CE6VMO	*	28,350	352	21	42
***XQ4EM**	**28**	**53,131**	**288**	**20**	**47**
*CE6TBN	*	8,316	89	16	26
*CA6VMR	*	2,525	52	11	14
COLOMBIA					
***HK3AXY**	**A**	**264,953**	**467**	**55**	**174**
EASTER ISLAND					
***CEØY/SQ9BOP**	**A**	**43,727**	**235**	**26**	**47**
***CEØY/SP9PT**	**28**	**87,384**	**567**	**20**	**46**
*CEØY/SP9EVP	14	5,002	54	14	27
ECUADOR					
***HC2GT**	**A**	**435,348**	**1421**	**63**	**111**
***HC1JQ**	**28**	**903,886**	**2116**	**30**	**121**
***HC1/NP3D**	**7**	**308,712**	**965**	**25**	**89**
FERNANDO DE NORONHA					
PTØF	**A**	**14,426,804**	**7812**	**150**	**502**
GALAPAGOS ISLANDS					
HC8N	**A**	**16,394,049**	**8364**	**151**	**532**
					(OP: NN1N)
PERU					
***OA4BQE**	**A**	**379,358**	**966**	**51**	**107**
TRINIDAD & TOBAGO					
9Y4NZ	**28**	**1,392,026**	**3543**	**30**	**112**
URUGUAY					
CX5BW	**21**	**1,182,978**	**2848**	**37**	**134**
CX8CP	*	254,288	1074	27	65
CX7BY	**14**	**547,459**	**1249**	**36**	**121**
***CX9AU**	**A**	**1,098,294**	**1308**	**95**	**230**
***CX1TA**	**28**	**850,766**	**2378**	**29**	**105**
					(OP: CX2TL)
*CX7CAJ	*	352,602	1206	29	85
*CX4DX	*	264,474	765	30	96
***CX2AM**	**21**	**385,140**	**1188**	**30**	**101**
***CX3AT**	**14**	**48,503**	**212**	**26**	**65**
VENEZUELA					
YV6BTF	**A**	**1,879,605**	**2082**	**93**	**258**
YV5LIX	*	158,202	655	28	71
YV4DDK	7	30,537	166	21	66
YV5NWG	3.7	1	2	2	2
***YY5JRU**	**A**	**197,280**	**546**	**42**	**95**
*YY5PER	*	22,176	127	33	63
***YY5JMM**	**28**	**243,726**	**922**	**26**	**72**
*YY5BDP	*	19,800	265	19	41
*YY5OHZ	*	12,936	145	19	47
***YY5YMA**	**21**	**172,912**	**1102**	**25**	**76**
*YV5IAL	*	8,880	104	12	28
*YV7QP	14	16,900	106	16	49
***YY5OIG**	**7**	**65,961**	**452**	**16**	**47**
QRP					
5B4AGM	**A**	**1,423,175**	**1633**	**80**	**297**
F5BEG	**"**	**924,426**	**1066**	**93**	**366**
N8IE	**"**	**484,300**	**643**	**64**	**226**
N4KG	**"**	**470,808**	**600**	**81**	**231**
K8ZT	**"**	**449,202**	**531**	**85**	**253**
UA3BL	**"**	**448,448**	**909**	**73**	**279**
DF1DX	**"**	**400,780**	**727**	**61**	**229**
OK2PP	**"**	**350,470**	**845**	**65**	**282**
WAØV8W	**"**	**342,016**	**510**	**62**	**194**
LU1VK	**"**	**317,184**	**569**	**73**	**163**
IK5RUN	**"**	**316,683**	**450**	**88**	**245**
S59O	**"**	**307,430**	**668**	**72**	**283**
SM3C	**"**	**264,327**	**623**	**61**	**226**
					(OP: SM5CCT)
EA3FF	**"**	**208,339**	**447**	**63**	**191**
UAØSE	**"**	**204,765**	**637**	**57**	**130**
CT1DYV	**"**	**194,821**	**496**	**48**	**151**
UA9SG	**"**	**185,656**	**399**	**43**	**141**
I1ZHH	*	175,925	423	55	172
DL3ABL	*	162,797	434	59	204
N1TM	**"**	**156,585**	**295**	**59**	**160**
KIØOV	*	145,400	291	60	140
UN4L	**"**	**143,160**	**472**	**27**	**93**
HA1WD	**"**	**107,040**	**282**	**62**	**161**
WA3NKO	**"**	**106,212**	**249**	**43**	**116**
GØDCK	**"**	**102,371**	**376**	**41**	**126**
M3RCV	**"**	**93,969**	**443**	**38**	**159**
KR1ST/4	*	78,624	216	47	109
JH7RTQ	**"**	**77,142**	**227**	**51**	**87**
T94DO	**"**	**75,348**	**295**	**41**	**115**
RZ3QY	*	74,214	332	37	149
SP3BLT	**"**	**71,440**	**196**	**60**	**128**
SP9RQH	*	66,774	297	50	136
SM6CRM	**"**	**52,960**	**211**	**39**	**121**
K1DX	*	47,972	173	36	98
UT4UWT	*	44,968	264	33	121
					(OP: UY2UF)
W7RAB	**"**	**39,676**	**152**	**40**	**69**
					(OP: KH7YD)
PA9TT	**"**	**38,199**	**222**	**31**	**88**
GM4HOF	**"**	**38,110**	**221**	**25**	**78**
W86BWZ/4	*	27,324	125	37	71
GM4ELV	*	24,200	227	20	85
ES8DH	**"**	**22,656**	**138**	**34**	**94**
DF1RK	*	15,775	142	19	58
K9FOH	**"**	**14,005**	**82**	**36**	**58**
KH6/KØCD	**"**	**11,854**	**73**	**32**	**35**
NA4BW	*	11,832	89	24	44
MU3GSY	**"**	**10,650**	**156**	**13**	**62**
UA4WLI	*	10,152	127	15	57
DJ1AD	*	9,900	93	31	59
9A1CEI	**"**	**9,882**	**101**	**16**	**45**
					(OP: 9A5AEI)
PAØFAW	*	8,216	101	20	59
DG1KTS	*	8,136	79	21	51
RV9COI	*	7,399	60	14	35
KC4ATU	*	7,371	52	25	38
KE6CC	**"**	**5,610**	**58**	**25**	**41**
EA3ACZ	*	4,941	65	16	45
N8XA	*	3,297	94	20	69
SM6AHU	*	3,143	68	14	31
OK1SI	*	2,784	56	16	32
K3MZ/4	*	2,046	26	12	21
UR4MO	*	1,792	20	14	18
AC7AF	*	1,527	32	20	21
AB8ND	*	1,260	21	17	18
EA7HCB	*	1,148	32	7	21
IK2AIT	*	796	21	12	15
UA3TT	*	532	10	9	10
UAØSBQ	*	396	24	9	9
DL6UAM	*	168	12	3	11
M3MLR	*	100	75	12	39
OH6GFI	*	84	8	5	7
RK3TYA	*	54	3	3	3
RZ3TWW	*	24	2	2	2
K6MI	*	24	3	3	3
LU6HPF	**28**	**103,425**	**579**	**20**	**55**
LW7DQW	**"**	**83,345**	**427**	**21**	**58**
HA7UG	**"**	**55,752**	**240**	**25**	**66**
JA1BPA	**"**	**46,170**	**226**	**28**	**53**
OL1B	**"**	**45,580**	**253**	**19**	**57**
					(OP: OK1GPC)
JR3RWB	**"**	**44,704**	**205**	**30**	**58**
DH8BQA	**"**	**42,504**	**228**	**20**	**64**
SP1GZF	**"**	**39,986**	**175**	**28**	**86**
JA7EMH	**"**	**25,256**	**126**	**31**	**57**
SP9W	*	20,636	139	21	56
EA3CKX	**"**	**14,508**	**119**	**18**	**44**
XE1NW	**"**	**12,831**	**119**	**16**	**31**
WBØIWG/3	**"**	**12,798**	**97**	**16**	**38**
UX8MM	**"**	**11,200**	**108**	**22**	**48**
KIØG	**"**	**9,396**	**90**	**17**	**37**
JA2MWV	**"**	**9,159**	**85**	**17**	**26**
EA4DRV	**"**	**7,320**	**82**	**16**	**24**
WB7OCV	**"**	**7,166**	**63**	**13**	**41**
OK2ACM	**"**	**6,923**	**75**	**16**	**27**
PY3YD	**"**	**5,904**	**78**	**16**	**20**
EW6CU	**"**	**4,048**	**79**	**12**	**34**
UR5NJW/A	*	3,645	76	13	32
OY1A	**"**	**475**	**28**	**6**	**12**
JQ1AWC	*	372	15	5	10
URØET	*	368	22	3	13
KD7HDP	*	140	5	5	5
YY5PMR	*	27	3	2	1
LU3DR	**21**	**113,600**	**470**	**25**	**75**
EA8TX	**"**	**57,776**	**238**	**19**	**73**
JQ1NGT	**"**	**51,987**	**294**	**25**	**61**
IKØEJE	**"**	**50,794**	**278**	**25**	**84**
HAØGK	**"**	**46,640**	**310**	**20**	**68**
OH4ML	**"**	**30,270**	**257**	**20**	**72**
W2IQL	**"**	**25,993**	**148**	**17**	**62**
HA7MW	*	17,155	142	17	56
JR1NKN	**"**	**11,417**	**117**	**19**	**30**
7K4QOK	**"**	**10,050**	**92**	**20**	**30**
					(OP: JR2BNF)
YO6EZ	**"**	**9,002**	**147**	**11**	**7**
KC8LTL	**"**	**7,450**	**66**	**13**	**37**
UA3QJJ	**"**	**7,139**	**211**	**10**	**49**
7N4WPY	*	5,217	63	18	29
OK1AIJ	**"**	**4,920**	**109**	**8**	**33**
EC1ALY	**"**	**4,823**	**56**	**15**	**38**
OK1KZE	*	3,948	98	14	28
					(OP: OK1XYZ)
JI8GZS	*	360	14	7	9
JK3AHS	*	126	8	3	6
YU1NR	**14**	**244,348**	**1105**	**34**	**114**
S54AA	**"**	**118,188**	**547**	**30**	**104**
OK2WTM	**"**	**63,232**	**490**	**20**	**84**
EA4GV	**"**	**59,280**	**402**	**18**	**77**
KH6WW	**"**	**45,927**	**212**	**29**	**52**
					(OP: W8QZA)
YB2OK	**"**	**43,620**	**162**	**35**	**88**
YT1CS	*	39,420	363	18	72
SP9IBJ	**"**	**25,844**	**272**	**14**	**57**
UX8IXX	**"**	**9,048**	**203**	**14**	**38**
JH2AQI	**"**	**8,836**	**76**	**22**	**37**
SP9EWO	**"**	**7,487**	**97**	**15**	**52**
JA7KQC	**"**	**6,134**	**64**	**21**	**30**
EP3CQ	**"**	**2,940**	**40**	**6**	**24**
IZ8EWD	**"**	**1,064**	**37**	**6**	**22**
YL2PP	*	600	20	5	20
HC1/EW1AR	*	150	5	5	5
					(OP: NP3D)
WØTDD	*	120	9	6	6
W2BVH	*	35	5	1	3
ES1CW	**7**	**10,010**	**151**	**11**	**54**
RX6LDK	*	7,504	101	11	45
N7IR	**"**	**4,290**	**48**	**15**	**24**
OK1VBA	**"**	**3,864**	**75**	**9**	**33**
K3TW	*	2,849	38	13	24
DG1UA	*	616	32	3	19
IK5WGK	*	354	21	4	15
KP4KE	**3.7**	**57,907**	**399**	**17**	**62**
LY7Z	**"**	**21,905**	**302**	**9**	**56**
					(OP: LY2TA)
F8CED	*	16,992	240	10	49
SP4GFG	*	15,892	265	7	51
OH7FF	*	2,160	63	5	25
OH3BU	*	851	38	3	20
M5AOF	*	360	26	2	13
ES5MG	**1.8**	**9,129**	**199**	**7**	**44**
YU1RA	*	6,392	129	5	42
RZ3DDD	*	90	14	3	7
N2AA	*	70	10	3	2
					(OP: KR2Q)
RW4CJB	*	63	7	3	6
ASSISTED					
NORTH AMERICA					
UNITED STATES					
N1DG	**A**	**2,413,418**	**1441**	**132**	**470**
W1CU	**"**	**1,673,012**	**1175**	**119**	**398**
K1LD	*	1,542,078	1150	113	388
W1NT	*	1,367,652	1206	93	336
K1RV	*	1,283,997	1047	100	351
W1ZT	*	892,530	782	95	327
W1EBI	*	767,261	791	82	291
WO1N	*	724,739	734	84	289
N1API	*	716,237	828	73	280
W1HR	*	710,635	579	104	353
W1FM	*	658,592	733	80	272
W1RH	*	534,966	614	74	252
W1UK	*	506,496	504	87	297
KC1F	*	503,524	550	79	264
K2TE/1	*	475,752	590	91	253
NM1W	*	462,808	532	79	249
KK1DX	*	443,020	476	82	258
W1RZF	*	436,128	540	73	235
N1AU	*	384,642	457	71	235
KV1J	*	353,115	469	82	213
K1AE	*	352,080	362	81	279
W1NK	*	305,599	384	66	227
NC1N	*	303,282	426	59	202
K1TW	*	277,420	445	45	175
KB1JCT	*	233,964	358	64	204
KI1G	*	200,239	352	54	157
W1NG	*	181,608	243	69	213
W1QK	*	164,780	286	57	163
K1MZ	*	127,248	270	47	129
KG1D	*	103,740	232	47	143
NE1B	*	84,864	161	50	154
K1TH	*	78,952	209	36	106
N4XR/1	*	66,234	160	49	117
N1MD	*	59,976	164	34	102
W1JR	*	3,792	30	20	28
AA1QD	*	2,964	31	12	27
W1US	**28**	**305,760**	**761**	**29**	**118**
					(OP: K6ND)
W1NA	**21**	**814,300**	**1834**	**36**	**134**
K1TC	**14**	**131,895**	**377**	**28**	**107**
W2RE	**A**	**5,410,032**	**3080**	**138**	**518**
K2NG	**"**	**4,039,176**	**2042**	**159**	**585**
N2MM	**"**	**3,369,807**	**2013**	**130**	**493**
W2WB	*	3,177,831	2062	131	466
K2OWE	*	2,850,155	1793	129	476
WE2F	*	2,278,452	1742	111	381
NO2R	*	2,274,262	1386	135	482
W2GDJ	*	2,057,328	1395	120	426
NA2U	*	1,876,210	1273	122	425
N1RK/2	*	1,634,180	1173	109	396
N1EU/2	*	1,488,905	1014	118	417
W2TV	*	1,438,590	1128	104	370
W2YR	*	1,168,146	853	117	394
KA2D	*	936,603	948	76	297
K2XA	*	836,813	674	115	364
W2RD	*	677,920	564	98	348
K2XF	*	651,014	712	75	268
W2XL	*	603,600	744	73	227
W2IRT	*	438,944	543	69	250
KF2O	*	345,600	329	91	309
WR2I	*	259,549	361	53	224
W2LE	*	202,464	347	56	166
AB2E	*	181,368	330	58	171
N2AB	*	169,736	322	43	153
N1JP/2	*	108,086	228	55	132
K2PF	*	94,185	228	46	115
K2BX	*	78,880	175	41	129
KD2HE	*	53,325	181	31	104
NU2W	*	28,060	240	63	181
N2YJJ	*	18,564	92	34	57
WA2E	*	12,166	69	28	51
K3WW	**A**	**3,714,126**	**2146**	**143**	**520**
AA3B	**"**	**2,793,272**	**1717**	**124**	**460**
N3ZA	*	1,822,144	1191	122	446
W3GM	*	1,720,224	1197	118	410
					(OP: K3ND)
N3NA	*	1,275,340	944	112	372
K3CP	*	1,259,220	1028	101	364
K3MD	*	1,190,700	1114	93	348
W2UP/3	*	1,177,044	1026	89	318
N3AM	*	998,460	853	95	335
W3GK	*	932,028	901	89	315
N2EA/3	*	822,560	787	93	331
NN3Q	*	767,344	741	93	305
N3MX	*	652,340	746	76	262
WW3S	*	632,111	652	84	277
WB3CIW	*	608,937	801	67	254
W3CC	*	606,924	569	91	323
W3EA	*	599,691	713	80	259
N3KN	*	586,568	668	71	252
N3II	*	528,882	561	92	270
W3HVQ	*	498,955	565	90	275
K3BSA	*	460,324	546	74	240
					(OP: K3JLK)
K3SV	*	427,440	522	80	232
W3OU	*	418,170	498	79	239
K3PD	*	400,773	514	85	255
K3UA	*	372,592	500	71	221
KB3MM	*	355,770	463	67	228
W3FVT	*	344,977	533	70	213
KU3X	*	275,128	414	56	182
N3ND	*	238,158	343	68	194
N3HS	*	163,064	287	49	169
W8FJ/3	*	120,554	219	62	156
AAØCY/3	*	85,656	203	40	126
N3QQ	*	83,655	203	47	118
K2YWE/3	*	83,056	210	57	122
K3CT	*	46,648	134	44	92
WA3KYY	*	44,640	146	35	89
N3GNW	*	27,120	108	45	75
WA3RHW	*	24,395	112	23	62
4U1WB	*	3,318	54	18	24
					(OP: AJ3M)
N3RW	7	5,109	48	9	30
NZ3O	3.7	6,210	57	10	36
W4MYA	**A**	**4,087,167**	**2196**	**151**	**556**
N4WW	*	1,678,493	1118	132	445
W3GQ/4	*	1,592,390	1180	109	384
WD4DDU	*	1,161,270	947	102	357
K4YT	*	1,107,975	990	101	324
W3OA/4	*	900,885	819	98	337
W3YY/4	*	710,112	660	100	316
K3KO/4	*	458,720	384	105	365
AD4EB	*	299,715	441	67	198
K4XG	*	256,311	346	87	210
WR4K	*	188,214	303	63	184
N4VV	*	138,600	298	44	131
K2SD/4	*	90,560	221	44	116
N4XMX	*	68,460	169	58	105
KT4HN	*	46,863	157	37	90
W4ZW	*	13,825	75	28	51
KQ4VT	*	12,483	67	26	47
W4QA	*	8,967	57	22	39
K4EA	**28**	**643,218**	**1357**	**33**	**144**
KQ4MR	*	70,980	165	30	126
N4GM	*	47,080	172	27	83
K4MM	**21**	**136,344**	**363**	**29**	**109**
W4UNP	1.8	940	30	6	14
AB5K	**A**	**1,066,948**	**1114**	**85**	**274**
W5ZL	*	444,318	574	78	220
K5ZG	*	344,058	501	77	209
NØRQ/5	*	186,480	260	84	196
K5NZ	*	140,132	254	62	150
K5LP	*	139,152	262	72	151
W5GAI	*	51,340	142	50	101
K5WW	*	34,551	143	36	63
KB5SSJ	*	27,324	135	46	86
KD5RYQ	*	18,270	101	29	58
K1NT/5	**14**	**203,980**	**584**	**33**	**122**
NX5M	7	6,768	54	16	31
W6TK	**A**	**684,388**	**768**	**105**	**241**
AB6WM	**"**	**416,532**	**526**	**90**	**219**
KI6T	*	383,964	511	90	204
K6XX	*	224,379	351	64	169
K6RIM	*	216,750	330	70	180
N6RK	*	207,713	312	78	175
ND2T/6	*	148,010	297	59	131
N6VH	*	128,690	281	59	111
NI6T	*	111,672	255	63	125
K6GT	*	74,253	190	57	102
N6EM	*	62,168	239	64	88
K6OWL	*	47,532	180	46	56
K6III	*	23,940	111	36	59
WZ6Z	*	18,748	89	32	54
KE6QR	*	13,224	91	24	33
W6ZZZ	*	10,074	66	32	37
K6DGW	*	3,128	39	17	29
W6ISQ	21	12,892	76	23	55
W6RKC	7	3,737	46	15	22
K9JF/7	**A**	**1,707,530**	**1376**	**124**	**349**
K7XZ	*	432,234	494	95	238
					(OP: K1MY)
K7ABV	*	332,320	495	73	195
K7BG	*	272,783	373	85	208
W7AH	*	269,280	471	87	185
WU9B/7	*	184,485	324	67	178
W6SA/7	*	135,861	302	62	117
K7VIT	*	111,860	238	63	125
N7MBL	*	32,724	136	35	73
W7GTM	*	23,800	126	41	59
KT7G	*	11,600	69	31	49
KC7MIQ	*	1,312	21	15	17
K7QX	**28**	**184,112**	**371**	**28**	**80**
N8TR	**A**	**2,329,397**	**1409**	**138**	**485**
KF8HR	*	894,588	927	89	292
KK9T/8	*	491,834	600	63	238
AA8LL	*	481,081	596	77	236
K8LN	*	430,954	529	69	233
K8SIX	*	429,968	563	84	224
N8KR	*	360,528	437	82	266
ND5S/8	*	324,276	344	86	280
WB8ZRL	*	143,663	223	81	176
AF8C	*	140,624	313	50	138
KI8IZ	*	131,943	261	42	141
KA8PTT	*	62,329	163	43	114
KZ8E	*	35,910	114	47	79
N2BJ/9	**A**	**1,462,525**	**1175**	**108**	**367**
W9XY	**"**	**1,315,215**	**1010**	**122**	**373**
WE9V	*	1,062,200	872	104	348
WO9Z	*	874,620	827	106	324
KB9BUM	*	859,572	839	92	286
KF9YR	*	749,952	776	84	294
N9LF	*	669,775	699	88	277
K9UQN	*	626,961	752	71	238
W9XT	*	458,040	494	87	260
KC9JS	*	448,392	511	86	271
N9QQK	*	381,096	522	62	206
K9MM	*	249,424	413	68	170
KB9KEG	*	183,885	350	60	145
K9OR	*	168,844	296	54	167
NF9V	*	145,493	306	44	129
N9GUN	*	84,632	234	40	102
KØKX	**A**	**2,160,216**	**1469**	**129**	**419**
KE9KD/Ø	**"**	**1,529,752**	**1281**	**119**	**353**
NØAT	*	670,819	614	104	315
KØOU	*	636,840	746	92	268
NT4TT/Ø	*	519,384	556	104	304
WRØDK	*	385,163	510	74	209
KØOB	*	238,329	330	71	202
NFØN	*	211,850	339	56	167
WØTT	*	172,059	309	64	185
KØBX	*	169,505	330	49	154
KØAD	*	128,106	259	58	140
AKØM	*	92,162	205	59	144
KØGT	*	76,779	172	58	113
KTØR	*	39,243	142	36	91
KØIL	**28**	**39,560**	**169**	**22**	**70**
K3PA/Ø	**7**	**34,874**	**162**	**25**	**81**
CANADA					
VE1OP	**A**	**1,298,751**	**1217**	**100**	**353**
VA3NR	*	313,973	563	64	189
VE9FX	*	294,415	452	65	200
VE7IO	*	89,947	232	62	125
VE2OWL	A	15,714	84	25	56
VE3JAQ	**21**	**175,770**	**563**	**28**	**107**
MEXICO					
XE1KK	**28**	**903,552**	**2888**	**33**	**123**
PUERTO RICO					
KP3Z	**A

CZECH REPUBLIC

OK2FD	**A**	**2,237,872**	**1740**	**138**	**551**
OK1FDY	*	203,574	446	69	193
OL7N	**28**	**370,832**	**1040**	**31**	**125**
			(OP: OK1HRA)		
OK2ZJ	*	5,934	50	15	31

DENMARK

OZ4O	**A**	**388,276**	**631**	**70**	**273**
OZØF	*	43,508	259	31	115
			(OP: OZ1AIZ)		

ENGLAND

G3LZQ	**A**	**278,720**	**445**	**79**	**256**
MØC	**14**	**619,650**	**2038**	**38**	**132**
M3MCX	**7**	**5,264**	**154**	**6**	**41**

ESTONIA

ES5QX	**3.7**	**38,340**	**384**	**15**	**67**

EUROPEAN RUSSIA

UA3BZ	**A**	**641,560**	**1007**	**92**	**338**
RN4WA	*	640,135	1041	90	353
UA3AB	*	141,478	269	80	174
RF4R	**28**	**129,360**	**602**	**32**	**122**
			(OP: UA4RC)		
RU6YY	*	43,520	142	33	103
UA6LV	**21**	**461,700**	**1541**	**36**	**126**
UA4RC	**7**	**69,690**	**294**	**26**	**89**
RU6LA	**3.7**	**84,209**	**683**	**24**	**83**
UA6O	*	6	1	1	1

FINLAND

OH6NIO	**A**	**1,689,171**	**1598**	**118**	**443**
OH6DX	*	287,217	719	72	219
OH2LU	*	266,385	553	64	237
OH3HS	*	54,378	218	41	118
OH6Y	*	48,576	234	25	67
			(OP: OH6YF)		
OH3WW	*	18,424	150	25	73
OH2CI	*	8,165	89	17	54
OH4MDY	**14**	**401,432**	**1860**	**37**	**115**
OH2BO	**1.8**	**11,136**	**215**	**8**	**50**

FRANCE

TM7F	**A**	**5,321,810**	**3720**	**128**	**483**
F5IN	*	202,860	429	57	195
TM5HV	*	189,334	540	59	215
			(OP: F5GKW)		
F6FFM	*	124,488	292	54	180

GERMANY

DLØWW	**A**	**3,400,704**	**2366**	**134**	**514**
			(OP: DK3GI)		
DJ2YA	*	**3,294,160**	**2212**	**134**	**512**
DL1YD	*	2,212,272	1815	112	457
DL8OH	*	1,826,820	1427	132	465
DL4YAO	*	1,199,544	1437	96	357
DL4FAY	*	1,141,832	1551	90	334
DL6LAU	*	1,100,317	1006	116	455
DF6QN	*	1,083,460	1199	98	399
DL8NFU	*	740,253	1021	85	358
DL8AAM	*	641,991	1067	80	319
DL4RCK	*	613,468	916	83	329
DF2LH	*	609,952	834	82	307
DJ9MH	*	308,040	535	73	267
DL3NM	*	263,088	574	57	195
DL1NEO	*	249,426	519	54	225
DF6JC	*	225,387	397	58	179
DL6QW	*	223,266	388	64	190
DL5KM	*	189,126	414	56	210
DP1POL	*	163,614	465	43	91
			(OP: DL5XL)		
DF8QB	*	137,997	326	65	204
DF2UU	*	88,355	256	52	153
DF2AP	*	36,828	170	35	89
DK2ZO	*	16,350	99	31	78
DL9LR	*	14,596	110	27	55
DL9EE	28	27,468	130	20	64
DF9ZP	**21**	**1,012,285**	**2330**	**40**	**153**
DL3BQA	*	123,711	504	29	100
DJ7EO	**14**	**829,738**	**2229**	**39**	**143**
DL7CX	**1.8**	**31,570**	**653**	**9**	**61**

GREECE

SV1BFW	**A**	**379,908**	**539**	**88**	**278**
SV1XV	*	8,976	62	24	44

HUNGARY

HAØHW	**A**	**360,418**	**651**	**74**	**233**
HA5PT	*	40,326	160	40	101

ITALY

IQ2A	**A**	**1,653,864**	**1548**	**117**	**431**
			(OP: IK2RZP)		
IK1RQT	*	**1,549,824**	**1869**	**107**	**405**
IKØYVV	*	**1,416,389**	**1626**	**107**	**386**
I2SVA	*	908,564	1060	88	306
IK2ULV	*	246,268	596	74	245
I7CSB	*	41,952	145	42	110
IK2SAE	*	4,500	69	16	44
IR2A	**28**	**291,653**	**1332**	**24**	**65**
			(OP: I2UIY)		
IZ8DBJ	*	122,303	395	35	122
IZ4AFW	**21**	**164,640**	**551**	**31**	**109**
IV3NVN	**3.7**	**22,470**	**282**	**9**	**61**

LATVIA

YL8M	**A**	**487,396**	**872**	**90**	**322**
			(OP: YL2KL)		
YL2KA	*	299,437	515	71	206
YLØA	**3.7**	**50,625**	**559**	**13**	**68**
			(OP: YL2KA)		

LITHUANIA

LY2FY	**A**	**3,759,120**	**3716**	**144**	**546**
LY3CY	*	62,208	329	32	130
LY2IJ	**21**	**451,770**	**1321**	**37**	**128**
LY3BY	14	20,856	292	11	55

NETHERLANDS

PG3N	**A**	**609,687**	**1089**	**77**	**274**
PA9ZZ	*	331,483	688	64	225
PA5A	*	146,328	485	48	108
PE2SVN	*	72,036	283	43	131
PAØR	**28**	**73,312**	**351**	**27**	**89**
PC1A	**21**	**627,444**	**1717**	**37**	**137**
PE1PQH	*	22,188	129	21	65

NORTHERN IRELAND

GI4XSF	A	9,234	64	28	53

POLAND

SP6EKS	**A**	**2,737,800**	**2110**	**130**	**518**
SQ8FEW	*	199,984	446	56	176
SP6EQZ	*	87,531	361	39	140
SP3HUU	**28**	**46,530**	**212**	**30**	**111**
SO2R	**14**	**1,031,940**	**3118**	**37**	**145**
SQ5BE	7	3,157	78	5	36

PORTUGAL

CT1CXP	A	11,625	68	32	61

ROMANIA

YP3A	**14**	**728,160**	**2822**	**37**	**148**
			(OP: YO9GZU)		

SCOTLAND

MMØQ	**A**	**41,313**	**173**	**35**	**106**
			(OP: MMØBQI)		
MMØBQI	**3.7**	**11,644**	**123**	**16**	**55**

SICILY

IT9GSF	**A**	**4,782,904**	**2917**	**146**	**620**
IT9IQQ	**21**	**115,164**	**646**	**28**	**98**

SLOVAK REPUBLIC

OM7ZZ	**A**	**162,178**	**509**	**35**	**96**
OM2VL	*	53,818	208	39	103
OMØM	**14**	**696,756**	**2359**	**39**	**147**
			(OP: OMØWR)		
OM3DX	**3.7**	**55,091**	**498**	**16**	**73**
OM3GI	**1.8**	**30,933**	**494**	**8**	**55**

SLOVENIA

S52ZW	**A**	**2,816,844**	**2572**	**126**	**492**
S58WW	*	1,087,734	1383	91	307
S52A	*	132,912	270	65	169
S54G	**21**	**719,043**	**1925**	**38**	**141**
			(OP: IK3UNA)		
S51CK	**14**	**178,149**	**1014**	**29**	**100**

SPAIN

EA3QA	**A**	**936,945**	**1515**	**90**	**353**
EA5YJ	*	91,324	541	32	126
EA1JW	*	7,998	55	37	49
EA2AYD	**28**	**87,330**	**320**	**25**	**98**
EC5AMK	**21**	**60,168**	**743**	**23**	**69**

SWEDEN

SM2EKM	**A**	**1,999,230**	**2357**	**115**	**400**
SM5D	*	353,775	507	89	356
			(OP: SM5DJZ)		
SM4XIH	*	32,619	145	31	100
SM6RXZ	*	1,216	19	14	18

UKRAINE

UT7QF	**A**	**4,168,826**	**3336**	**164**	**607**
UU2JQ	*	85,744	215	47	137
UT5UGR	**21**	**614,008**	**1856**	**37**	**147**
UXØL	**14**	**281,240**	**1144**	**37**	**121**
			(OP: UXØLV)		
UY2UF	*	1,020	49	4	16
EO3Q	**7**	**300,672**	**1446**	**31**	**113**
			(OP: UR3QCW)		
UU7J	**3.7**	**110,460**	**989**	**22**	**83**
			(OP: UUØJM)		

WALES

GW7X	**14**	**130,581**	**894**	**21**	**78**
			(OP: GWØRYT)		

YUGOSLAVIA

YT6A	**21**	**1,087,952**	**2867**	**39**	**155**
YZ1V	**14**	**211,640**	**1258**	**31**	**112**
			(OP: 4N1FAN)		
YU1UU	**1.8**	**9,250**	**194**	**6**	**44**
YU1UA	*	418	14	5	14

OCEANIA

AUSTRALIA

VK4UC	**A**	**1,875,578**	**1387**	**97**	**198**

HAWAII

AH6NF	A	9,869	57	34	37

NEW ZEALAND

ZL3GA	**A**	**80,509**	**204**	**52**	**91**

SOUTH AMERICA

ARGENTINA

LU7DR	**A**	**139,587**	**516**	**37**	**82**

ARUBA

P4ØW	**A**	**11,755,443**	**6738**	**137**	**496**
			(OP: W2GD)		

BRAZIL

ZX2B	**A**	**5,540,722**	**4134**	**106**	**367**
			(OP: PY2MNL)		
PY2LTY	*	468,906	970	52	134
PPSAMP	**28**	**3,280**	**55**	**14**	**26**
PY2WC	**7**	**52,281**	**284**	**27**	**84**

TRINIDAD & TOBAGO

9Y4ZC	**A**	**14,979,055**	**8114**	**137**	**500**
			(OP: DL6FBL)		

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

K1IR	**4,569,953**	**2616**	**145**	**538**
KV1W	**2,194,512**	**1562**	**114**	**410**
N1RY	1,559,789	1170	115	402
W1BK	553,344	537	92	292
K1NU	532,836	567	85	257

AA2MF 3,248,505 2198 132 485

KA2FIQ 2,735,054 1851 120 443

N2LBR	809,904	799	82	294
N2SS	744,600	710	100	308
AB2DE	545,184	672	102	330
W2YC	426,600	498	80	280
WB2KHO	360,944	561	63	209
K2YEH	313,425	405	84	231
W2IW	273,790	574	71	191
KC2EVL	6,480	55	23	37

NE3F 3,065,403 2024 134 493

W3LJ	296,529	429	66	225
W3LRC	10,152	124	34	74

N4PN 4,258,124 2538 153 523

W4WS 3,538,161 2245 138 489

K9ES/4	2,733,659	2038	129	458
WD4K	2,641,548	2113	127	406
WC4H	1,914,704	1635	116	390
NJ4M	638,308	693	90	266
KD4QHB	407,826	508	86	240
WA4TFZ	179,536	337	51	178

K5GH 1,333,239 1075 131 390

K5UTD 1,225,561 1081 104 359

K5UA	1,102,428	1031	107	345
KM5VI	922,614	794	113	349
AG5TX	834,054	779	111	331
W5LCC	259,945	635	68	177
WX5II	38,364	179	46	93

W6KK 3,206,238 2230 145 437

N6EAV	420,763	655	85	192
WW6OR	112,112	262	73	123
W6ISO	34,447	97	52	81

K7ZSD 2,131,766 1988 118 324

K8AZ 5,334,459 2773 158 583

N8BI	1,047,850	986	117	358

KD9ST 2,099,333 1473 126 431

WN9O 1,894,356 1293 137 469

KG9N	57,568	194	36	76
W9NAA	37,076	140	42	82
W9BIL	7,155	61	23	30

NØNI 3,563,010 2232 149 500

KØRF 3,051,020 1938 154 511

KKØT	661,580	709	92	288
WBØNNI	140,293	356	67	172
KØSV	131,355	274	51	138

ALASKA

KL1ME	33,044	160	40	57

ANGUILLA

VP2E	**25,299,296**	**11617**	**182**	**720**

CANADA

VY2TT	**5,423,220**	**3691**	**119**	**486**
VE3RM	**5,074,710**	**3945**	**124**	**427**
VA3SK	**4,226,466**	**3472**	**121**	**433**
VE7SV	**3,216,960**	**3266**	**130**	**350**
VE3YAA	1,631,840	1761	104	330
VE7GL	1,597,365	1999	112	273
VE6AO	**1,494,200**	**2682**	**92**	**218**
VA2TG	432,900	746	53	207
VA3ARG	101,304	296	61	128
VE8JL	16,560	132	34	38

COSTA RICA

TI5A	**5,082,975**	**5577**	**124**	**351**

CUBA

T42GG	**3,203,605**	**4273**	**91**	**274**

HONDURAS

HR6/VE3BW	**1,137,150**	**1679**	**90**	**225**

MEXICO

6D9X	**3,708,403**	**4420**	**120**	**289**

PUERTO RICO

KP4US	**347,851**	**883**	**61**	**156**

TURKS & CAICOS ISLANDS

VP5DX	**11,106,072**	**7244**	**150**	**546**

AFRICA

CANARY ISLANDS

EA8ZS	**8,732,607**	**4886**	**144**	**555**

MADEIRA ISLANDS

CQ3T	**8,427,762**	**5002**	**129**	**505**

NAMIBIA

V55V	**1,819,958**	**1943**	**82**	**261**

TUNISIA

3V8BB	**15,548,610**	**7749**	**153**	**617**

ASIA

ASIATIC RUSSIA

RT9W	**7,191,120**	**3873**	**150**	**572**
RK9TWA	2,268,402	2051	92	346
RF9C	1,984,580	1662	105	337
RK9CKE	828,412	972	87	269
RK9QWZ	259,530	460	66	180
RK9AZZ	238,266	457	69	210
RW9QWD	10,985	103	21	44
RKBAXX	**285,600**	**522**	**78**	**282**
RKØQWT	10	7	6	6

CYPRUS

P3A	**20,196,420**	**9210**	**167**	**656**

ISRAEL

4X6FR	**7,096,896**	**4398**	**128**	**464**

JAPAN

JA7YAA	**3,146,343**	**2147**	**156**	**417**
JI2ZJS	**2,078,822**	**1862**	**141**	**337**
JE6ZIH	**1,538,908**	**1592**	**131**	**296**
JA1KQX	**1,312,395**	**1189**	**123**	**308**
JA2ZJW	1,121,170	1168	118	264
JI2ZEY	883,014	1053	114	260
JA6WFM	432,789	689	89	170
JI2ZMW	334,662	513	94	195

KYRGYZSTAN

EX9A	**4,000,457**	**3415**	**120**	**407**

SINGAPORE

9V1YC	**2,674,100**	**2689**	**137**	**413**

EUROPE

AUSTRIA

OE2S	**8,087,625**	**4945**	**163**	**656**

BELGIUM

OT3H	**2,094,300**	**2306**	**97**	**371**
OR3P	**2,048,196**	**2532**	**108**	**384**
OT3O	1,183,767	1707	81	300
ON5GQ	1,104,840	1353	90	306
OT3W	313,335	735	63	234

CRETE

J49Z	**5,950,413**	**5376**	**149**	**572**

CROATIA

9AØR	**6,599,124**	**4707**	**155**	**619**

CZECH REPUBLIC

OK5W	**8,635,320**	**4920**	**164**	**666**
OL3A	**3,752,234**	**3255**	**139**	**583**
OL7R	3,421,898	2901	142	532
OK1KQH	1,359,072	1632	104	364
OK1KCI	1,333,306	1749	96	398
OK1KDO	467,777	968	72	287
OL7C	411,312	989	71	257
OL2A	308,028	656	66	200
OL2U	289,980	809	66	258
OK1KMG	147,489	649	43	190

DENMARK

OZ5E	**2,527,300**	**2245**	**131**	**504**
OZ5ESB	**1,530,672**	**1985**	**97**	**349**
OZ7SKV	37,736	414	43	135

ENGLAND

M1P	**5,031,208**	**3404**	**144**	**584**
G3BJ	**4,455,028**	**3581**	**143**	**600**
G6PZ	2,758,118	2659	115	451
M4A	2,209,942	2116	122	480
G3B	1,711,709	1951	100	403
M4U	574,092	1122	76	257
G5X	549,080	1156	63	217
M8C	523,110	1248	72	299
M2T	459,716	978	64	217
M4F	404,096	822	69	259
M3S	310,854	499	68	241
M4T	24,624	252	14	62

ESTONIA

ES1AJ	**1,262,125**	**1565**	**118**	**457**

EUROPEAN RUSSIA

RM6A	**5,561,652**	**4426**	**162**	**634**
RL3A	**5,383,826**	**4400**	**163**	**639**
RO4M	3,073,915	3319	141	514
RF3A	2,925,868	3685	132	506
RD3R	1,487,730	2211	104	401
RX3RXX	1,398,225	2374	115	400
RK3MWD	790,575	1615	83	298
RK6AYN	775,746	1392	88	338
RK3QWM	541,926	1081	73	301
RK3DZD	434,252	990	72	292
RK4CWA	335,315	765	74	263
RK6XWA	50,560	251	39	119
RK3DZV	48,504	374	32	140

FINLAND

OH2BP	**370,363**	**745**	**71**	**266**
OH2K	39,312	173	39	105

FRANCE

TM8DX	**4,678,100**	**4634**	**131**	**521**
F6KHM	**3,555,576**	**3318**	**101**	**385**
TM2S	2,743,200	3171	102	378
F8KGM	1,175,493	1743	134	463
TM6R	500,136	1004	74	238
F6KRK	149,372	446	50	164
F8KGH	85,598	519	61	193
TM5ER	71,133	315	36	145
F5KAR	63,712	314	39	137

GERMANY

DLØCS	**5,166,372**	**3504**	**160**	**629**
DF3CB	**4,176,900**	**2879**	**148**	**617**
DKØSU	3,803,388	3058	120	484
DFØRI	2,817,920	2350	126	469
DLØAO	2,060,765	2030	120	487
DLØOV	1,484,625	1562	108	427
DLØDX	1,377,459	1636	92	367
DKØALK	1,040,655	1349	85	300
DKØMN	488,700	815	74	288
DLØDRO	234,300	520	69	231

GREECE

SY8A	**7,632,300**	**6368**	**160**	**620**
SV1AFA	924,687	2106	82	299
J43GRC	804,672	1776	78	303

HUNGARY

HG1S	**8,960,680**	**5259**	**162**	**668**

ICELAND

TF3W	**1,193,812**	**2413**	**71**	**255**

IRELAND

EI9E	**1,113,658**	**1350**	**87**	**319**

ITALY

IR4X	**11,866,656**	**6049**	**171**	**681**
IU2X	**6,602,208**	**4321**	**161**	**615**
IO4T	3,971,058	3442	128	509
IU4U	3,010,287	2644	125	484
IQ5LV	1,991,108	2447	110	366
IR8M	1,609,471	2514	114	437
II3A	880,341	1140	95	312
IO3T	874,014	1686	84	297
IQ2LS	681,054	977	86	288
I5UWT	669,510	1242	79	308
IK3TCH	667,667	1154	86	233
IQ2CJ	321,114	607	47	171
IQ3TN	77,976	320	40	131

LATVIA

YL4U	**2,551,689**	**3327**	**119**	**468**
YL1XN	162,567	585	45	178

MOLDOVA

ER3R	**1,089,175**	**1534**	**102**	**373**

NETHERLANDS

PA7MM	**6,052,233**	**4242**	**141**	**582**
PI4DEC	1,878,590	2047	112	459
PG9W	972,426	2017	89	322

NORWAY

LN8W	**1,454,656**	**1992**	**97**	**379**

POLAND

SO6Y	**2,154,386**	**2454**	**128**	**483**
SO9O	**1,862,245**	**2067**	**115**	**424**
SP5KVW	1,098,048	1761	111	421
SP3PKL	550,420	1086	81	296
SPØPZK	389,664	683	76	252
SR25JP	283,860	1018	48	201
HF8KAF	184,075	860	51	148
SP6PCL	160,593	522	65	204
SP9ZHR	151,290	405	59	187
SP9KJT	103,797	374	41	130
SP9KRT	71,050	829	78	272
SP1KZE	21,210	202	24	77

PORTUGAL

CT7A	**4,504,104**	**4240**	**118**	**446**

SICILY

IR9U	**4,082,130**	**3983**	**139**	**563**
IT9HBT	1,147,090	1634	105	385
IR9K	691,675	1121	78	287

SLOVAK REPUBLIC

OM7M	**8,137,620**	**4975**	**169**	**684**
OM4A	1,275,378	1573	101	397
OM3KKF	99,474	461	35	142
OM3ROM	10,710	98	25	60

SLOVENIA

S5ØC	**6,545,916**	**4440**	**157**	**631**
S53S	2,072,520	2547	109	404
S59TTT	408,000	854	82	258

SPAIN

EA1EEY	**6,692,450**	**4642**	**130**	**555**
ED3SSB	**5,600,268**	**4152**	**135**	**522**
EA1COZ	3,144,557	2732	116	435
EA5EA	3,055,320	3772	131	484
EA3RKG	2,206,635	2653	106	365
EA5HQ	1,487,954	2798	68	234
EA1DVY	1,298,088	1402	96	368
ED1URS	660,447	1159	75	326
ED5GKC	469,152	1470	62	226
AN2URV	458,052	1159	65	222
EA3URC	107,632	419	48	169
ED1ISS	78,125	294	38	87

SVALBARD

JW5E	**185,826**	**301**	**97**	**224**

SWEDEN

SK3W	**5,429,010**	**4311**	**156**	**574**
SM2LIY	722,930	1207	81	334
SM5U	521,884	1176	67	252
SK7A	356,895	858	64	245
SM4V	221,098	619	49	178
SK7AX	76,830	286	49	148

UKRAINE

UT7M	**2,460,117**	**3205**	**129**	**458**
UX2IO	**2,006,555**	**2856**	**141**	**468**
UZ4E	913,780	1688	92	336
UR4LWA	229,658	719	58	228

YUGOSLAVIA

YU7AJM	126,260	352	48	166

OCEANIA

FEDERATED REP. OF MICRONESIA

V63B	**484,594**	**996**	**74**	**104**

INDONESIA

YBØZDA	**2,127,200**	**2122**	**107**	**293**

SOUTH COOK ISLANDS

ZK1SSB	**628,320**	**1012**	**91**	**147**

SOUTH AMERICA

ARGENTINA

LW7DX	**5,666,091**	**4391**	**120**	**359**
LO7H	**5,112,406**	**4198**	**126**	**368**
LS1N	4,576,040	3810	110	362
LT7Y	1,290,366	1858	86	208
LU8XW	320,530	783	55	135

BRAZIL

PX2B	**5,859,273**	**4407**	**111**	**372**
PR7CP	1,278,578	1725	89	248
PY2TEL	756,650	1720	56	129

CHILE

CE3N	**2,065,060**	**2404**	**95**	**221**
CE3PA	76,006	445	27	62

FRENCH GUIANA

FY5KE	**21,729,494**	**9068**	**166**	**676**

NETHERLANDS ANTILLES

PJ4T	**5,905,627**	**4296**	**109**	**402**

PERU

OA4O	**5,853,916**	**4196**	**133**	**394**

SURINAME

PZ5JR	**1,024,488**	**1215**	**81**	**243**

VENEZUELA

4M4C	**2,934,933**	**3459**	**90**	**247**

MULTI-OPERATOR TWO TRANSMITTER NORTH AMERICA

UNITED STATES

K1KI	**9,787,520**	**4950**	**159**	**587**
NT1Y	**7,804,981**	**3811**	**156**	**583**
K3NA/1	5,796,440	3102	152	558
KØTV/1	4,480,478	2741	133	501
W1SRG	1,490,951	1220	102	367
N2NT	**8,166,574**	**4177**	**154**	**600**
N2NU	**6,078,100**	**3299**	**148**	**552**
W2CG	2,185,356	1547	119	419
W2/VA3NU	783,290	904	87	283
N3RS	**11,054,901**	**5276**	**165**	**638**
K3OOO	2,639,420	1801	128	467
K4JA	**12,327,066**	**5376**	**174**	**672**
W4RM	**7,829,741**	**4146**	**157**	**574**
N4TO	6,680,115	3569	152	589
N4RV	6,455,802	3510	147	551
NO4U	603,330	711	84	273
N5YA	**3,589,944**	**2570**	**140**	**466**
AA5NT	1,685,346	1497	124	403
AD5OW	142,688	303	64	144
K6AO	**3,084,396**	**2574**	**134**	**377**
N6KJ	**3,043,170**	**2307**	**133**	**377**
W6YX	1,515,618	1354	118	324
W6EEN	154,875	522	30	95
NK7U	**3,117,906**	**2220**	**147**	**447**
KØDU	**3,551,400**	**2405**	**147**	**453**

ALASKA

KL7CQ	**1,060,798**	**2353**	**78**	**136**

ANTIGUA

V26B	**16,622,600**	**11101**	**143**	**537**

BERMUDA

VP9I	**2,590,256**	**3601**	**87**	**269**

CANADA

VE3EJ	**13,255,464**	**7257**	**164**	**615**
VE1JF	**11,981,676**	**7553**	**141**	**545**
VE6SV	3,363,500	3799	114	320
VE3DC	2,246,640	2328	107	353
VE6FI	1,991,790	2517	108	297

COSTA RICA

TI8M	**2,995,083**	**4321**	**105**	**248**

CUBA

CO8LY	**1,415,484**	**2874**	**82**	**192**

GUATEMALA

TG9URQ	**989,880**	**2193**	**65**	**154**

ST. KITTS & NEVIS

V47DM	**10,916,306**	**7276**	**127**	**487**

SAN ANDRES/PROVIDENCIA

5JØX	**3,978,116**	**5188**	**98**	**288**

TURKS & CAICOS ISLANDS

VP5B	**18,404,223**	**12814**	**155**	**506**

U.S. VIRGIN ISLANDS

WP2Z	**13,370,255**	**9245**	**145**	**502**

AFRICA

AFRICAN ITALY

IH9P	**29,447,379**	**11831**	**171**	**688**

MADEIRA ISLANDS

CT9L	**24,455,105**	**10960**	**155**	**630**

ASIA

JAPAN

JR1ZTT	103,312	278	61	115
JA7YAF	5,187	53	24	33

KAZAKHSTAN

UP5G	**6,543,040**	**4621**	**146**	**498**

KOREA

D7ØLW	**980,624**	**1881**	**114**	**220**

EUROPE

AUSTRIA

OE5T	**6,196,683**	**5447**	**144**	**569**

BELGIUM

OT3L	**5,760,558**	**4303**	**152**	**577**
OR3R	656,214	1213	83	275

CROATIA

9A7A	**12,757,650**	**8011**	**170**	**680**

EUROPEAN RUSSIA

RU1A	**10,925,937**	**7363**	**178**	**691**

FINLAND

OH1F	**7,140,442**	**5418**	**165**	**629**

FRANCE

TM7Z	**2,232,120**	**3047**	**94**	**346**

GERMANY

DAØBCC	**10,940,896**	**6528**	**170**	**678**
DLØTS	2,941,920	2594	129	519

HUNGARY

HG6N	**11,581,568**	**7420**	**168**	**664**

ISLE OF MAN

MD4K	**9,976,698**	**8159**	**155**	**631**

MALTA

9H3UD	**2,291,696**	**3259**	**96**	**353**

NETHERLANDS

PA1T	**3,292,030**	**3167**	**125**	**530**

NORWAY

LN2T	**428,868**	**1169**	**74**	**287**

POLAND

SN5Z	**2,662,464**	**2981**	**114**	**474**
HF25JP	43,732	175	36	80

ROMANIA

YO3KSD	12,261	109	12	35

SCOTLAND

GM5A	**5,341,075**	**4742**	**138**	**557**

SWITZERLAND

HB9H	**4,565,204**	**4361**	**134**	**524**
HB9OK	3,100,494	3742	107	431

OCEANIA

AUSTRALIA

VK4WR	**1,269,681**	**1582**	**100**	**209**

GUAM

AH2R	**9,724,779**	**5604**	**171**	**462**

NEW ZEALAND

ZM1G	**992,904**	**1440**	**84**	**180**

NORTHERN MARIANAS

KHØAA	**14,109,480**	**7589**	**172**	**488**

SOUTH AMERICA

BRAZIL

PX2A	**7,481,877**	**6330**	**102**	**337**

NETHERLANDS ANTILLES

PJ2T	**26,212,824**	**12329**	**157**	**602**

SURINAME

PZ5A	**11,952,050**	**7904**	**119**	**431**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

KC1XX	**17,442,900**	**7637**	**177**	**723**
W3LPL	**14,897,584**	**6894**	**177**	**694**
K9NS	**13,202,948**	**6646**	**177**	**659**
K1TTT	**9,345,200**	**5005**	**155**	**611**
NQ4I	**8,610,210**	**5324**	**165**	**625**
K1RX	**7,950,756**	**4591**	**151**	**586**
N3AD	7,057,148	3973	151	570
WE3C	6,703,015	3900	155	582
W3PP	6,690,079	3784	150	563
KB1H	6,013,716	3379	147	550
W2AX	**5,993,872**	**3588**	**143**	**513**
K5NA	**5,394,252**	**3888**	**158**	**550**
WBAIH	**4,515,168**	**3069**	**151**	**521**
W8ZA	**3,732,506**	**2335**	**132**	**482**
W3MF	2,244,385	1475	124	435
K6IDX	**1,564,055**	**1180**	**135**	**380**

ANTIGUA

V26DX	**6,280,560**	**5876**	**106**	**389**

The TH6DXX at the contest site of LX9SW (Op. LX1RQ), Single Op, High Power, 14 MHz, and LX5A (Op. LX1AQ), Single Op., High Power, 3.7 MHz.

CANADA

VB2C	**13,540,280**	**9318**	**149**	**527**

COSTA RICA

TI5N	**14,584,050**	**9991**	**156**	**546**

ST. KITTS & NEVIS

V47KP	**9,074,183**	**7386**	**124**	**423**

TURKS & CAICOS ISLANDS

VP5T	**8,683,209**	**7795**	**108**	**385**

AFRICA

GAMBIA

C5Z	**33,764,550**	**14030**	**177**	**673**

MADEIRA ISLANDS

CQ9K	**26,357,967**	**11609**	**162**	**675**

TANZANIA

5I3A	**2,045,455**	**2329**	**75**	**238**

ASIA

JAPAN

JA3YBK	**8,584,960**	**4823**	**169**	**537**
JA5BJC	**8,570,016**	**4716**	**168**	**534**
JA7YRR	**5,326,992**	**3745**	**167**	**460**
JA1YPA	**5,211,875**	**3583**	**163**	**462**
JE1ZWT	3,961,240	2871	162	431
JJ1YAF	9,954	82	29	50

UNITED ARAB EMIRATES

A61AJ	**30,033,600**	**12994**	**191**	**769**

EUROPE

BELGIUM

OT3A	**15,855,120**	**10358**	**172**	**683**

BULGARIA

LZ9W	**10,184,832**	**7977**	**169**	**673**

CZECH REPUBLIC

OL5T	**6,521,460**	**5779**	**145**	**578**
OL9S	314,223	828	57	216

GERMANY

DFØHQ	**15,798,744**	**10074**	**182**	**754**
DLØKC	3,010,777	2944	131	540

KALININGRAD

RW2F	**10,120,190**	**6861**	**165**	**665**

LIECHTENSTEIN

HBØ/HB9AON	**8,942,519**	**7968**	**125**	**558**

LITHUANIA

LY7A	**8,133,600**	**6767**	**159**	**641**

NETHERLANDS

PA6Z	**405,765**	**1816**	**42**	**171**

NORWAY

LN4C	**5,262,771**	**5387**	**140**	**559**

POLAND

SP9KDA	**852,176**	**1208**	**99**	**383**
SP5PPK	41,402	234	38	125

SARDINIA

IS0/DL3EW	**8,254,729**	**7399**	**147**	**574**
IS0A	646,328	1443	65	281

SCOTLAND

GMØB	**4,025,976**	**4692**	**121**	**498**
GM2T	1,009,821	1641	91	318

SPAIN

ED7VG	**7,719,972**	**6658**	**136**	**527**
EA4URE	5,631,624	5863	142	500

UKRAINE

UTØAZA	**1,224,960**	**2392**	**88**	**352**
UV7M	903,125	1723	91	334

OCEANIA

PHILIPPINES

DX1DBT	**891,906**	**1511**	**94**	**164**
DX1MK	212,925	645	62	105

SOUTH AMERICA

ARGENTINA

LT1F	**12,576,014**	**7638**	**158**	**504**

BRAZIL

PY3MHZ	**4,883,301**	**4277**	**108**	**351**

PARAGUAY

ZP5AA	**2,742,750**	**3139**	**92**	**253**

URUGUAY

CV5D	**1,706,904**	**2779**	**83**	**219**

VENEZUELA

YV4A	**18,744,300**	**9830**	**155**	**551**

CHECK LOGS

The following stations submitted check logs, which are always appreciated. Thank you.

4Z5BZ, 4Z5MU, 4Z5OZ, 5Z4IC, 7K4XNN, 8SØF, 9A5KV, AI9U, C56JHF, D44AC, DF3OL, DF7IT, DG2DRA, DHØGHU, DH2RTW, DH5MM, DJ1EH, DJ5AV, DJ7BA, DJ8RS, DK6JG, DK7AO, DL1AMQ, DL1DCY, DL2HRE, DL2RVD, DL3MG, DL4OK, DL5AWI, DL5DWW, DL5NA, DL5SVB, DL6USA, DL7VMM, DL8UFO, DL9NO, EA3BJM, EA4AXZ, EA4CEN, EA4DP, EA7SL, EA8TH, ERSAA, ES4MM, ES5RIM, ES6CO, ES6RMR, EU2EU, EW2AA, F/G3VQO, F6GOX, G3NXT, G4FKA, HA75MS, HF65ØO, HSØXNO, IØKHP, IZØEGC, JAØFVU, JA1WPX, JA6WJL, JE3WVA, JF1SEK, JI2KXK, K3QDC, K9JS, KA9ZFW, KD6BWE, KM5TY, LA4OGA, LA4PGA, LA4YGA, LA8HGA, LA9NM, LA9TJA, LU3HIP, M5AAV, N5IJE, N5KO, N5NA, N7DB, N8HN, NS3T, OE3DMA, OH8SE, OK2HZ, OK2UGY, PAØUKC, PY2DBU, PY3LUK, PY5IP, RAØQR, RA1QCZ, RA3AJ, RA3FD, RA3ZH, RA6HSM, RD3AN, RN6FK, RN9WWW, RU4WE, RWØLKA, RW3WWW (OP: RA3WJ), RW6FO, RX6LJS, RZ6HF, RZ6HX, SK5PZ, SM3PZG, SM5BFJ, SM5BTX, SM5DXR, SM6BSK, SM7BHM, SN7ØLXK, SP3BVA, SP3JHR, SP3V, SP4CGJ, SP4FCP, SP4HHI, SP5ECC, SP5EPP, SP5ICS, SP5OXJ, SP6CJK, SP6KYU, SP6NIJ, SP7HOV, SP8HPW, SP8QED, SP9MDY, SP9SOU, SQ4NR, SQ5TA, SQ5TT, SQ6R, UAØJD, UA1AIR, UA1ATZ, UA3AGW, UA3DCI, UA3DEE, UA3IIH, UA6AF, UR3IFD, UR5FCM, UR5ZQV, UT1IWA, UT1WPR, UT2IO, UT2UZ, UUØJC, UW7W, UXØIB, W3QY, W7LBN, YL1ZS, YL3DX, YO2CMI, YO3CCC, YO3JOS, YO4LHR, YO6LA, YO8AII, YZ1ZA, Z35G.

our readers say

Clubs are Ham Radio "Glue"

Editor, *CQ*:

Your comment about clubs (May "Zero Bias") is right on point. I recall that back in 1947 I belonged to a great club which met in Brooklyn every couple of weeks and it really was a "glue" which added to our feeling of ham brotherhood. In all the years I was in New Jersey, I never bumped into such a club. When we moved to Virginia, I joined the Vienna Wireless Society and I felt transported back in time. In fact, the VWS is better than the NY club because it has a bunch of very active members, runs good Field Day outings, and is in some other contests. It also runs the "Winterfest" hamfest and actually has a few young members. In addition, it runs a couple of good repeaters and is active in various ARES activities. Also, the Vic Clark Chapter 91 of QCWA is a very active chapter.

—73, Dave Wiesen, K2VX

Car Care

The following letters are in response to K4TWJ's two paragraphs in his May "World of Ideas" column on keeping your car—as well as your mobile ham station—neat and clean.

Editor, *CQ*:

Remember, you are a magazine devoted to amateur radio, not polishing one's vehicle. It's bad enough you continue to rehash old articles, but how to polish a car?? That takes the cake. Really too bad *QST* isn't available here in Canada. Have fun with your car . . . er ham radio magazine. I have read my last copy. —Max Donoghue, VE3TMT

Dear Max,

First of all, we don't rehash old articles. We do revisit certain topics periodically, as new hams come along who need to learn about them for the first time, and there are old-timers who benefit from the review as well (though most would never admit it). Regarding Dave's column, the "car care" segment included only two paragraphs at the end of the column, along with a few photos. Hardly enough to qualify us as a car magazine. Read on for a different point of view...

Hi Dave,

I liked your HF article but (probably unlike most...) I liked your car more! Blue Camaro! Nice! What year is it? Z28 or base model? But where do you mount a radio in it?? I just bought a 1998 Z28 six speed and went to mount my front-mount Motorola Radius UHF radio in it—arrgggh! No room! LOVE the car but. . . . .

—Scott, N1KXT

BPL Matters

The following letter was to author Gary Pearce, KN4AQ:

Hi Gary,

I just read your article "BPL Primer: How Do I Know What I'm Hearing?" in the May issue. Very FB. I spent several weeks reading everything I could find (on BPL) and you covered all that quite well in summary.

It became very obvious from reading your piece that BPL is even more expensive than I realized, probably the most expensive broadband solution, and that's without all the linesmen and service people who will get tied up in its problems with real world implementation. All for a solution that cannot compete today, much less in the future.

BPL will fail here just like it did in the other countries, and just as quickly. But the sense of betrayal by the FCC is the hardest thing for me to accept over the entire issue. You will notice that they required the stations to identify on those "Earth station" 3-Gig frequencies, yet felt no need to for HF. Nice to know where you stand. Despite the best efforts at the FCC to hand over the HF spectrum to the special interests, they will fail. I only hope that the HF spectrum never seems appealing to said special interests again anytime soon. —Don Rasmussen

KN4AQ replies:

Thanks, Don. I'd like to believe that economics will bring BPL down. I don't have much expertise there, though bad ideas have gathered lots of startup money before, and some of them keep limping along. Still, we're aiming our complaints toward making Progress Energy feel it in their wallet. We want them to know just how much effort (money) will have to go into "interference mitigation" before they commit.

Contest Calendar *(from page 90)*

The response to my request was absolutely amazing. In fact, it was actually overwhelming, and within 48 hours I had a wheelchair plus several hundred dollars in cash donations to cover the shipping. I actually had to cut off the donations once the shipping costs were covered. The donations came from all over the country and even from a ham in DL who has a relative in J7. Here was my reply to the contest community:

"Thanks to the generosity of hams in the US and DL, a wheelchair was delivered yesterday to Lambert, J73LC, for his ailing mother in Dominica. Ten generous hams stepped forward with cash donations and another with a nearly new wheelchair that was shipped to Miami for air delivery to J7. They made a difference. The fellow who donated the wheelchair told me his mother had used it until she passed away last October. She had been very supportive of ham radio and would think it fitting that her wheelchair would go on a DXpedition to help someone else who loves the hobby.

"God Bless you all. 73, George, K5KG"

I think enough has been said on this one. Thank you contesters!

Final Comments

Thanks in advance for taking the time to respond to this year's survey. Your answers (and comments) are invaluable in helping guide the future editorial direction of this column. I encourage you to respond and pass the survey along to your friends and club members. With the capability of submitting your responses via the internet (http://hamgallery.com/survey), the time to participate takes only a matter of minutes. Feel free to include either the survey itself or the internet link in your club's next newsletter. Increased participation will make this a better survey!

73, John, K1AR

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