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Hy-gain verticals go up easily with just
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Two year limited warranty.

AV-18HT \$949.95 (10.12.15.20.40.80 M.

AV-18HT, \$949.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.

Standing 53 feet tall, the famous Hy-Gain HyTower is the world's best performing vertical! The AV-18HT features automatic band selection achieved through a unique stubdecoupling system which effectively isolates various sections of the antenna so that an electrical 1/4 wavelength (or odd multiple of a 1/4 wavelength) exists on all bands. Approximately 250 kHz bandwidth at 2:1 VSWR on 80 Meters. The addition of a base loading coil (LC-160Q, \$109.95), provides exceptional 160 Meter performance. MK-17, \$89.95. Addon 17 Meter kit. 24 foot tower is all rugged, hot-dip galvanized steel and all hardware is iridited for corrosion resistance. Special tiltover hinged base for easy raising & lowering.

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AV-14AVQ	\$179.95	10,15,20,40	1500 W PEP	18 feet	9 pounds	80 MPH	1.5-1.625"
AV-12AVQ	\$139.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	\$119.95	10 - 80 M	1500 W PEP	18 feet	4 pounds	80 MPH	1.5-1.625"
DX-88	\$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	\$449.95	10 - 40 M	1500 W PEP	29 feet	25 pounds	60 mph no guy	1.5-1.625"

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Prices and specifications subject to change without notice or obligation. ** Hy-Gain*, 2010.

Busy Hurricane Season Predicted

The National Oceanic and Atmospheric Administration's Climate Prediction Center says it anticipates a busy Atlantic hurricane season this year (the Atlantic hurricane season began on June 1). The center says it is likely that there will be 14 to 23 named storms, of which 8 to 14 may develop into hurricanes (with sustained winds above 73 miles per hour), and 3 to 7 may become major hurricanes, of category 3 or higher (out of 5). NOAA is the parent agency of both the National Weather Service and the National Hurricane Center.

Ham radio operators will again activate station WX4NHC at the National Hurricane Center this year, beginning the fourth decade of a formal relationship between amateur radio and the NHC. Hams in areas threatened or affected by tropical storms or hurricanes are encouraged to gather and relay information to the Center through WX4NHC. The Hurricane Watch Net on 14.325 MHz is activated whenever a tropical storm or hurricane in the Atlantic basin threatens to hit land. WX4NHC may also be contacted via Echolink and IRLP, using Echolink's WX-Talk conference room (node 7203) or IRLP node 9219. See <www.wx4nhc.org>, <www.hwn.org>, and <www.voipwx.net> for more details.

WX4NHC and its contributions are being featured on the National Hurricane Center's Hurricane Preparedness Observations web page at http://www.nhc.noaa.gov/HAW2/english/forecast/observations.shtml>.

Hamvention Attendance Continues to Recover

After hitting a low of 17,253 in 2008, attendance at the Dayton Hamvention® was up this year for the second straight year, according to the Dayton Amateur Radio Association. DARA says 2010 attendance was 19,750, up nearly 900 from 2009 and up 2500 from 2008. The highest attendance ever at Dayton was 33,669 in 1993, according to DARA.

W3BE Proposes Bringing Back Disaster Radio Service

John Johnston, W3BE, who spent years administering the Amateur Radio Service at the FCC before retiring, has proposed creating a new Disaster Radio Service—made up entirely of licensed amateurs—to operate during disasters and drills without regard to whether an operator is paid or employed by the agency on whose behalf he/she is operating. The Notice of Proposed Rule Making suggests that the DRS follow the MARS (Military Auxiliary Radio System) model of using hams as its operators and frequencies shared with or near current ham allocations. Since all operators would hold ham licenses, licensing in the proposed DRS would be by rule, and no separate licenses or callsigns would be issued. At press time, the FCC had not responded to the petition.

No Signals from Satellite Headed for Venus

Initial joy over strong signal reports from a ham satellite on a journey to Venus have been tempered by the
satellite's silence after the first day of transmissions. The
UNITEC-1 satellite was built in Japan and was designed
to help hams and universities "develop their capabilit(ies)
to receive ... interplanetary signal(s)," according to the
AMSAT News Service. The first round of signals on May
21 were the only ones received, however, and at press
time a month later, the satellite remained silent. Updates
(if any) are available on the UNITEC-1 website at
">http

South African Hams on Standby During World Cup Games

The South African Radio League's "Hamnet" emergency communications organization was on standby to provide backup communications across the country during the World Cup soccer (football) tournament held there in June and July. "Every city in every province has its own arrangements," according to a Hamnet bulletin, which reminded hams that "you are not expected to man any station anywhere... Your role is merely to be on standby should we need you at a specific point. Should a call out come, we will place people who live closest to the point where you are required to possibly pass information to the (Joint Communication Centre). Hence 2 metres will be the preferred mode of transmission."

FCC Proposes Massive Overhaul of Part 95

The FCC in early June released a 92-page Notice of Proposed Rule Making aimed at streamlining and reorganizing the rules for the personal radio services covered under Part 95 of the Commission's rules. These services include CB, GMRS (General Mobile Radio Service), FRS (Family Radio Service), MURS (Multi-Use Radio Service), and others. Highlights of the proposal include a recommendation to eliminate individual station licenses for GMRS, allow transmission of GPS location information on GMRS channels, and ban the inclusion of FRS capability on radios intended for use in public safety services. The NPRM also asks for comments on whether the widely-ignored distance restriction on CB contacts is still necessary and whether the rules should specifically permit the use of hands-free microphones for CB transceivers. The complete NPRM may be found on the FCC's website. It is WT Docket 10-119.

FCC Goes After Ham Bootlegger, Overpowered CBers

FCC Special Counsel Laura Smith continues to chase down alleged rulebreakers in both the amateur and CB services. In one rather bizarre case, she charges that a Matthew J. Lapham is illegally operating on the ham bands as KC5RLU, which is licensed to Matthew A. Lapham of Baker, Louisiana. The real KC5RLU, Smith says, is currently serving in the U.S. Air Force in Iraq. No word on whether the two Matthew Laphams are related.

Also in early May, Smith cited seven CBers for allegedly using excessive power and, as a result, causing interference either to neighbors' home electronics, other CBers or, in one case, the 10- and 12-meter ham bands. While these letters are made public, responses from the individuals cited generally are not.

China's President Watches Ham Satellite Contact

Chinese President Hu Jintao visited the amateur radio station at the China Science and Technology Museum in Beijing on May 31 and, according to the AMSAT News Service, watched and listened as several children made contacts via the Chinese-built HO-68 amateur satellite. ANS quotes Michael Chen, BD5RV/1, one of five hams accompanying the president, as saying that President Hu "encouraged (the children) for further activities and confirmed the positive effects of amateur satellites."

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.



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features

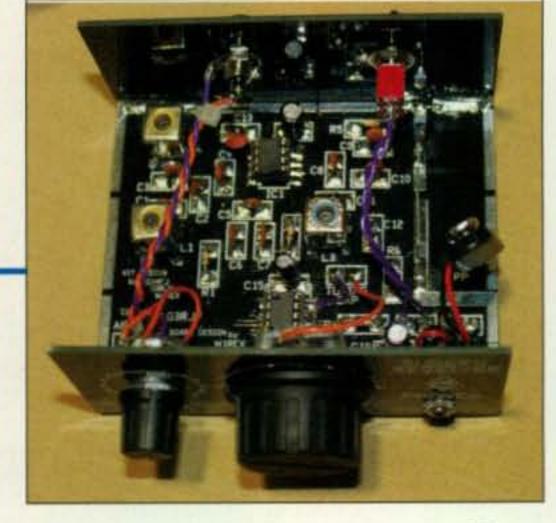
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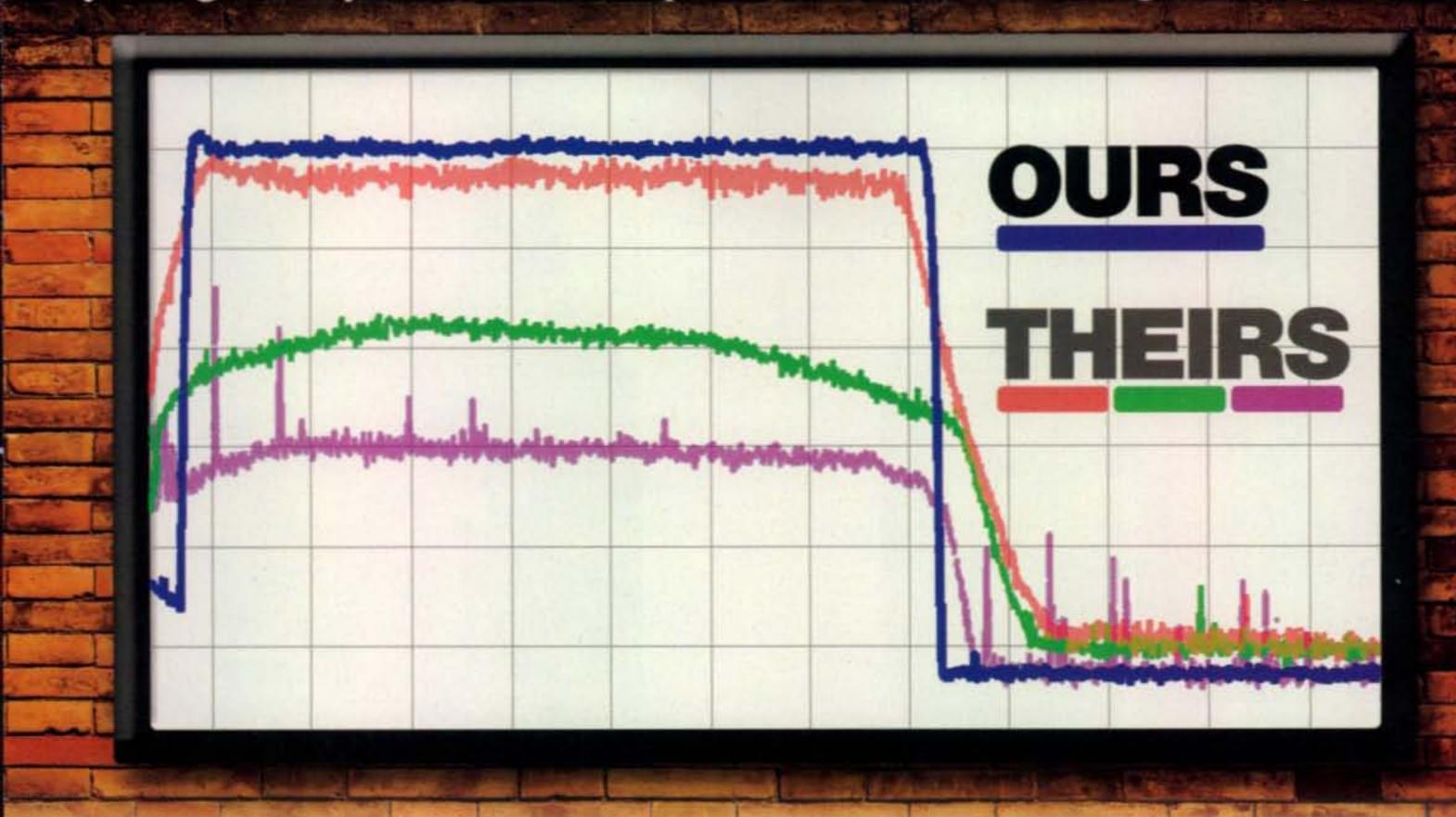
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brick wall /brik - wôl/ - noun

anything or anyone that is impenetrable, unrelenting, or unyielding



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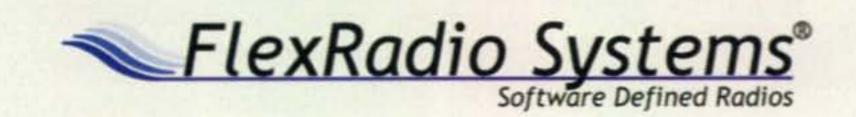
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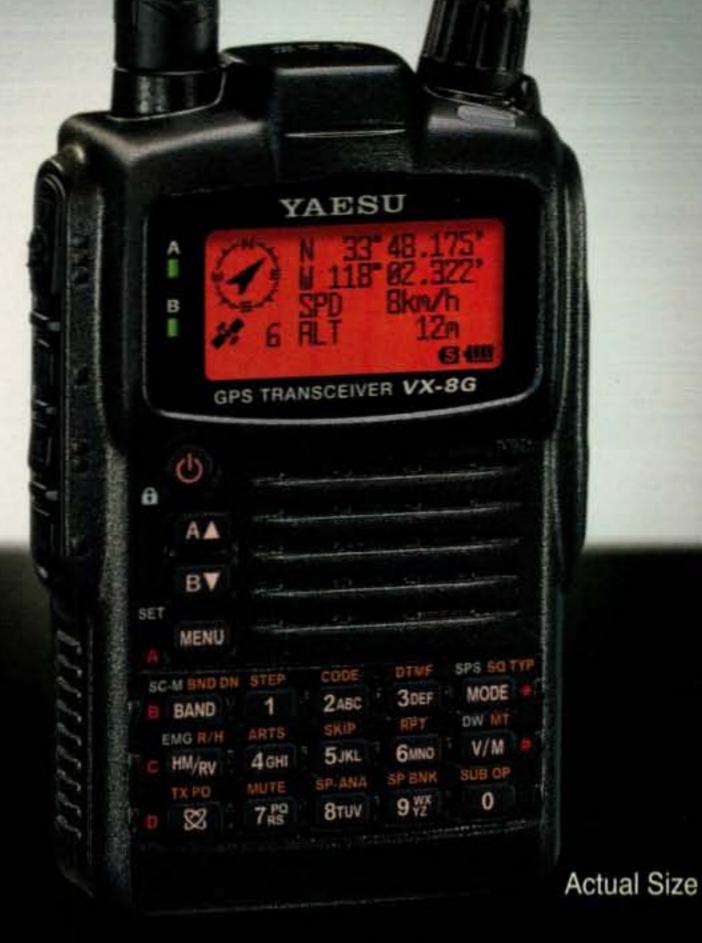


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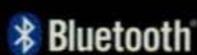


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BY RICH MOSESON,* W2VU

Still "Successfully Dying" After All These Years

he drumbeat of misinformation continues unabated among many of our fellow hams—"Ham radio is dying." "Our numbers are dropping."— often including hams who convey this "information" to the news media, which unknowingly reinforce the perception among the general public that ham radio is on its way out.

Fact¹: As of May 31, 2010, there were 691,982 active licenses in the FCC amateur radio database. After adjusting for a change in the way the FCC kept track of its statistics back in 1997, this represents the all-time high number of amateur radio licensees.

Fact²: As of June 18, 2010, nearly 17,000 new people had joined the ranks of amateur radio licensees so far this year. This is 3000 people more than the same point last year (a record-setting year for new hams), and 600 people more than became hams in the entire year of 2005.

But Are They Active?

A few weeks ago at Ham-Com in Texas, a ham asked me where I thought the hobby was heading. I said I believe the future looks bright and that we are at or near our all-time high number of licensees (I didn't have the above stats handy at the time).

"But how many of them are active?" he responded.

"That's the \$64,000 question," I said, adding, "and that answer depends on how you define active."

"Well, I judge by the number of lookups a person has on QRZed," he replied. "The more lookups they have, the more active they are."

His method is valid ... to a point. A high number of lookups on QRZ.com probably does indicate a high level of on-air activity, but more specifically, it generally indicates a high level of HF activity, for which QSL cards are most commonly exchanged. On the other hand, the ham who is very involved in his local radio club, participates regularly in public service and emergency communications, and maybe helps keep the club repeater on the air ... but isn't on HF very much ... may not meet the "QRZ standard" for being considered "active."

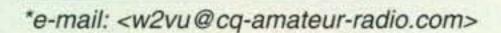
Neither would the ham whose main activity involves talking with longtime friends in different parts of the world, who don't need his QSL card and wouldn't need to look him up on QRZ, even if he talked on the air with them every day or every week.

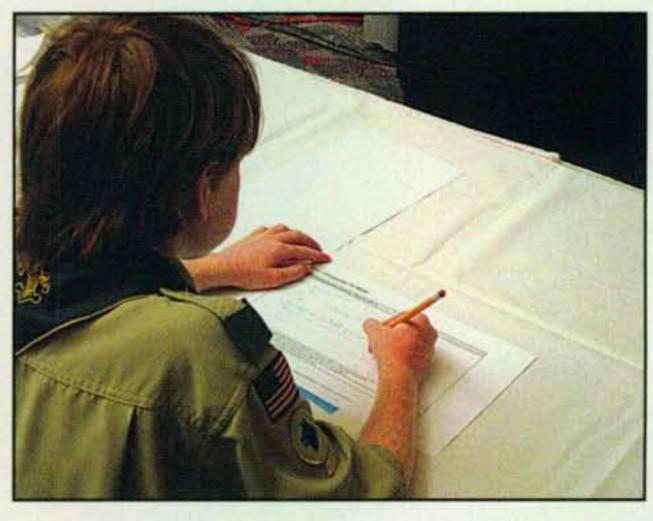
Neither would the ham whose primary interests lie in experimenting, designing, and building new things, and whose on-air activity may be limited to testing out a new piece of gear or some new software. This amateur may be actively advancing the radio art, but might not be considered "active" based on his number of QRZ lookups.

The FCC used to have an activity standard for renewing your license. Back in the day, you needed to show you had been on the air for minimum amount of time in order to qualify for renewal³. It was an arbitrary standard, to be sure, but a standard nonetheless. This requirement went away in the late 1970s, though, and since then, the definition of an "active" ham has been subject to wide interpretation. The fact is that activity levels are difficult to quantify, or to qualify, which is why we have to rely on licensing statistics to assess the health of the hobby. So let's look at some licensing statistics:

Crunching the Numbers

There is widespread agreement that the so-called "gold-





More than 130 Scouts from the Dallas area attended a daylong Radio Merit Badge course at the Ham-Com hamfest in June. All of them learned about ham radio and four went home with licenses.

en age" of ham radio was in the 1950s and 1960s, when American-made equipment dominated the market for commercially-built gear and when solid-state technology had not yet made enough inroads to displace tube gear and discrete components, making it still quite feasible for individual hams to build and repair their own radios. No fancy microprocessors, no microscopic surface-mount components. Real components and real tubes for real radios built by real hams.

In 1960, according to ARRL statistics, there were 227,500 "real hams" in the United States. Let us assume, since this was the Golden Age, that every one of those 227,500 hams was active on the air on a regular basis, easily meeting the FCC activity requirement.

Now let's look at 2010, as ham radio suffers through its supposed death-throes. Let's say that only one-third of our current roughly 700,000 licensees are actually active on the air on a regular basis. Let's see... that's 700,000 times point-3-3-3... and that comes out to ... 233,100, or over 5000 more active hams today than the total number of licensed hams in 1960. If we make the numbers a little more realistic and assume that "only" 75% of 1960 hams were active and that 50% of today's hams are active (by whatever definition you choose), that would give us approximately 346,000 active hams now vs. 170,625 in 1960, or roughly double the number of active hams today than in the so-called Golden Age.

It is oh-so-clear that ham radio is dying. Another fact is that old-timers have been predicting the imminent death of ham radio ever since it came back from the dead at the end of World War II. It's never been quite the same as it was in the past, and the operators just aren't like they were in the good old days. Ham radio was going to be killed off by, successively, the Novice and Technician licenses, CB, computers, cell phones, the internet, and social networking. Each of these supposed threats has, in fact, contributed to its vitality. I will repeat once again—for the benefit of the 100,000+ new people who have joined our ranks in the past four years and haven't heard my favorite slogan before—"Ham radio: Successfully dying for more than 60 years."

(Continued on page 10)

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HAM-IV

The most popular \$64995 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

HAM-IV

grease permits normal operation down to -30 degrees F. New alloy ring gear gives extra

strength up to 100,000 PSI for maximum reliability. 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 21/16 inches.

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

HAM-V



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, \$109.95. Heavy duty mast support for T2X, HAM-IV and HAM-V. MSLD, \$49.95. Light duty mast support for CD-45II and AR-40.

TSP-1, \$34.95. Lower spacer plate for HAM-IV and HAM-V.

Digital Automatic Controller



Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1º accuracy, 8-sec. brake delay,

\$74995 choice for center of rotation, crisp plasma display. Computer controlled with many logging/contest programs.

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 \$1229⁹⁵ bearing strength, electric lock-

with DCU-1 ing steel wedge brake, North or South center of rotation scale on meter, low voltage control, 21/16 inch max. mast. TAILTWISTER Rotator Specifications

T-2X

T-2XD

Wind load capacity (inside tower) 20 square feet Wind Load (w/ mast adapter) 10 square feet Turning Power 1000 in.-lbs. **Brake Power** 9000 in.-lbs. Brake Construction Electric Wedge Triple race/138 ball brngs Bearing Assembly Mounting Hardware Clamp plate/steel U-bolts Control Cable Conductors 31 lbs. Shipping Weight Effective Moment (in tower) 3400 ft.-lbs. AR-40

AR-40

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. 21/16 inch maximum mast size. MSLD light duty lower mast support included.

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

AR-35 Rotator/Controller



For UHF, VHF, 6-\$8995 Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

NEW! Automatic Rotator Brake Delay RBD-5

29⁹⁵ 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.

For antenna CD-45II arrays up to 8.5 \$44995 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 21/16 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	600 inlbs.	
Brake Power	800 inlbs.	
Brake Construction	Disc Brake	
Bearing Assembly	Dual race/48 ball brings	
Mounting Hardware	Clamp plate/steel U-bolts	
Control Cable Conductors	8	
Shipping Weight	22 lbs.	
Effective Moment (in tower)	1200 ftlbs.	

HDR-300A

HDR-300A King-sized anten-\$149995 na 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. Heavyduty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

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

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The following Special Event stations are scheduled for August:

W1H, in commemoration of Hiram Percy Maxim, W1AW, who married the daughter of the governor of the State of Maryland and is buried in Hagerstown, MD's Rose Hill Cemetery; Antietam Radio Association (W3CWC) on Aug. 14–15. Frequencies: 14.290, 7.178, 3.902 MHz ±QRM. Also on W3CWC's two repeaters. Special QSL card for an SASE and contact information sent to WA3EOP (address available at QRZ.com) or to: W3CWC, Antietam Radio Association, P.O. Box 52, Hagerstown, MD 21741.

K5R, 5th annual special event station K5R to commemorate the anniversaries of Hurricanes Katrina and Rita, Hammond, Lousiana; Southeast Louisiana Amateur Radio Club (SELARC); Aug. 28 and 29 from 1400–2000 UTC each day. Club members will be operating on 7.250 and 14.250 MHz (±QRM), and also in other areas of the general portions of the HF bands. Send an SASE for a QSL to: SELARC/K5R, P.O. Box 1324, Hammond, LA 70404. More information: http://www.selarc.org or on the Yahoo group site: http://groups.yahoo.com/group/K5R.

K8FBN, from the 29th Annual Sweet Corn Festival, Fairborn, Ohio, Aug. 21 and 22. Operations on 75, 40, and 20 meters SSB and PSK-31. QSL to K8FBN, 36 E. Routzong Drive, Fairborn, OH 45324.

W8AL, from the Pro Football Hall of Fame Festival, Canton ARC; Aug, 5–8 from 1300–2400Z each day on 7.265 and 14.265 MHz. For unfolded certificate send 9 € 12 SASE to Donald E. Perry, WQ8J, 968 Culverne Ave. NW, Massillon, OH 44647.

. The following hamfests, etc., are slated for August:

Aug. 21–22, Huntsville Hamfest & ARRL SE Division Convention, Von Braun Center, Huntsville, Alabama. For details go to: <www.hamfest.org>. See us at the CQ Booth.

Aug. 22, **Denver Radio Club Hamfest**, Jefferson County Fairgrounds, Golden, Colorado. (Talk-in 145.490 or 448.625 [both 100 Hz]; exams 10 AM). Contact Bryan Steinberg, KBØA: <drcfest@w0tx.org>.

Aug. 22, 2010 East Central illinois Hamfest, Vermilion County Fairgrounds, Danville, Illinois. Contact Kathy Tucker, KD5GPR, e-mail: <gkt6399@aol.com>, phone: 217-765-2098; <www.vcarahamfest.info>

Aug. 28, Owen-Monroe Amateur Radio Hamfest, Owen County Fairgrounds, Spencer, Indiana. Co-sponsored by Owen County ARA and Bloomington ARC. Contact Katie Smith, K9INU, e-mail: <k9inu@arrl.net>, phone: 812-829-2149. (Talk-in 146.985, 136.5 PL; exams 1 PM)

Aug. 28–29, Boxboro ARRL New England Convention, Holiday Innn, Boxborough, Massachusetts. For details go to: <www.boxboro.org>. See us at the CQ Booth.

Aug. 28–29, The Kansas QSO Party, CQ KsQP. Information: http://www.ksqsoparty.org/.

zero bias (from page 8)

A Great Idea

Oh, and as far as all those kids who are no longer getting interested in ham radio, Ham-Com featured a day-long Radio Merit Badge program for Scouts from throughout the Dallas area. More than 130 boys attended and virtually all earned their merit badges and got an introduction to ham radio through not only their lessons and demonstrations, but also through their free admission to the hamfest.

Plus, the hamfest committee agreed to pay the exam fee for any Scout who studied ahead of time and came to the show with proof of having scored at least 80% at least three times on online practice tests. Four young men brought in the required paperwork, and all four went home at the end of the day as newly-licensed amateurs. Congratulations to them, and to the Ham-Com committee for such a wonderful idea. May you be widely copied, to help make sure that ham radio continues "successfully dying" for at least another 60 years.

73, W2VU

- 1. Courtesy Joe Speroni, AHØA, <www.ah0a.org>; May is the last full month for which statistics were available at press time.
 - 2. Courtesy Allen Pitts, W1AGP, ARRL Media Relations Director
- 3. In 1970, Section 97.3 of the FCC rules said a ham seeking to renew a license needed to be able to demonstrate a minimum of 2 hours of operating time in the 3 months preceding the renewal application, or a minimum of 5 hours in the preceding 12 months. The rules at the time also required all transmissions to be logged.

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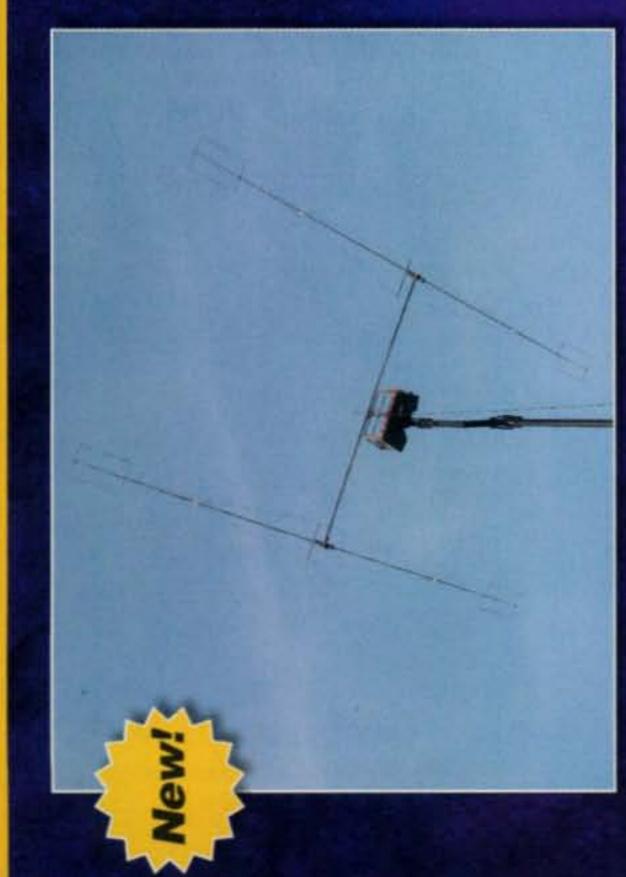
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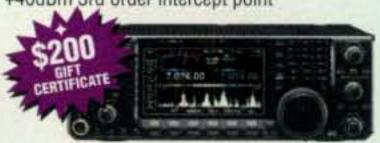
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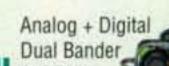
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Many contest DXpeditioners head south, to warm, sunny, places such as the Caribbean or the Canary Islands. But not these guys ... (they may get cold, but they rack up pretty impressive scores!)

"From Zone 2 Canada, This is VE2DXY" Operating a Contest DXpedition for CQ WW SSB

BY ANDY VAVRA,* KD3RF/VE2DXY and IRWIN DARACK,† KD3TB

VE2DXY's antennas at sunset, looking out over the St. Lawrence River. (All photos courtesy of the authors)

ur families, friends, and neighbors think we're crazy
... and maybe we are. Who in their right mind would
travel 1,000 miles from home to operate an amateur
radio contest from a northern location where it's cold and
there is snow and ice? Why not head south to some warm
Caribbean country where you can drink piña coladas and lie
on the beach?

Sun, sand, and surf are great, but for our contesting team it's the friendship, the challenge, the pile-ups, the spirited competition, and the warm Canadian hospitality that bring us back year after year to Zone 2 in northern Canada.

The VE2DXY Zone 2 contesting team is made up of a dedicated team of experienced operators from the Philadelphia area. Our core group consists of Andy Vavra, KD3RF/VE2DXY, Irwin Darack, KD3TB, and Bill Ballantine, K3FMQ. In 2009 two new operators joined the team—Ken Nicely, N3PSJ, and Sebastian Jean, VE2GTZ. Andy, Irwin, Bill, and Ken all are members of the Frankford Radio Club, a club dedicated to improving contesting performance.

Why Zone 2?

The definition of rare DX is the contact your buddy made that you didn't, and with that thought in mind our goal has always

East Malaysia using Irwin's callsign 9M6TBT. At the end of the 2001 contest there were only two areas of the world we did not work, Zone 2 and Zone 33, and our thinking was that many other amateurs must have missed getting Zone 2 into their logs as well.

Zone 2 is a rare zone in northeastern Canada (see sidebar "What's So Rare About Zone 2?") and a highly desired multiplier in the CQ WW contests, and we have been thanked on the air numerous times for activating it. Zone 2 is also a rare zone for CQ's Worked All Zones award. The thanks we

receive are extremely gratifying, but we also get something

from the operation itelf, as it gives our team the opportunity

to be rare DX - a station everyone else wants to contact. If

you have never operated from a highly desired location or

been on the receiving end of a pile-up, you have to experi-

been to help put Zone 2 in the logs of as many fellow ama-

teurs as possible. Although our team has activated Zone 2

seven times since 2002, our inspiration actually came from

the tropics during CQ WW SSB 2001, when we operated from

ence it at least once to be able to understand what we mean. Traveling to Zone 2 was an easy choice when we were looking for a contesting location. Although it is in a northern climate and does not have the trans-equatorial propagation the Caribbean power-house stations benefit from, it is an enjoyable destination, relatively easy to reach by car, and in a safe, politically stable country with a warm and friendly population.

With some research, and help from our friends in Canada, we identified a spot north of the 50th parallel and in 2002 our first DXpedition was born. Except for taking a year off in 2003 when we operated from Antigua with the Frankford Radio

^{*111} Collins Lane, Schwenksville, PA 19473 e-mail: <kd3rf@arrl.net>

^{†2002} Country Club Drive, Doylestown, PA 18901

e-mail: <kd3tb@arrl.net>



The VE2DXY contesting team: from left, Andy Vavra, KD3RF/VE2DXY; Sebastian Jean, VE2GTZ; Bill Ballantine, K3FMQ; Irwin Darack, KD3TB; and Ken Nicely, N3PSJ.

Club at V26DX, we have returned to Zone 2 every year since, handing out contacts to other contesters worldwide for this much-needed part of the world.

We carry everything with us on a trip to a location that takes nearly 20 hours behind the wheel to reach. It's an exhausting trip, but not without its rewards, as we travel through some of the most rugged and beautiful country in the northeastern U.S. and Canada to reach our destination. Each year's trip is different and has its own unique challenges, however, and in the pre-dawn darkness of October 23, 2009 we crawled along for more than three hours in near whiteout conditions during an early season snowstorm in the mountains north of Quebec City.

Although the weather can be less than cooperative in late October, the scenery along the way is breathtaking and makes the effort worthwhile. We cross deep river gorges by ferry boat, and travel along mountain ridges and through small rural towns and fishing villages as we make our way along the northern banks of the St. Lawrence River. We have seen whales and eagles in their natural settings, and keep a sharp lookout for moose and bear that

would be disastrous if we collided with one with while en-route.

Going Portable

In many respects the mini DXpedition that we do each year to activate Zone 2 for the contest has a lot in common with other, more exotic DXpeditions you may have read about. We never leave North America, but travel more than 1,000 miles from home and bring everything we need for a "Field Day" style portable operation: rigs, amplifiers, antennas, masts, feedline, tools, and spare parts. We set up everything onsite the day we arrive and take it all down again on Sunday night after the contest is over. Checklists and customs forms are prepared in advance and everything is carefully packed.

Just like the larger DXpeditions that travel by air to more exotic destinations and have baggage and weight limitations for what they can carry, we also have to be prudent about how much equipment we take on the trip. Everything has to fit in one vehicle, and for economy of space, ease of setup, and operating consistency between stations we adhere to the principles of "keep it simple" and configure our multi-

2 operation with identical radios, antennas, computers, and logging software. By following this approach it is much easier for the operators not to have to learn a whole new setup when changing positions during the contest.

Improving Results: A Constant Effort

Over the past eight years we have constantly worked at improving our results, meeting as a team months in advance to decide what we will do in terms of operating skills, transmitting and receiving equipment, antennas, and logging software in the coming year. CQ WW SSB 2009 was no exception. In fact, we ended up with brand new transceivers and antennas.

We upgraded our rigs to Elecraft K3s in order to resolve intrastation interference problems. We got the bonus of improved sensitivity and selectivity that let us pull many more weak stations out of the noise. At the other end of the feedlines, we replaced all but one of our ground-mounted verticals (which had been suffering interference from an industrial plant across the river) with full-wave loops and wire beams.

Based on the results we experienced in 2009, we are now convinced that full wave loop antennas are the way to go for our treeless location in Zone 2. In 2010, we will be equipping the station with a homebrew two-element quad for 10 and 15 meters, a two-element Vee Beam for 20 meters, single-element delta loops on 40 and 80 meters, and an inverted L antenna for 160 meters.

The Effects of Propagation

Each year, we compare our logs with previous year's contacts, looking for areas of similarity and difference between solar activity, the number of contacts, countries and zones we have worked. During the post-contest season, we review the comparisons, and discuss ideas for improving our results in future contests.

Despite somewhat weak propagation our overall score in CQWW SSB 2009 was higher than ever achieved in previous years. When you take into account the benefits gained from the lower noise, higher efficiency loop antennas we used in 2009, improved radios and a moderate improvement in the solar flux, it becomes apparent why our numbers of contacts, countries and zones increased. [For a detailed analysis of how solar conditions affected our propagation, see "Digging Deeper -- Solar Flux, the A-Index and CQWW



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What's So Rare About Zone 2?



Co-authors Andy Vavra, KD3RF/VE2DXY, and Irwin Darack, KD3TB, celebrate crossing the 50th parallel at Port Cartier, northern Quebec, officially entering CQ Zone 2.

Back in 1934, the editors of *R/9* magazine, a predecessor of *CQ*, announced the Worked All Zones award for which they divided the world into 40 geographic zones. These zones also constitute multipliers (along with countries) for the CQ World-Wide DX Contest. Some zones are easier than others to contact. One of the more difficult is Zone 2, designated as the "Northeastern Zone of North America." It is difficult because even though it is quite large geographically, it is quite sparsely populated. Here is the official description from the WAZ Award Rules:

Zone 2. Northeastern Zone of North America: VO2 (Labrador), the portion of VE2 Quebec north of the 50th parallel, and Nunavut Territories east of 102 degrees (includes the islands of King Christian, King William. Prince of Wales, Somerset, Bathurst, Devon, Ellesmere, Baffin, and the Melville and Boothia Peninsulas, excluding Akimiski Island, Bear Islands, and East Pen Island in Hudson Bay).

If you look at a zone map, such as the one at http://www.hamatlas.eu/waz/Strefy_mapy/World_2.jpg, you will see that the vast majority of Quebec's population is in Zone 5, south of 50° north latitude. So in order to work Zone 2, the person you contact must be either in Labrador, the eastern portion of Nunavut, or in Quebec north of the 50th parallel. According to WAZ Award Manager Floyd Gerald, N5FG, one of the most common errors in award applications relates to contacts claimed for Zone 2 with stations that were actually in Zone 5 (a complication is that some Zone 5 stations in northern Quebec mistakenly think they are in Zone 2).

Propagation from Zone 2" on the CQ website. Follow the link from the August 2010 highlights page.]

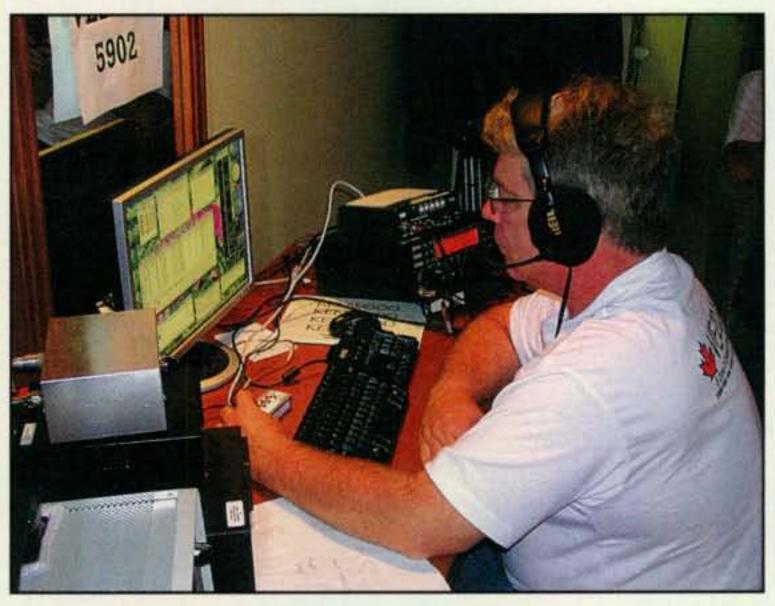
Going Beyond Amateur Radio

Something we did differently for the VE2DXY DXpedition in 2009 is an idea we would like to suggest to the amateur radio community: Publicize *your* event, no matter how small or modest. What started for us as a personal website at http://www.wix.com/andyvavra/VE2DXY quickly turned into a full-fledged on-line presence that gained notice from the non-amateur community and has received comments from all over the world. More information about the VE2DXY Zone 2 CQ WW SSB Contest DXpedition, including a daily blog of our activities, a link to a YouTube video from our 2008 DXpedition, links to online logs, and brief bios can be found at our website.

However, we didn't stop there, because back in the middle part of 2009 Hewlett-Packard solicited entries for the "HP in Real Life" website from people who had unique stories to tell about how they were using HP computers. We submitted



New team member Ken Nicely, N3PSJ, happily engages his first pileup as a rare zone in CQ WW SSB.



"Listening this frequency and 7.43," Andy Vavra, KD3RF/ VE2DXY operates 40 meters split during the late night shift.

a story about VE2DXY and amateur radio, and were pleasantly surprised when HP's advertising agency got in touch with us to let us know that we were selected as one of three (now five—ed.) stories to be presented on the HP website at http://www.hp.com/united-states/reallife/hamradio.html. We were interviewed about amateur radio and our experiences operating from Zone 2, and how HP's products were helping "Bring Voices to Quiet Corners of the Earth."

The attention from HP is a testament that amateur radio can still generate interest and awareness in the general public when it is presented in the right ways. Showing how we connected technology—from controlling our radios via computer links, to logging, to internet packet spotting networks—was fascinating to HP and its advertising agency. Be sure to visit both websites, and leave a note for us in the comments area of the VE2DXY website if you like what you see.

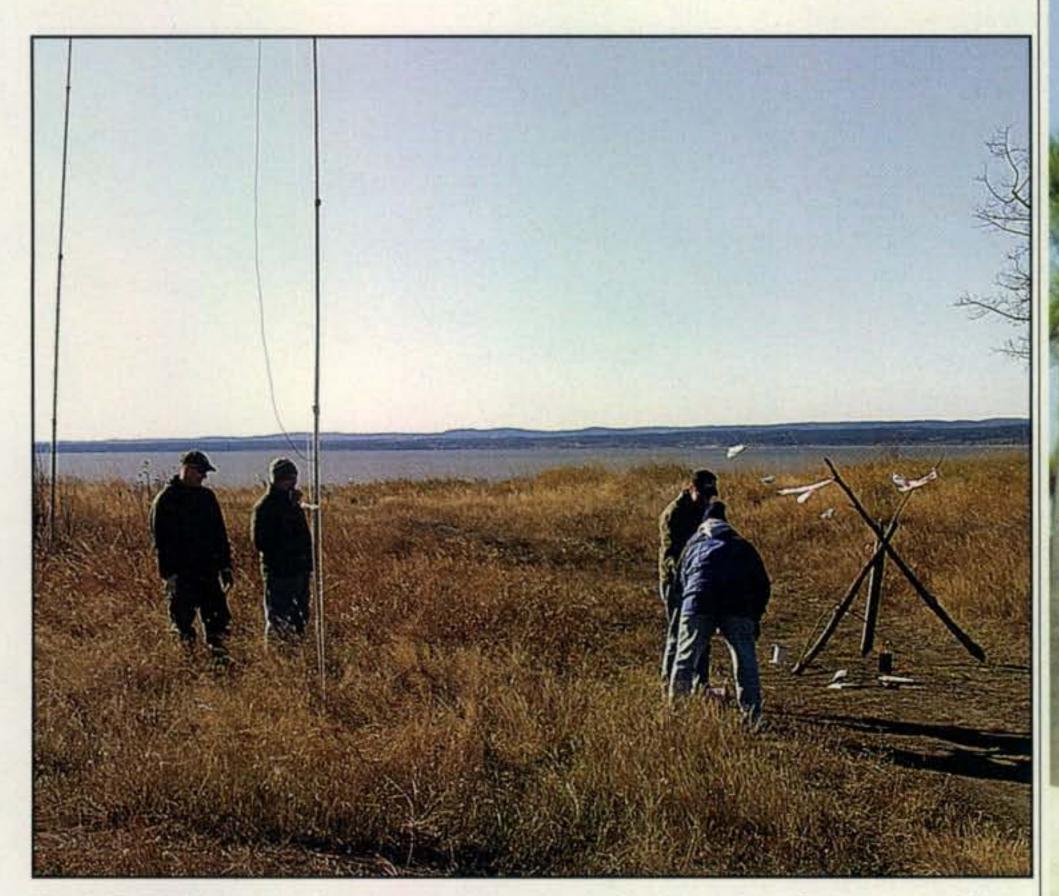
Conclusion

It may be tempting for readers to think of this article as a checklist to follow for a mini-DXpedition of your own, but it is nothing more than a description of our experiences and what worked for us. Preparation and planning are critical

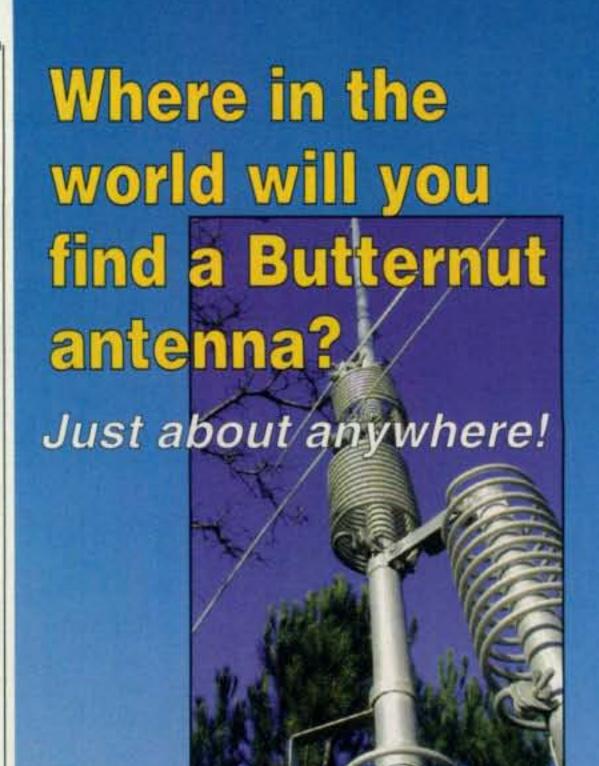
elements of any DXpedition, and contesting from a rare location can be both fun and rewarding, but can be a disaster if you are not properly prepared, especially once you go outside of your home country. Your results and experiences will definitely be different.

It has taken us eight years to get to where we are now. We learned the hard way, from how to get through Homeland Security and U.S. Customs to functioning in a part of the world that does not speak our native language, and from fixing antennas in freezing rain during a howling nor'easter to tearing amplifiers apart during the contest to repair defective relays and failed bias circuits. Thus, learn from our experiences, and whether you have in mind a mini DXpedition, an IOTA, or a VHF rover that you want to try, start modestly and be prepared, but most of all have fun doing it!

Contesting and DXing are great ways to learn new skills, improve your station, make new contacts, and work new countries and zones. You don't have to be a big gun or in a rare location to have a good time. Therefore, when the next contest comes along, turn on your radio and make a few contacts, even when poor propagation, modest stations and antennas, limited budgets, and common beliefs say otherwise.



The VE2DXY antenna farm overlooking the north shore of the St. Lawrence River. The river, which is tidal at this point, contains enough salt water as a ground plane to provide an excellent path over water to the US and the Caribbean.



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Many radio clubs sponsor basic ham radio licensing courses. Far fewer run upgrade classes. Here are some tips from Gordo for organizing an outdoor, hands-on course for already-hams.

Organize Your Own Backyard Upgrade Class

BY GORDON WEST,* WB6NOA

he path for Technician Class operators to upgrade to General Class has been easier since the FCC eliminated the Morse code exam for all license classes. However, upgrading still takes a lot of study, and a formal class with trained mentors can be very helpful.

Renting a classroom for ham radio training can be expensive, though, and neighborhood community centers likely will ask for expensive insurance policies as well. Rented facilities may also have little to no outside access for live antenna demos. Therefore, how do you make an upgrade class affordable, educational, and fun? The answer? Take it outside during warm-weather months in a cooperating club member's backyard!

With required home study and workbook completion before class, a weekend Technician-to-General upgrade class will be *very* popular. Add live equipment and outside HF dipole and vertical antenna demos and expect a big crowd!

Our local American Red Cross volunteer communications team made up the student body for our first outdoor upgrade course. With volunteer instructors and donated facilities, the class was free except for the cost of textbooks. A date was set in springtime and the big back yard of Kevin, KG6MIH, Bobbie, KG6MIF, and Cliff, KG6MIG, Guice was commissioned for the classroom. A patio cover provided shade and there was wheelchair access for our communicators with special needs.

Kevin, KG6MIH, with his own wheelchair, is also an Extra Class Volunteer Examiner whose credentials allow him to take part in testing on Sunday afternoon where the students come to him! Our class photographer was Pandora Nash-Karner, KE6ZVD, who came in from several hundred miles away to both digitally document the class and take her own General Class upgrade training and exam (all of the photos accompanying this article are by Pandora).

Well ahead of time, Suzy, N6GLF, prepared all students with their General Class theory pre-study assignments. Workbooks had been provided in which students answered additional questions based on their book study before the weekend class. (Go to <instructor@W5YI.org> for pre-study pages.)

Hands-On Instructions

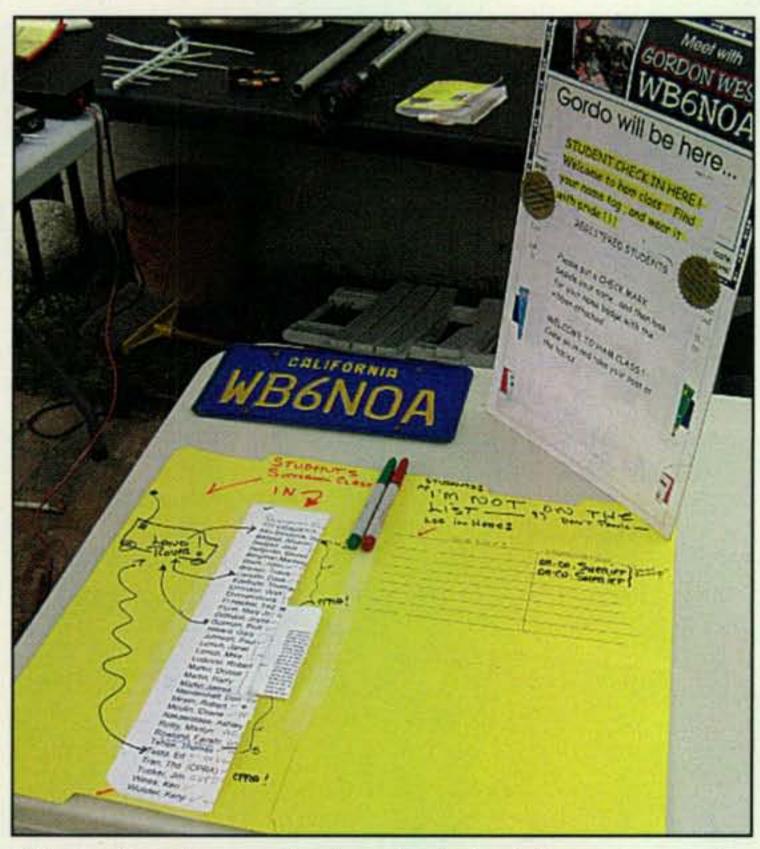
The backyard class at "Kevin's house" focused on live equipment, operating procedures, antennas and antenna safety,

*Contributing Editor, CQ, 2414 College Dr., Costa Mesa, CA 92626 e-mail: <wb6noa@cq-amateur-radio.com>

and two fun-filled days of learning and playing radio. We started at the front of the book with rules and regulations and ended the next day with RF Safety, relating book questions to the real world of using radios and antennas.

Here are some of our backyard ham-upgrade experiments:

- Dipoles vs. tripod verticals
- Demos of various HF radios on different antennas
- Evaluating SWR with MFJ analyzers
- Making live contacts and operating courtesy
- All about antenna safety around radio frequency emissions
 - Built-in vs. external automatic tuners
 - Manual tuners and tune-up procedures
- Hearing DSP (Digital Signal Processing) at various levels



This backyard upgrade class had about three dozen students pre-registered. Pre-registration and before-class preparation are essential for success in one- or two-day licensing courses. (All photos by Pandora Nash-Karner, KE6ZVD, of <PandoraAndCompany.com>)

- Solar panels and batteries
- Making your first contact

There were plenty of highlights during the two-day backyard class. Kevin assisted with talk-in on Saturday morning, and the neighborhood quickly filled up with vehicles. Neighbors were alerted ahead of time, and their kids were invited to take part in the ham radio excitement.

Digital communications were demonstrated by Tom, W6WC, and Bill, K6ACJ. This gave the students an exciting computer view of radio whistles (PSK) that can be turned into live text. The mobile units dispelled the myth that new General Class operators would need to take a drill to their vehicles to install a mobile HF antenna. Our new students saw the many advantages of lip-mounts and magnetic-mount, high-frequency antenna systems—no holes need to be bored for these!

Co-host Cliff, KG6MIG, an avid electronics buff, had plenty of solar panels and gel-cell batteries to demonstrate throughout the weekend. Cliff and Kevin provided the students with some terrific high-frequency contacts from their roof-mounted, five-band vertical antenna affixed to an iron plumbing pipe on the backside of the roof. We continuously underscored the importance of RF safety around antennas, as well as personal safety when working with any roof-mounted antennas and dangerous power lines 75 feet away. Our mobile antenna demos required all students to wear protective glasses.

On Sunday, our first contact was on 20 meters with a station on the East Coast. We described our class, our equipment, our antenna ground as the wrought-iron fence surrounding the swimming pool, and our antenna system as seven feet of old sprinkler pipe insulated from ground. This crazy lash-up allowed us to demonstrate a manual tuner, and to illustrate that nearly anything can be turned into an effective antenna system, maybe only 2 dB down from the professional roof-mounted 5-band vertical! Everyone laughed!

Sunday afternoon was test time, and those who had completed their home study before class hardly missed any questions on the Element 3 General Class exam. Those who completed only a portion of the home study tended to miss five or six questions, and the few who had little chance to work on the prestudy generally opted to take another class at a later date. Home study makes teaching the class and testing a breeze!



Gordo's better side is facing the students as he explains what they need to understand in order to pass the General Class upgrade exam. Note all of the props and display items on the table in the foreground.





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DX AND CONTEST PROVEN

"Finally, before the students arrive, and before any antenna demos, check for safety."

The weather cooperated, all demos were successful, and the backyard venue allowed many more live antenna tests than I could have pulled off inside a classroom.

Suggested Class Size and Logistics

We recommend keeping the class size to about 30. This makes managing the facilities and related accommodations, including "munchies" easier. Classes smaller than 30 will drain the "Elmer." While I have taught classes of 10 and 15, the enthusiasm and excitement of a larger class is contagious. However, too large a class can be unwieldy, and we've found 30 to be "just right," although "your mileage may vary."

Speaking of munchies, thanks to Tom, KI6GOA, with the American Red Cross Orange County chapter, "flipping burgers" was just a part of his upgrade requirement!

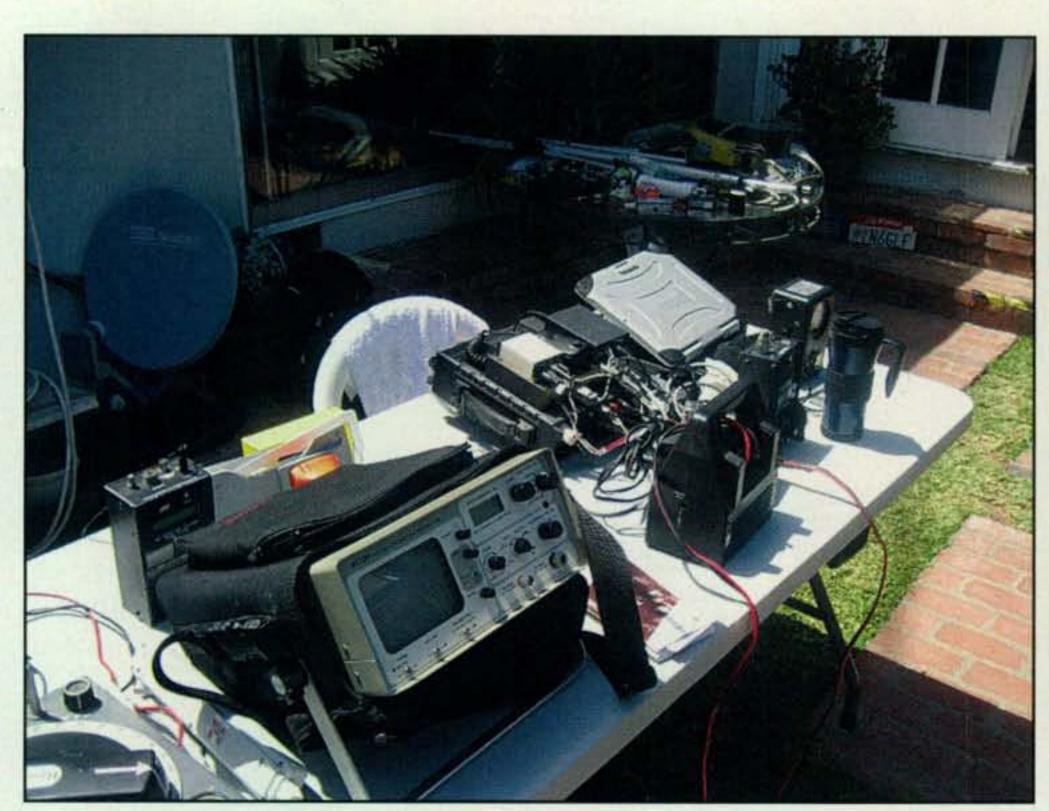
Finally, before the students arrive, and before any antenna demos, check



A wide variety of rigs and possible setups brought to the class helped students understand what their options would be for getting on HF once they passed their General exam.

for safety. Make sure no one will trip over your portable PA system speaker wires, that all mobile antennas have rubber ball tips, and that any multi-band verticals on the lawn for display have sharp elements covered with lightweight rubber play balls. Coax cable on the lawn must have no trip hazards. Think Safety!

Will we do more classes in a backyard? Absolutely! It sure beats talking about antennas when you can actually string up antennas and see how they play with live radio checks.



Test equipment and a portable power supply were among the items put to use in the many demonstrations during the two-day class.



Sunday afternoon was test time, with volunteer examiners administering the Element 3 General Class exam. Those who put in the most effort before the weekend class had the highest scores.

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Results of the 2009 CQ WW DX SSB Contest

BY BOB COX,* K3EST

Expanded Results on the Web

Editor's Note: Having more than 6000 logs submitted for the CQ WW SSB Contest is wonderful, but it does put a squeeze on space. In order to assure that the efforts of all entrants are recognized through the publication of complete line scores, certain other elements of our contest reporting have been moved to the CQ website. Please visit the CQWW DX Contest page on the CQ website (follow the links from <www.cq-amateur-radio.com>) for QRM, expanded top scores listings, and more. And thanks for being part of the world's largest participation sporting event!—W2VU

he 2009 CQ WW DX SSB Contest was a welcome surprise. After a sun stuck with no sunspots for more than a year, the CQ WW brought its own sunspots to the party; the bands came to life. As usual, the CQ WW SSB is better than 100 sunspots. Stations from all over the world were on the air: I enjoyed the weekend" (IK2MLS); "With a solar flux index of 76 the contest stood under good stars this year. The bands were burning! The propagation held me in my shack" (DF5LR); "Wonderful 10m opening from sunset to sunrise during the two days of this contest" (F5RD).

As has been mentioned before, the CQ WW is a fantastic competition which brings out the best in amateur radio: teamwork, station construction, antenna design, propagation knowledge, and operating skills. Just turn on your radio and you can join in the fun. Once you listen to the bands during the CQ WW, you will be hooked. You can be guaranteed to have a good time. The CQ WW is a celebration of ham radio skill and effort. New and experienced hams who try the CQ WW become addicted. After all the logs were counted, an amazing number emerged: 6065 received entries. Below are presented the results of many of the efforts.

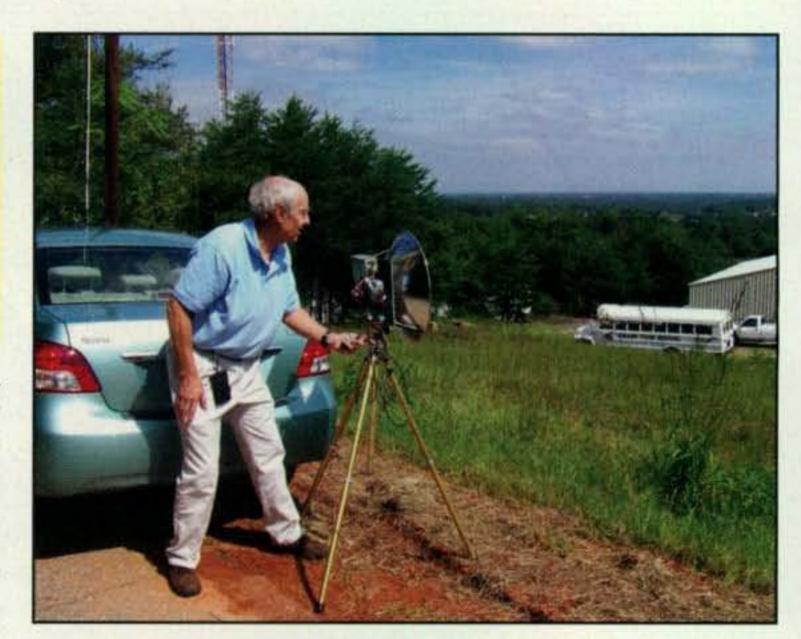
A yearly reminder: If you want to know how long it is until the 2010 CQ WW SSB test, check out the website of OT5A: http://www.on7lr.org. Read on to see how you and your friends ended up. Everyone who operated the CQ WW in 2009 was a winner and had a chance for great fun.

High Power, All Band

The top spot in this difficult category went to an operator familiar with winning the CQ WW. Rich, N6KT, put his considerable skill to work talking HC8A to the world high score. HC8A sits on the side of a dormant volcano on San Cristobal Island, and Rich took full advantage of the location and propagation to find the path to top honors. Second place world was Jim, W7EJ, operating from CN2R. Third place world again went to several-time world winner Tom, W2SC, operating 8P5A from beautiful Barbados. Taking first place in Europe and fourth in the world was Tonno, ES5TV, operating from super station 4O3A. Just a few QSOs behind, placing second place in Europe and fifth in the world, was Jukka, OH2UA, operating from CR2X. From Slovenia, Tine, S5ØA, took his station to third place in Europe. Krassy, K1LZ, did a fabulous job and took top U.S. honors! What a great job and score. Doug, K1DG, took U.S. second place from Long Island, Maine. Ken, K4ZW, took third place from his countryside QTH in Virginia. Other worthy efforts from propagationally challenged areas which should be mentioned were those of DU1BP, VK4CZ, EX8MAT, XV1X, YC9MDX, 9M8Z, JT1ZO, UN9L, UN7MMM, A61C, VU2PAI, HSØZEE, and XU7FMZ. The continental winners were: North America: 8P5A (W2SC), Africa: CN2R (W7EJ), Asia: RC9O (UA9PC), Europe: 4O3A (ES5TV), Oceania: KH7XS, South America: HC8A (N6KT), Japan: JAØJHA, U.S.: K1LZ.

Low Power, All Band

To enter the low power category all you need is a transceiver and an antenna. You will be surprised at what you can work with 100 watts.



Doug, K4LY, finished #1 QRP USA.

Running low power places you in the most popular contesting category. For this reason, to make the Top Scores box really means something. It is a real challenge.

Operating from beautiful Aruba, John, KK9A, operating as P4ØA, again took away the top world low power trophy. Five years in a row is quite an achievement! World second place went to Sébastien, F8IVJ, using his contest call, 6V7Q, while on his honeymoon! Third place in the world and number one in Asia was taken by 7Z1SJ operated by Sulaiman; a great job from Saudi Arabia! LY9A operated by Gediminas, LY3BA, took first place in Europe. Gediminas's efforts always place him near the top. This time he took top honors. Congratulations! Second place Europe went to low power champion Marius, YO3CZW. Taking Europe third place was Franc, S51F, operating from the sunny side of the Alps. In the U.S., we had a repeat winner from 2008, Art, K1BX. Great operating, Art! Second place went to Ed, N1UR. Third place U.S. went to John, N8AA, from southwest Ohio. BD1TCC, 4L1FP, VR2ZQZ, VR2PX, JY5CC, JY4NE, A41MX, HSØZHC, HSØZCW, UK9AA, FO8RZ, A31KK, KHØ/JK2VOC, and DV1JM all had excellent scores from interesting locations. The continental winners were: North America: K1BX, Africa: 6V7Q (F8IJV), Asia: 7Z1SJ, Europe: LY9A (LY3BA), Oceania: KHØ/JK2VOC, South America: P4ØA (KK9A), Japan: JH3CUL, U.S.: K1BX.

QRP

The QRP category sharpens your tuning skills and the rewards are very satisfying. You can work a lot of stations with 5 watts or less. It is interesting to note that QRP stations range from a few milliwatts to 5 watts, which is quite a power difference! Our world winner this time was Dmitry, RX1CQ, operating from his station just north of St. Petersburg, Russia. Long-time QRPer Douglass, K4LY, took second place world and first place U.S. from northwestern South Carolina. Third place world and number two Europe was Norbert, DK1YY. Second in the U.S. was Chris, KA1LMR, and taking third in the U.S. by repeating a top score west of New Jersey was Philip, NØKE. Third place in Europe went to Angel, EA3FF. Special mention must be made of the fine score of Izuno-san, JR4DAH, #11 in the world and #1 in Asia. The top zone 3 scorer was Bill, W8QZA, operating W6QU. He was followed closely by Randal, NDØC. JA2MWV, VK4ATH, PY2BN, JG4AKL, and 9M6/W8AY (RA3AD) are to be congratulated for their outstanding efforts. The continental winners were: North America: K4LY, Africa: (no entry), Asia: JR4DAH,

^{*}e-mail: <k3est@cgww.com>

Europe: RX1CQ, Oceania: VK4ATH, South America: PY2BN, Japan: JR4DAH, U.S.: K4LY.

Assisted

"I worked assisted and I spent too much time chasing DX-cluster spots; I have lots of multipliers but at least 500 less QSOs. Difficult to break, at times, the big pile-ups on cluster spots" (9A2EU). It takes a lot of discipline to achieve a good balance between chasing packet spots and running stations. The top scoring stations know how to do it just right. A reminder: use of any QSO spotting tool places you in the assisted category. The use of any Skimmer either internally or externally also places you in the assisted category.

The top assisted score in the world came from ER4DX operated by Sergey, UT5UDX.

Great job, Sergey! Second place world and number one in Asia was RG9A operated by Yuri, UA9AM. Third place world and second in Europe went to CR6K, the contest call of Felipe, CT1ILT. Third place in Europe went to Daniel, E73M. First place in the U.S. was taken by Gene, W3UA/1, operating from New Hampshire. Second place went to Charles, K3WW, who never ceases to amaze everyone by his dedication to the assisted category. Third place

TROPHY WINNERS AND DONORS

SINGLE OPERATOR
World All Band
HC8A (Opr.: Richard Smith, N6KT)
Donor: Southern California DX Club

P4\$\$A (Opr.: John Bayne, KK9A)
Donor: Slovenian Contest Club

World QRP
Dmitry A. Sokolov, RX1CQ
Donor: Jeff Steinman, N5TJ

World Assisted ER4DX (Opr.: Sergey S. Rebrov, UT5UDX) Donor: Glenn Johnson, WØGJ

U.S.A.

Krassy Petkov, K1LZ

Donor: Potomac Valley R.C. – KC8C Memorial

U.S.A. Low Power
Arthur Hambleton, K1BX
Donor: North Coast Contesters

U.S.A. QRP Douglass Allen, K4LY Donor: Pat Collins, N8VW

U.S.A. Assisted Gene Shablygin, W3UA/1 Donor: John Rodgers, WE3C

U.S.A. Zone 3 Mitch Mason, K7RL

Donor: Dave Pruett, K8CC & Greg Surma, K8GL

U.S.A. Zone 4 Mike Wetzel, W9RE

Donor: Dave Pruett, K8CC & Greg Surma, K8GL

Canada

VC30 (Opr.: Ron Vander Kraats, VE3AT)
Donor: Contest Club Ontario

VE3WT Memorial

Caribbean/C.A.

8P5A (Opr.: Thomas Georgens, W2SC Donor: Alex M. Kasevich, W1CDC

Europe 403A (Opr.: Tonno Vahk, ES5TV) Donor: Potomac Valley R.C. – W4BVV Memorial

LY9A (Opr.: Gediminas Lucinskas, LY3BA)
Donor: Scott Jones, N3RA & Tim Duffy, K3LR

Russia
Anatoly Yu. Medvedev, UA4WKW*
Donor: Roman Thomas, RZ3AA

CN2R (Opr.: James Sullivan, W7EJ)

Donor: CQ magazine

Asia
RC90 (Opr.: Anatoly Polevik, UA9PC)
Donor: CQ magazine

Japan
Akira Minagawa, JHØJHA
Donor: Tack Kumagai, JE1CKA

Japan Low Power Eiji Souno, JH3CUL Donor: Western Washington DX Club

Oceania
KH7XS (Opr.: Wilbert E Kollenbaum, K4XS)
Donor: Northern California DX Club

South America
PZ5M (Opr.: Michael Kasrich, AJ9C)*
Donor: Yankee Clipper Contest Club

SINGLE OPERATOR, SINGLE BAND World – 28 MHz Juan Manuel Morandi, LU1HF Donor: Joel Chalmers, KG6DX

World – 21 MHz ZX5J (Opr.: Sergio Almeida, PP5JR) Donor: Robert Naumann, W5OV

World – 14 MHz
D44AC (Opr.: Luca Aliprandi, IK2NCJ)
Donor: North Jersey DX Assn. – K2HLB Memorial

World – 7 MHz UPØL(Opr.: Vladimir Vinichenko, UN9LW) Donor: Fred Laun, K3ZO – K7ZZ Memorial

> World – 3.7 MHz Jeffrey T. Briggs, VY2ZM Donor: Fred Capossela, K6SSS

World – 1.8 MHz EI7M (Opr.: Dmitrij Pavlov, LY3MM) Donor: CQ magazine USA – 28 MHz

Charles Dietz, W5PR Donor: Donald Thomas, N6DT

USA – 21 MHz Victor Walz, N2PP Donor: 11PM Dayton Pizza Gang

USA – 14 MHz Jerry Rosalius, WB9Z Donor: Yankee Clipper Contest Club -KC1F Memorial

USA – 7 MHz Daniel Handa, W7WA Donor: Stanley Cohen, W8QDQ

USA – 3.7 MHz Joseph Gagliardi, Jr, AA1BU Donor: CQ magazine

USA – 1.8 MHz Manuel Fonseca, Jr., W2MF Donor: Glenn Johnson, WØGJ

Carib./C.A. (21 MHz)
Jean-Pierre Lauwereys, P43A
Donor: Nate Moreschi, N4YDU

Europe – 28 MHz Emil Tafro, E71A Donor: Charles Dietz, W5PR

Europe – 21 MHz Suad Zukic, E77XZ Donor: Tine Brajnik, S5ØA

RZ3AXX (Opr.: Vladimir Umanets, UA9BA)
Donor: Charles Wooten, NF4A

YT8A (Opr.: Ceha Dusan-Dule, YU1EA) Donor: John Warren, NT5C

Europe – 3.7 MHz GI5K (Opr.: Chris Smith, MIØLLL) Donor: Ted Demopoulos, KT1V

Europe – 1.8 MHz Viesturs Jakovlevs, YL2SM* Donor: Robert Kasca, S53R

Oceania (7 MHz)

Dusko Dumanovic, ZL3A

Donor: Bruce D. Lee, KD6WW

9K2K (Opr.: Abdallah Hamad Al-Muzayan, 9K2GS)
Donor: Charles Shinn, W7MAP

Japan – 14 MHz Akira Asai, JA8RWU Donor: Take Yokoyama, JL1BLW

MULTI-OPERATOR, SINGLE TRANSMITTER World

CN3A (Oprs.: IK2QEI, IK2SGC, IK1RQT, IK1SPR, IZ2FFK, I2WIJ, IK1HJS, IV3ZXQ, CN8WW, CN8WK)

Donor: So. Calif. DX Club – W6AM Memorial

U.S.A. W3BGN (Oprs.: W3BGN, K2TW) Donor: Carolina DX Association

Carib./C.A.
VP5DX (Oprs.: N4KE, AB4UF, N4EPD, NW4C, NU4Y)
Donor: Bob Raymond, WA1Z

Africa
CR3A (Oprs.: CT3BD, CT3DL, CT3DZ, CT3EE,
CT3EN, CT3IA, CT3KU, CT3KY, CT3NT, CT4NH)*
Donor: Doc Sayre, W7EW

Asia
P33W (Oprs.: URØMC, RW3QC, RA6LBS,
UA2FZ, RX3DCX, RW4WR, RA3AUU)
Donor: Edward L. Campbell, NX7TT
AA6BB and KA6V Memorial

Japan
JH4UYB (Oprs.: JH4UYB, JA1FXR)
Donor: Bob Epstein, K8IA

TM6M (Oprs.: F1AKK, F4DXW, F4ELK, F5TTU, F8DBF)

Donor: Bob Cox, K3EST

Oceania
AH2R (Oprs.: JI3ERV, JR7OMD, JH7QXJ)
Donor: Junichi Tanaka, JH4RHF

South America
FY5YE (Oprs.: F1HAR, F5HRY, F6FGZ, F6FVY, F8CMF, FY5FY)
Donor: Victor Burns, KI6IM –
The Cuba Libra Contest Club

MULTI-OPERATOR, TWO TRANSMITTERS
World

AO8A (Oprs.: EA8AH, EA8CAC, EA8ZS, EA5DY, OH1MA, OH3RB, OH5XT, OH6RX)

Donor: Array Solutions

U.S.A.
WE3C (Oprs.: WE3C, N3RD, NN3Q, KQ3V,
KQ3F, K3CT)
Donor: Kimo Chun, KH7U & Mike Gibson, KH6ND

Europe
IR4X (Oprs.: I4TJE, I4VEQ, I4EAT, I4IKW,
I4AVG IKADCT IZ3EYZ IKAALIY IW2M.IO

IAAVG, IKADCT, IZ3EYZ, IKAAUY, IW2MJQ, IZ2FDU)

Donor: Aki Nagi, JA5DQH Oceania

AH\$\$BT (Oprs.: 7L1FPU, JE1NDE, JG7PSJ, JI5RPT, AHØBM) Donor: Japan CQ Ham Radio

MULTI-OPERATOR, MULTI-TRANSMITTER
World
PJ2T (Oprs.: WØCG, G3NKC, G4XUM, WA4PGM,
K6AM, K8LEE, W9JUV, NØVD, NØYY)

K6AM, K8LEE, W9JUV, NØVD, NØYY)

Donor: Dave Leeson, W6NL and Barb Leeson, K6BL

U.S.A.

K3LR (Oprs.: K3LR, N2NC, N2NT, K6AW, W3TX, W2RQ, K8GL, IK2YCW, K3LA, K1AR, N6MJ, K3UA, DL6LAU, LU7DW, N3GJ, LW8EXF) Donor: Jim Lawson, W2PV Memorial

DR1A (Oprs.: DB6JG, DF6JC, DJ1YFK, DJ6ET, DJ7EG, DJ7EO, DK2CX, DK5TX, DK6WL, DL1MGB, DL3DXX, DL6FBL, DL8WPX, DL9DRA, DO2WW, PA1TX, SV2KBS) Donor: Finnish Amateur Radio League

Japan JR5VHU (Oprs.: JR5VHU, JM1UWB, JA5FDJ, JA5JCC, JH5FIS, JH5RXS, JR5JAQ, JR5PWV, JJ6WYS, JK6RIP)

Donor: Masahiro Kitagawa, JH3PRR

CONTEST EXPEDITIONS
World Single Operator
HT2N (Opr: Michael Tessmer, K9NW)
Donor: National Capitol DX Assn.
Stuart Meyer, W2GHK Memorial

World Multi-Single 4U1ITU (Oprs.: RW3AH, SV3SJ) Donor: Gail Sheehan, K2RED

World Multi-Multi SU1KM (Oprs.: SU1KM Team) Donor: CQ magazine

*Second place

in the U.S. went to Bill, N4LA, in North Carolina. The efforts of some good multipliers-BD5BAJ, 5B/G3RXQ, KG6DX, ZK2DL, VR2YYW, UP4L, 9M6/JJ2CJB, IG9R, and IG9S—put a lot of QSOs in contester's logs. The continental winners were: North America: V31MW (NØHJZ), Africa: ZS4U, Asia: RG9A (UA9AM), Europe: ER4DX (UT5UDX), Oceania: KG6DX, South America: ZX2B (PY2MNL), Japan: JH1NBN, U.S.: W3UA/1.

Multi-Single

The top three winners from 2008 repeated their positions in the 2009 competition. They say three times is a charm. CN3A took world first place for three years in a row. The team from CN3A has everyone else chasing their efforts. What a great job they did. Reprising their second place world finish from last year was P33W. A team from the Radio Amateur Club of Kourou. operating as FY5YE on the French Guyana coast, came in third place. They summed up what many contesters thought when they said, "Conditions were a lot better than last year, especially on 10m, where we had a very good EU opening on Sunday, and a rather good one to NA." Most multi-single operations take place in Europe. This year there were 173 different teams who put in a lot of hard work to have fun in the contest. Doing a fine job and taking the top position was radio club F6KHM using its

club call, TM6M. Second place went to the Bosnia and Hercegovina contest team of E7DX. Third place in Europe again went to the Salgotarjani Varosi Radio Klub, HG6N.

A MS team from the Frankford Radio Club, W3BGN, took advantage of the good conditions to beat back a challenge from the Potomac Valley Radio Club's K3EST/4. Just a few QSOs separated the two scores. Not far behind but about 2300 miles farther west was the marvelous effort of N2IC/5. N1MM/6 took top honors from the U.S. West Coast. Outstanding performances were turned in by many teams. Some of the rarer ones appearing in many logs were: 3DAØWW, AH2R, EK8WA, TS9A, TC7KA, B7P, A73A, A47RS, 9K2HN, HSØAC, VR2C, YEØX, and 4LØA. The continental winners were: North America: VE3EJ. Africa: CN3A, Asia: P33W, Europe: TM6M, Oceania: AH2R, South America: FY5KE, Japan: JH4UYB, U.S.: W3BGN.

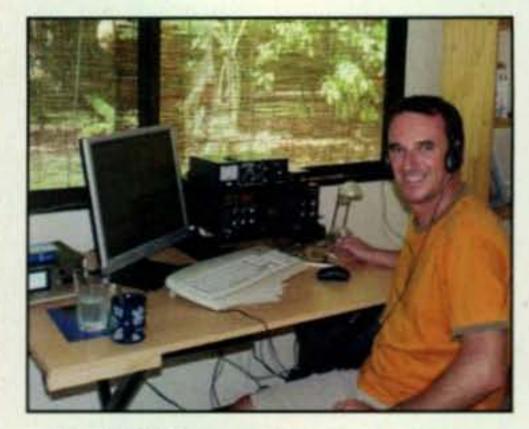
Multi-Two

19,419,972

17,542,980

The Multi-Two category needs two stations manned nearly all the time, and stations have to move skillfully and smoothly as the propagation changes. The AO8A team operating from Gran Canaria proved they could do it three wins in a row. Pekka's (OH1RY) international group finished #1 in the world. Another zone 33 team, EE9Z, rose to the occasion by taking sec-

TOP SCORES



Phil, FO8RZ, gave out a new one to many.

ond place in the world. Jorge, EA9LZ, mentioned that all the money collected from direct QSL to EE9Z is donated to an orphanage located in Tangier, CN. Third place in the world and first place in Europe went to IR4X. They have been having a good time on a mountaintop near Bologna for a very long time. As mentioned above, IR4X took top European honors. Second place in Europe went to OL4A. Their operation takes place from Brezina. Here you can find also 8 towers at heights from 13m to 52m. Third place in Europe went to Radio Club Varazdin, 9A7A. Making them the M2 team to

WORLD	HC1JQ631,180
SINGLE OPERATOR	UA9QCQ497,490
All Band	
HC8A14,987,592	7 MHz
	E79D338,541
CN2R 13,526,045	OK1WCF226,738
8P5A12,098,900	YT2T210,240
403A10,373,592	112110,270
CR2X 10,006,334	2.7 MHz
The same of the sa	3.7 MHz
28 MHz	OK1FPS75,960
LU1HF881,784	IV3KFB71,400
PW5G807,552	YT3R53,331
E71A312,741	2222
	1.8 MHz
21 MHz	SP5CJY16,506
ZX5J2,456,622	F5SSK13,824
ST2KSS2,029,632	DL3KZA11,480
P43A1,583,113	
7.1961	ORP
14 MHz	The state of the s
D44AC3,000,096	All Band
	RX1CQ489,775
9K2K	K4LY369,380
4L8A1,452,378	DK1YY326,459
7 4814-	EA3FF284,382
7 MHz	KA1LMR268,320
UPØL1,045,265	
ZL3A788,000	ASSISTED
YT8A774,400	All Band
	ER4DX
3.7 MHz	RG9A
VY2ZM573,780	E73M
GI5K479,853	CR6K6,612,060
0G5B	TK9R6,231,573
	1838
1.8 MHz	
EI7M125,584	MULTI-OPERATOR
VE3PN76,626	SINGLE TRANSMITTER
YL2SM 67,837	CN3A 20,052,100
12 Section of the Control of the Con	P33W 19,388,448
Low Power	FY5KE19,358,440
All Band	CR3A 16,195,382
P4ØA7,129,408	TS9A14,632,939
6V7Q2,846,844	Manual Constitution of the
7Z1SJ 2,352,770	MIII TI ODEDATOD
LY9A 2,249,140	MULTI-OPERATOR
K18X1,994,512	TWO TRANSMITTER
	A08A 24,644,952
28 MHz	EE9Z 17,374,344
PU2MTS 201,983	IR4X
LU6FOV193,860	0L4A
PY1NX185,500	C4I 13,031,604
The state of the s	
21 MHz	MULTI-OPERATOR
58/HA5PP806,680	
HI3K 631,289	PJ2T 22,010,913
HG3M 554,820	DR1A 20,693,196
	CR3L 20,025,560
14 MU-	V21 D 10 410 072

UNITED STATES	W2AW	122.884
SINGLE OPERATOR	WD8CQB/2	106,140
All Band		
K1LZ6,265,620	7 MHz	
K1DG5,933,696	KI6LZ	
K4ZW4,654,793	W5Z0	
W9RE4,187,780	W5RI	8,308
K5ZD/14,005,504	3.7 MH	
28 MHz	WA6WPG	The state of the s
W5PR36,360	K2SZ	
K2EK/417,865	KG9Z/8	
K4WI16,170	Ward-Salaman Marian	Minning Administra
781741	1.8 MH	
21 MHz	W1WBB	
N2PP557,039	K3TW	340
N8II398,426		
W6YA364,820	QRP	
4.000	All Ban	
14 MHz	K4LY	
WB9Z 991,660	KA1LMR	
AA1K/3885,222 K1IM266,640	NØKE	
N 11141	N1TM	
7 MHz	N8XA	96,607
W7WA336,720		
N7DD336,335	ASSISTE	270
W6YI316,288	All Ban	
	W3UA/1	
3.7 MHz	N4LA	
AA1BU157,257	AA3B	
K7ZV118,752 ND8DX24,034	N3RS	
NUOUX24,034	THE STATE OF THE S	
1.8 MHz W2MF 14,784	MILL TI ODER	ATOD
W2MF14,784	MULTI-OPER SINGLE TRANS	
1412/9	W3BGN	Andrew W. P. Person.
W3GH5,687	K3EST/4	
	N2IC/5	
Low Power	NØNI	
All Band	K8AZ	3,708,750
K1BX1,994,512		
N1UR	MULTI-OPER	ROTAL
N8AA	TWO TRANSA	
N5DO587,860	WE3C	
	N5DX	5,257,616
28 MHz	KB1H	5,006,925
KJ4KVC929	N1LN/4	
KI4WMH100	ND I V/ I	4,300,733
		4700
21 MHz	MULTI-OPER MULTI-TRANS	
W6AFA	K3LR	
W9ILY	KC1XX	
	W3LPL	
14 MHz	KITTT	
K2MFY158,877	NO4I	

	EUROPE		362,411
SIN	GLE OPERATOR	S520T	239,443
	All Band		
403A	10,373,592		MHz
CR2X	10,006,334	E79D	338,541
S5ØA	5,484,636		226,738
GW4BLE	4,622,391	YT2T	210,240
OH8X	4,364,312	24	
	28 MHz		MHz
71A	312,741		75,960
	255,576		71,400
IIIIIDX	178,852	Y13H	53,331
00107	110,002	4.0	MU
	21 MHz		MHZ
F77X7	1,007,868		13,824
S53MM	830,450		13,824
Z8DPL	488,430	DESNEH	11,400
Hear Bill			RP
	14 MHz		Band
XXAESF	1,227,640		489,775
	1,082,900		326,459
	1,074,597		284,382
			236,808
Acres 1	7 MHz		223,746
	774,400		
ES5MC	650,848		ISTED
YU7W	500,975		
	3.7 MHz		7,661,916
	479,853		6,643,920
OG5B	295,245		6,612,060
	206,180		6,231,573
Cardo a disco		55/UX	5,477,650
	1.8 MHz		
EI7M	125,584	MULTI-0	PERATOR
/L2SM	125,584 	SINGLE TH	ANSMITTER
JU7J	65,685	1MbM	11,459,650
		E/UX	10,236,288
	Low Power	OMON	10,186,302 9,768,200
was	All Band	120000000000000000000000000000000000000	9,656,000
LTBA	2,249,140	Owi M	5,000,000
	1,287,728	100000000	BOX TOWN
DR5M	861,714		PERATOR
DI BOCD	848,725		NSMITTER
			15,092,576
	28 MHz		13,175,342
WØHBY.	164,274	RW2F	11,873,622
/T2B	114,080		9,658,728
SV9GPV.	62,000	11010	3,000,120
	THE PARTY OF THE P		
	21 MHz	MULTI-0	PERATOR
163M	554,820	MULTI-TR	ANSMITTER
S1LBK_	301,112		20,693,196
EA1CBX.	195,480		17,542,980
	14 180-		12 335 324
PETOTU	14 MHz	1 70W	13,335,324

362.934

S57RTH

751,518

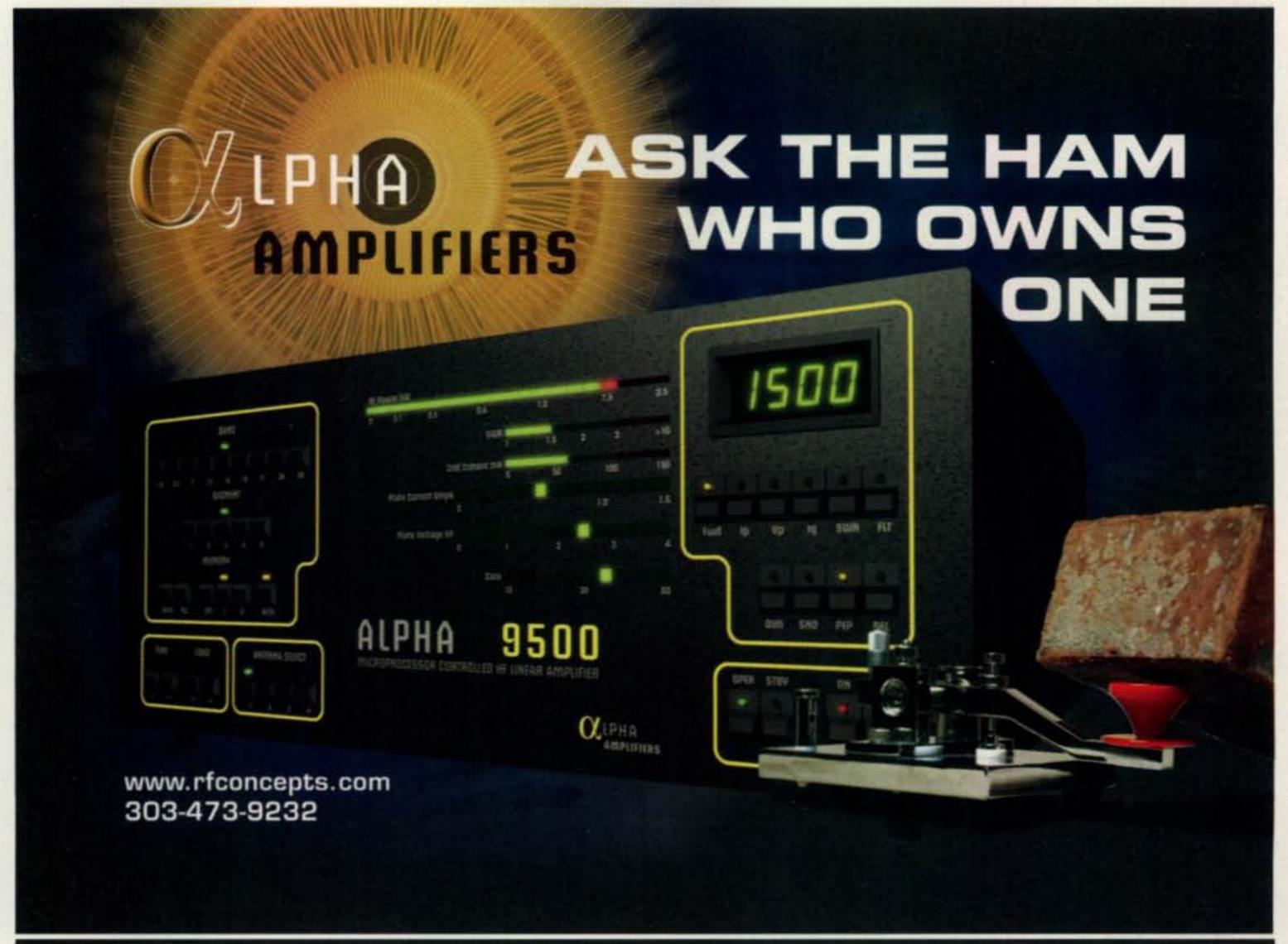
14 MHz

K3LR.

DFØHQ

12,691,960

LZ9W



U.S. honors in this popular category. Drawing from Missouri and Arkansas contesters, N5DX took second place in the U.S. Third place went to Dick's team at KB1H located in far eastern Connecticut. The far west U.S. stations of NK7U and K6IDX deserve special mention for their efforts. There were several stations that put nice multipliers on the air and made big scores: YE2R, ZS9X, AHØBT, B4B, JU1DX, 4U1UN, and EE9Z. FB job! The continental winners were: North America: WE3C, Africa: AO8A, Asia: C4I, Europe: IR4X, Oceania: AHØBT, South America: PJ4K, Japan: JA1YPA, U.S.: WE3C.

Multi-Multi

Every year a select group of entrants takes on the ultimate challenge and enters the multi-multi category. Over the years MM stations have contributed greatly to contesting knowledge. Many innovations that we use originated from this category. The top world score this time was the Caribbean Contest Consortium, PJ2T. PJ2T, located at a QTH called "Signal Point," is situated on half an acre of ocean-front property within the grounds of what used to be called the Coral Cliff Hotel. What a great

try to beat, WE3C's station in eastern Pennsylvania again took the top job this seasoned group did from Sint Martha's Bay. The number two score in the world and number one in Europe went to DR1A. DR1A is the contest callsign of the DFØCG crew. A nice picture of their QTH appears on QRZ.com. Third place world went to the Rhein-Ruhr DX Association team at CR3L. The MM battle in the U.S. is always competitive. Repeating from 2008, K3LR took top honors. Tim's crew broke into first place over friendly rival KC1XX. Matt's team took U.S. second place honors. Third place in the U.S. went to Frank's team at W3LPL. As mentioned above, the top European score was made by DR1A. They were followed by DFØHQ, the club call of the Ilmenau Contest Club. That is perhaps the only MM club in the world that uses quads. Third place went to 9A1P, Radio Club Porec. The Chinese team B1Z made a big effort which allowed many contesters to log a new one. The JR5VHU team, from the Shikoku mountaintop QTH, showed their muscle by taking first in Japan, edging out the eastern Nara team of JA3YBK. The continental winners were: North America: K3LR, Africa: CR3L, Asia: JR5VHU, Europe: DR1A, Oceania: WH2DX, South America: PJ2T, Japan: JR5VHU, U.S.: K3LR.

TOP SCORES IN MOST ACTIVE ZONES

Zone 3			
K7RL	2,557,412		
K6XX	1,301,688		
K5RR/7	1,233,585		
K6NA	1,206,373		
	784,125		
Zor	ne 4		
VC3O	6,606,719		
W9RE	4,187,780		
	1,759,320		
	1,489,536		
	1,335,880		
	A CONTRACTOR OF THE PARTY OF TH		
Zone 5			
K1LZ	6,265,620		
K1DG			

K4ZW

W1100	
	Zone 14
CR2X	10,006,334
GW4BLE	4,622,391
GA2MP	2,670,376
	2,532,152
PASAAV	1,991,616

Zone 15			
403A	10,373,592		
S50A	5,484,636		
OH8X	4,364,312		
LY80	4,030,290		
SP9LJD	3,975,482		
	111111111111111111111111111111111111111		

Zone	16
US5D	3,583,884
UA4WKW	2,358,199

RO4W	1	.817.158
UA6UDV		Committee of the Commit
UYØZG	1	,669,910

Zone 20							
LZ3FN	2,820,853						
OD5WPX	1,976,405						
SV9CVY	1,590,408						
4X/EA5RM	1,527,708						
*Y03CZW							

Zone 25							
JAGJHA	4,342,032						
JA7NVF	1,436,925						
JQ1BVI	1,320,462						
JA2PAC	1,263,100						
JE1LFX	1,060,113						

*Low Power

Team Contesting

You can make a team with five contesters from anywhere. You can be on team and still submit your score for your local club. All you need to do is register your team anytime before the contest begins. You can submit your team list to <teams@cqww.com>. Again this year the Worldwide Young Contesters (C6APR memorial group) team took top honors. Second place went to the Yankee Clipper Contest Club team honoring the C6APR operators. Third place went to the famous Chiltern DX Club. The results of team contesting are as follows:

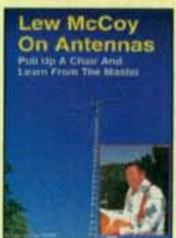
- 1. Team WWYC (C6APR memorial group): 403A (ES5TV), CR2X (OH2UA), CR6K (CT1ILT), NN3W, OY3AA (OZ1AA): 29,144,949.
 - C6APR YCCC: K1RX, N1SV, FS/K1XM, W1UE, K1LI: 16,115,121
- Chiltern DX Club: 9M8Z (9M6DXX), GW4BLE, 5B/G3RXQ, MØGHQ, G3UEG: 13,783,423.
- 4. Contest Club Finland Team Finlandia: OH8X (OH6UM), OH4A (OH6KZP), OG6N (OH6NIO), KH6/OH7WV: 11,772,255.
- 5. Florida Contest Group Globetrotters: CX7TT (K6CT), HSØZCW (K4VUD), KH7XS (K4XS), VP9/W3TB, K9OM: 9,761,087.

4,654,793 .4.005.504



BOOKS

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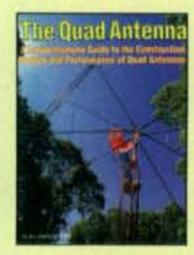
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by Lew McCoy, W1ICP

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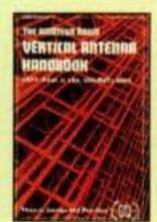
The Quad Antenna

by Bob Haviland, W4MB

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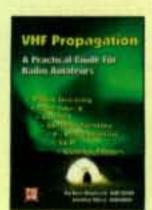


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by Ken Neubeck, WB2AMU & Gordon West, WB6NOA

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- 6. Florida Contest Group Heat: K1TO, K5KG, K5RQ, N4UU or using KM4MK, N6AR: 5,929,727.
- 7. VK Contest Club Kookaburras: VK7ZE, VK4CZ, VK3TDX, VK6HZ, VK3TZ: 4.169.551.
- 8. Grupo DXXE Low Calories 1: A31KK (XE1KK), XE1GRR, XE1AY, XE3N, XE1R: 1,822,616.
- 9. Grupo DXXE Full Calories: XE2K, XE2AU, XE2S, XE1CQ, XE1MM: 1,715,713.

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
HC8A	123/13/22	446/28/76	1437/29/109	1340/35/116	2978/34/122	1567/27/76
CN2R	367/14/62	488/21/82	1218/32/113	1172/36/120	1813/34/118	1118/26/109
8P5A	153/14/30	573/19/75	1867/29/113	2165/33/113	2508/32/104	683/20/65
403A	219/10/55	776/27/87	1770/33/115	2075/38/122	2325/31/119	465/26/81
CR2X	258/13/60	695/24/86	1321/28/98	1861/30/95	3174/31/122	469/19/61
	WORLD	MILLTLOS	EDATOR	INGLE TRA	NOMITTEE	,

CN3A	92/13/60	688/23/97	1545/35/124	1872/37/135	3688/39/150	604/20/106
P33W	141/10/58	761/21/92	1727/32/124	1739/37/133	3170/38/140	1083/29/114
FY5KE	165/16/62	524/27/96	1160/34/122	1676/39/154	3366/34/143	1080/25/104

WORLD MULTI-OPERATOR TWO TRANSMITTER

A80A	115/13/62	1062/23/90	1977/32/128	2539/37/142	3947/38/153	1020/23/111
EE9Z	129/8/40	738/19/86	2085/31/114	2348/34/121	2509/34/118	1179/20/74
IR4X	156/11/57	1078/22/96	1915/37/140	2290/38/150	2785/39/151	491/26/105

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

PJ2T	327/16/62	1006/23/92	2294/31/121	2858/37/135	3201/33/132	900/21/80
DR1A	1115/17/76	2001/26/111	2984/37/146	3658/39/157	2307/39/157	734/25/102
CR3L	182/8/50	535/17/79	2213/32/119	2292/36/132	3477/33/128	829/20/79

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
K1LZ	105/14/52	494/18/79	813/23/89	1364/29/108	1200/26/107	19/8/13
K1DG	114/16/57	514/20/87	465/24/90	1155/31/121	1351/26/119	36/8/15
K4ZW	43/13/31	240/18/71	737/23/90	866/34/116	1147/27/105	44/9/22
W9RE	42/10/22	152/18/66	374/28/99	1024/34/121	1102/27/114	46/8/18
K5ZD/1	45/10/22	238/14/66	494/24/90	1415/28/106	933/18/89	37/8/13

USA MULTI-OPERATOR SINGLE TRANSMITTER

W3BGN	58/12/36	179/18/76	355/28/97	841/31/126	944/29/131	42/9/23
K3EST/4	41/11/27	142/19/74	537/30/109	1374/33/128	535/29/121	6/6/6
N2IC/5	19/10/17	80/24/57	727/32/102	677/36/135	968/35/129	39/14/25

USA MULTI-OPERATOR TWO TRANSMITTER

WE3C	83/16/57	686/25/98	1340/29/117	2229/38/161	1886/32/144	92/13/39
N5DX	38/11/18	185/23/83	823/32/116	1325/36/133	992/33/131	78/9/19
KB1H	40/8/26	239/18/82	332/27/102	1408/35/120	1064/29/124	70/8/16

USA MULTI-OPERATOR MULTI-TRANSMITTER

K3LR	390/22/72	1074/28/111	1949/32/136	3223/40/174	2162/34/150	235/16/43
KC1XX	264/16/61	915/25/102	1566/31/127	2787/39/162	2355/31/146	230/13/33
W3LPL	308/19/68	895/25/104	1738/32/127	2673/38/162	1768/32/146	162/14/36

EUROPE TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
403A	219/10/55	776/27/87	1770/33/115	2075/38/122	2325/31/119	465/26/81
CR2X	258/13/60	695/24/86	1321/28/98	1861/30/95	3174/31/122	469/19/61
S5ØA	102/12/52	408/23/71	1030/31/102	1355/32/98	1015/32/108	153/22/74
GW4BLE	155/11/58	510/16/67	696/25/89	1257/31/83	1013/27/94	160/17/55
OH8X	252/10/59	624/22/79	888/29/96	1858/34/116	693/31/101	58/7/30

EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

TM6M	153/15/67	853/22/99	882/36/130	2113/37/141	2241/38/141	221/21/91
E7DX	223/15/62	1034/24/94	1215/34/130	2190/39/148	1665/37/155	399/26/110
HG6N	307/10/54	904/25/102	1071/35/128	1674/37/144	2153/38/152	152/28/104

EUROPE MULTI-OPERATOR TWO TRANSMITTER

IR4X	156/11/57	1078/22/96	1915/37/140	2290/38/150	2785/39/151	491/26/105
OL4A	275/13/63	1215/24/95	1777/36/127	2927/39/154	2041/39/153	186/24/92
9A7A	260/10/60	1356/22/91	1220/35/128	2145/39/141	2404/37/150	624/24/101

EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

DR1A	1115/17/76	2001/26/111	2984/37/146	3658/39/157	2307/39/157	734/25/10
DFØHQ	1097/16/71	2363/28/109	3283/37/146	2691/39/170	1582/38/160	660/25/10
9A1P	540/11/60	1554/21/91	2828/35/125	3137/38/141	1987/37/129	1110/24/10





Louisiana Contest Club Team #1: W5WZ,
 N5RKK, W5WMU, K5ER, NA5Q: 1,660,377.

11. Maritime Contest Club #1 Team: VA1MM, VE1OP, VA1CHP, VY2LI: 1,245,996.

Florida Contest Group Lakers: K5AUP,
 N4BU, N4DXI, W4STB: 932,760.

 VK Contest Club Kangaroos: VK2KDP, PAØMIR, VK2BJ, VK4AN: 760,263.

14. Florida Contest Group Magic: AE4TE, N4EEB, N4WO, NF4A: 455,261.

 Florida Contest Group Grizzlies: N4BP, W4AMS, W4ZW: 229,670.

16. Grupo DXXE Low Calories 2: HK3W, XE1EE, XE2WWW, XE1YYD, TG9AJR: 203,446.

17. Louisiana Contest Club Team #2: KA5M, KC5WA, W5PEM, KB5YEG: 126,828.

18. Green Hornets: W3GH, K3RWN, KB3LVH, K3RMB, AB3GY: 97,411.

19. Louisiana Contest Club Team #3: KG5VK, K5OR: 30,661.

20. Florida Contest Group Rockets: K5WW: 14,118.

Records

Beating an existing record is a real accomplishment. Take a look at the record list at cqww.com. You might find that you have a chance to take on the personal challenge of going for a new record. If you discover an error in the record list, please document it and let us know at <questions@cqww.com>. Below are the outstanding efforts which resulted in setting new world or continental SSB records during the 2009 contest. Congratulations!

World: A3.7 SP3GEM. U.S. A7 N2ZX. North America: A7 N2ZX. Africa: 14 D44AC (IK2NCJ). Asia: 7 UPØL; A14 RW9USA. Japan: L14 JG2KKG; M2 JA1YPA. Europe: L7 E79D; A14 DL2ARD; A3.7 SP3GEM. Oceania: None. South America: A3.7 YV6BXN.

Special Mention

The CQ WW is a great place to pick up new QSOs for your WPX, DXCC, and many other awards. During the 2009 SSB contest there were 235 different countries in the QSO data base! The CQ WW is famous for DXpeditions. Why not make a plan and travel to a nearby country that is rarer than your own? You will be pleasantly surprised that you are now the hunted! Some of the exotic callsigns appearing in entrants' logs making the contest more interesting for all of us were:

V25Z, AA5R/C6, 8P5A, W3TB/VP9, ZF2AH, FS/K1XM, OX2A, J37K, J37T, HQ9R, TO7A, HT2N, PJ7/AH8DX, V48M, PJ7MF, IG9/I2ADN, D44AC, 3B8GT, 5R8FU, EA9IE, CN2R, CN2P, 6W1RY, S79MI, 6W1RY, 6V7Q, ST2KSS, 5H3EE, C4M, 107 Chinese entrants(!), 5B/

HA5PP, H2E, C4Z, 4X/EA5RM, XU7FMZ, 8Q7EJ, JT1ZO, JD1BIA, TA2ZAF, YM3A, TA2/DL7BC, A62ER, OHØX, OHØJFP, CR2X, OY3AA, J43J, EI/ON4EI, 403A, CT1JLZ, IMØ/IKØFMB, GZ5Y, 9M8Z, 9M8YY, 3D2KJ, KH6LC, KH7XS, YC2VRG, KHØ/JK2VOC, A31KK, R1ANY, P4ØA, HC8A, PZ5M, 9M6/W8AY, V31MW, J68JA, IG9S, IG9R, EA8/OH6CS, EA8CMX, 5B/G3RXQ, EA6/AA5UK, TK9R, EI/W5GN, ER4DX, ISØ/ K7QB, 9M6/JJ2CJB, ZL4NX, ZK2DL, DP1POL, V26B, VY2TT, TI5N, YS1YS, VP5DX, T46A, EE9K, CR3A, CQ9T, CN3A, 3DAØWW, TS9A, P33W, P39P, VR2C, 4LØA, 9K2HN, A47RS, TC7KA, 4U1ITU, V6B, AH2R, YEØX, FY5KE, AA4V/VP9, VP2V/KN5H, 4U1UN, AO8A, EE9Z, JU1DX, AHØBT, PJ4K, VP5T, KP2M, SU1KM, CR3L, OHØZ, HBØ/HB9AON, and PJ2T.

Comments

The week before the contest brought a collective shock to all of us when we learned of the tragic loss of the C6APR team on their way to Crooked Island. We dedicate this CQ WW SSB Contest to the C6APR team of W2EJ, K3IXD, K4QO, and W3PP. They were following their passion for this great hobby.

For the 2009 CQ WW SSB contest we received 6065 logs, of which 5922 were electronic! In case you are wondering, that is a 17% increase in entrants over the previous year. Wow! Thanks to all the contesters around the world who sent in a log. Please send in your log no matter how small. Your effort to submit an electronic log allows for a fairer adjudication process. Submitting an electronic log is easy. Send your SSB log to <ssb@cqww.com> (CW to <cw@cqww.com>). Please send your log in Cabrillo format. If your radio has a computer interface, please submit a log with exact frequencies. Exact frequencies help in the logchecking process as well as with statistical analysis of band openings.

Before you submit your log, you can help us a great deal by double-checking your Cabrillo submission. Please make sure your category is correctly indicated. If you are submitting a single-band entry, please check that your chosen category matches what is in your log. If you did everything OK, you will get back an acknowledgment from the robot. If you are having submission problems, we can help you at <questions@cqww.com>. If you make a mistake on your first submission, you can resubmit your log. It will replace the first submission. We archive all your submissions.

The CQ WW Contest Committee provides several ways for an entrant to check his/her log



John, N8AA, took 3rd place USA low power.



Haibo, BD1TCC was #1 low power in China.

Accurate Measurements. Lo Excuses!

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SS-330W Convenient, lightweight 30 amp switching supply.

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- · Dual meters
- Adjustable voltage (5-15V)
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- · Weighs less than 5 lbs.
- · Carrying handle



NEW! POWER SUPPLY

SS-505 Lightweight switching power supply.

- . 50 amp continuous, 55 amp peak
- Adjustable voltage, 5-15V
- Can be used for DC motors requiring peak start-up voltage
- Dual-use V/A meter
- · Built-in fan
- · Weight: 8lbs 6 oz
- · Carrying handle



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CS-201GII

- · 2-position 2GHz switch
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- Conns: Gold plated N-type



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CN-103M

- Frequency ranges: 140-525MHz
- Forward power ranges: 20/200W

CN-103N

 Same as CN-103, but with N-type connectors



PROFESSSIONAL SERIES

Accurate and dependable featuring a large, easy-to-read lighted meter. 13.8VDC jack on rear panel. 6"l x 4 1/4"h x 4 1/2"d (approx.)

CN-801HP

- PEP reading SWR/power meter
- Frequency range: 1.8-200MHz
- Forward power ranges:
 20/200/2000W

CN-801V

- Frequency range: 140-525MHz
- Forward power ranges: 20/200W

NEW! CN-801G D-STAR

- Frequency range: 900-1300MHz
- Forward power ranges: 2/20W
- N-type connectors



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for category, club, and operator. Soon after you submit your log and long before the final results are published in *CQ* magazine, a *log received list* with your category is posted on the CQ WW site (cqww.com). Look over this list to find if your data is accurate. If it is not OK, please let us know at <questions@cqww.com>. About one month before the results become finalized in *CQ*, you will receive via e-mail a password that will allow you access to your log analysis (rpt). You can look over the report to again verify your category. You can see information concerning the CQ WW on our web page at: ">http://www.cqww.com>.

Top Scores: If you plan to try to make the Top Scores box, you can count on your log being scrutinized. Running more power than the rules of your category allow, the use of undeclared QSO spotting help, the use of additional operators for a single operator entry, two signals simultaneously on the same band, or on separate bands at the same time if you are single operator, is in violation of the CQ WW rules. If you are multi-single, do not alter the times in the log to conform to the ten-minute rule. The CQ WW has at its disposal many methods to verify the score of an entrant. All the work of the CQ WW CC is to ensure a fair contest.

If you are a single operator in any single operator category, you cannot receive help that could impact your score in any way from another person or any QSO spotting network. Spotting yourself is against the rules. Using a QSO spotting network is OK; just claim to be assisted. The CQ WW has few requirements: log the callsign of the station you are talking to and follow the rules of your chosen category. For the 2009 contest our software and extensive data analysis suggested that some logs probably should be in the assisted category. We sent out a QSO spotting inquiry to over 75 stations in the Top Scores box. We asked them to confirm that they really were not assisted. The following stations replied yes, they were assisted: 3V8SS, E73W, EF1W, HA8BE, HI3TEJ, HK1X, IK4TVP, IT9RWB, IW7EBE, LX7I, LZ1NG, LZ2JA, LZ9X, PU2LEP, PY2WC, RVØAL, SN3X, SP4XQN, SV2DCD, UA3BS, UT7MW, UW1M, UX2X, UZØU, YO8WW, YO9HP, YT5C, YU2A, and YU7ZZ. We wish to publicly thank each of them for their cooperation and honesty and for helping to maintain the high integrity of the Top Scores box. Their clarification helped to realize the real winners' proper standing. Everyone enters the contest to fairly compete and have fun. A fair competition means that everyone is obeying the same written rules. You can find the complete CQ WW rules at cqww.com.

There are several submission errors which you can help to correct. MS and M2 categories: Please indicate in the submitted log which of your transmitters is making each contact. All contesting logging programs allow transceiver designation during setup. U.S. Location: For U.S. entrants please make sure your operating QTH is shown correctly. We need this information to place you in the right call area within the results. Single band entrants: Single band entrants can make QSOs on other bands as a check log. Please submit the QSOs made on all bands you operate. Indicate in the comments section of the Cabrillo header that all contacts on your non-entry bands are to be a check log.

Thanks

Creating the results you see in CQ magazine is just the final product of a lot of work. Entrant log submission problems, incomplete logs, forgotten band changes not in log, incorrect call indicated as used in the contest, and a myriad of other subtle problems are sorted out behind the scenes. Using an armamentarium of log-checking tools and data sources, the CQ WW Contest Committee has done its best to certify the winners.

The members of the CQ WW CC who provided insight into many contesting topics are: CT1BOH, EA3DU, ES5TV, DJ6QT, DL6RAI, E21EIC, ES5TV, F6BEE, G3SXW, JE1CKA, K1AR, K1DG, K3LR, K3WW, K3ZO, K5TR, K5ZD, K6AW, KM3T, KR2Q, KT3Y, LY3BA, N2AA, N2NC, N2NT, N3ED, N5KO, N6AA, N6TR, N6TW, N8BJQ, N9RV, OH6LI, PA3AAV, PY5EG, S5ØA, VA7RR, VE3EJ, W3ZZ, W5OV, W6OAT, WØYK, and ZS4TX. A special thank you to Ken, K1EA, who spent countless hours making the CQ WW database the best in contesting. Thanks as always to John, K1AR, and Tim, K3LR, for their advice. We want to thank Barry, W5GN. Barry has provided the machinery to send certificates to you in a timely manner. Over many years, Larry, N6TW, has been a solid rock in contributing to the results of the CQ WW. Larry, congratulations on your CQ Contest Hall of Fame induction in May 2010! Finally, we want to thank Sergio, EA3DU, as he leaves the CQ WW CC, for his 14 years of help. He has helped solve numerous problems behind the scenes.

Congratulations to all the winners and entrants! CU in the 2010 contests! 73, Bob, K3EST

(Continued on page 101)



The 2010 Dayton Hamvention® Safari – Part I

BY JOHN WOOD,* WV5J

h, Dayton! It's heady wine for ham radio aficionados who love to make new friends, visit with old friends, and see all the new products unveiled by manufacturers at this annual gathering that has been called the largest event of its type in the world.

Seeing all the new products displayed was our goal on the third and final day of this 59th annual Hamvention. The CQ team of Advertising Manager Don Allen, W9CW, Editor Rich Moseson, W2VU, and "What's New" columnist, John, WV5J, gave up our entire Sunday morning in ham radio Nirvana just to find for you, dear reader, the best and newest that amateur radio manufacturers officially debuted at the big show.

For the sake of organization, we'll start this article with HF transceivers and amplifiers and then check out VHF/UHF mobile rigs and handhelds,

before ending our tour with stand-alone receivers. Thus, let the tour begin...

HF Transceivers

"The All-Around Transceiver," the IC-9100 could very well be the answer for the majority of hams wondering how they can enjoy a lot of what amateur radio has to offer when their budget says they can only afford to purchase one HF rig. This radio covers the ham HF bands (from 160 to 10 meters), plus 6 and 2 meters, all with 100 watts; 430–450 MHz with 75 watts; and 1.2



ICOM's new IC-9100 covers the HF ham band plus 6/2 meters, 70 cm, and with an add-on board, 1.2 GHz.

GHz (with optional UX-9100 unit) with 10 watts; and handles SSB, CW, RTTY, AM, and FM modes. It also comes with dual independent 32-bit DSP doubleconversion superheterodyne receivers, a multi-functional display, an out-of-thebox capability for satellite operation and RTTY (without the need for a PC or other external unit), and has a built-in voice synthesizer and automatic antenna tuner for HF to 6 meters. The IC-9100 also accepts optional equipment for D-STAR and GPS position-reporting function. Pricing for this transceiver has not been released. For additional information, visit <www.icomamerica.com>.

Yaesu FT DX 5000. One of the most visually impressive HF transceivers displayed at this year's Hamvention® was the Yaesu FT DX 5000. This is Yaesu's new series of premium-class amateur HF radios, which come in three versions: the FT DX 5000, 5000 MP, and 5000D. All three receive 30 kHz to 60 MHz, transmit 10 to 200 watts CW, LSB, USB, FM, RTTY, and packet (5 to 50 watts in AM mode) from 1.8 to 29.7 MHz, plus 50–54 MHz. The SM 5000 Station Monitor is included with the MP and D models, but it's listed as an option

^{*}New Products Editor

¹⁸⁷⁰ Alder Branch Lane, Germantown, TN 38139

e-mail: <wv5j@cq-amateur-radio.com> (Note: This article replaces this month's "What's New" column)



THE MEW 10-30LP12 LUG PERIODIS



The 10-30LP12 removes the concern many share regarding the complexity and cost of other multiband antennas. This Higher Performance log periodic covers every frequency..instantly, from 10 to 30 MHz! Just one feedline is all you need to access this flawless feature. From moments after it was installed at the M2 test facility on the West Coast, U.S.A., stations in Europe were contacted using just 100W on 17M, 15M and yes, 12M. This antenna is definitely a band opener.

M2 has done everything possible to keep cost down and performance up. This standard version is built for 80 plus MPH winds and years of no maintenance, trouble free performance. For those who don't need 30M, we designed it without the rear element and boom section. It becomes the 13-30LP11 with the same specifications, less 30M on a 37 ft. boom. An optional kit will add the boom and rear element if you need the full coverage.

THE NEW GIR-TON SOLID STATE AMP



The 6M-1000 represents the culmination of many years of solid state amplifiers designed by Ken Holladay, K6HCP (KLM, Mirage and RF Concepts). Physical size and weight are the smallest ever for this kW amp. When combined with a lightweight switching power supply at 7-10 lbs, the 6M-1000 is perfect for DXpeditions and field day operations. It will make a great addition to any home station as well. EME and Meteor scatter usage are capable with either CW or the very popular JT6M & JT65A. Full power output of 1 kW for 50 seconds using JT65A should be possible for hours. Two temperature controlled whisper fans cool the finned heat sink and will cycle on and off as needed. If external preamp and relays are used, the amp supplies 12VDC and also sequences a N.O. key line.

COMING SOM 2 METER IKW AMPLIFIER!

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M2 Antenna Systems, Inc. 4402 N. Selland Ave. Fresno, CA 93722 Phone (559) 432-8873 Fax (559) 432-3059 www.m2inc.com M2 Offers many HF Logs, Monobanders and Multiband products.
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The Yaesu FT DX 5000 comes in three different models and is built for the seri ous ham. It covers HF plus 6 meters.

for the basic FT DX 5000. All three come with two crystal roofing filters (600 Hz and 3 kHz), two independent receivers, and a high-speed automatic digital antenna tuner. Yaesu has available a raft of unique options and accessories that are, as the brochure explains, "designed to meet the demands of serious amateur radio operators." Street pricing for this unit starts at approximately \$5,500. For more information, go to <www.yaesu.com>.



Kenwood has a new HF rig on the market. The TS-590 HF+6 transceiver is expected to be available this fall.

Kenwood TS-590. Kenwood was also showing its newest HF transceiver during the Hamvention®, the TS-590, but there was only a prototype to see and touch, and very little information about the rig was available. We were able to find out that the transceiver offers digital signal processing, 100watt output, an automatic antenna tuner, and a dual conversion receiver. It covers 160 to 6 meters and functions in modes CW, LSB, USB, AM, FM, and FSK. Kenwood officials tell us the radio is expected to ship in late August and be in the stores by October. So far, the MSRP has not been released, but a "street price" around \$1800 is expected. As more information about the TS-590 becomes available, we'll relay it to you in the pages of CQ's monthly "What's New" column. Also go to <www.kenwoodusa.com>.

Flex-Radio 1500. One of the most interesting radios we looked at during our Dayton tour was Flex-Radio's new



The new Flex-1500 from FlexRadio is a QRP SDR, or low-power software-defined radio. It puts out 5 watts on the HF ham bands plus 6 meters.

Flex-1500 HF-6m, 5-watt, softwaredefined transceiver. Like most SDRs, the display on the computer screen is more attractive than the small (2.4" high x 4" wide x 7" deep) box that is the actual radio, especially with Flex Radio's new version 2.0 PowerSDR software. Interfacing the radio with your computer is done easily through a USB 2.0 cable. Priced at under \$700, the 1500 lets you operate SSB, CW, AM, FM, and digital modes while it receives from 490 kHz to 54 MHz. On the 1.5-pound radio are connections for an RJ-45 microphone, headphones, CW key, antenna out, computer interface, transverter, ground, 10-MHz reference signal in, and 13.8 volts DC input. Dominating the PowerSDR screen is the spectrum display which can also serve as a PSK waterfall, while around it are on-screen buttons to select numerous receive and transmit parameters, including frequency, mode, and VFO choice. For more information, visit <www.flexradio.com>.

Ten-Tec QRP Transceivers. Our Ten-Tec friends from Sevierville. Tennessee unveiled a pair of two-band, CW QRP transceivers at this year's Hamvention® designated as R4020/ R4030. The R4020 covers 40 and 20 meters, while the R4030 covers 40 and 30 meters. As simple, lightweight, palmof-your-hand, trail-friendly dual-band transceivers, these Ten-Tec units offer a surprising package of features such as a bright, easy-to-read LCD display that informs you of frequency, mode, supply voltage, S-meter, RIT, and more, plus a powerful DDS electronic synthesizer that gives you 5-16 MHz for general-coverage receiving, a convenient 20-frequency memory bank, low current consumption at 55 mA on receive or about 550-950 mA on transmit depending on supply voltage, builtin adjustable keyer with automatic CQ and callsign insertion for memory keying, a connection for a straight key or your favorite key paddle, 8-ohm headphone output (requires stereo plug), and an RIT (receive incremental tuning)



Also in the QRP category is a pair of new dual-band transceivers from Ten-Tec. The 4020 (pictured) covers 40 and 20 meters; the 4030 covers 40 and 30!

that allows for 10-Hz or 100-Hz tuning. Each QRP rig is priced at \$249 and more information about both can be found at <www.tentec.com>.

Alinco DX-SR8. After apparently focusing on improving its USA line of VHF and UHF HTs for the past few seasons, Alinco surprised a few of its followers at Dayton this year with the debut of its new HF transceiver, the DX-SR8. Featuring a detachable front control panel and a size that can fit on your shelf as easily as it can go into a car or boat, the Alinco DX-SR8 transmits 160 to 10 meters including the 5.3 MHz band (T model only). Covering SSB, CW, and FM with 100 watts power and AM with 40 watts, and a general-coverage receiver that listens from 135 kHz to 30 MHz, the DX-SR8 also comes with a large digital readout, front-firing speaker, and a frontpanel keypad for direct frequency input. Retail pricing has not yet been released, but more information about the DX-SR8 can be found at <www.alinco.com>.



Alinco's first new HF entry in several years is the 160- to 10-meter DX-SR8. It includes a general-coverage receiver that tunes down to 135 kHz.



TAPR's Hermes transceiver is a 'highperformance software-defined radio" (HPSDR) putting out 15 watts on 160-20 meters.

TAPR Hermes. Over at the TAPR booth, folks were showing off their new Hermes transceiver. Billed as a "high performance software defined radio," the Hermes covers DC to 16 MHz with a maximum output power of 15 watts. It's designed for techies who like to tinker and features open-source software architecture. No definite pricing figures were available, but more information about the Hermes is; just visit <www.openHPSDR.org>.

HF Amplifiers

Alpha 8406. Six-meter enthusiasts who attended the Dayton Hamvention[®] this year had a reason to stop by the RF Concepts booth if they wanted to get a glimpse of the new Alpha 8406 1.5-KW, 6-meter amplifier. Designed specifically to operate from 50 to 54 MHz, the Alpha 8406 draws its power from one 4CX1500B tetrode and utilizes manual

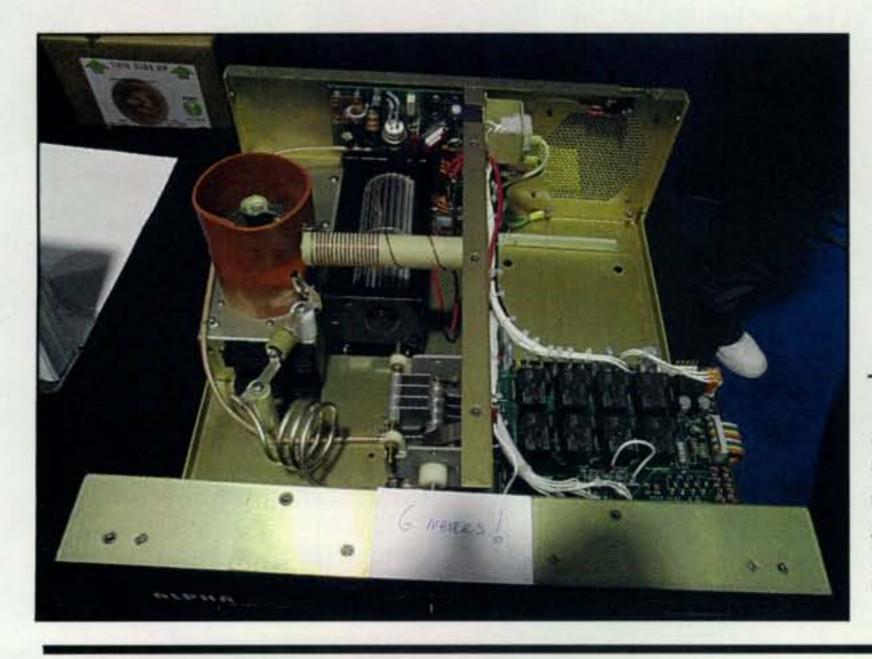


Tokyo Hy-Power's HL-550FX puts out 600 watts on 160–6 meters and weighs only about 20 pounds.

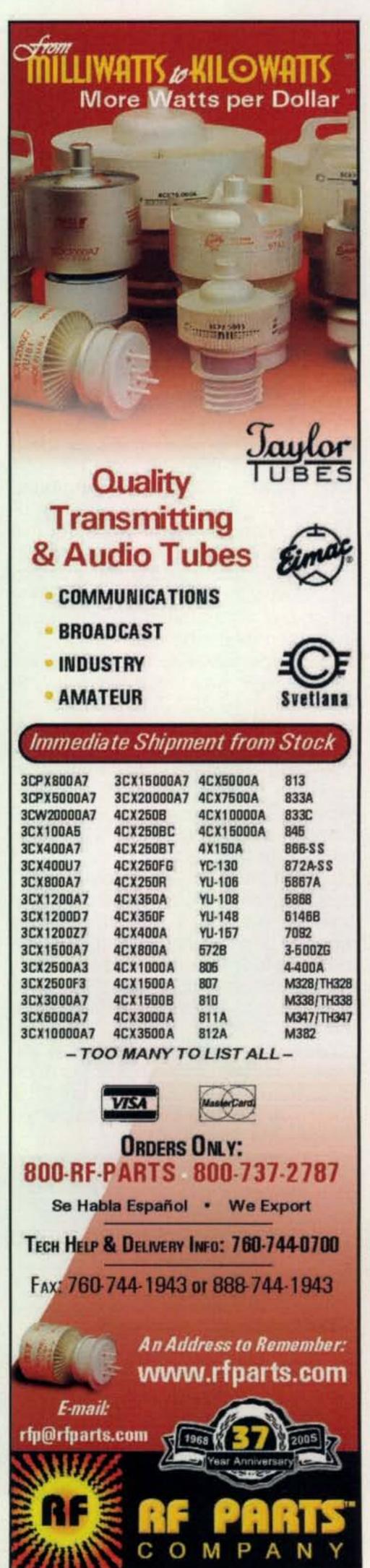
tuning. Price for this band-specific amplifier as shown on the RF Concepts website, <www.rfconcepts.com>, is \$4250.

Tokyo Hy Power HL-550FX. With 6 meters gaining in popularity and more and more HF transceivers including the "magic band," it's no surprise that the engineers at Tokyo Hy Power have developed the HL-550FX all-sold-state, 600-watt linear amplifier to cover 1.8 to 54 MHz and handle SSB, CW, and RTTY. What is surprising is that this notune amp comes with forced-air cooling and a number of high-speed protection circuits in case of overdrive, high SWR, and DC over-voltage, all packed into a compact, lightweight 20-pound package. On the front is an analog multimeter that shows forward output power and reflected power, along with voltage and current draws. The sale price for this versatile unit is \$2400, and it's expected to be ready for distribution beginning in September. For more information, visit <www.tokyohypower.com>.

Elecraft KPA-500. There was lots of activity all weekend at the Elecraft booth, with a large number of visitors expressing interest in seeing the prototype of the KPA-500, Elecraft's new



The Alpha 8406 is a 6-meter-only amplifier, generating up to 1500 watts of output.





Elecraft has entered the standalone amplifier market with its 1.8–54 MHz solid-state KPA-500 that, logically, puts out 500 watts.

solid-state, 500-watt, diode-switched amplifier which operates from 1.8 to 54 MHz. The KPA-500 features auto-band select and reportedly works with any HF radio. A price has yet to be set for this new arrival, but Elecraft officials expect to be taking orders by the holidays and hope to ship units before January 2011. For more information visit <www. Elecraft.com> on the web.

SPE Expert 2K-FA. Yes, a 2-KW linear amplifier was on display at the Dayton Hamvention®, thanks to the folks at RF Concepts and SPE, and they described it as "the most advanced solid-state automatic linear amplifier in the world." Priced at \$9395, the SPE Expert 2K-FA operates on HF and 6 meters (1.8 to 54 MHz) and works with most of the HF radios on the market today. This unit is fully automatic and capable of continuous operation. It features an advanced switching power supply, a built-in automatic tuner, and a USB port for PC control and for downloading software upgrades. For more information visit <www.rfsolutions. com.au>.

Yaesu VL-2000. On display at the Yaesu booth at Dayton but not expected to be available for sales until the Christmas holidays was the company's

new VL-2000 linear amplifier. Teamed with the matching VP-2000 power supply, the VL-2000 makes for a formidable station addition, since it has a built-in antenna tuner and provides the full legal limit for amateur transmission on the 160 to 10 meter bands plus 6 meters. The MRSP for the VL-2000 was not available at the time, but additional information should show up online soon at <www.yaesu.com>.

VHF/UHF Mobile

Yaesu FTM-350R. It does seem like multi-band, multi-feature ham mobile rigs just continue to be more complicated, more powerful, and more advanced technologically, doesn't it? Case in point is the Yaesu FTM-350R—the only new VHF/UHF mobile seen at this year's Hamvention®. It features a large LCD display in a detachable front panel, 50-watt power output, APRS and Bluetooth® capabilities, and a receiver with a range of 108 MHz to 1000 MHz, plus the AM and FM commercial broadcast bands. (There are even two speakers for FM stereo reception.)

The FTM-350R transmits on the VHF and UHF ham bands with your choice of 50, 20, or 5 watts plus 1 watt on the 222-MHz band, while the front panel gives you barometric-pressure readouts on command, numerous APRS displays, and a choice of eight LCD backlight colors. It also comes with a built-in mic and a PTT key in case you misplace your hand microphone. Street sale price for this Yaesu varies from \$550 to \$600. For additional information, visit <www.yaesu.com>.

Handhelds

Kenwood TH-D72 (or similar). With a promise of the rig being on the market "soon," Kenwood reps at Dayton showed off the company's next 5-watt, dual-band (2 meter and 440 MHz) HT which has tentatively been labeled the

Selection of the select

If you really need serious power, SPE has introduced its 2-kilowatt solidstate amp for 160-6 meters, the Expert 2K-FA.



The Yaesu FTM-350 is only new VHF/UHF FM mobile rig introduced at this year's Hamvention®. It lets you listen to your favorite AM or FM broadcast station while simultaneously listening for activity on your favorite ham frequency.



Kenwood's newest handheld for 2 meters and 70 centimeters includes a built-in TNC and APRS software as well as an integrated GPS receiver for sending out your exact location on APRS.

MFJ Balanced Line Antenna Tuner

Superb balance . . . Very wide matching range . . . Covers 1.8-54 MHz . . . Cross-Needle SWR Wattmeter . . . Handles 300 Watts . . . Compact size . . .

The MFJ-974HB is a fully balanced true balanced line antenna tuner. It gives you superb current balance.

Johnson Matchbox

For decades, the Johnson Matchbox has been the standard of comparison for balanced line antenna tuners. But, it had a severely limited matching range and covered only 80, 40, 20, 15 and 10 Meters.

The MFJ-974HB is its successor. It meets today's needs and even surpasses the Johnson Matchbox outstanding performance.

Everything You Need

The MFJ-974HB gives you excellent current balance, very wide matching range(12-2000 Ohms) and covers 1.8 through 54 MHz continuously including all WARC bands, 160 Meters, 6 Meters and the new 60 Meter band. Handles 300 Watts SSB PEP and 150 Watts CW.

Tuning is fast and easy - - just three tuning controls. You can adjust for highly efficient broadband low-Q operation or use higher Q when you encounter extreme loads.

A large three-inch lighted Cross-Needle SWR/Wattmeter lets you read SWR, peak or average forward and reflected power all at a glance on 300/60 or 30/6 Watt ranges.

A ground post is provided to ground one output terminal so you can also tune random wires and coax fed antennas.

Compact 71/2 Wx6Hx8D in. fits anywhere.



Tunes any Balanced Line

The MFJ-974HB tunes any balanced lines including 600 Ohm open wire line, 450/300 Ohm ladder lines, 300/72 Ohm twin lead - - shielded or unshielded.

Superb current balance minimizes feedline radiation that can cause troublesome TVI /RFI, painful RF bites, mysterious RF feedback problems and radiation pattern distortion.

Excellent Balance, Excellent Design The MFJ-974HB is a fully balanced wide range T-Network. Four 1000 Volt air variable capacitors are gear driven. A high-Q air wound tapped inductor is used for 80-10 Meters with separate inductors for 6 and 160 Meters. The tuning components are mounted symmetrically to insure electrical balance.

MFJ-974HB

95 placed on the low impedance 50 Ohm input to convert the balanced T-

Net-work to un-balanced operation. An efficient balun is made of 50 ferrite beads on RG-303 Teflon™ coax to give very high isolation. It stays cool even at max power.

Balanced Line = Extremely Low Loss

Balanced lines give extremely low loss. Doublet, horizontal loop, vertical loop, quad, double extended Zepp, Lazy H, W8JK antennas all give efficient multi-band operation when fed with balanced lines.

6-80 Meter Balanced Line Tuner MFJ-974B

\$189⁹⁵

MFJ-974B, \$189.95. Same as MFJ-974H but for 6-80 Meter operation (no 160 Meters).

160-6 Meters All Band Doublet Antenna

MFJ-1777, \$59.95. 102 feet doublet antenna covers 160-6 Meters with balanced line tuner. Super strong custom fiberglass center insulator provides stress relief for 450 Ohm ladder line (100 feet included). Authentic glazed ceramic end insulators. Handles 1500 Watts.

MFJ 1500 Watt Fully Balanced Antenna Tuner

Fully balanced MFJ-976 handles 1500 Watts legal limit . . . Extra-wide 12-2000 Ohms matching range . . . continuous 1.8 to 30 MHz coverage including all WARC bands . . . Four separate 500 pF in two gangs gives you a total of 2000 pF capacitance . . . Heavy duty 1:1 current balun . . . more!

MFJ Legal Limit planced Live Tune NOUCTANCE 2.8.87

MFJ-976

The MFJ-976 is a 1500 Watt Legal Limit fully balanced antenna tuner.

You get superb current balance, very wide matching range (12-2000 Ohms) and continuous 1.8-30 MHz coverage including all WARC bands. Handles full 1500 Watts SSB and CW.

You can tune any balanced lines including 600 Ohm open wire line, 450/300 Ohm ladder lines, 300/72 Ohm twin lead -- shielded or unshielded. Also tunes random wires and coax fed antennas.

MFJ's fully balanced extremely widerange T-network gives you simple, fast three knob tuning. No complicated switching between high and low impedance and switching in additional capacitance of L-networks.

Four separate 500 pF in two gangs gives you a total of 2000 pF for highly efficient low loss operation on 160 Meters.

You get superb 10 Meter performance due to MFJ's low minimum capacitance and exclusive Self-Resonance Killer™ high-Q AirCore™ roller inductor with silver plated contacts.

Heavy duty 1:1 current balun gives you superb balance and stays cool even at 1.5kW.

True active peak reading lighted Cross-Needle SWR/Wattmeter lets you read SWR. true peak or average forward and reflected power all at a glance on 300/3000 Watt ranges. 12Wx6Hx153/4D inches.

Copper wire

MFJ-18G100, 100 Ft., \$24.95. MFJ-18G250, 250 Ft., \$59.95.

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Ladder line, Twin lead, Insulators, Super-strong fiberglass 450 Ohm

ladder line insulators MFJ-16D01, \$8.95. Center insulator. Double weave ladder line stress-relief. Strong wire tie points. Hang hole.

MFJ-16E01, \$9.95. Feedpoint *End* Insulator. Double weave ladder line stress relief. Built-in SO-239 connector.

MFJ-16F01, \$8.95. Middle insulator. High-strength coax connection at midpoint with SO-239, quadruple weavethrough ladder line stress relief.

MFJ-16C06, \$4.56. Authentic glazed ceramic Insulator, 6-pack.

450 Ohm Ladder Line Extremely low loss, openframe construction. Heavy duty black polyethylene. Solid 18 gauge wire. MFJ-18H050, 50 Ft., \$19.95. MFJ-18H100, 100 Ft., \$34.95. MFJ-18H250, 250 Ft., \$89.95. 300 Ohm Twin-Lead

20 gauge stranded copper wire. Black polyethylene. MFJ-18T050, 50 Ft., \$24.95. MFJ-18T100, 100 Ft., \$44.95. MFJ-18T250, 250 Ft., \$99.95.

Copper Antenna Wire Flexible, 7-strand, 14 gauge, hard solid-copper wire. Strong/long-lasting.

MFJ... The World Leader in Ham Radio Accessories

Kenwood TH-D72 Data Communicator. Looking a lot like its predecessor, the TH-D7A, with a 16-button keypad and a similar multi-function disk control on the front, the radio Kenwood showed us comes with a built-in TNC (1200/9600) and has APRS capabilities, but this one also comes with an integrated GPS receiver. Again, like the TH-D7A, this new unit works with Kenwood's Skycommand System II+ when used with the TS-2000 series. The TH-D72 also offers EchoLink memory compatibility and comes with a mini-USB connector for enhanced computer connectivity. No price points were hinted at, but additional information should show up soon at <www.kenwoodusa.com>.

Yaesu VX-8DR, VX-8GR. Yaesu was also showing its 5-watt APRS-capable HTs at this year's Hamvention® with the latest derivatives of the VX-8R—the VX-8DR and VX-8GR. The VX-8DR was recently announced as an improved APRS version of the now discontinued four-band VX-8R, while the VX-8GR is a 2-meter and 440-MHz FM APRS-capable dual-bander that also comes with a built-in GPS unit.

The VX-8DR transmits on the 6-meter, 2-meter, and 224 and 440-MHz ham bands and can monitor two ham frequencies simultaneously via two independent receivers while it also lets you listen to commercial AM and FM broadcasts. Along with APRS capability (optional GPS antenna required), the VX-8DR also has a general-coverage receiver, Bluetooth® capabilities, and is advertised as waterproof, submersible to 3 feet for 30 minutes.

The VX-8GR also comes with a general-coverage receiver with a range from 108 to 899 MHz and proclaims the waterproof label like its VX-8DR brother. The manufacturer's suggested retail price for the VX-8GR (two bands, plus GPS) is \$540; MSRP for the VX-8DR (four bands plus GPS and APRS) is \$566. Dealer prices generally are lower. For full specs and additional information, visit <www.yaesu.com>. To order, visit your favorite Yaesu dealer (see our review in last month's CQ).

ICOM IC-T70A, IC-V80. Rugged and basic with lots of audio is the image ICOM chose to convey about two of its newest HTs on display during Hamvention® 2010—the IC-V80 VHF handheld and the IC-T70 dual-bander.

The two radios are almost exactly the same size, while other specs vary slightly: The 2-meter IC-V80 is touted to have 5.5 watts output, 750 mW of audio, and weighs 12.7 ounces with the BP-264 NiMH battery pack and antenna, while the IC-T70 transmits 5 watts of RF, weighed in at 13.4 ounces with BP-264 Ni-MH battery pack and antenna,



The IC-T70A is one of two new HTs introduced by ICOM. It covers 144 and 440 MHz, while the IC-V80A is a single-band rig for 2 meters.

and produced 700 mW of audio out on both the VHF and UHF bands. Both handhelds have credentials for sporting the rugged label by meeting IP54 standards for dust protection and water resistance while also passing Mil-Std. 810 environmental tests.

Other common features for both radios include: WX channel and WX alert

functions, direct keypad frequency entry, PC programmability, internal VOX function, auto power off, an LCD backlight, and automatic repeater function.

Approximate street price for the IC-T70 dualbander is \$220, while the IC-V80 goes for around \$140. For more information, visit <www.icomamerica.com>.

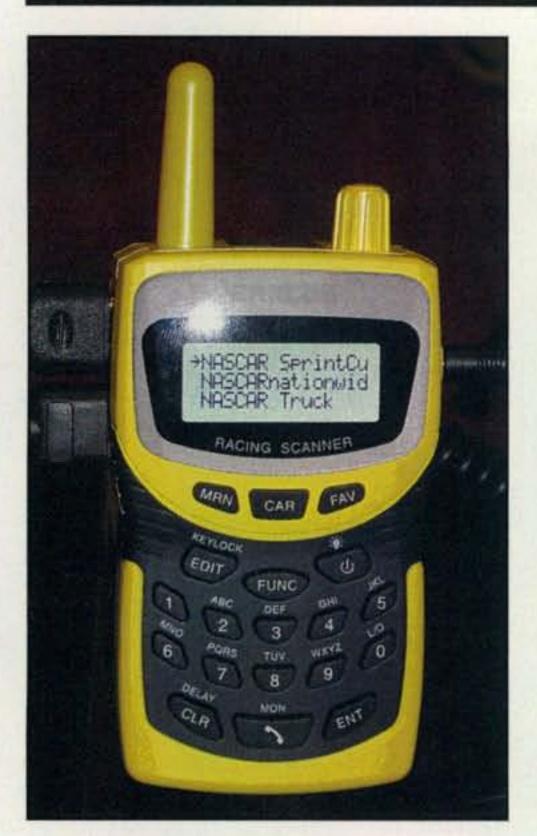
Receivers and Scanners

Alinco DJ-X11 Portable Receiver. With a main band coverage of .05 to 1,299.99995 MHz and the capability to receive AM, FM, WFM, CW, and SSB modes, Alinco's new DJ-X11 portable receiver lives up to its tag line that says buyers will be "getting the power of a desktop in a handheld radio."

Pocket-size at 2.4 inches wide, 4.17 inches tall, 1.5 inches deep and weighing in at a scant 8.29 ounces, this radio is big in features, including two VFOs, preset, programmed, memory, VFO and tone scanning modes, a PC interface for cloning and real-time control software (available free at alinco.com), selectable tuning steps, a large illuminated keypad and LCD display screen, an optional wire remote control, and an 1800-mAh rechargeable Li-Ion battery pack that provides approximately 15 hours of operation. The DJ-X11 also comes with ChannelScope, which checks signals on nearby frequencies for both receivers and also a feature that Alinco calls "Bug Detector," which searches for hidden transmitters. The basic DJ-X11 is street priced at around \$400, but with it in the box you'll find a whip antenna, instruction manual, belt



MFJ has entered the scanner market with two models, the MFJ-8310 desk scanner and the MFJ-8322 handheld analog trunking scanner.



Racing fans will enjoy the GRE PSR-110 race scanner, which comes preprogrammed with the frequencies most commonly used in major auto races around the U.S.

clip, drop-in charger, hand strap and an AA power case. For more information visit <www.alinco.com>.

ICOM IC-R6 Portable Receiver. ICOM updates its portable receiver line with the addition of the IC-R6, another pocket-size package that picks up AM, FM, and WFM signals from .1 to 1309.995 MHz. Small but rugged and packed with features, this 7.1-ounce package offers 100 channel-per-second high-speed scanning, 1300 memory channels in 22 banks, up to 15 hours of operation from its supplied NiMH rechargeable battery, and an innovative capability ICOM likes to call "Voice Squelch Control," which opens the squelch only when a modulated signal is detected and ignores unmodulated beat noise. Listeners who are scanning for talk, news, or music may find this feature useful to filter out unwanted data bursts and beacons. Prices on the web for the IC-R6 are in the neighborhood of \$260, and for that amount you also get NiMH cells, a belt clip, AC adapter, antenna, and handstrap. For more information, check first at <www.icom america.com>.

MFJ-8310/8322 Scanners. Scanners also made their first appearance ever at the MFJ booth at this year's Hamvention® with two models being placed on display-a base scanner designated as the MFJ-8310 and priced

at \$99, plus a handheld trunking scanner listed as the MFJ-8322 and priced at \$199.95.

The base scanner receives ham repeaters and public-service broadcasts originating in the usual bands-29 to 54 MHz, 108 to 174 MHz, and 380 to 512 MHz-and comes with a onetouch weather information button. It can also decode digital S.A.M.E. codes so can hear a weather alert if one is issued for your area.

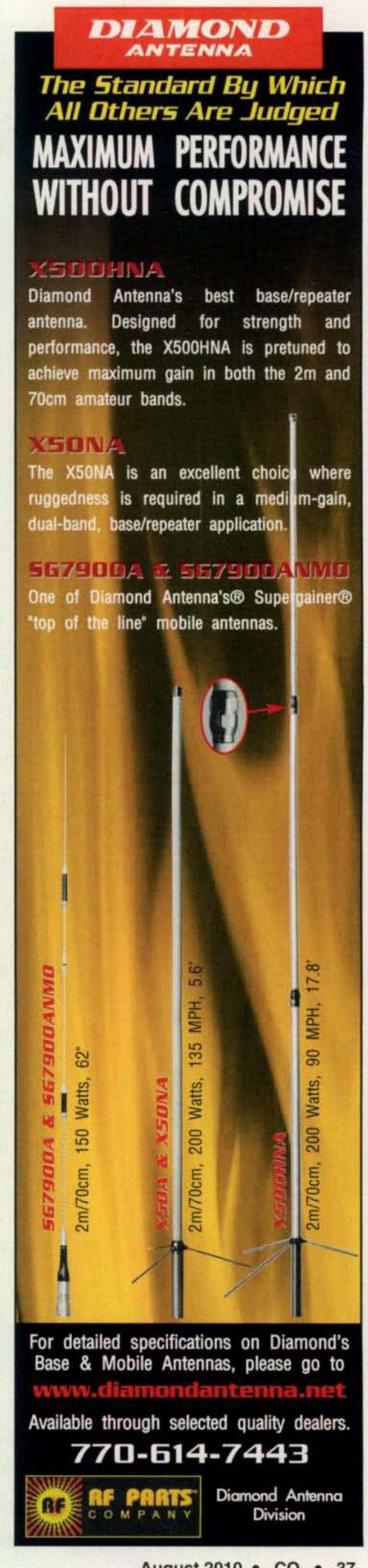
The handheld scanner, according to MFJ, tracks analog Motorola type I, type II and hybrid, EDACS, and LTR systems. It is PC programmable, can store up to 1000 frequencies in memory, and receives signals emanating in the 25-54 MHz band, from 108 MHz to 174 MHz, from 216.0025 MHz to 512 MHz, 764 MHz to 960 MHz, and 1240 MHz to 1300 MHz. It functions on four user-supplied AA batteries (either alkaline or NiMH) and comes with an AC adapter and flex antenna.

GRE PSR-110/700 Handheld Scanners. GRE America, which is now the U.S. distributor for Alinco, was also showing off two of its newest GRE-brand handheld scanners. The real eye-catcher was the bright yellow and gray PSR-110 Race Scanner for auto-racing fans. It covers the 450-470 MHz band and features one-touch MRN Channel Access and search, upgradeable car number, frequency and driver data, plus full dot alphanumeric, backlit display. The frequencies in use by six popular racing series are pre-programmed. All the listeners need to do (you can plug in two headsets) is pick the track at which they are and tune in. The PSR-110 Race Scanner has an MSRP of \$149.

GRE's second scanner first shown at Dayton this year was the PSR-700 EZ-Scan-SD. Sporting a six-line LCD display and only six buttons on the front panel of a 5-inch tall, 2.5-inch wide, basic black case, its appearance is deceptive for the capabilities it offers. What is inside is a 2-GB SD card that comes pre-programmed with the entire U.S. database for all known analog trunking systems and conventional frequencies used by public-safety agencies, businesses, and governments. To monitor the frequencies in use in your area, all you need to do is scroll through the library, select your city or county, and tell the radio to scan. MSRP for the PSR-700 is \$229. For more information, visit <www.greamerica.com>.

Looking Ahead

In part two of our 2010 Dayton Safari, we'll look at the newest offerings among antennas and accessories for your ham shack. Stay tuned...









Timeline of Ham Radio History 1945–2010

To help celebrate CQ's 65th anniversary, we've put together a timeline of significant events in ham radio history from 1945 to the present. Each month this year, we'll present five or six years' worth, and then put the whole list on our website when we're done. (Since this is a timeline and not a textbook, we had to be selective. We apologize in advance if we leave out something of importance to you.)

This month, we'll cover the years 1985–1990:

1985: FCC adopts policy, known as PRB-1, requiring "minimum practicable regulation" of amateur antenna towers and that municipalities "reasonably accommodate" amateur operation. Ruling does not apply to private land use reg-

ulations, including CC&Rs, and these restrictions continue to pose a major threat to ham radio operation in many areas; Tony England, WØORE, has first SSTV QSO from space, aboard shuttle Challenger; 12 meters and 902 MHz opened for ham use.

1986: Japan launches its first amateur satellite, Fuji OSCAR-12; in the U.S., 3500 hams participate in Hands Across America event; CQ establishes Contest Hall of Fame.

1987: FCC adopts Novice Enhancement, giving Novices (as well as Technicians) some voice privileges on 10 meters; Novices also get access to 220 and 1296 MHz; FCC splits Tech/General theory exams, pre-1987 Techs retain credit for General Class theory; FCC proposes reallocating 220–222 MHz to Land Mobile Service.

1988: OSCAR-13 launched; it was second, and to date, last, successful high-orbit ham satellite (OSCAR-40, launched in 2000, suffered an explosion in orbit and became disabled).

1989: 17 meters—last of the socalled WARC bands approved a decade earlier—opened to hams; ARRL celebrates 75th anniversary; ARRL, QCWA, and others petition FCC for a code-free entry-level ham license.

1990: ham radio magazine ceases publication and is purchased by CQ; Communications Quarterly launched by CQ as "spiritual successor" to ham radio; first WRTC (World Radio Teamsport Championship) held in Seattle, won by K1AR & K1DG.

Next month, we'll look at 1991 through 1995, featuring the code-free Technician license, the "pizza rule," and CQ's 50th anniversary.

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- Hours of portable operation, fast recharging
- Complete with software, charger, coax adapters and more!

25th Aniversary Edition of the Legendary PK-232/USB!

- PK-232/USB Multimode Data Controller* Sound card interface, USB, Pactor, RTTY, Packet & more! 100,000 sold - All-time top selling data controller!
- DSP-232+ Multimode Data Controller* Sound card interface, USB, Pactor, 1200/9600 Packet
- PK-96/100 TNC 1200/9600 Packet*

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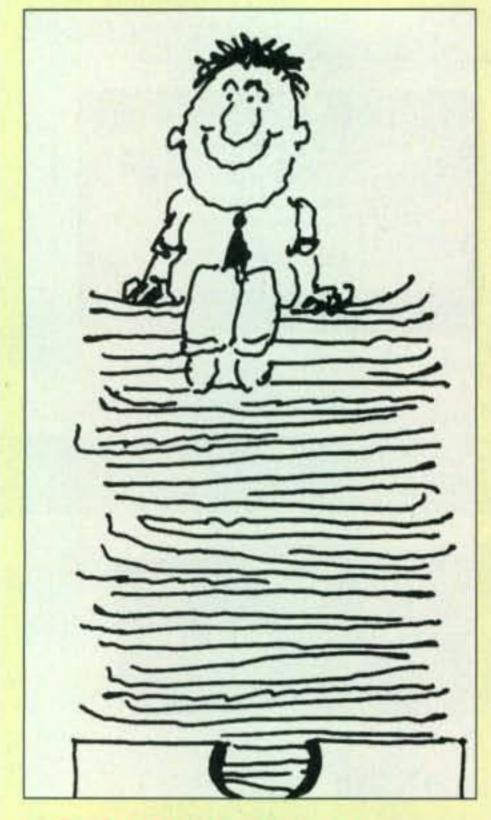
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What You've Told Us...

Our May survey asked about your use of social networking sites on the internet (while fully recognizing that ham radio is the *original* social networking "site"). To start with, 92% of the readers who replied have internet access, and a surprisingly high 37% belong to at least one social networking site. Of that group, 87% belong to Facebook, 22% each have accounts on LinkedIn and Twitter, 15% are on MySpace, and 16% belong to another networking site.

Among the social network members, 28% log in "just here and there," while 19% check in about once a day, 18% each log in either more than once a day or a few times a month, and 16% check in a few times a week. The bulk of you have a variety of acquaintances on these sites, with 27% saying you contact mostly family, 13% mostly non-ham friends, 10% mostly ham friends, 6% mostly people from work, and 45% reporting a combination of those groups.

On the question of your main motivation in using these sites, 52% of you say it's to keep in touch with family and friends, 8% each for meeting and networking with fellow hams and networking for work, 28% a combination of those groups, and 5% have other, non-specified, reasons. Finally, 22% of the social networking readers are registered as fans of the *CQ* magazine page on Facebook (25% of those identifying themselves as Facebook members).

Thank you for your responses. This month's free subscription winner is J.E. Palmer, KA5UUN, of Mt. Ida, Arkansas.

questions.

Reader Survey August 2010

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 incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to CQ.

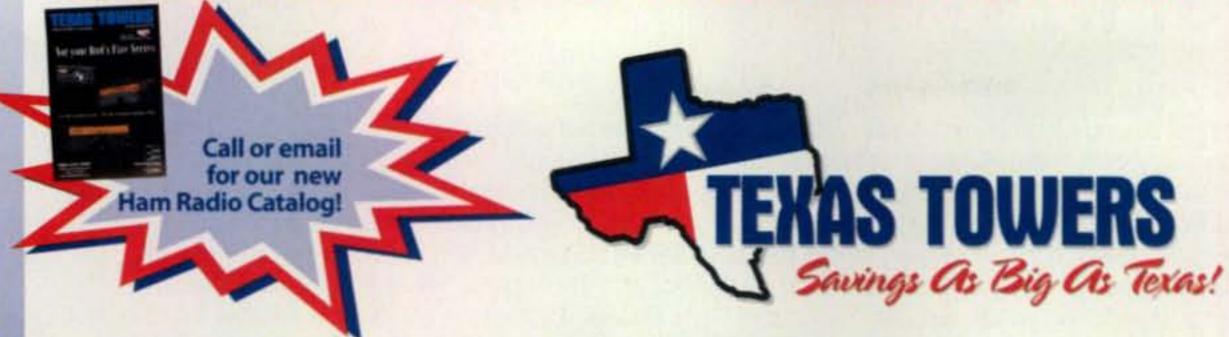
This month, we'd like to know more about your views on CQ-sponsored contests and results reporting.

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2. What is your main motivation for operating in <i>CQ</i> -sponsored
contests?
Competition with other hams35
Competition with my own past performances36
Building up DX totals37
Fun and camaraderie38
Other39
Do not operate in CQ-sponsored contests40
3. Do you submit a log in CQ-sponsored contests?
Yes, always41
Yes, sometimes42
No, even though I operate in them43
No, I do not operate in CQ contests44
4. Do you read the contest result articles published in CQ?
Yes, always45
Yes, sometimes
Only if I have submitted a log47
No48
5. Do you read the expanded contest results on the CQ website?
Yes, always
Only if I have submitted a log51
No52
6. Which portion of contest reports published in CQ is most important to you? (Choose one)
Main contest article53
Trophies box
Top Scores boxes55
QRM (participant comments)56
Individual station scores (line scores)57
MY score58
All are equally important59
Do not read contest reports60

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

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What If?

am a fan of science fiction, especially sci-fi that is not too ridiculous. Several years ago I was really taken in by the first "Back to the Future" film, and more recently by a scene in the movie "Night at the Museum" in which a young man in the 1940s accidentally acquires a modern Motorola cell phone. This got me wondering what we, as technically adept amateurs, could actually accomplish if we

*c/o CQ magazine

were to somehow get transported back in time at or close to the turn of the 20th century with the knowledge we have now. Before going on, let me say that I know all about the paradoxes involved with time travel, so please don't write to me about that. This column is simply a "what if" exercise.

Before 1900 (and radio as we know it), telegraphy was very widespread. In fact, there was so much traffic that ways to send more than one message over a single wire were highly desirable. Fig.

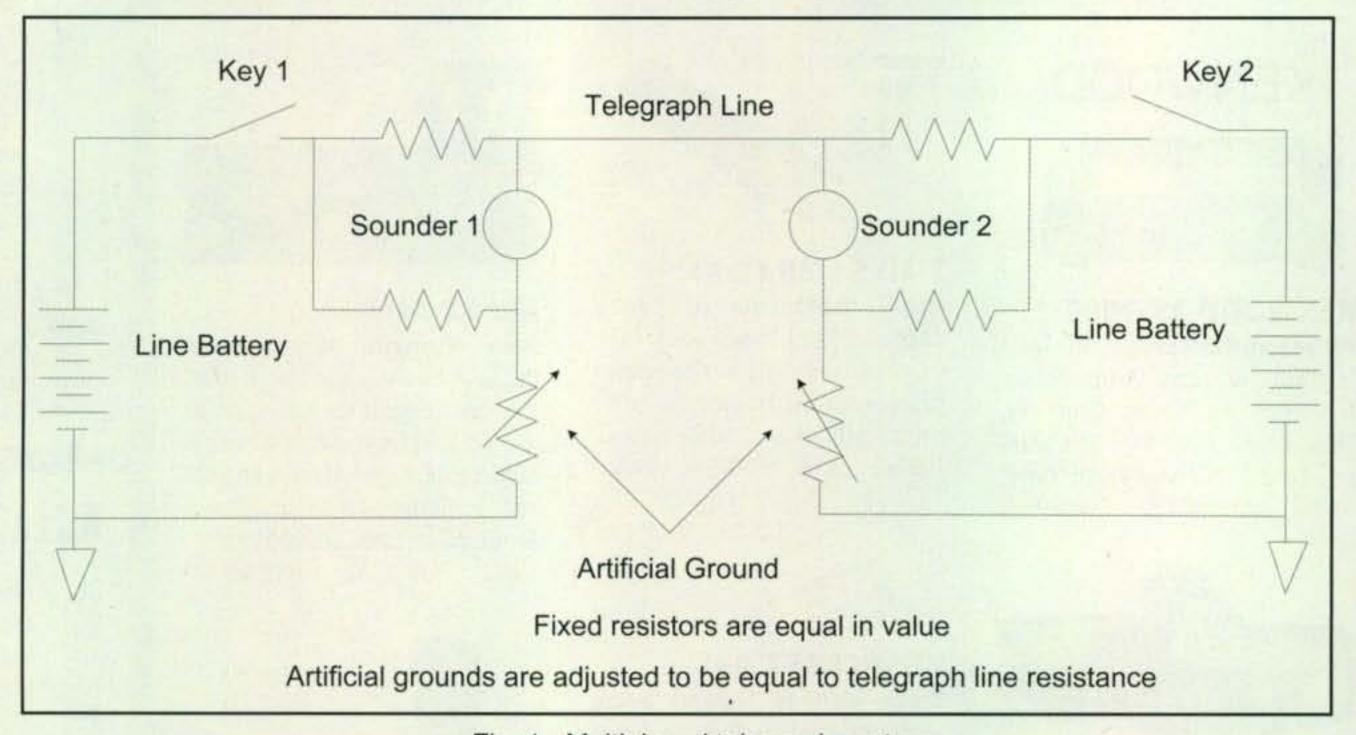


Fig. 1- Multiplexed telegraph system.

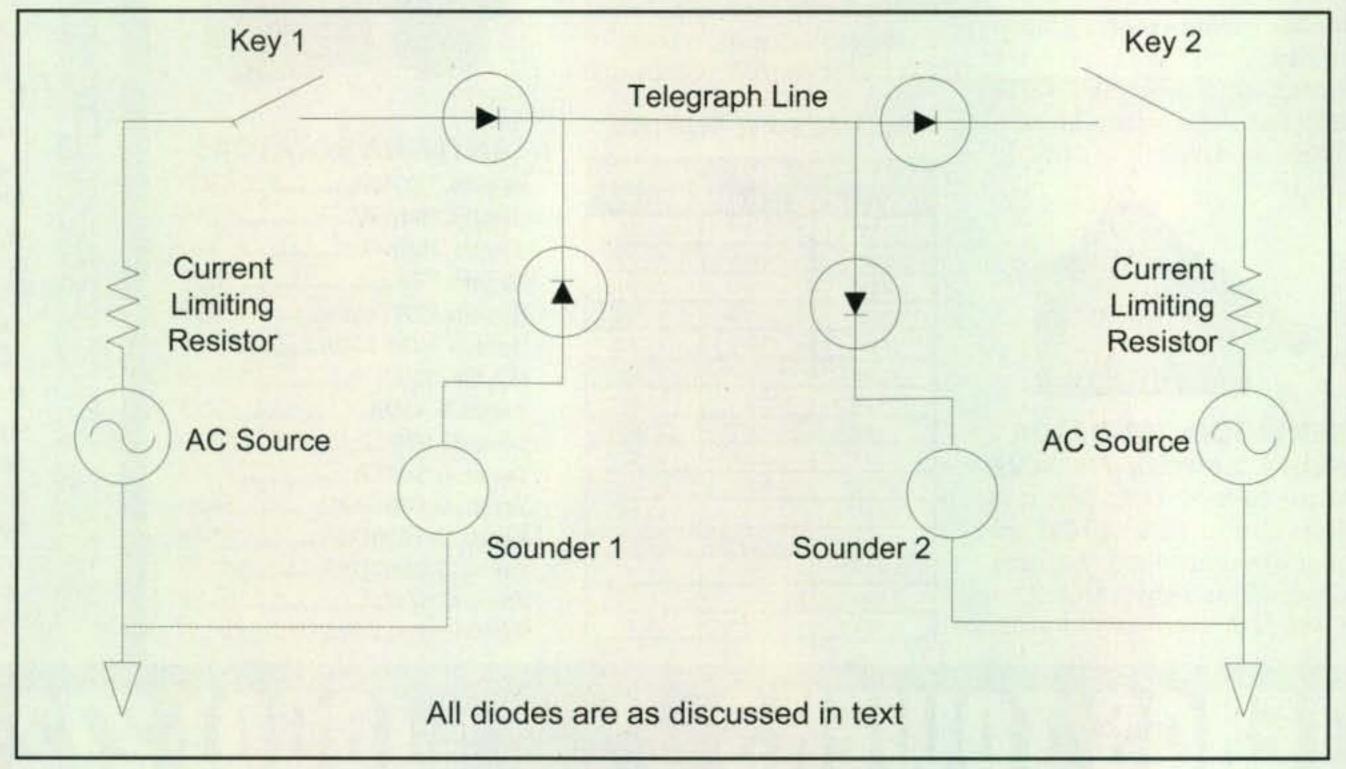


Fig. 2- Diode-based multiplex system.

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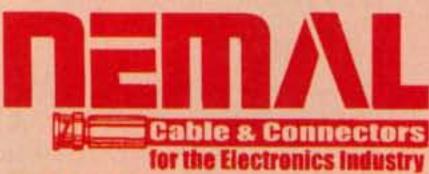
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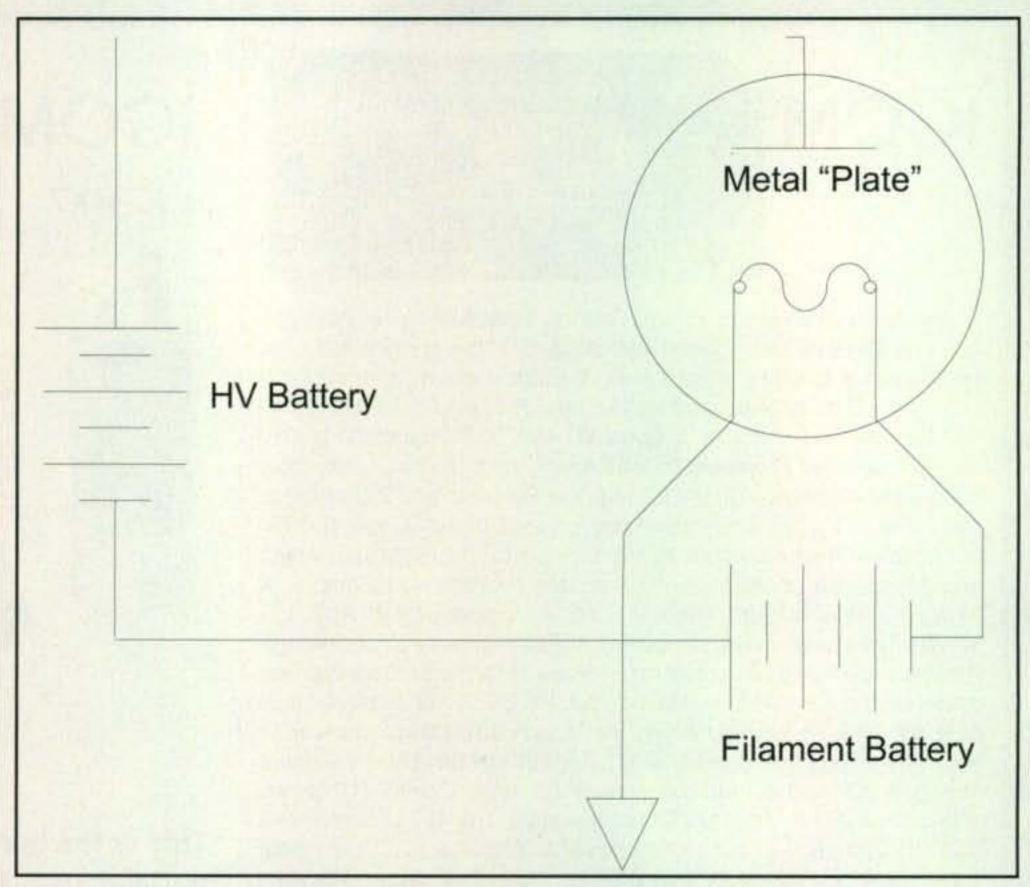


Fig. 3- "Edison's Effect" to prevent incandescent lamp blackening.

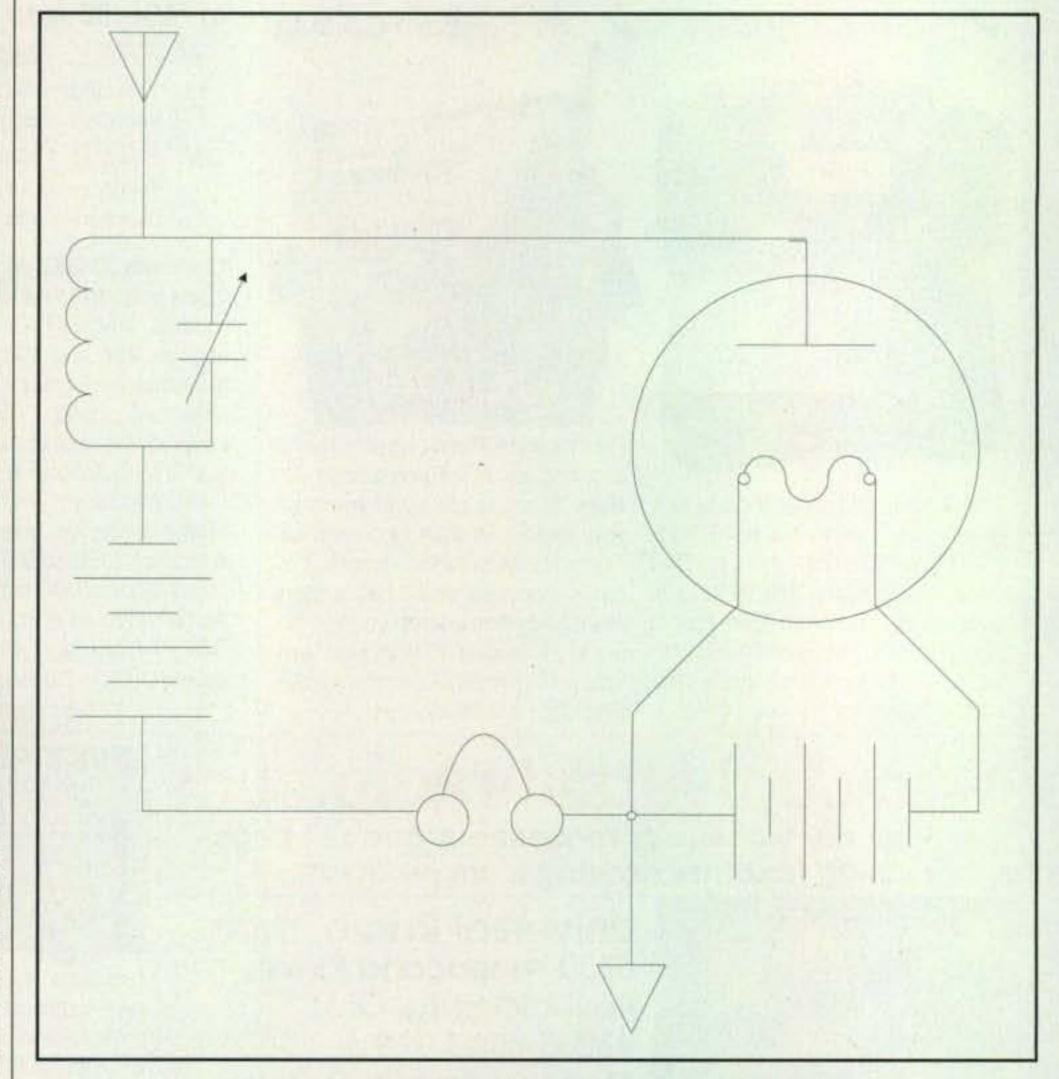


Fig. 4- "Edison Effect" pseudo crystal set circuit.

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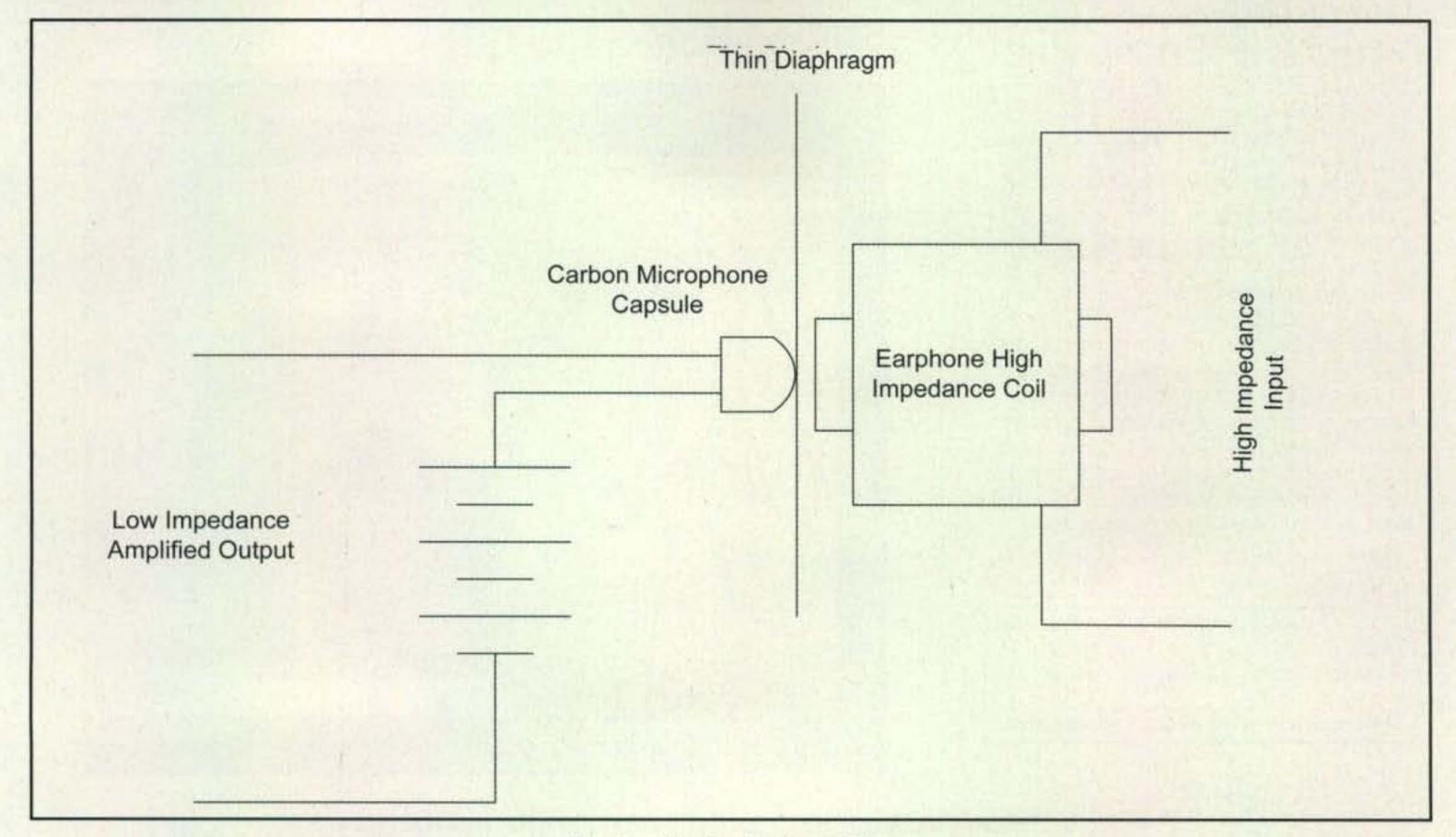


Fig. 5- Mechanical amplifier.

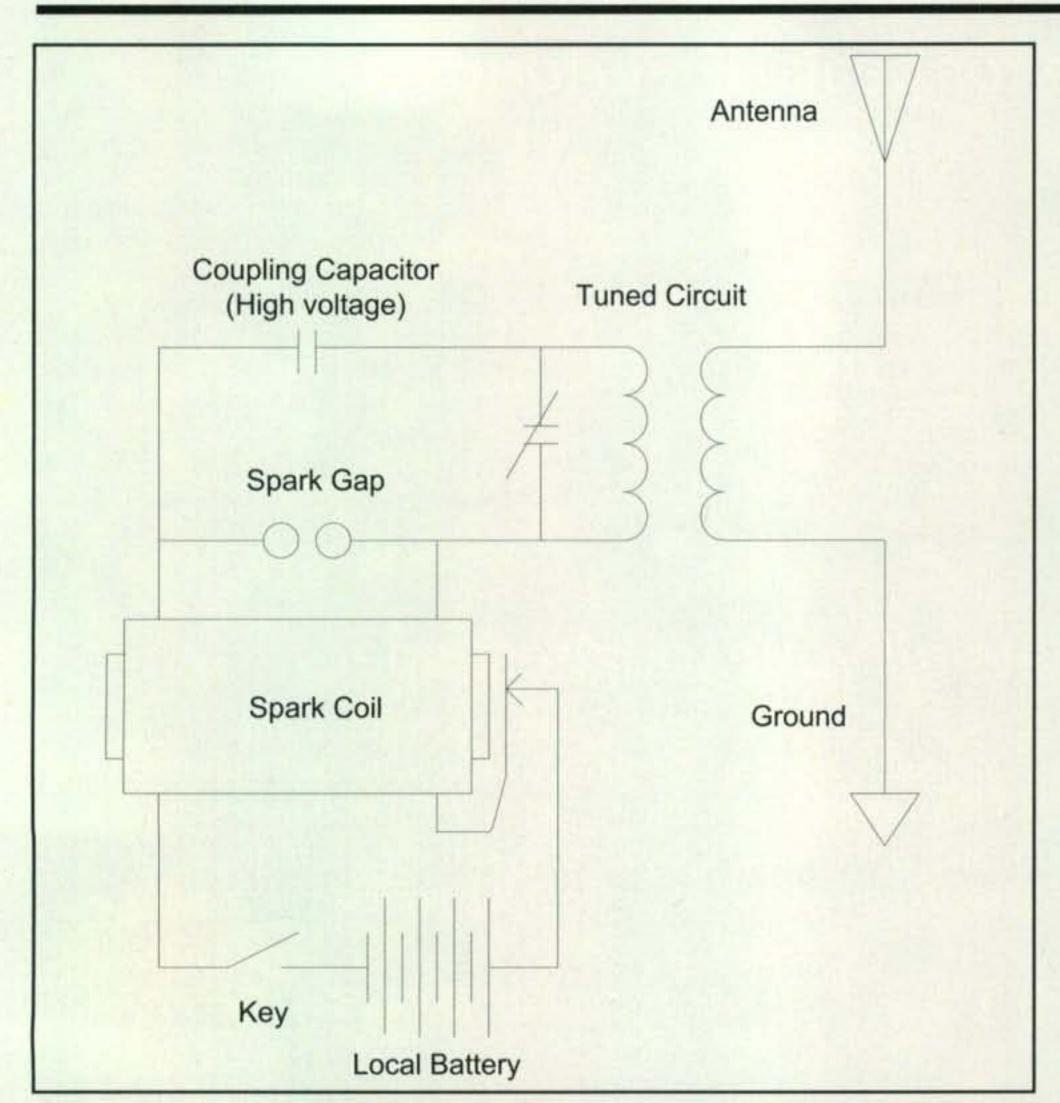


Fig. 6- Spark-coil-based amateur transmitter.

1 shows one of many methods that were developed to accomplish this. In this particular scheme the telegraph sounder is basically connected in a Wheatstone bridge configuration so that the local key at each end applies equal voltage to both sides of the local sounder, and as a result it is silent. The sounder on the other side of the system is connected between the incoming line and ground, however, so it responds to the incoming signal. Note that the artificial grounds had to be very carefully adjusted (at each end of the link) to assure correct bridge balance, but this was "standard operating procedure."

Some other systems used special polarized relays and a host of other clever, but delicate mechanical mechanisms. When we arrive on the scene our knowledge of diodes could lead to the circuit of fig. 2. While it is true that 1N4002 or 1N4148 devices had not yet been invented, galena (lead sulfide) and carborundum (silicon carbide) were readily available (as early "wireless" detectors), and by careful selection one might be able to fabricate simple diodes that would work well enough, not

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SUCH A HAM



Since your "No radios in the bedroom" policy, Clifford and I need a way to practice our Morse code. require system rebalancing, and be a lot more robust than the techniques in use at the time.

Fig. 3 is a diagram of Thomas Edison's 1882 attempt to prevent the premature blackening of his newly invented incandescent lamps. He believed that something was boiling off the filament and being deposited on the glass, so he added a small metal plate adjacent to the filament and reasoned that by polarizing this plate it would attract this material and extend the life of his lamps. Unfortunately, this did not work as Edison hoped, but he did notice that current would only flow from the filament to the plate, not the other way. He recorded this fact as "interesting but of no practical value" and did not realize that he had actually made a vacuum diode.

Any amateur "worth his salt" would immediately take one of these "Edison Effect" lamps and hook up the circuit of fig. 4. This would result in a "pseudo crystal set" that would be much more sensitive than the coherer, galena, or carborundum detectors that were in common use at the time due to the almost zero voltage drop across the diode. Note that fig. 4 is derived from an actual schematic in Hawkins Electrical Guide published in 1917. It would not be much of a "leap of faith" to then add a grid (which could certainly be done easily with the equipment and techniques available at the time), which would then result in a crude but operational triode and probably advance electronic technology by at least 20 years!

Before the invention of the triode, there was really no means of amplifying the weak signals of the early radio receivers. In fact, the only way was to use a headphone with a very-highresistance coil (impedance) and an ultra-thin diaphragm to allow the feeble currents available to produce enough movement of the diaphragm to provide usable volume. Even without the triode a "mechanical amplifier" that was developed many years later could easily have been built at the time by a clever amateur and would probably work quite well, since carbon microphone "capsules" also existed. Fig. 5 shows the basics of this device.

A carbon microphone capsule was simply mechanically attached to the diaphragm of a high-impedance earphone. Any slight movement of the diaphragm would then produce a much greater current flow through the carbon microphone circuit. Whether such a device could be turned into an oscillator remains to be seen, but the gain was surly more than one! You will also note

that such a device did not require a highvoltage "B" battery.

With regard to our hobby, we, of course, would immediately realize that the "useless" wavelengths below 200 meters are the place to be and probably achieve "solid" transatlantic communications before Marconi—even with spark transmitters. This would be done simply by shock-exciting a tuned circuit (at 80, 40, or 20 meters?) as per fig. 6. For a receiver, another tuned circuit and perhaps an "Edison Effect" incandescent-lamp diode would do the

trick. As far as components are concerned plenty of wire would be available for coils, and a couple of glass plates with some tin foil would easily suffice for reasonable capacitors.

In conclusion, even reasonably technically inclined amateurs could perhaps do wonders given the opportunity to go back in time with the knowledge they have today. I wonder, therefore, how much of tomorrow's technology could actually be made today if one simply thinks "outside of the box."

73, Irwin, WA2NDM

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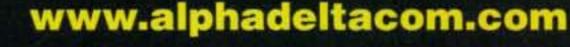


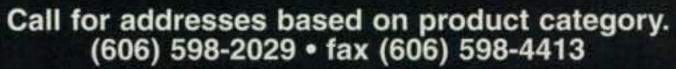




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Where Things Stand: A Roundup of Pending Amateur Radio Rulemaking

he Federal Communications Commission makes a presentation every year at the Dayton Hamvention® during which one or more representatives discuss the status of amateur radio regulatory affairs. The primary speaker this year was William Cross, W3TN, an official in the Mobility Division of the FCC's Wireless Telecommunications Bureau (WTB). This is the FCC office responsible for overseeing the Amateur Radio Service. The Wireless bureau regulates all U.S. domestic non-government radio-based telecommunications.

Bill started by saying that the FCC "...has an unusually large number of amateur radio proposed rule changes out for comment," adding that "...there are a couple of other matters open also."

"What I'm going to do is talk about a number of rulemaking proceedings that we have opened in the past year, a couple of Public Notices that have come out, and the Commission's National Broadband Plan, or NBP as it is affectionately known, and how it may affect your service."

Changes to the 60-Meter Band

The first item Cross discussed was the recently released Notice of Proposed Rulemaking in ET Docket No. 10-98. This NPRM was issued in response to a 2006 Petition for Rulemaking filed by the ARRL. This proceeding concerns the five channels that make up the 60-meter ham band.

Since May 2003, the FCC has allowed hams secondary access to five discrete 2.8-kHz-wide channels on a non-interference basis to (primary) federal government users at 5332, 5348, 5368, 5373, and 5405 kHz. The allocation was made after the FCC agreed that 5-MHz frequencies could be useful for disaster communications when 80, 75, and 40 meters are not available due to ionospheric conditions. Amateurs may use only USB (upper sideband) with a maximum effective radiated power (ERP) of 50 watts on 60 meters.

One of the channels, 5368 kHz, is seldom available because of occupancy by the primary user. The proposal is to substitute another channel at 5358.5 kHz. The NPRM also looks toward increasing the allowed ERP from 50 to 100 watts and permitting certain digital modes. CW, PSK-31, and PACTOR-III emissions would be allowed "...with conditions to ensure that these operations are compatible with other users of the channel." Those conditions could include using Voice-Operated Transmit (VOX) while in the single sideband emission mode and limiting the duration of data transmissions.

In the United States, regulatory responsibility for the radio spectrum is divided between the FCC,

*1020 Byron Lane, Arlington, TX 76012 e-mail: <w5yi@cq-amateur-radio.com> which administers spectrum for non-federal use, and the National Telecommunications and Information Administration, which regulates government frequencies. The request for these 60-meter band changes was coordinated with and has been approved by the NTIA.

"The idea here is to make the 60-meter band more useful to you all," Cross explained, "while making sure the primary users can also use the channels."

Power Limit on Spread Spectrum

The second Notice of Proposed Rule Making currently under consideration is WT Docket No. 10-62. This NPRM concerns the power limit for stations transmitting a Spread Spectrum (SS) emission.

Spread-spectrum techniques are methods in which a signal is deliberately spread across several frequencies, resulting in a signal that is considerably wider than the frequency content of the original information. The receiver decodes the received signals to retrieve the original communications.

This NPRM responds to a 2006 ARRL Petition proposing to amend Part 97 to facilitate the use of spread spectrum technologies by eliminating the requirement that amateur stations use automatic power control (APC) to reduce transmitter power when transmitting SS emissions. The League called the APC provision "virtually impossible" to implement. The NPRM also proposes to reduce the power level of stations transmitting spread spectrum from 100 watts to a peak of 10 watts.

Housekeeping Changes

The spread-spectrum NPRM also includes an FCC ruling (Order) on several minor points that do not require a full rulemaking procedure. "The Order part of this docket also makes many conforming rule changes to your Part 97 rules," Cross said. "Most of these come out of changes to Part 2 rules; other changes conform your rules with decisions in other dockets." FCC Part 2 covers Frequency Allocations and General FCC Rules and Regulations.

In addition, the FCC proposes to move the 60-meter transmitter power limit information contained in Section 97.303(s) to Section 97.313, the section concerning transmitter power standards. The comment period closed on this proceeding June 5; reply comments on July 5.

Vanity and Club Call Signs

On November 24, 2009 the Commission released a NPRM in WT Docket No. 09-209. This docket concerns the rules applicable to Vanity and Club Station Call Signs. The vanity call sign system has been available since 1996 and over 80,000 radio

amateurs have received them. The comment period has already closed for this docket.

The proposal clarifies certain rules and codifies existing procedures that apply to the vanity call sign system. Some of these include putting into the rules the exception to the two-year hold period for former holders and codifying the procedures used for canceling a license when a licensee dies.

The FCC also proposed that the call sign shown on a license that is canceled due to the death of a licensee more than two years earlier remains unavailable to the vanity call sign system for 30 days after the staff cancels the license. This would allow the assignability of a desirable call sign to become known and would provide an opportunity for other licensees to apply for the call sign.

The FCC also wants to specify exactly who is an "in-law" for purposes of determining the eligibility of a relative of a former holder now deceased exception to the two-year hold period. Right now, the term "in-law" could apply to more relatives than originally intended.

The proposal of limiting clubs to holding only one call sign has proved to be very controversial. The FCC wants ham radio clubs that currently hold more than one call sign not to be allowed to obtain any more call signs. But clubs could renew or modify their existing station license grants. "This proposal generated a lot of comments, both pro and con."

"The idea in this docket," Bill Cross said, "is to make the vanity call sign system more equitable and efficient."

Emergency Communications

Cross then turned to the issue of emergency communications training. "As you are probably aware, there have been a number of items out of the Commission over the past few months that expand what you can do to help out with emergency communication tests and drills. There have been a proposed rule change and two Public Notices. I want to mention these so you all know where we are on this topic."

On October 20, 2009 the Commission released a Public Notice concerning amateur service communications during government disaster drills. The PN noted that "...transmissions by amateur stations participating in government disaster drills must comply with all applicable amateur service rules and that the amateur service is not an emergency radio service."

The PN also noted that the Commission's Rules specifically prohibit ama-







reply button is all it takes to respond to a digital calling

*IP-X7: tested to work after being under 1 meter of water for 30 minutes.

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teur stations from transmitting communications "...in which the station licensee or control operator has a pecuniary interest, including communications on behalf of an employer."

"You may recall that I said the same thing at this forum last year," Cross noted. "Contrary to what some licensees claimed in letters to their congressional representative and in other forums, my statement was not 'a new interpretation.' It is what the rule says, and has said since 1993."

The PN also set up a process that allowed the government entity conducting the drill to request a waiver so that employees could transmit messages on behalf of an employer if certain information was provided.

"We have received about 25 requests for a waiver since October 20. Most have been granted. Many of the requests have been for weekend-type events; a few have been for only a few hours. There is no requirement that the grantee report back to us whether they used the waiver, so we have no idea as to whether the waiver was needed, used, or what happened during the event."

"This process is still available today and we occasionally receive requests, but it seems that most government entities, when they look at their communications needs, find they can satisfy them without needing employees to transmit messages on behalf of their employer. Note that this process is available only to the government entity conducting the drill and only for government-sponsored emergency preparedness and disaster drills."

Prohibited Communications

The October 20 Public Notice was followed by an NPRM in WP Docket No. 10-72. This was released on March 24, and proposes to add another exception to Section 97.113—Prohibited Communications. The proposal is to allow a station control operator to participate on behalf of an employer in a government-sponsored emergency preparedness or disaster readiness test or drill.

The comment and reply comment period on this proceeding has closed. "We have received a great many comments on the proposal so far. To say the views expressed are miles apart would be an understatement," Cross commented. The staff of the Public Safety Bureau will be handling this docket.

"Some of you may be aware that a petition on this topic was filed by Tom Blackwell, N5GAR; David Coursey, N5FDL; and Gordon West, WB6NOA,

on Oct. 15, 2009." Their petition sought to amend the rules to permit amateur transmissions "...necessary for disaster relief or emergency response, including training exercises, planning, drills, or tests, without regard to whether the amateur operator has related employment, where the transmissions are for the exclusive use of amateur radio operators for noncommercial purposes."

"The Commission incorporated the Blackwell, Coursey, and West Petition into this proceeding. It did not give the proposal a rulemaking number; propose what Blackwell, Coursey, and West asked be proposed; or seek comment on their proposal but rather proposed a much simpler rule change."

American Hospital Association Waiver Request

"After the October Public Notice was released and people had a chance to see how it applied to their situation, certain groups noticed that they are not eligible for waivers because they are not government entities or they wanted to conduct emergency preparedness and disaster drills which were not part of a government-sponsored test or drill. Yet they, too, wanted their employees to be allowed to transmit business messages for them on amateur service frequencies."

One of those groups is hospitals, and on February 17, 2010 the American Hospital Association filed a request for a blanket waiver of Section 97.113(a)(3). "It wants us to permit hospitals seeking accreditation to use amateur radio operators who are hospital employees to transmit communications on behalf of the hospital they work for." The reason is that hospitals need to have backup emergency communications systems in place to meet certification requirements.

On April 19, the FCC requested comment on the waiver request and several hundred comments were received in response to the Public Notice. The comments are from amateur radio operators who oppose and support the waiver request, and hospitals supporting the waiver request. "The waiver request will be addressed in a future Order or other Commission decision," Cross said. "Stay tuned for further developments."

As of now, amateur radio operators who are employees of a hospital may be included in the waiver request from a government entity conducting a government-sponsored emergency preparedness and disaster drill," Cross added.

National Broadband Plan

The Commission recently adopted what is called the NBP, or National Broadband Plan. Congress and the White House have expressed support for this plan, although many details are still to be worked out. The NBP calls for reallocating 500 MHz of spectrum to mobile broadband over the next 10 years.

"Re-allocating" means moving spectrum from one service to another. As part of this process, a Congressionally mandated inventory of both federal and non-government spectrum is in the works. The Radio Spectrum Inventory Act, HR-3125, requires the FCC and the NTIA to inventory all RF bands from 225 MHz through 3.7 GHz.

The inventory would include all radio services authorized in each band (except sensitive national security, proprietary commercial, and classified services), the licensed users, the activities and missions supported by the users, and information on the percentage of spectrum licensed and the degree of usage broken down geographically.

within one year, and the FCC and NTIA would report to Congress within two years on their findings with recommendations for reallocation where appropriate. The goal is to find spectrum that can be used for the NBP; 300 MHz is sought in the next five years. Bill Cross noted that "What is being looked for is primarily under 3 GHz and in large blocks. The plan is to auction it off and it would be used for a commercial [mobile broadband] service, probably something similar to the cellular service today, but at greater bandwidths."

Since nearly 90 percent of all television is not received over the air by the public, the FCC is looking at a possible reallocation of TV spectrum. Broadcasters have already said, "Not us," and federal agencies are examining their spectrum to see if it is being used as efficiently as possible.

"Your bands below 225 MHz do not appear to be of much interest for the NBP because they are narrow—4 MHz or less—and the propagation is 'too long'," Cross noted. "902–928 has a lot of consumer devices in it which may cause interference to mobile devices, particularly hand-held devices."

"But you have other bands that may be of use for the NBP. The 9-cm band is 200 MHz wide. The 13-cm band, although split, covers 150 MHz. The 5cm band is 275 MHz wide. These bands are possibilities, especially if paired with other spectrum." They could be in jeopardy. Amateur radio has access to these bands on a secondary basis.

Cross mentioned that the 70-cm ham band could also be impacted. He said "...commercial interests, particularly the land mobile community, are looking for an additional 30 MHz of spectrum. Land mobile already is allocated 450–470 MHz."

"You have 420–450 MHz, on a secondary basis; 30 MHz right next to an existing land mobile band. Although not 'pure' due to government radars like the Pave-Paws systems and other uses, I would not be surprised if the land mobile community says we can make more efficient use of that spectrum than the hams do and our use will create jobs."

RACES

The FCC representative reminded everyone that "...the Radio Amateur Civil Emergency Service is managed by FEMA—the Federal Emergency Management Agency—and not the FCC. We have the rules for RACES in Part 97 because it uses amateur stations."

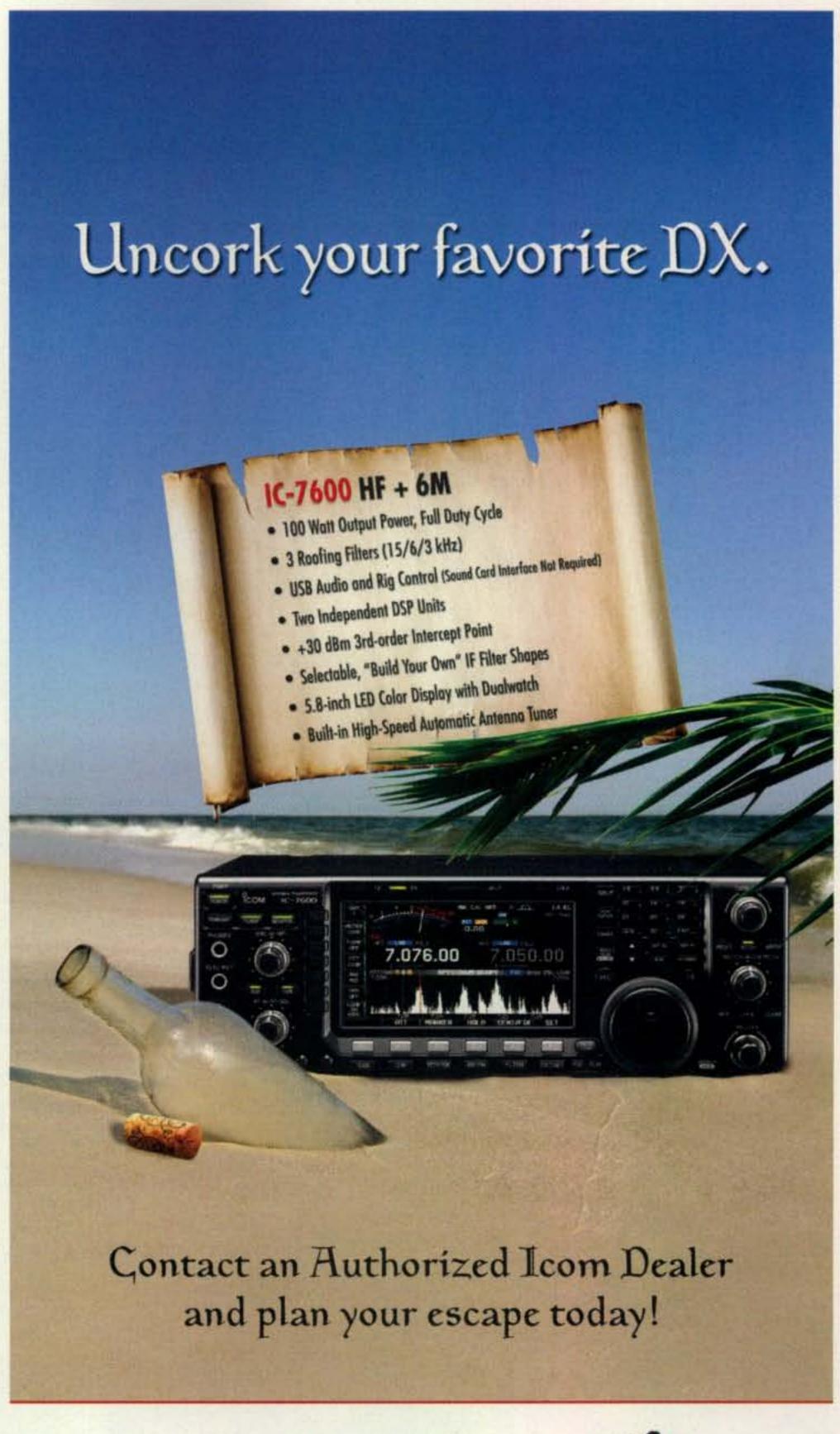
All FCC-issued RACES station licenses have now expired. The service, however, continues to exist and "...it is used by some emergency management agencies in some places for whatever purpose they have for it. In other places, hams seem to organize themselves under the ARES program to provide communications during emergencies." ARES is the ARRL-sponsored Amateur Radio Emergency Service.

"There are a lot of clubs with RACES in the name. If a club wants to call itself a RACES club, there is no rule against that. But the license we issue is a club station license, and the rules that apply to club stations are the same for all clubs."

Amateur Radio Emergency Communications Enhancement Act

The last topic Bill Cross mentioned is the legislation that the ARRL had introduced into Congress, HR 2160. The Amateur Radio Emergency Communications Enhancement Act of 2009 "...directs the Department of Homeland Security to undertake a study to identify unreasonable or unnecessary impediments to Amateur Radio communications, such as the effects of private land use regulations on residential antenna installations, among other things."

The bill presently is assigned to a House committee. It has a number of co-sponsors. A similar bill has already passed the Senate. 73, Fred, W5YI



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In the Darkness, Ohio EmComm Operators Face Tornado Terror

ighttime tornadoes are Bob Schumann, W8NYY's biggest fear. "Not only are they difficult to spot, but they also put our members at risk during their attempts to track their paths," said the Wood County (Ohio) ARES® Emergency Coordinator.

That was precisely the situation radio amateurs faced on June 5 in the state's northwestern region when a deadly EF4-intensity tornado touched down in late-night darkness.

National Weather Service meteorologists determined the twister, with winds of 170–175 mph, hit the ground "near I-80 and Oregon Rd. (east of Perrysburg) at 11:20 PM EDT, moved across the south side of Moline, near Metcalf Airport, across the northwest side of Millbury, into Ottawa county following Trowbridge Rd., and finally lifted at 11:35 PM just west of Clay Center."

It was 300–400 yards wide on a path 8–10 miles long. The storm left five people dead and numer-

*1940 Wetherly Way, Riverside, CA 92506 e-mail: <ki6sn@cq-amateur-radio.com>

The Millbury, Ohio home of Alwin "Fritz" Welling, W8HCQ, was destroyed in the EF4 tornado on June 5. Welling "sustained injuries while hiding in his basement during the storm and is currently recovering," said Bob Schumann, W8NYY, Emergency Coordinator, Wood County ARES®.

(Courtesy of W8NYY)

ous others injured in its wake. Tornado details and a map by the NWS Office in Cleveland can be seen on the internet at: http://bit.ly/9Qtd0u.

Operators supporting SKYWARN and ARES® in Wood, Erie, Huron, and Sandusky counties of the region activated nets as early as 10:30 PM. As a net control during the event, "I learned quickly that it's my job . . . to remain as calm as I possibly can, and the more calm I can remain, the more likely my amateurs are going to be able to calm down and give accurate reports," Schumann said.

According to American Radio Relay League Ohio Section Manager Frank J. Piper, KI8GW, "traffic on the nets was filled with reports of severe weather damage, flooding, and downed power lines."

"Safety before, during, and after an activation is one of my greatest goals," Schumann stressed. "We're fortunate that one of our (Assistant Emergency Coordinators) Ed Brown, K8ZCS, is one of the (firefighters) with the Lake Township fire department." He was also one of the first responders on the scene.

Brown's first responsibility was to do his job as a firefighter, W8NYY said, "but besides giving us the critical report of the severe damage to Lake High School (in Millbury), he was able to make the assessment that the area was too dangerous to deploy additional ARES® members."

Schumann noted that the severity of the damage quickly showed itself with the number of reports coming in during a 15-minute span just before midnight.

Tony Everhardt, N8WAC, reported the funnel cloud was visible only when exploding electrical transformers lit up the sky.

Brown gave updates on severed natural gas lines and downed wires, "requiring Schumann to recall weather spotters from the area for their own safety. Hams relayed continuous reports on the net of telephone poles and power lines down blocking roads; live electrical wires were an immediate danger," according to ARRL reports.

Schumann said one of the most important lessons learned from the activation "was that the safety of our members (must be kept) high on the list of priorities at all times. The number of hazards in an area impacted by an EF4 tornado are too long to list."

He also stressed that "the time and effort we put into building and maintaining an excellent relationship with our county Sheriff Mark Wasylyshyn, EMA Director Brad Gilbert, and our Red Cross Director Ken Robinson made communications with them much easier and more efficient during the initial response period. If that relationship does not exist, (our) chances of making that important

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contact while they are faced with the pressures of responding to events is nearly zero."

Wood County Sheriff Wasylyshyn advised Schumann he was setting up a temporary command center adjacent to the Lake Township Police Department building, which had been heavily damaged by the tornado. "The sheriff and Schumann decided to deploy the Wood County ARES® trailer" equipped with police-band radios, as well as a generator and amateur radio equipment, the League reported.

By early Sunday morning communications had been restored to Lake Township using temporary equipment. However, "many Wood County ARES® members remained on standby in case they were needed at a later time. The nets stood down at approximately 4:30 AM."

District Emergency Coordinator George Henzler, WB8HHZ, kept in contact through the incident with Ohio Section Emergency Coordinator Jack Sovik, KB8WPZ, as directed in the Ohio Section Emergency Response Plan, the League report said.

Sovik said, "the professionalism of the ARES® members, working in conjunction with the National Weather



Bob Schumann, W8NYY, Emergency Coordinator, Wood County ARES® Emergency Coordinator, handles EmComm traffic in the late hours of June 5 when a deadly tornado ripped through the northwestern Ohio region. (Courtesy of W8NYY)

Service and their SKYWARN program, as per the written *Memorandum of Understanding*, saved lives and kept the National Weather Service and the public apprised of the situation that was developing in the immediate affected areas," the League noted.

"As a result of yearly SKYWARN training I'm very confident when spotting during severe weather," Everhardt said. "I've attended these training courses almost every year since 1992. And it seems that I pick (up) something new each year I attend. During emergency situations when lives are at stake it is very important to know what and when to report."

Everhardt praised net controls in Wood County, "and all counties under the district's jurisdiction," as well as District 1 of Northwest Ohio. They "do a fabulous job. Here in northwest Ohio reports are (made) to net controls in each county."

The various counties report directly to the District at the Lucas County 911 Building. "The District then reports directly to the Cleveland National Weather Service (office) and vise versa," Everhardt said. "This is very efficient and very effective. There are also monthly meetings with net controls and spotters year round to discuss how and where improvements can be made. This has been many years in the making, which makes a top notch team in northwest Ohio, and I'm proud to be part of it."

Everhardt said that if he had to choose one way to improve EmComm

activations, "I would have to say we need to get more hams involved. During severe weather or any other unforeseen emergency there are never enough amateurs to help out. . . . If anything good comes out of bad situation like the tornados in northwest Ohio it is to promote amateur radio," he said.

"I am very proud of the work (the radio amateurs) did in the middle of darkness," said Ohio Section Manager Piper. "All I have been hearing is how professional(ly) the net was run, and how calm everyone remained." Continue the great work, he encouraged the operators. "You are an example to all the hams in the Ohio Section."

Wanted: Your EmComm Stories

The experience of others can sometimes be the best teacher when it comes to radio amateurs' emergency communications. For evidence, you need look no further than the Ohio EmComm operators' excellent response chronicled in this month's column.

Has your response team played a role in an emergency situation? Have you implemented an EmComm training program with positive results? Have incidents provided lessons learned from which radio amateurs everywhere might benefit?

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73, Richard, KI6SN

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The LDG AT-600Pro will handle up to 600 watts SSB and CW, 300 on RTTY (1.8 – 30 MHz), and 250 watts on 54 MHz. It will match virtually any kind of coax-fed antenna and will typically match a 10:1 SWR down to 1.5:1 in just a few seconds. You can also use the AT-600Pro with longwires, random wires and antennas fed with ladder line just by adding a balun. It has two antenna ports with a front-panel indicator, and separate memory banks for each antenna. Easy to read LED bar-graph meters showing RF power, SWR and tuner status, tactile feedback control buttons and an LED bypass indicator. Operates from 11 – 16 volts DC at 750 mA. Includes Icom interface cable, DC power cable and coax jumper. **Suggested Price \$359.99**



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The ultimate autotuner for QRP radios including the Yaesu FT-817(D). Tuning is simple; one button push on the tuner is all that is needed - the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2000 memories cover 160 through 6 meters. The Z-817 will also function as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the tune button on the tuner. Powered by four AA internal Alkaline batteries (not included), so there are no additional cables required. A coax jumper cable is also induced for fast hook up. **Suggested Price \$129.99**.



KT-100

LDG's first dedicated autotuner for Kenwood Amateur transceivers. Easy to use - just right for an AT-300 compatible Kenwood transceiver (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. The LEDs on the front panel indicate tuning status, and will show a match in seconds, or even less of you've tuned on or near that frequency before. Has 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. If you have an AT-300 compatible Kenwood radio, you can simply plug the KT-100 into your transceiver with the provided cable; the interface powers the tuner, and the Tune button on the radio begins a tuning cycle. The supplied interface cable makes the KT-100 a dedicated tuner for most modern Kenwood transceivers. **Suggested Price \$199.99**



AT-200Pro

The AT-200Pro features LDG's new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 – 30 MHz, and 100 watts on 54 MHz (including 6 meters). Rugged and easy-to-read LED bar graphs show power and SWR, and a function key on the front panel allows you to access data such as mode and status. Includes Icom interface cable, DC power cable and coax jumper. **Suggested Price \$249**



NEW! Z-11Proll

Meet the Z-11Proll, everything you always wanted in a small, portable tuner. Designed from the ground up for battery operation. Only 5" x 7.7" x 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 - 6 meters. The Z-11Proll uses LDG's state-of-the-art processor-controlled Switched-L tuning network. It will match dipoles, verticals, inverted-Vs or virtually any coax-fed antenna. With an optional LDG balun, it will also match longwires or antennas fed with ladder-line. Includes Icom interface cable, DC power cable and coax jumper.

Suggested Price \$179.99

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Join the LDG Yahoo Group at > http://groups.yahoo.com/group/LDG-auto-tuners/

The #1 Line of Autotuners!



NEW! AT-100Proll

This desktop tuner covers all frequencies from 1.8 – 54 MHz (including 6 meters), and will automatically match your antenna in no time. It features a two-position antenna switch with LEDs, allowing you to switch instantly between two antennas. The AT-100Proll requires just 1 watt for operation, but will handle up to 125 watts. Includes Icom interface cable, DC power cable and coax jumper. **Suggested Price \$229.99**



radio not included

AT-897Plus for the Yaesu FT-897

If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897Plus Autotuner mounts on the side of your FT-897 just like the original equipment and takes power directly from the CAT port of the FT-897 and provides a second CAT port on the back of the tuner so hooking up another CAT device couldn't be easier.

Suggested Price\$199.99



FT Meter 2.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu.

Still Only \$49



FTL Meter For Yaesu FT-857(D) and FT-897(D). 4.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu.

Suggested Price \$79.99



NEW! M-7600 For IC-7600. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7700 and the virtual meter on your radio can work together. Suggested Price \$79.99



M-7700 For IC-7700. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7700 and the virtual meter on your radio can work together. Suggested Price \$79.99



AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. Includes Icom interface cable, DC power cable and coax jumper. Suggested Price \$599

YT-100



An autotuner for several popular Yaesu Radios. An included cable interfaces with your FT-857, FT-897 and FT-100 (and all D models) making it an integrated tuner, powered by the interface. Just press the tune button on the tuner, and everything else happens automatically: mode and power are set, a tune cycle runs, and the radio is returned to its original settings. It's the perfect complement to your Yaesu radio. Suggested Price \$199.99

Z-100Plus



Small and simple to use, the Z-100Plus sports 2000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes Icom interface cable, DC power cable and coax jumper. Suggested Price \$159.99

15.00 - - - M

IT-100

Matched in size to the IC-7000 and IC-706, the new IT-100 sports a front panel push-button for either manual or automatic tunes, and status LEDs so you'll know what's going on inside. You can control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other lcom rigs. It's the perfect complement to your lcom radio that is AH3 or AH-4 compatible.

Suggested Price \$179.99

To order today, call or visit your favorite dealer! Visit www.ldgelectronics.com for a complete dealer list. LDG Electronics, Inc. 1445 Parran Road St. Leonard, MD 20685 Phone 410-586-2177 Fax 410-586-8475



Choosing a Mobile Rig

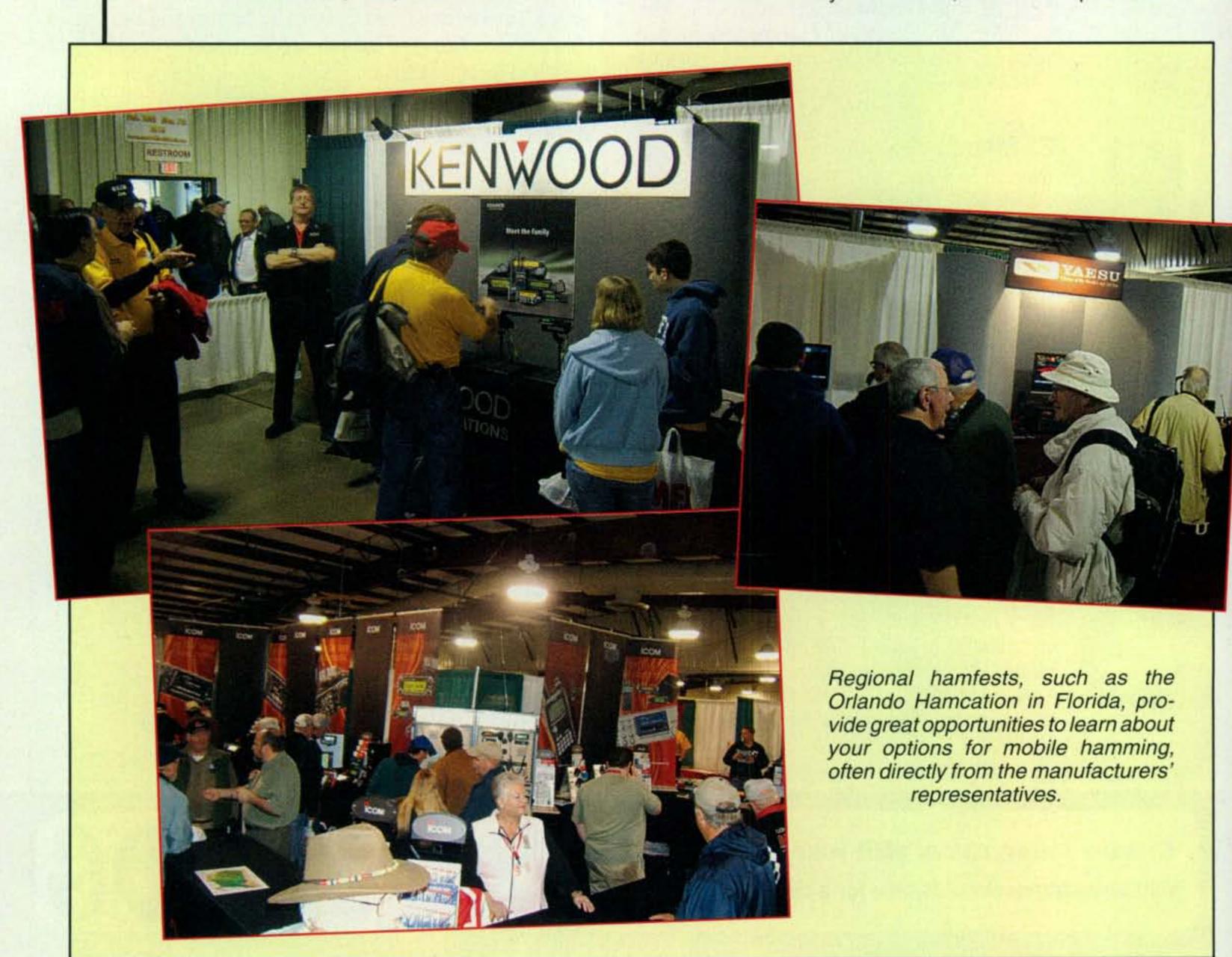
Dayton Hamvention® provides a treasure trove of information on new products, advancements in technology and opportunities to interact with other hams and swap information, either at Dayton itself (see the article "The 2010 Dayton Hamvention® Safari, Part I, by John Wood, WV5J elsewhere in this issue—ed.) or at any of the numerous hamfests held in practically every region of the country. There are also the infinite resources of the internet to learn even more about products and tips. Each of these items offers value, especially if take a few moments to drill down for information that can enhance your ability to operate mobile.

*5904 Lake Lindero Drive, Agoura Hills, CA 91301 e-mail: <aa6jr@cq-amateur-radio.com>

Let's Go Shopping!

I'm sometimes asked for recommendations on which radio to buy. Now I do try to be a neutral third party, but it's also my genuine opinion that each of the major manufacturers makes fine equipment. The durability and reliability of modern mobile rigs is terrific, so the choice then comes down to small differences among the available gear. Some of those considerations might be physical dimensions, secondary features, the size of the display, ease in operating, or some difference in price—but be careful about that last one, because a small difference in price can also mean the difference between having a desired feature or not.

Nevertheless, there are some cool new products to consider, even if you have an "old reliable" already installed in your car or truck. After all, my XYL can buy new shoes, even if the pair she's



MFJ Speech Intelligibility Enhancer

... makes barely understandable speech highly understandable!



"What did you say?" Can you hear but . . . just can't always understand everything people are saying?

As we get older, high frequency hearing loss reduces our ability to understand speech. Here's why . . .

Research shows that nearly half the speech intelligibility is contained in 1000 to 4000 Hz range, but contains a miniscule 4% of total speech energy.

On the other hand, the low frequencies, 125 to 500 Hz have most of the speech energy (55%) but contribute very little to intelligibility -- only 4%.

To dramatically improve your ability

to understand speech, you must:

First, drastically increase the speech energy above 500 Hz, where 83% of the speech intelligibility is concentrated.

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energy below 500 Hz where only 4% of speech intelligibility lies.

The MFJ-616 splits the audio speech band into four overlapping octave ranges centered at 300, 600, 1200 and 2400 Hz. You can boost or cut each range by nearly 20 dB.

A balance control and separate 21/2 Watt amplifiers let you equalize perceived loudness to each ear so both ears help.

By boosting high and cutting low frequencies and adjusting the balanced control, speech that you can barely understand become highly understandable!

Even if you don't have high frequency hearing loss, you'll dramatically improve your ability to understand speech. You'll get an edge in contesting and DXing and enjoy ragchewing more.

Here's what OST for April, 2001 said ... "I expected a subtle effect at best, but I was astonished . . . The result was remarkably clean, understandable speech without hissing, ringing or other strange effects . . . made a dramatic improvement . . .

Immuned to RFI. Has phone jack, on/off speaker switch, 2 inputs, bypass switch, 10Wx21/2Hx6D". Needs 12 VDC.

MFJ-1316, \$21.95. For 110 VAC operation. Provides 12 VDC/1.5 Amps. MFJ-72, \$69.80. All-in-one MFJ-

616 Accessory Pack. Includes MFJ-392 headphones, two MFJ-281 speakers and MFJ-1316 power supply. Save \$7!

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Transformer-coupled -- No RFI, hum or feedback 75 seconds total, 5-messages . . . Records received audio . . .



Let this *new* microprocessor controlled MFJ Contest Voice Keyer[™] call CQ, send your call and do contest exchanges for you in your own natural voice!

Store frequently used phrases like "CQ Contest this is AA5MT". "You're 59" . . . "Qth is Mississippi" . . . Contest by pressing a few buttons and save your voice.

Record and playback 5 natural sounding messages in a total of 75 seconds. Uses eeprom -- no battery backup needed. Use your mic or its built-in mic for recording.

You can repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes a great voice beacon and calling CQ is so easy.

You can also record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "Please repeat".

A playing message can be

MFJ-434B halted by the \$19995 Stop Button, your microphone's PTT/VOX, remote control or computer.

Has jack for remote or computer control (using CT, NA or other program). Lets you select, play and cancel messages.

Your mic's audio characteristics do not change when your MFJ-434B is installed.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

New! It's easy to use -- just plug in your 8 pin round or modular mic plug, set the internal jumpers for your transceiver and plug in the appropriate (included) cable for your rig.

Built-in speaker-amplifier. Speaker/phone jack. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312D, \$15.95. 6¹/₂Wx2¹/₂Hx6¹/₂D in.

MFJ-73, \$34.95. MFJ-434B Remote Control with cable.

60 dB Null wipes out noise and interference



Wipe out noise and interference before it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes.

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

It works on all modes -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null

out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an adjustable phasing network. You can combine two antennas to give you various directional patterns. Null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive Constant Amplitude Phase Control™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312D, \$15.95. 6¹/₂x1¹/₂x6¹/₄ in.

MFJ-1025, \$179.95. Like

MFJ-1026 less built-in active antenna, use

external noise antenna.

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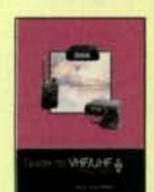
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\$33.00



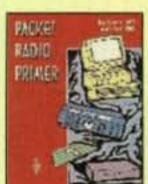
IOTA Directory

Edited by Roger Balister, G3KMA

RSGB, 2007 Ed...

Fully updated, lists all islands that qualify for IOTA, grouped by continent, and indexed by prefix. Award rules and includes application forms.

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Packet Radio Primer

By Dave Coomber, G8UYZ & Martin Croft, G8NZU

RSGB, 2nd Ed., 1995, 266 pages Detailed practical advise for beginners. Completely revised and greatly expanded to cover developments in this field and beyond bare basics into advanced areas such as satellite operations.

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By Andy Barter, G8ATD

216 pages

If you're interested in building equipment for the amateur radio microwave bands, the designs in this book are sure to please! Projects have been selected from international authors and all projects use modern techniques and up-to-date components. Details on how to obtain ready-made boards are included with most projects.

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wearing is perfectly functional. Therefore, I think we hams can invoke the occasional "cuz I wanted a new one" reason to pick up a new rig. (Use that reason for purchase at your own risk, however!)

Kicking the Tires

Browsing the new offerings begins to raise all kinds of possibilities. In no particular order, here are a few:

The new Yaesu FTM-350R dual-bander has a large, eyecatching dot-matrix display along with Bluetooth® GPS and APRS® capabilities, and with a detachable face.

Kenwood's DM-710A dual-band offers a whopping 1000 memory channels, which would come in handy for a longdistance driver who programs repeaters for multiple cities. The clever design also allows for inverting the front panel, providing added flexibility for installation and operation.

The ICOM IC-2820H dual-band transceiver also offers expanded reception tuning ranges and the ability to upgrade to GPS and D-STAR digital, along with analog communications. You can also store up to 500 alphanumeric memory channels to keep all the information neatly sorted.

In additional to the conventional dual-band mode, the Alinco DR-635T offers crossband operation capability which can come in handy when used in conjunction with an HT. However, when operating in the USA, you must be sure to properly ID in that mode. Another nice feature of this unit is the ability to select from different display colors (amber, blue violet), which may provide a closer match to the dash lighting in your car or truck.

I've highlighted these rigs because the dual-band transceiver seems to be the most popular choice for mobile operators, offering great flexibility and the capability to put you in the middle of more action, which can be important if you're

an emergency responder.

Of course, there are many more choices in monoband models, which can also come with a lower price tag. At the other end of the price spectrum are the multiband HF mobile rigs that often come with 6 meters. Some models also have VHF and UHF included in the same tidy package, something that was unthinkable not all that long ago.

Which rig is right for you? All I can recommend is "do your homework" first. There are so many choices right now, and there's a lot of value to be found in mobile rigs. Read the ads in CQ and other ham publications, visit the websites, but also ask your fellow hams for their experiences with a rig you may be considering. Also, don't be afraid to ask your favorite ham dealer for his/her thoughts on various rigs. The dealers see a lot of them, and often have some idea of user experiences with certain brands and models. One tip, though: In my humble opinion, it's not classy to get information from one dealer and then buy from another just to save a dollar or two. Treat your sales contact with respect and you'll get the same in return. The nice news regarding mobile rigs is prices are currently reasonable, yet the menu of features and capabilities seems to continually be expanding.

Corvette Redux

I received several e-mails following our last column which featured a nifty installation in a newer Corvette, probably one of the most difficult cars in which to install a ham transceiver. Apparently, there are quite a few readers who have taken the challenge! One writer, Tim, N8NQH, referred me to his website for a sequence of photos on his unique approach to

combining "light speed" communications with his ride, which is nearly as quick. Unfortunately, I don't have enough space for all his photos, but if you'd like to see what an antenna looks like hanging inside a car,take a look at http://tim-yvonne.com/mikemercury/hamradio.htm. Fortunately, Tim knows to keep the output power setting at "low."

From the Mailbag

From just north of San Francisco, Donald Burr, AJ6X, writes to share some memories of a mobile skyhook from "those thrilling days of yesteryear":

Here is an idea for a really efficient mobile antenna for your car.

In the 1950s there were no 2-meter repeaters and not much use of FM radio. The Fresno Amateur Radio Club in central California had a mobile frequency using AM at 3995 kc in the 80-meter band.

I wanted a really efficient antenna for my Nash Rambler station wagon. I bought a military-surplus whip antenna 1 meter long (39 inches). It was on a large base insulator. I mounted the insulator on a strap hinge. The other end of the hinge was bolted under the edge of the hood. (No visible holes in the body of the car.) It was located at the lower center of the windshield.

I knew that a base loading coil was not efficient because it was at the high current point on a vertical whip antenna, with lots of loss heating the coil. The antenna above the coil had a lower current, with not much radiation. I put a solid plastic coil form at the top of the whip with a dozen or so turns of wire on it. A top-loading coil only works with a lot of capacity to ground above it.

I put two short whips on the rear gate, which was hinged at the top. From the top of the loading coil I ran two wires in a V pattern to insulators on each of the rear whips. The loading wires were really made from the braided covers of an old piece of coax. These were more flexible than wire and had more capacity to ground than wire. When I put the car in the garage, I lifted the rear gate. This allowed the whole antenna to tilt forward and be lower.

I don't know what the input impedance of the antenna was. My transmitter was a small home-brew rig loaned to me. It had some receiver-type vacuum tubes with a pi-network final, so it could match almost any antenna impedance. If you have a modern transmitter with 50 ohms output, you will need an antenna tuner to match this antenna.

I know this antenna was efficient! After sunset, I worked some DX with only 3 or 4 watts from the transmitter. One evening I talked to a ham in Seattle. He said my signal was exactly the same strength as a 50-watt mobile in the San Francisco area.

Thanks, Don. Like the Corvette with the inverted antenna, your story illustrates the value of "try it to see if it works," which sometimes reveals surprising results. It's also in the best spirit of experimentation. However, a modern solid-state rig might not be as friendly to strange impedances as some of the older "hollow-state" tube-powered rigs.

We Need Photos!

Once again, we'd love to share photos and the story behind your mobile installation, including any obstacles you had to overcome putting everything together. Please send them to the address shown at the beginning of this column.

Enjoy the remainder of the summer driving season with safe driving and great mobiling. Hopefully, I'll catch you on the air!

73, Jeff, AA6JR

A TARHEEL ANTENNAS

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Our weather shield is made of Lexan[™]. This is the same stuff used on race car windshields and even used to make bulletproof windows. Our antennas are a plug and play system.

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Dayton 2010

his month "Learning Curve" will focus on my personal experiences at the Dayton Hamvention® 2010. This is a break in the action from hard-core electronics and operating modes and strategies. It was a fun column to write, as I have great respect for the people showcased in this column. I hope you enjoy this little detour in our ongoing attempt to demystify the ham radio hobby.

Although I hate crowds, Dayton 2010 was a great place to be in mid-May. This was my seventh time attending the Hamvention®. This fantastic event has become an annual pilgrimage for thousands of radio amateurs worldwide. It's a place where you meet old friends, make new ones, and can see the latest offerings from the various advertisers that grace the pages of CQ magazine. It is a well-established fact that during the Dayton

*770 William St. SE, Dacula, GA 30019 e-mail: <k7sz@arrl.net>



K7SZ doesn't like crowds, but crowds of fellow hams at Dayton are another story! (W2VU photo)

Hamvention® weekend local businesses take in a tremendous amount of money, something on the order of \$10 million! That ain't chump-change, bro! Although this year's attendance was down from the peak years of the 1980s and '90s, the Hamvention® folks told a local TV station that there were over 20,000 radio aficionados present for the weekend. That's almost a small city!

Manufacturers often debut new gear during Dayton, allowing us to twist the knobs and flip the switches on their newest offerings (see "The 2010 Dayton Hamvention Safari" elsewhere in this issue). The Hamvention® is also a place where you might end up face-to-face with a legend. This year's Dayton topped even my expectations. I met not one, not two, but *three* real-life legends in the world of amateur radio!

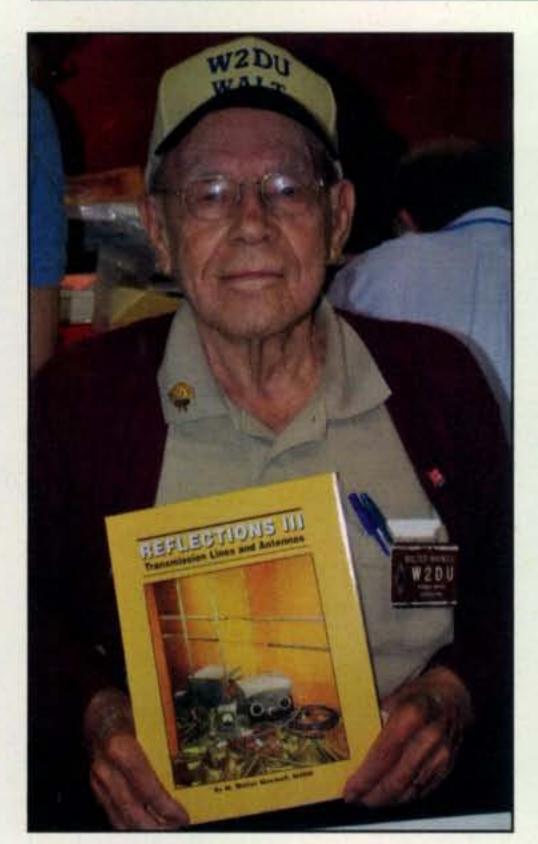
Meeting a Legend I: W2DU

Walt Maxwell, W2DU, is a living legend among hams. Born in Daytona, Florida in 1919, Walt's specialty is antennas and transmission lines. I have lost count of the times that I have referred to W2DU's various published articles, books, and papers. He is a true master of his craft. When you quote Walt Maxwell, virtually no one questions your source of information. Walt has saved my bacon more times than I can recall.

My wife, Patricia, KB3MCT, and I were cruzin' the Hara Arena venue on Saturday afternoon. She had been studying for her General Class ticket and I ended up dropping her off at the testing center. I continued on toward the main display area with the idea I would stop by the CQ booth before continuing on to take in the entire show. As I rounded the main entrance to the exhibit floor, I almost ran over an elderly gentleman in his battery-powered scooter. I looked down and spotted his callsign on his baseball cap—"W2DU." I stopped in my tracks and introduced myself.

Walt is the epitome of an "Elmer." He certainly has my vote for "Elmer of the Year." We chatted for about ten minutes and, sensing Walter needed to be someplace other than the middle of the entrance to the Hamvention®'s main area, I shook his hand and we said our goodbyes.

W2DU's new book is out: Reflections III (available at the CQ Bookstore) is chock-full of muchneeded information and history regarding antennas and transmission lines. Walt has been diligent in turning out three books on the subject and probably has a couple more in the back of his mind. Walt's newest book came at the most opportune time for me. I was in the middle of working on a series of articles for this column on antennas, feed lines, and matching networks. Several of Walt's articles in past issues of QST's "Technical Correspondence" column served as the basis for my column on transmatches, or "antenna tuners" as they are mistakenly referred to. Thanks to W2DU's expertise and his extremely readable writing style, I was able to lay down a good column



Author, antenna authority, and "Ham Radio Legend" Walt Maxwell, W2DU, with his latest book, Reflections III, at the Dayton Hamvention®. (Rachel Moseson photo)

from which even I learned something. Wow! Walt Maxwell! How could I ever top that?

Meeting a Legend II: W9KNI

Turning the corner into the main venue I wandered to the CQ booth, picked up a couple of books, including my autographed copy of W2DU's Reflections III. After a brief exchange with CQ Editor, Rich Moseson, W2VU, I did an aboutface and stood nose-to-nose with another living legend in the world of ham radio, Bob Locher, W9KNI.

Over the last 30–35 years, I had read Bob's articles in *CQ*, *Ham Radio*, and *Ham Radio Horizons* magazines, not to mention his outstanding book *The Complete DXer*. "TCDXr" is the most definitive source of info on DXing ever published, and is one of the most influential and informative ham radio manuscripts I have ever read. "TCDXr" taught me a lot, so much so that I have all three editions and often pick up the latest offering and read it over, yet again. I always glean something (or more likely several "somethings") every time I read it.

I shook hands with Bob, and told him how much I appreciated his efforts to acquaint the world with the art of working DX via his writings. He shocked me by returning the compliment! We stood there with the throng of attendees gently jostling us as they walked by, discussing the state of DXing and contesting on today's extremely crowded bands. Bob was also promoting his latest book, A Year of DX, his first-person account of nearly winning the CQ DX Marathon in 2008 (He did win in 2009!—ed). I quickly procured a copy, which he personalized with his autograph. We parted, with me aimlessly wandering around with my head in the clouds! This is such a great hobby!

Regarding Bob's two books, let me just state this: They are both "must haves" for any serious amateur radio operator. His unique writing style places you at his elbow while he works the world. I like Bob's writing style. It is very effective in getting his various points across to those not familiar with the nuances of working DX and contesting. Not only that, Bob is a one-man cheerleading squad for living the DX dream. He goes into antennas, their effectiveness and what to expect on good and bad days of propagation. W9KNI delves into the minute details of how to get that rare one into your log. What bands to operate and when. How to properly use the various DX spotting tools on the internet. How to understand propagation (prop) forecasts, find out where the DX lives, and what to do about "Slim."

I remember cutting out W9KNI's articles in the pages of Ham Radio Horizons in order to have a handy DXer's reference at my elbow while prowling the HF bands; that's how valuable I viewed Bob's thoughts and writings. His newest book, A Year of DX, is also a great read. I'm about five chapters into the book and I'm already trying to figure out how to put up a set of StepplRs on a 120-foot tower. (Yeah, like that'll ever happen!)

Meeting a Legend III: W7EL

Roy Lewallen, W7EL, is a Godsend to all of us who experiment with antennas. Roy's world-class contribution to our hobby is a little 'ole program called "EZ-NEC," an antenna-modeling program for the rest of us. I have used several versions of EZ-NEC over the years with outstanding results. All of us antennageeks love to put up antennas and experiment with them to increase our station's efficiency. Antennas, especially for QRP (under 5 watts) operators, are where we can make up for a 13-dB disparity between our 5-watt signals and the majority of the rest of the world's 100-watt signals. True, QRP with its 13dB disparity will be weaker than the average 100-watt station, but that 13 dB translates into only slightly more than two S-units. Thus, to level the playing field QRPers have become some of the most prolific antenna experimenters in the hobby. Guess what? Roy Lewallen is also a QRPer! Imagine that!

Do not let the title of this fantastic software, EZ-NEC, fool you. It is a full-blown piece of antenna-modeling software that allows the user to build an antenna and check out its performance on the computer screen *before* spending the time, effort, energy, *and* money to build



2010 CQ DX Hall of Fame inductees (and K7SZ's heroes) Lynn Lamb, W4NL (left), and Bob Locher, W9KNI (right), with CQ Editor Rich Moseson, W2VU, at Dayton. (Rachel Moseson photo)

and hang same. In short, EZ-NEC can greatly simplify your amateur radio life when you want to upgrade your antenna farm.

How well does EZ-NEC perform? Let me put it this way: At the Bent Dipole Ranch here in Dacula, Georgia, I use this modeling software in all my antenna projects. Since I am acrophobic (one who is afraid of heights) and really, really don't like climbing roofs, tall ladders, and especially antenna towers, EZ-NEC provides me a way to check out my new antenna designs without ever leaving the shack.

Roy, a soft-spoken radio amateur, is a tremendous asset to the radio hobby. Being an avid homebewer of QRP radio gear and station accessories and, of course, antennas, Roy is a true master of his craft. His EZ-NEC creation was used by the ARRL in its antenna modeling course and that's quite an endorsement.

An active QRPer and hiker, Roy savors the times he can dash into the bush, radio in hand, and operate from a primitive site. Being an outstanding CW operator, Roy prefers the ARRL's annual Field Day emergency communications (EmComm) exercise at the end of June to pack in and operate from the field. All of his gear is homebrew (home-built) and Roy gets a chance to display not only his operating but his building talents during exercises such as Field Day.

Adding #IV: W4NL

Right on the heels of Dayton and the associated "Four Days In May" QRP gathering, I attended a meeting of the Southeastern DX Club (SEDXC) in Atlanta. The guest speaker was Lynn Lamb, W4NL, who used near-QRP power levels to achieve over 300 countries worked on HF. He did it using wire antennas for the most part!



Roy Lewallen, W7EL, developer of the EZ-NEC antenna modeling program and a member of K7SZ's personal ham radio hall of fame. (Photo courtesy W7EL)

Lynn and his wife are both ardent DXers and both of them are on the Honor Roll, which means that they've worked just about every country currently on the DXCC country list! Talk about a family hobby. Wow!

Lynn's presentation came four days after he and Bob Locher, W9KNI, were inducted into the CQ DX Hall of Fame at the Dayton Hamvention®. To be considered for the DX HoF is, by itself, a major milestone in a ham radio operator's life. Induction into this prestigious group is only awarded to those who've provided years upon years of service to the radio hobby in general and the DXing facet in particular.

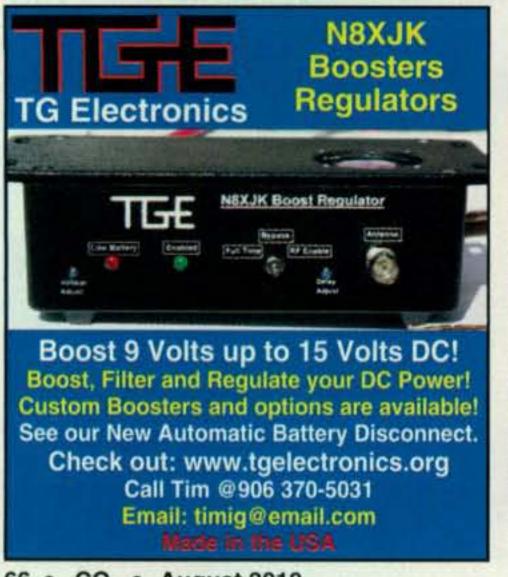
Lynn and Bob have both used their Elecraft K2 transceivers to show the rest of us how it's done. That's right, two world-class DXers powered down their

linear amplifiers, rolled their output power down into the single digits, and then proceeded to work just about anything they heard on the bands! In Lynn's case, he worked enough DXCC entities to qualify for the Honor Roll. Both Lynn and Bob admit that they were not at "true" QRP power levels, but were running about 9–12 watts output rather than the universally accepted 5 watts QRP output.

Throughout Lynn's presentation at the SEDXC, he referred to using 9–12 watts as "a challenge." For Lynn, it was the ultimate challenge of his skills. He kept telling the audience that he is a much better operator for the low power experience. While some hard-core QRPers would whine about them not "really being QRP," I tend to look upon their accomplishments as a guideline for the rest of us as to what can be accomplished using minimal power output. These guys are two of my heroes, that's for sure.

That is a wrap for this month. The summer can produce some extremely dangerous weather, so please be careful as you venture outside with your radio gear. Mid-summer "pop-up" storms are something we have to contend with. Thunderstorms are an everpresent threat, so watch the weather and take a weather radio with you into the bush. In the next column we'll have some new ideas for you to mull over.

73 Rich, K7SZ





It Just Followed Me Home from Dayton!

Property of that event was rain followed by a cold wind. This year I felt a need to go back to meet and greet both old friends and new acquaintances. The sheer volume of technical input (new gear, new kits, new modes) was overwhelming, but it is the people who made the biggest impression. What a great family to be a part of!

I'd like to thank all of you who took the time to email or write to me after the appearance of my first column. I appreciate your words of encouragement, praise, or criticism. I especially appreciate those of you who took the time to make suggestions for subjects you'd like me to cover in these pages. Please keep those ideas coming. I tend to have tunnel vision, so please do give me a nudge if you notice an area of interest that's fallen off my QRP radar.

NS-40 and the Mothers of Invention

In his June 2009 column, Dave Ingram, K4TWJ, reviewed the NS-40 transmitter, which is offered by the Four State QRP Group http://www.4sqrp.com/. Lately, one of the more interesting designs to bubble up out of the QRP pond, this little green

*1959 Bridgeport Ave., Claremont, CA 91711 e-mail: <qrp@cq-amateur-radio.com>

board is about the size of a QSL card and looks vaguely like your mother's electric stovetop, the one with those spiral burners. Only in this little transmitter, the spirals are the inductors, etched onto the board so you don't have to wind toroids. When you open the box and empty the plastic bag, only 14 parts tumble out. About ten minutes of solder time later and you're on the air with a clean 5 watts.

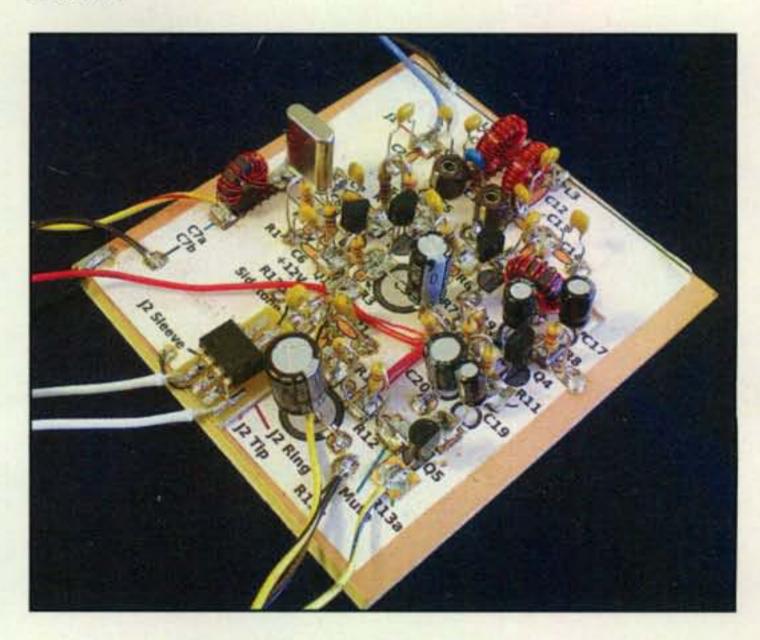


Photo A- The VRX-1 (versatile receiver) can be built for any band from 160 through 10 meters, comes with a parts layout diagram, and is a good kit for first-time Manhattan builders.

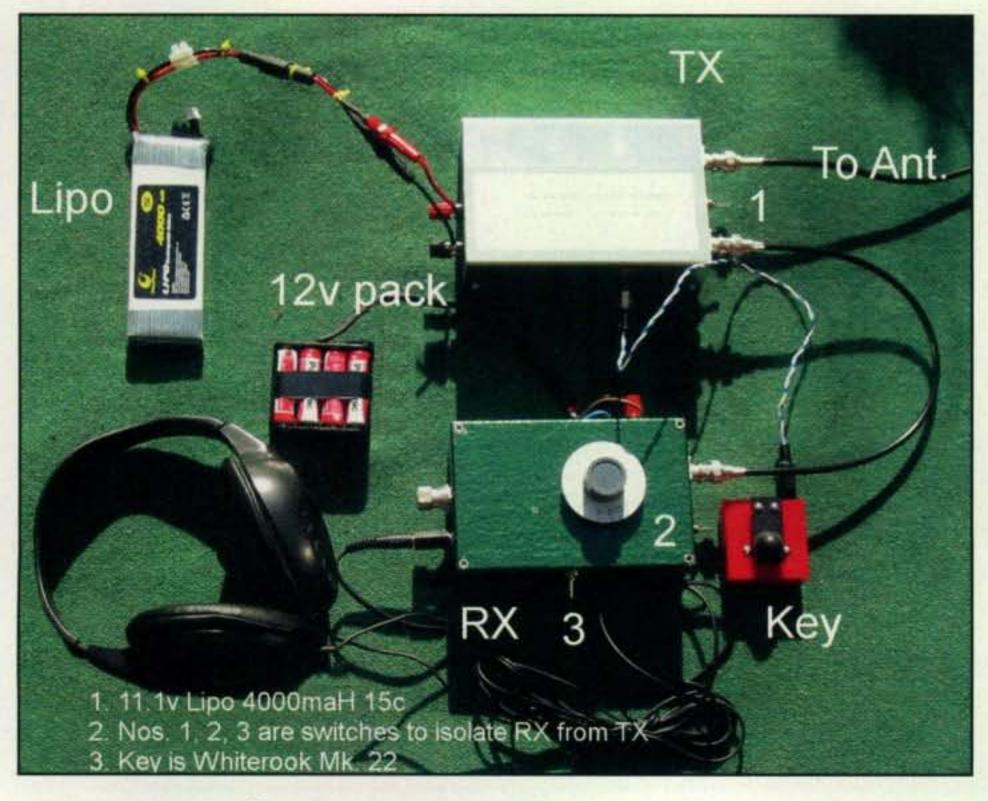


Photo B- Ian Maxwell, MMØMXW's portable setup, which he uses for hilltopping. See the text for a description of all the parts.

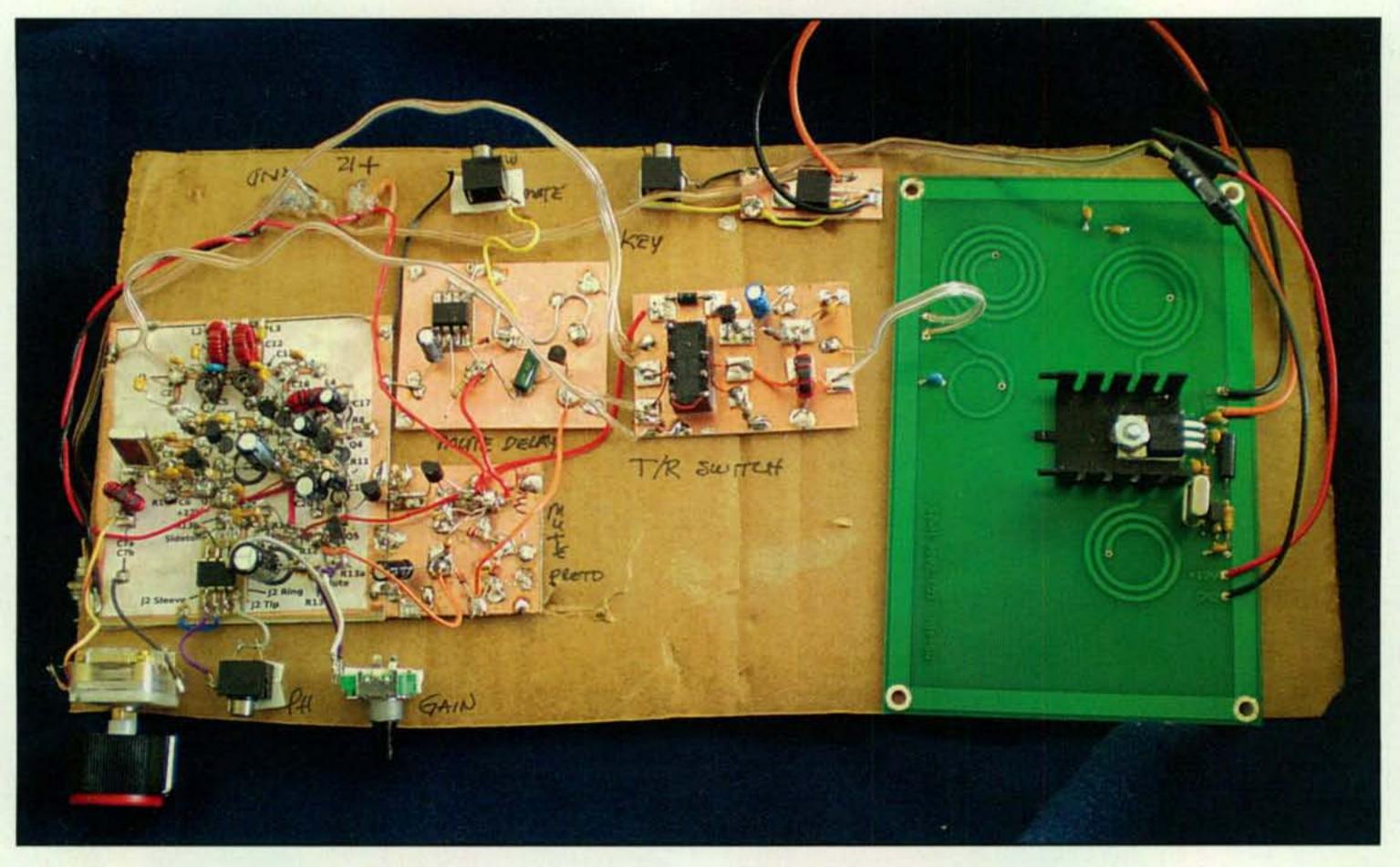


Photo C- This Cardboard Breadboard was cobbled by Terry, WAØITP. A guy has to have a place to put the parts while in the midst of a creative spasm!

It's about this time that most NS-40 builders stop to ask themselves the question, "What do I do for a receiver now that I have a transmitter?" In the world of QRP kit building we've become so used to making little transceivers that when a transmitter comes along it throws us for a collective loop. To find the answer, I logged on the to the Yahoo group dedicated to the NS-40 transmitter http://groups.yahoo.com/group/NS-40/ to eavesdrop on the crowd. The subject of what receiver to use with the transmitter surfaced regularly. It seemed that several of the group members were able to reach into a drawer and pull out a Ten-Tec 1056 receiver kit. Other receivers mentioned ran from the elderly (Drake 2B) to the new wave (Softrock Lite), to an updated version of KK7B's R1.

Meanwhile, the powers that be at the Four State QRP Group had also seen the need and set about designing their own answer to the question, the VRX-1. Jason Mildrum, NT7S, was called upon to do the design, and he came up with a nifty little DC receiver kit that can be built for any band from 160 through 10 meters (photo A). This receiver is built Manhattan style, and for those unfamiliar with or fearful of Manhattan construction, Jason's excellent assembly instructions include a tutorial that brings the whole process into clear focus. You can download the assembly instructions from the Four State website at http://www.wa0itp.com/vrx1assembly.html. (Also see KØNEB's "Kit-Building" column in this issue; it's all about Manhattan-style construction.—ed.)

Here comes the next collective head-slap from the NS-40 builders: "Now that I have a transmitter and a receiver, how do I control them?" That's right; a new set of needs has surfaced. How do you switch from transmit to receive? How do you switch the antenna? What do you do for a sidetone? Old timers had to deal with these dilemmas, because boatanchors mostly came in two flavors—transmitters and

receivers. Antenna switching was usually accomplished with a coax or open-framed relay. These were big clanky things with 110-VAC relay coils that certainly outweighed an NS-40 and VRX-1 combined. That is not to mention some kind of switch the operator had to throw to make the changeover. If you were lucky, the relay had a second set of contacts that served to switch the transmitter on and mute the receiver. If you weren't lucky, you had to throw these switches by hand. Also, as for the sidetone, we didn't need no stinkin' sidetones!

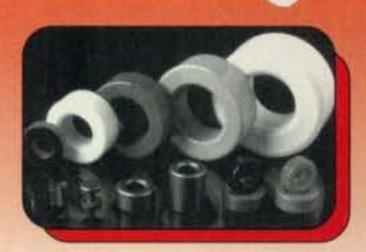
Meanwhile, back in this century, another item on the NS-40 Yahoo group led me to an e-mail correspondence with lan Maxwell, MMØMXW. I quizzed him about what peripherals he was using with his NS-40 and he replied as follows, "I used the NS-40 with Rick Campbell, KK7B's Modular Direct Conversion Receiver (sect. 8.5 of EMRFD). I've been using it for about five years now, working around Europe (as far as Asiatic Russia...)." The EMRFD lan refers to is the common abbreviation of Rick's book, Experimental Methods in RF Design, published by the ARRL. This particular design of KK7B's results from lessons learned over the ten years since he first published the design of the R1 and applies them to an even better receiver, but that's fodder for another column or three. Ian sent along a photo of his portable setup (photo B), and you readily can see that he adheres to the KISS principle! His explanation follows:

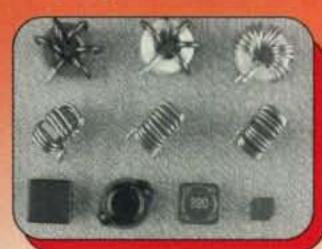
"As to the T-R switching, my own aim was to keep it as simple as possible with three switches. The antenna comes into the TX and runs through to a SPDT switch, which connects the antenna either to the TX or the RX. Switch 1 is the SPDT switch. Switch 2 (SPST) is in the RX to isolate the other end of the cable as a precautionary measure. Switch 3 mutes the RX (this is in the circuit diagram of the DC receiver). On transmit, all three switches are up, isolating and muting the

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Photo D– Jim Kortge, K8IQY's Magic Box will do the heavy lifting when you need to interface a separate transmitter and receiver.

RX. On receive all three switches are down, reconnecting the RX to the antenna. There is no sidetone as such; the tone heard in the RX is the stray RF being picked up."

Not exactly QSK, yet it bears a closer resemblance to the Armstrong method. However, it's simple and it works.

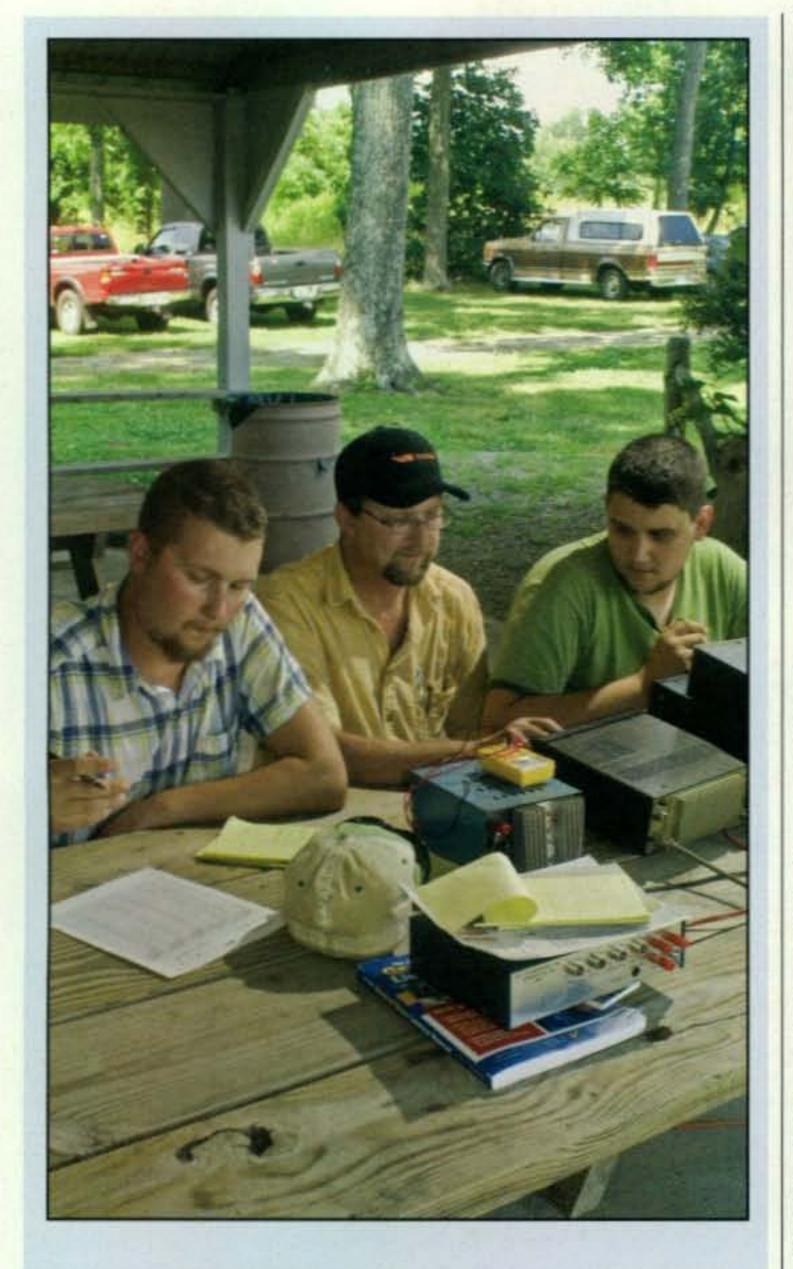
Back on this side of the pond, Terry Fletcher, WAØITP, started researching the circuits needed to come up with a more automated means of TR control. You can see some of these circuits in the photos section of the Yahoo group. It's the item portrayed in photo C, though, that really clarified the creative process for me. This is known as the "Cardboard Breadboard." You just need a place to bring all your ideas together. It may not be pretty, but it serves the purpose.

Now take a look at photo D. Terry had it in the back of his mind all along that this collection of T-R control circuits needed to be gathered together and sold as a kit by the FSQRP group. It would make life much easier for all the hams who had separate transmitters and receivers. For this job the FSQRP Group turned to Jim Kortge, K8IQY, who was asked to make a formalized kittable version of Terry's Cardboard Breadboard. The first thing Jim did was jettison the cardboard. Then he proceeded to design a microprocessor-based T/R switch which provides full- or semi-QSK, sequenced T/R switching, 80-dB isolation between RX and TX, and an easyon-the-ears 700-Hz sine-wave sidetone. The FSQRP Group introduced this kit at OzarkCon in April and calls it the "Magic Box." It should be on sale on the website by the time this column is published. (See more on the Magic Box in this month's Kit-Building column.—ed.)

NUE-PSK Continues to Grow

Smokey the Bear celebrated his 66th birthday in May. I'm not offering this tidbit because I think there are many Smokey fans in the ranks of QRPers. It got my attention because it came to me via PSK-31. Special-event station K5S was celebrating Smokey the Bear Days in Capitan, New Mexico, and I ran into them on 20 meters PSK-31 using an NUE-PSK modem (see photo E). This digital modem is offered by George Heron, N2APB, and Milt Cram, W8NUE. You can access their extensive and very informative website at http://www.nue-psk.com.

By now most hams have either heard of or used PSK-31. When I first tried it out, the software was running in DOS and my computer was a 386. Things have changed. Now the soft-



On the Cover

The Grider family of Tennessee is just full of hams ... three of whom are seen on this month's cover. In the center is dad Terry, KQ4LS, flanked by sons Jeff, KJ4MCL (left), and Jason, KJ4MCK (right), as they operate a portable station at the Hyder Burks picnic shelter on the campus of Tennessee Tech University outside Cookeville. Other licensed family members include a son-in-law and Jason's wife, Jenny, KJ4MCJ. Jason, Jenny, and Jeff all took their license exams at the same time last May and received sequential callsigns.

Terry has been licensed since the 1980s and concentrates most of his operating today on 2 meters, working with ARES (the Amateur Radio Emergency Service) and as a storm spotter. During the last sunspot cycle, Terry says, he also did quite a bit of operating on 10 meters and confirmed more than 80 countries on the band. He has worked for the past 22 years as an industrial maintenance technician for Cummins Filtration, a division of Cummins Engine Corp.

Jeff, who is 26, is also an electrician, and is also active in public service communications. Jason, 23, has recently upgraded to General Class, but does not yet have an HF radio. He is also active on 2 meters, and recently devoted time to talking over the air with a group of Boy Scouts working on Radio Merit Badge at scout summer camp. All three are active with the Cookeville Repeater Association. (Cover photo by Larry Mulvehill, WB2ZPI)

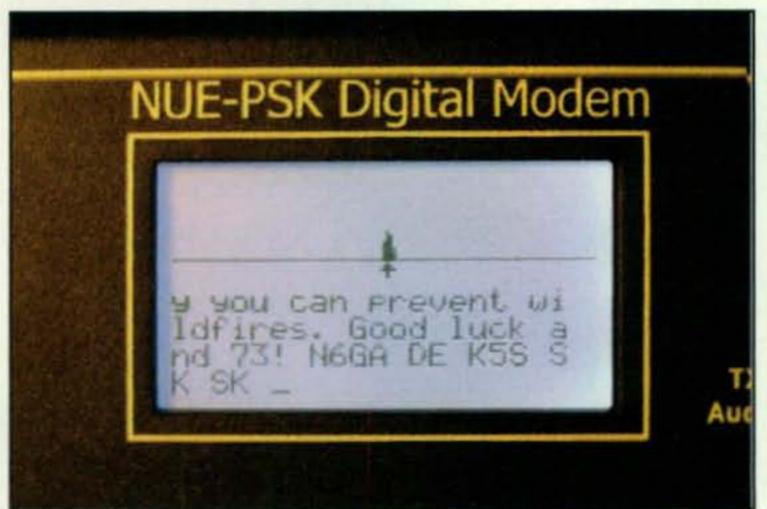


Photo E-"Only you can prevent wildfires," says Smokey.

ware actually runs in color (!) and there are macro brag sheets and all sorts of automated bells and whistles. However, the mode itself is unchanged and it remains very QRP friendly. It works well at low-power levels and requires very little bandwidth.

My Field Day compatriot, Bill Phinizy, K6WHP, brought along one of these modems last June and ran up an impressive number of Qs with it. I wanted to get some hands-on evaluation time, so Bill very generously lent me his unit so I could use it at my leisure. This little paperback-book-size box literally screams "Take me to the woods!" However, since I had no trips to boonies planned, the back patio would have to be pressed into service (photo F).

Getting the NUE-PSK modem on the air was quite easy. Bill uses his unit with an FT-817, but I wanted to use it with my K2. Fortunately, he had kept the unterminated cable which came with the modem, so all I had to do was solder on a K2-compatible microphone connector. After that, hooking up the station was a breeze: connect keyboard to modem, connect modem to radio, connect the radio to the antenna. A 7-AH 12-volt battery provided power for everything. After wiring and powering up the station, little signal pips started dancing across the miniature spectrum display. PSK stations were readily identifiable by their tiny train tracks which showed up at the beginning and end of each transmission. All you have to do is center the station over the cursor and away you go.

More NUE-PSK

At Dayton I shared a room with Dave Wilcox, K8WPE. "Doc" Dave resides in Traverse City, Michigan (The Cherry Capital of the World, don't ya know!) and was looking forward to opening up his summer cottage, throwing up a piece of wire and working some DX. He picked up an NUE-PSK modem at Dayton, and a week after we returned home I got the following e-mail from him: "What a hoot! I hook it up and hear a guy in the Canary Islands. . . . Give him a call and he comes back! Scared me half to death . . . just like my first CW QSO 50 years ago. I was just fooling around using my 817 and a Z-11 pro tuner, balun, and 125-foot long wire. . . . I don't even know how much power I was using. I think 1 watt because I am using the internal battery.... Tonight all of Europe was booming in as well as the Azores and some other IOTA stations. . . . This is the way to go to get started. No extra computer, just a modem and a rig."

Meanwhile, George and Milt have been busy finding new things to cram into their little black box. To an old brass pounder like me, it seems like magic to be able to include



Photo F- The PSK-NUE digital modem set up with keyboard, K2, and battery makes a compact, portable digital station.

more stuff. Case in point: The units they now are shipping can do RTTY as well as PSK-31, and by the time this column is published they will be able to do CW as well. That's not all, though. George said that after some discussions on the group's e-mail list, the next mode they are going to implement will be MT63. Development for support of this mode is in progress, and they hope to have it complete and available this summer. The next mode to be added, he said, would be Olivia.

All the software development notwithstanding, you still have to plumb this modem to a radio to tune in the signal you want to decode. As Doc Dave said above, all you need is the modem and a rig. Or do you? Another item George and Milt are working on developing is a Softrock-style transceiver that would live in a similar-size box attached to the back of the modem. All you would need to be able to get on the digital airwaves is the modem/transceiver combo, keyboard, battery, and antenna. On the NUE-PSK webpage, about one quarter of the way down the page, look for the NUE-SDR in the "Modem News" section. You can bet I'll be watching this item closely for further developments!

Back to the Fort

I managed a short eyeball QSO with Doug Hendricks, KI6DS, while in Dayton. He was busy selling his Hendricks QRP Kits products, which you can find on his website at http://www.qrpkits.com/index.html (also (209) 704-3522). When I first

Ft. Tuthill 15
Is Metar CW Transceiver
WWW GREATS COM
LOWN
RIT

Spot
VOLUME
Sp

Photo G- The second in the Ft. Tuthill dynasty, a 15-meter version, now selling in the hopes that the sun hasn't forgotten its spots.

became aware of the Ft. Tuthill 80 transceiver kit, the plan was that The AZ ScQRPions were going to kit the 80-meter version and Doug was going to kit the other bands, starting with 160 meters and 40 meters. However, the recent surge in sunspots made him change course. Doug thought it would be best to get some products ready for the higher bands before the spots came and went, so at Dayton he was selling the 15-meter version (photo G).

Holding the schematics of the two radios side by side reveals that Dan Tayloe, N6VE, the rig's designer, had to do some major redesign work. In the 80-meter version, the VFO ran at 1.18 MHz and then was tripled up to 3.5 MHz. In the 15-meter version, Dan ran the VFO at 6 MHz and mixed that with a 15-MHz crystal oscillator to produce the needed 21 MHz. Thus, the entire VFO architecture has been changed. Dan also added a third BS170 FET to the final amplifier, so it puts out a solid 5 watts, and he made some other changes such as rise/fall shaping for the finals B+.

I brought home a Tut 15 from Dayton, eager to get it built and playing. Fifteen meters is my favorite band, and I wanted to see how much of the goodness built into the Tut 80 carried over into the Tut 15. I monitored 15 meters as I soldered, and, of course, the band was deader than a doornail.

I hit a few bumps along the road but managed to get the rig in its box and playing just in time for the start of the CQ WW WPX CW Contest. I'd heard stations tuning and testing, so there would probably be some action. Indeed, the bell rang at 0000Z and the band lit up. I dove in with 5 watts flying and bailed out an hour later, full in the knowledge that a direct-conversion receiver isn't the preferred weapon of choice for major contesting. The band wasn't too crowded, though, and I was able to isolate enough lonely stations to make a fun run of it. I managed 20 Qs, including stations on the East Coast, Hawaii, and New Zealand. 15 meters was in the best shape it's been for a long time, and I know I'll be having fun on it with this little rig for at least the next sunspot cycle or two.

Signing Off

This column leaned toward the hardware side of the hobby, since some items that caught my eye at Dayton/FDIM just begged to be discussed. Back to our regularly scheduled programming next time, and please keep those ideas coming!

72/73, Cam, N6GA

Manhattan-Style Construction

Dayton this year! I hope to bring you more articles that kit builders want to read. I got lots of suggestions about future topics, so I know my work is cut out for me! This month I want to talk about a construction technique that is growing in popularity among builders. This technique is called "Manhattan" construction due to the finished product's resemblance to the big city and its densely-packed high-rise buildings (see photo A).

Many kit builders are familiar with regular printed-circuit-board construction, but a lot fewer have ever seen or tried Manhattan-style construction. That is because most major kit suppliers do not make any in this style, but the number of Manhattan kits is growing. Manhattan has advantages and disadvantages. It is not as neat as a pre-made board, but is a lot lower in cost and has an advantage of providing a solid ground plane, often lacking on some PC boards. There are a lot of homebrew projects made this way as well.

The basics of Manhattan construction are simply using a blank sheet of double-sided PC board cut to the size desired for the project and a number of round pieces of the same board punched and then glued to the surface of that blank board (see photo B). In most Manhattan kits, a pattern template is provided to allow you to put dots on the board to

*7133 Yosemite Drive, Lincoln, NE 68507 e-mail: <k0neb@cq-amateur-radio.com> locate where the Manhattan pads will be glued. By printing the template and placing it over the blank board, you can poke holes in the paper and then use a felt-tip pen to mark the spots. Most often, some type of cyanoacrylate glue, often called "super glue," is used to attach the pads to the board. Some epoxy glues work well, too. Some builders have used solder paste, as is used for surface-mount construction, and then heat the board with a low-airflow heat gun or bake it in a small toaster oven to melt the solder. Keep in mind during construction that heating glued or soldered pads too much can loosen their bond to the main board.

A proven method to easily make the round pads is to use a scrap from your main board material after you cut your main board to size. There are a few metal punch tools on the market that work for this purpose. Two available from Harbor Freight include its #44060 and #91510 hand punches for \$20 to \$25. The resulting round pads are used on your main board. These punches can also be used to punch nice holes in Altoids® or similar tins, making for very neat cases. There is also a new source for pre-made Manhattan pads, from Rex, W1REX, at http://www.grpme.com. These pads are square and come on a board that is scored so the pads snap off in rows and can then easily be separated by carefully breaking them apart. The pads come pre-tinned and ready to go. Rex calls them "MePads" and "MeSquares." The MePads are designed for mounting ICs and other similar com-

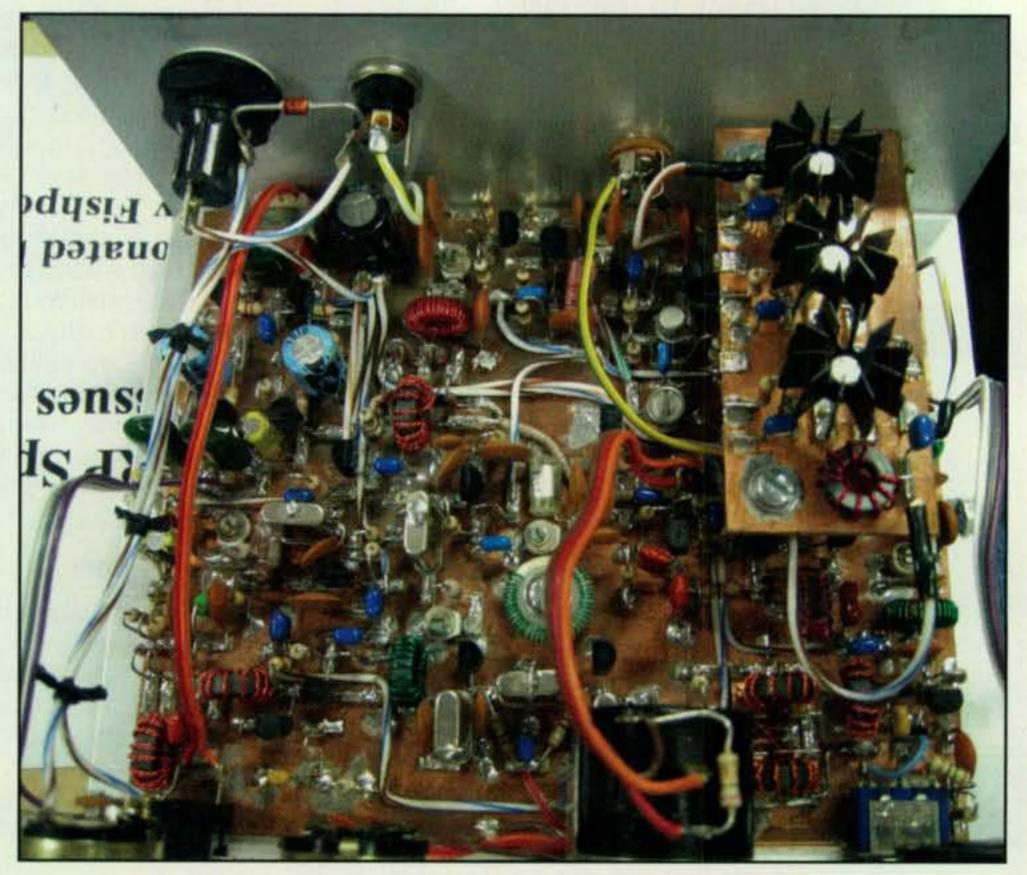


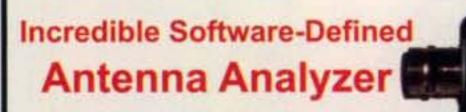
Photo A– A 2N2222-based CW transceiver built using Manhattan techniques.



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Photo B- Close-up of Manhattan component mounting.

ponents that have closely spaced pins and include pads designed for regular DIP ICs as well as surface-mount ICs. Both types of Rex's pre-made Manhattan pad sheets sell for \$10 apiece. These pads are also not double-sided, so they will need to be glued in place.

Installing the Parts

Allow plenty of time for the glue to set before beginning to place components on the board (photo C). When placing the parts on the board and pads, you will find that trimming the length of the leads and then bending them to form a kind of right-angle "foot" works the best. Be sure to make the legs that solder to a pad shorter than the leads that solder directly to the board to keep the parts standing upright. Also, it is a good idea to not have the components standing too tall above the board, as there can be problems with some RF circuits if too much lead is exposed. Since ground is the most common connection in most circuits, connecting to ground is the easiest thing to do in the Manhattan style. Simply solder the ground lead to the main board. The pads serve as insulated junction points for interconnecting parts. A good photograph and diagram are essential to success in making a Manhattan kit. Most of these kits come with a good-quality photo and diagram you often download to print out, along with templates for the pad locations.

A good example of a Manhattan kit available for purchase is the Four-State QRP Group's VRX-1 receiver kit. It is designed for first-time Manhattan builders and includes a template you can glue to the board permanently to mark the parts locations and pad sites. You can view the kit and order it from the Four-State QRP Group at http://www.wa0itp.com/vrx1.html.

An exciting new kit that is available is made with a PC board that has Manhattan pads already etched onto it. It is a new version of the popular "Sudden" receiver circuit designed by G3RJV and sold by Rex, W1REX, at http://www.qrpme.com (photo D). This kit uses the same PC-board material to make up the front and back panels as well, making it a one-of-a-kind Manhattan kit. The black PC-board material also adds to the unique style and look of the kit and makes for an attractive housing. Eliminating the two different levels of board material allows the builder to bend the component leads evenly and trim to fit the spacing between pads. In addition, Rex sells a

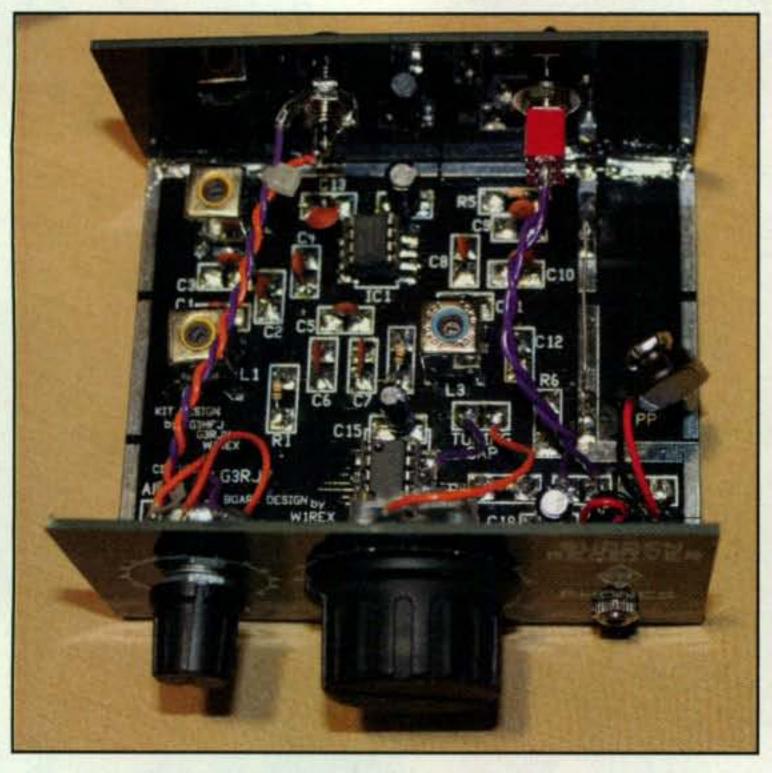


Photo C- A simple audio oscillator board.

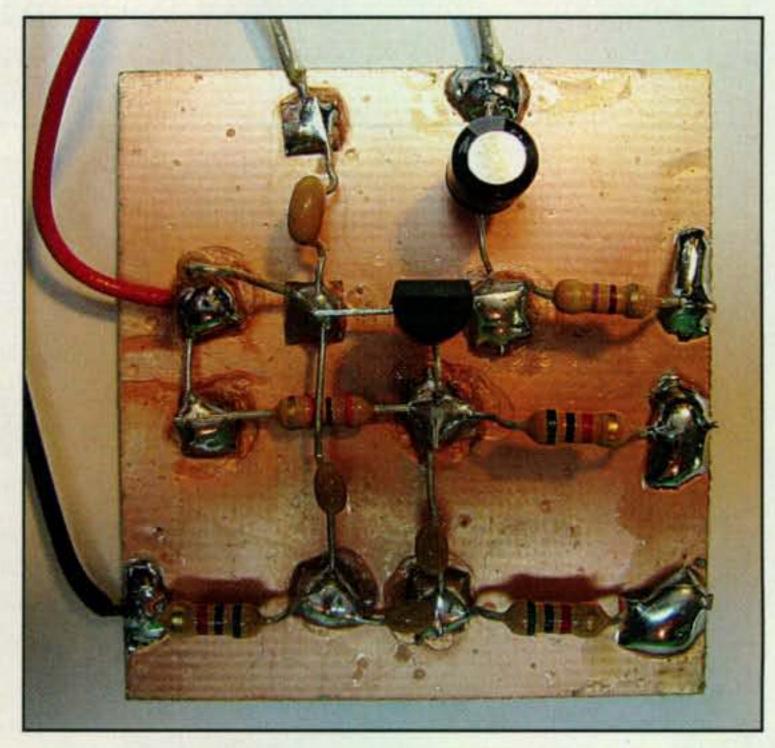


Photo D- G-QRP club "Sudden" receiver kit utilizing Manhattan-style pre-etched board.

"Reggie2" kit designed by Michael Rainey, AA1TJ. It is also a Manhattanstyle board, but was renamed "Limerick" by Rex, as he developed the pre-etched Manhattan pad boards with the pads all on one level.

New Kits at Dayton

Many more new kits were introduced at the Dayton Hamvention® this past May. Some of them include Hendricks Kits' new Tuthill 15, a 15-meter CW transceiver with digital dial, a new surface mount or thru-hole mount dummy load kit, a 40-meter CW transceiver with a digital dial option, and a CW keyer/audio amp kit. Hendricks Kits is online at http://www.qrpkits.com. In addition to its Sienna HF transceiver kit, DZ Kits also showed a handheld 40-meter AM transceiver kit. DZ Kits is at http://www.dzkit.com. Kanga US showed its R2Pro receiver, designed for

use in a microwave CW/SSB receiver or on HF. Kanga US is at http://www.kangaus.com.

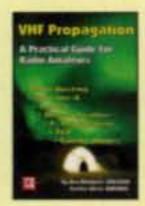
Pacific Antennas introduced its compact 40/20-meter trap dipole kit that looks easy to put together and enjoy. The antenna is available at http:// www.pacificantenna.com>. The 4-State QRP Group introduced its newest kit, a very unique automatic electronic T/R switch kit called the MagicBox. Designed by Jim Kortge, K8IQY, the MagicBox allows the user to connect any receiver and a low-power transmitter, allows for full break-in keying, and eliminates clumsy and slow toggle switching between transmitter and receiver. It also provides over 80 dB of isolation between transmitter and receiver. This kit is a breakthrough for those interested in combining different receivers and low-power transmitters without worrying about T/R delay and how to make them work together. Watch for announcements of availabil-http://www.wa0itp.com/ ity mbmagicbox.html>. I ordered one at Dayton, and am sure it will be handy when building and evaluating kits.

Don't let the summer hamfest season go by without looking over the latest in kits and parts and tools for the builder. I have been busy as well, and will be bringing more construction reviews and tips on new kits. Remember to say hi if you see me at the Huntsville Hamfest (without my Dayton hat!) or any other hamfest.

73 de Joe, KØNEB



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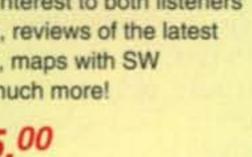
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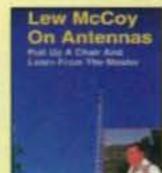
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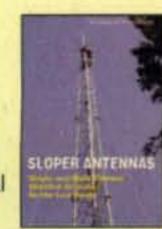
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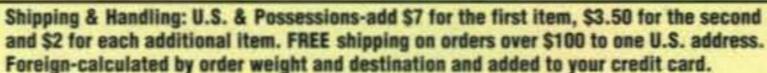
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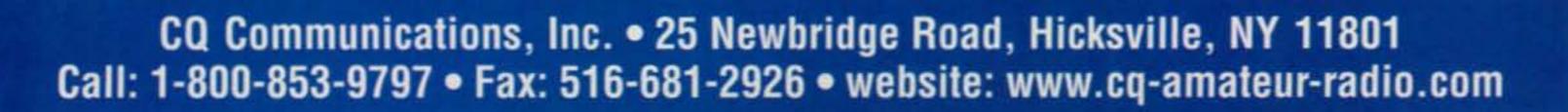


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Computer Numerical Control

ack in December, Imentioned in passing that I had a CNC (Computer Numerical Control) PCB (printed circuit board) drilling machine that I had made from plans I found in a magazine. The level of interest from readers surprised me. I guess you're tired of drilling PCBs by hand, like I was, so that's what we'll examine this month.

What I built (photo A) was designed by Dan Mauch and published as a series of articles in *Nuts & Volts* back in the early '90s. Basically, it's a wooden table that moves on drawer slides, under a gantry holding a Dremel tool, which comes down and pops holes in my PC boards. Software commands the table to a precise X and Y coordinate, and then moves the Dremel down to drill a hole through the PCB, which I have taped down to the wooden table. This repeats for each hole, about one every second or two.

The details of its construction are not that important, since you can get plans for similar machines from several places on the web (see the "Resources" box). Let's talk instead about what is important, because once you understand the basics (and they really are pretty basic), you'll be able to build one yourself.

Motors

The first thing you'll need for any CNC project are some motors to move things. My CNC drill uses

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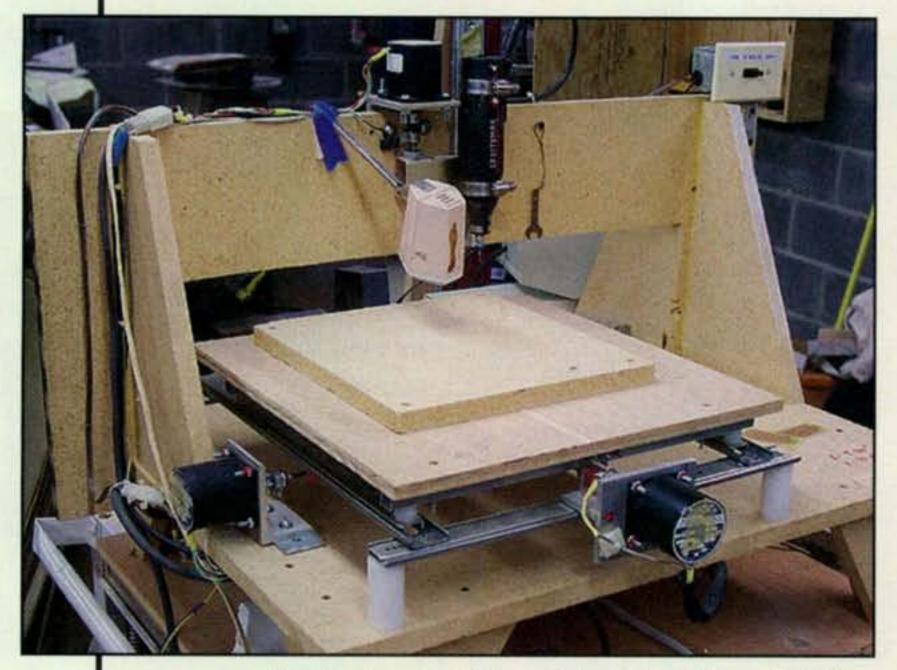


Photo A- My CNC printed-circuit-board drilling machine. The X and Y stepper motors are the black cylinders visible in front. These are connected to precision Acme lead screws. The Z axis motor and the Dremel tool used to turn the drills are visible near the top. At the upper right is the emergency cut-off switch.

stepper motors, while some larger machines sometimes use servo motors.

Stepper motors are special motors that can be moved one "step" at a time, typically around 200 steps per revolution. That means that with my 20-threads-per-inch lead screw (more on that in a moment) I can move my table by 1/200 of a turn, or 1/4000 of an inch (0.00025) at a time if I so desire.

The downside of stepper motors is that there is no feedback to the controller as to whether the motor moved the table to the correct spot or not. This is known as "open loop control"—send the signal and hope everything goes where it's supposed to. It sounds haphazard, but it actually works quite reliably if you stay within the performance limits of the motor.

In contrast, servo motors have built-in feedback systems which tell the controller exactly where they are. They also come in larger sizes, for those really huge machines, but can be overkill for a very small machine. They generally cost more than stepper motors.

Motion

Translating rotary motor motion into linear X or Y coordinate motion is the job of the *lead screw* (pronounced "leed"). This is merely a threaded rod with a nut (see photo B): Turn the rod, and the nut (attached to the table) moves towards or away from the motor. For any kind of accuracy, you can't use hardware-store threaded rod. What I have instead is precision lead screw stock with 0.003-inch-per-foot accuracy and a special zero-back-lash nut. It's a bit expensive; 3 feet of 1/4-20 (1/4 inch diameter, 20 threads per inch) precision acme-thread lead screw costs about \$30, and precision plastic nut about the same. Three feet of 1/2-10 material is about the same price.

Some systems, particularly large ones, use a toothed belt or chain and sprockets to move things. It's somewhat more challenging to maintain low backlash with these. Backlash is how much "play" is in the system—if you reverse directions, how long until the "play" or "slop" in the system is negated and things start to move again. My old Atlas lathe has about 0.010-inch backlash in the cross slide, pretty much normal for a machine of its age, meaning when I reverse directions, the indicator changes by about 0.010 inch before the mechanism actually moves.

Rails

OK, so now we have motors and linear motion. Next we need the three axes of motion (X, Y, and Z) to not only move smoothly, but accurately (90° to each other) and with no vibration or "chatter." What you need here is some kind of rail system. My machine uses special drawer slides (photo C), designed to have no "wiggle" in them, welded together at exactly 90 degrees. I have heard that hardware-store drawer slides can be found with

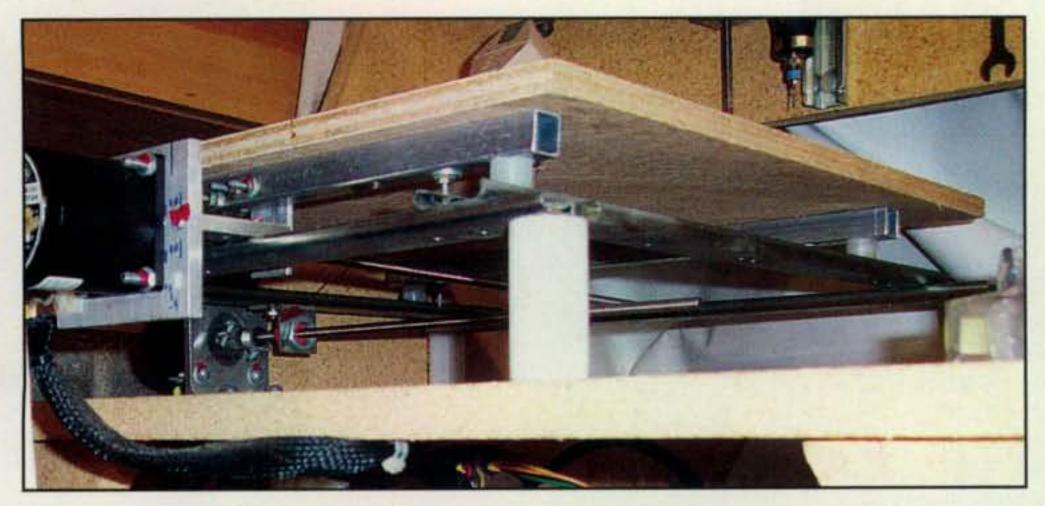


Photo B- The PC-board machine from underneath. Just under the table you can see the lead screws and red zero-backlash nut for the Y axis, attached to an aluminum bracket.

virtually zero wiggle, but I've never looked. This light-duty system is perfectly adequate for a PC drill.

If you plan on machining metal, you'll want something more rigid. Many machines use ground steel rod and either V-groove or linear bearings. These can be somewhat expensive—\$20 a foot, plus \$10 each bearing—but are rigid and precise. There are many other types of precision motion-control systems, such as one using angle extrusion. Pick one that fits your budget and need for precision.

What is absolutely critical is aligning the rods or tracks for each axis to be parallel with one another, and the machine axes need to be exactly 90



Photo C— A special drawer slide which uses a roller with a rubber O-ring to eliminate any play or wiggle in the system. This type is used for relatively light loads. Even the slightest amount of play in the rail will harm the machine's accuracy.

degrees to one another. This takes care and time to achieve, but it is essential. A difference of a thousandth of an inch in three feet is about the maximum tolerable error.

Tools

The last piece of hardware for your CNC machine is the tool that will turn the cutting bit. In my machine, I use a single-speed Dremel tool, spinning at about 12,000 RPM. This is almost the right speed for carbide CNC PC-board drills. You can't use a carbide drill even in a manual drill press, as the drill will be spinning far too slowly, and even the slightest horizontal movement while drilling will break the bit. Carbide is hard, but brittle.

For a larger machine, perhaps one designed to cut metal, you could use a Roto-Zip type tool, or even a wood router. They spin plenty fast and have sufficient power. Variable speed would be handy for certain materials.

Tooling

For drilling PC boards, it shouldn't be surprising that the best tool is a carbide PC-board drill (photo D). You can buy these in surplus, usually as "resharps," resharpened bits that might not work in production but are fine for hobbyists. You can get away with High-Speed Steel (HSS) bits, assuming your tool can grab onto them (those carbide bits have a uniform 1/8-inch shank, perfect for a Dremel), but they won't last very long, since fiberglass-epoxy PC-board material is very abrasive.

For machining (as opposed to drilling), the tooling of choice is an end mill. It is similar to a drill bit, but instead of the tip doing all the work, a mill is designed to cut sideways using the flutes along the sides. End mills come

in dozens of different styles, each with a specific purpose. Explaining all of them would take far more space that I have in this column, so take a look at the "Resources" box.

Safety

Just a short note about safety: A computer-operated machine tool will happily and reliably follow the instructions given, even if those instructions will result in self-destruction, flinging large chunks of metal at high speed across the room, or severe damage to expensive materials and equipment. A misplaced decimal point is all it takes. Humans, on the other hand, can generally recognize hazards and avoid them.

This means that you, as the human in the system, need to check and watch over the machine constantly. We can add some features to the system to help prevent many basic problems, but not every failure mode can be foreseen or detected.

Two mandatory features are a big ECO (emergency cut-off) switch and several limit switches. The ECO switch usually operates one or more relays or contactors, shutting off power to the motors and tool immediately and completely. The limit switches are placed to detect when the system has moved to the limits of its travel, signaling the software to stop all movement and sound an alarm. In my system the ECO is an ordinary light switch mounted to the front of the table, which turns off the motor power, and I've used it several times. Each axis also has a limit switch at each end. The ones at the "zero" position serve double-duty as "home" switches, so the software has a consistent physical starting point for any operation.

A cover is always a good idea. I never did install one, but I've been thinking of adding a clear plastic cover to help reduce noise (the Dremel is loud enough that I use ear plugs.).

Last but not least, real safety glasses are a must-have whenever the machine is on. I've been satisfied with a \$5 pair from Harbor Freight. Make sure you get a pair that are both comfortable enough to wear all day and don't distort your vision (causing a headache). If they are comfortable enough that you don't mind wearing them, you'll use them more often.

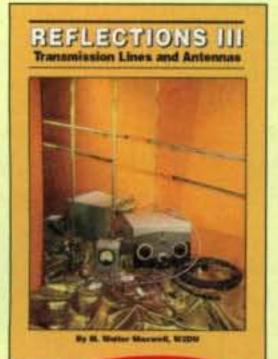
Controlling

OK, so now we have all the mechanical parts out of the way, leaving the last bit of hardware—the interface between the computer and the motors, known as a

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Photo D- An assortment of carbide PC-board drills. Carbide is very hard, allowing thousands of holes to be drilled in highly-abrasive glass-epoxy PC boards, but it is also very brittle, breaking easily if used in a manual drill press

controller. While anyone even mildly handy with electronics can buy a stepper or servo motor driver IC and assemble it (with a power supply) into what's needed, I recommend just buying what you need. For example, a four-axis controller with four larger stepper motors can be had for under \$500. (Why four axes? Hey, you never know; maybe you'll want to add a rotary table or something in the future). If you're really going to build one yourself, Google "stepper motor driver" to get some ideas. Make sure you get the right kind of motors for the driver!

Computer

A 1-GHz Pentium will be more than enough to run the motor controller. You might consider using the same computer to design your PC boards (or 3D parts); if so, a somewhat faster CPU might be worth it. My local computer store sells a refurbished desktop PC that's overkill for under \$300. Consider



Photo E- Some printed circuit boards that I drilled with my CNC machine. Despite having only a few dozen holes, it's still faster and more precise to let the machine do it.

that (and a nice \$99 flat screen) as part of the cost for your machine.

Software

You need software for two distinct tasks: controlling your CNC machine (CAM software), and designing your parts (CAD software). There are literally hundreds of different CAM (Computer Aided Machining) and CAD (Computer Aided Design) programs available, some better than others, ranging in price from freeware to over \$10,000 per license. It can be a difficult choice.

The main task for the CAM software is to import and interpret "G Code," the universal language for CNC machines, and move the axis motors as necessary. I have been using DanCAM from Dan Hudgins because that's what was recommended all those years ago, but it's getting outdated. It only runs under DOS (I use an old IBM PS2 at 4.77 MHz to run it).

These days, many hobbyists use Mach3 software (which runs under Windows™), and although I don't have much experience with it, I've downloaded an evaluation copy and so far I like it. You can buy it direct, but some sites offer it at a small discount, for example at Dan Mauch's website. It can import several file types and even convert them into G Code.

As for design software, I use Eagle from CadSoft, which generates an Excellon drill file (a type of G Code for drilling). I run the Excellon file through "Optimizer," a nifty program from Dan Mauch which optimizes the drill path to minimize the distance the X Y table has to travel (thus saving time), and drop that file directly into DanCAM. I have yet to try this with Mach3, but Dan has assured me that it works fine.

Putting it All Together

First decide what you want to do with your machine. Then figure out how large and powerful it needs to be while considering your budget. Browse through on-line designs to get some ideas—fixed table, moving table with one or two axis motion, full gantry, or whatever. Select motors, controllers, and rails and fit them all together (very carefully and accurately!) into a CNC machine. Wire up the controller, switches, power supply, tool, and safety systems. Fire up and configure the software, calibrate your machine, run a few test samples (photo E), and start production!

Don't let the bewildering wealth of online information befuddle you. Take it slowly, learn about each part of the whole system (much as I've outlined here), and write down your choices. Once you think you're ready, start collecting materials and get started.

Figure on at least half a year and \$1000 if you buy most of the components and assemble it yourself. If you don't have

Correction

In my June column on Universal Serial Bus, I trusted an online source too much and made a mis-statement of fact. Thanks to Peter Viscarola, K1PGV, for his excellent letter that helped me understand the fine nuances of this complex subject.

I stated that the root hub in the computer assigns a distinct address to each function in a composite USB device, such as a webcam with microphone. In fact, this kind of device is more commonly implemented as its own USB hub, which then communicates to the various functions within the device. Another variation uses a single address but assigns different "endpoints" to control different functions.

Also, just to clarify: I tended to describe the root hub and USB host controller as if they were different pieces of hardware. In fact, the root hub is an integral part of the controller and is not itself a separate device.

any familiarity with precision machining and measuring, get help from an online forum for getting the axes right. You'll need some basic tools—saws, drills and the like. Finally, start small and basic, working your way up to a bigger machine only after you have some experience.

I hope this has helped you at least start thinking about automating some aspect of your hobby. Next time, we'll swing back towards radio and operating, so until then . . . 73 de Don, N2IRZ

Resources

I have used all of these websites for supplies or information of one type or another. All are worth a visit if you're considering building a CNC machine. Don't be afraid to use your favorite search engine to find additional resources on your own.

Dan Mauch's Camtronics website, a good assortment of bits and pieces for building a CNC machine: http://www.camtronics- cnc.com>.

Probably the largest online CNC forum, with many helpful and patient members, is http://www.cnczone.com/>. Also look for the "JGRO Router Table" plans, a nice machine.

Xylotex sells CNC parts and kits. I recommend its four-axis controller and motor kit, which will simplify the construction of any CNC system: http://www.xylotex.com.

McMaster is the source for all things mechanical. While not necessarily the least expensive supplier, it has everything you can imagine. The website is very easy to use, and the explanations are an education in themselves http://www.mcmaster.com/>.

These websites show different kinds of CNC machines that have been built, along with plans of varying detail. Use these to get ideas: http://dpgeorge. net/cnc/>, http://www.volunteerlabrat.com/default.html?goto =cnc.html>, <http://buildyourcnc.com>.

Depiction equips ARES public service

American the bike ride for several years, tion" into the field where it With nearly 500 riders on five courses simultaneously, the event is a logistical challenge for the 45 ARES volunteers who run communications.

Responsible overall for situational awareness for the event, this year Assistant Emergency Coordinator Dennis Conklin, Al8P, used Depiction mapping software for planning and operations.

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> in Depiction, I was much more aware of exactly what was going on and what implications the were," said Conklin. "Depiction provided terrific situational awareness."



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EME: The Future of Weak-Signal VHF?

tion. It can be answered both in the affirmative and in the negative, depending on one's perspective of weak-signal VHF. On the positive side, I have chosen to highlight some of the movers and shakers of today's EME communications.

Joe Taylor, K1JT: Perhaps no one has done more to advance the ability of the ham with a marginal station to make EME QSOs than Joe Taylor, K1JT. Joe's development of WSJT, which stands for Weak Signal Communications by K1JT, has made it possible for hams running 100 watts and a long-boom Yagi to make digital-mode contacts with many moderate- to high-power stations. In opening this opportunity to marginally equipped hams, Joe has advanced the interest in EME communications, as well as weak-signal communications in general. Adding software defined radios to the mix has only served to further enhance one's ability to make extraordinary contacts once thought impossible to accomplish. For more information on Joe's many software developments, see his website: http:// physics.princeton.edu/pulsar/K1JT/index.html>.

Dave Blaschke, W5UN: For those of us who are in the business world, MBA stands for Master of Business Administration. For those of us in the EME world, MBA stands for Mighty-Big Antenna. The owner of that MBA is Dave Blaschke, W5UN. Dave's mighty-big 2-meter array consists of thirty-two 17-element horizontally polarized Yagis and thirty-two 11-element vertically polarized Yagis. Dave has made over 11,000 2-meter EME QSOs. He has achieved WAS, DXCC, and the world's first WAZ award on 2 meters.

With his MBA, Dave has been the first QSO for many aspiring EME operators. He has encouraged the activation of many countries on 2 meters. He has been a mentor to many new EME operators. For more information on Dave's MBA and other items in his station, see his website: http://www.w5un.net>.

Al Katz, K2UYH: The mentorship that Al Katz, K2UYH, has provided to the 432-MHz and above EME operator is incalculable. If his efforts were to be measured by his monthly newsletter alone (the 432 MHz and Above EME News) you would not be able to count the number of operators who have been encouraged to get on the air on EME on the UHF and above frequencies. Concerning that newsletter, if you want to know who is doing what during a particular month, you can go to: http://www.nitehawk.com/rasmit/em70cm.html.

Al's mentoring is not limited to his amateur radio activities. As a professor of engineering science at The College of New Jersey, Al regularly mentors three to four students on projects that he is working on at any given moment. One of his protégés is Marc Franco, N2UO. Marc has gone on to assist in designing and developing weak-signal and satellite projects, as well as translating WSJT documentation into Spanish.

mentation into Spanish.

e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

August 3	Last quarter Moon
August 10	New Moon
August 10	Moon perigee
August 12	Perseids meteor shower
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August 16 First quarter Moon
August 24 Full Moon

August 24 Full Moon August 25 Moon apogee.

-EME conditions courtesy W5LUU

Michael and Monika Kohla, DL1YMK: Michael and Monica are a DXpedition team that travels to exotic locations and gets them on the air. This year it was to Kaliningrad, where Michael operated as R2/DL1YMK. Here, from the July 2010 issue of the 432 MHz and Above EME News is part of their story:

Since the former military restricted area of Kaliningrad was opened in 1991, to our knowledge there had been no guest licenses issued by the Russian authorities for UHF/SHF operation, not to mention any moonbounce activities. It was a very lengthy procedure taking many months to get all the necessary legal permits, starting with the special moonbounce license with a special event callsign issued by the General Radio Frequency Center in Moscow and ending with the allowance to temporarily import all the radio equipment by the Russian customs and border control.

By far the job of logistics management was the toughest ever encountered to make this event become a reality. Monika spent many nights on the computer with endless correspondence, and the heap of documents finally reached some 6 cm in height. We are sincerely obliged to the Russian authorities for the extremely professional handling of our license application and also to the German embassies in Moscow and Kaliningrad for their support whenever things seemed to slow down. After two days travel by car and ferry we passed the Russian/Lithuanian border near Nida on 11 May without any problems due to the perfect preparation by Monika.

We were cordially welcomed by our hosts, who proved to be very tolerant people, allowing us to set up the dish amidst a strawberry field. The next day the stressed dish was installed, which by then was a routine matter. Although its location was very close to a concrete fence running around the farm ground, we had only some tolerable obstructions to the east (below about 7° EL there was a chicken shack) and to the extreme west (a farm house).

On Thursday night (13 May), R2/DL1YMK started the first-ever moonbounce operation from Kaliningrad on 23 cm. After the first CQ, at 0324 OK1DFC was the first to enter the log (569/559), immediately followed by at 0329 OK1CA (569/559), 0337 VK3UM (559/559), and went on to QSO on this first moonpass 42 different stations including very enjoyable sideband QSOs with DF3RU, F2TU, and LX1DB. Because the sun was close to the moon on Friday, 14 May, we were on 13 cm, hoping for some QSOs due to the narrower beam of the dish.

Despite the generally unfavourable condx, we worked 19 different stations, including sideband QSOs at 0742 F2TU (54/53), 0841 LX1DB (55/54), and 0847 G3LTF (54/54). On Sunday, 16 May, we activated 70 cm for the first time with a slightly modified rig compared to OHØ. The feed was down-gauged to just a linear polarized 1-wl short backfire loop, running the risk of possible Faraday lock-out, but saving one coax relay with its inevitable losses. Also the DB6NT LNA was upgraded in

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terms of NF in order to compensate for the lower power of 500 W, imposed by the license conditions.

When firing up the amp, we could hear echoes for the first time despite the relatively low output. The line was started at 0603 by VK3UM (559/559) with one third of the dish still obstructed by the chicken refuge and ended on Sunday at 1720 by G4YTL (O/O). The trade-off rig-wise seemed to pay off, as on the first 70 cm shot we were able to log 23 initials, not to forget K2UYH at 1516 (O/O) for his 98 DXCC.

A significant improvement of the portable setup in terms of moontracking was the implementation of a brand-new OE5JFL controller (produced by HB9DRI) together with cheap 12-bit magnetic absolute encoders, which were incorporated in the SPID rotator. For the first time on a DXpedition we never lost the moon. This was very essential, as we only had a visible moon for half a night; the second op really appreciated this technical improvement, as the nights were quite chilly in R2-land!

On the following days we subsequently reactivated all three bands again. We also ran some JT QSOs on 70 and 23 cm after the hard disk of our laptop came back to life after some problems, although it was extremely slow on decode operation. During the 23-cm DUBUS Contest we gave out the R2 multiplier to 49 stations, which is a quite respectable result for a portable setup. Unfortunately the activity from the U.S. was low on all three bands compared to previous DXpeditions.

When the dish was dismantled on Monday, 24 May, the total score was 201 moonbounce QSOs, which split up as follows: on 70 cm 34 QSOs with 31 initials in 19 DXCCs; on 23 cm 130 QSOs (3 SSB and 12 JT) with 79 initials in 35 DXCCs; and finally on 13 cm 37 QSOs (4 SSB) with 28 initials in 20 DXCCs.

The return trip was again somewhat exciting, as we feared possibly getting stuck in customs, but all went smoothly and the rig was returned home safely. So there is a good chance for hearing us off the rock from another very sought after DXCC in the future. Thanks to all QSO partners.

For more details on the R2/DL1YMK DXpedition, see: http://www.ok1dfc. com/peditions/ymk10/ymk10.htm>.

Zdenek Samek, OK1DFC: If you look closely at the R2/DL1YMK URL, you will see the callsign OK1DFC as part of the address. The reason that Zdenek's callsign is part of the address is the tremendous support that he gives to the European EME community. He hosts all of Michael and Monika's DXpedition URLs. He actively operates in and promotes VHF and above contests and DXpeditions. His callsign is a promotion of his second hobby, World

War II airplane and air history. Hence, the callsign signifies Distinguish Flying Cross. The DFC is awarded in the United Kingdom for an act or acts of valour, courage, or devotion to duty while flying in active operations against the enemy. The U.S. has a similar award that is also available to instructors and to civilians for valor related to flying.

DUBUS: There is no better source of worldwide technical papers than the little quarterly magazine DUBUS. Published in English and German, it is distributed around the world. Subscriptions are handled by agents in major countries. Here in the U.S. the agent is Janet and Ed Cole, KL7UW, who can be e-mailed at: <dubususa@hotmail. com>. Their snail-mail address is P.O. Box 8672, Nikiski, AK 99635-8672.

Here is a list of feature articles for the second quarter 2010 issue:

- "High-Power Directional Couplers with Excellent Performance -That You Can Build," by Paul Wade, W1GHZ
- "A Bistatic Backscatter Chirp Radar for Amateur Radio Use," by Andrew Martin, VK30E
- "Applied Conversion of Segmented Wires from NEC2 to 144-MHz Yagi Elements" and

- "for Semi-Insulated Mounting above the Boom using Standard Insulators— Part 1," by Hartmut Klüver, DG7YBN
- "Sporadic-E Summary 2009—144 MHz," by Joachim Kraft, DL8HCZ/CT1HZE
- "Experimental Mixer Head for 47 GHz with Circular WG," by Wolfgang Demmer, DD8BD
- "Idea for a simple multi-function transverter for X-Band," by Konstantinos Giannopoulos, SW3ORA
 - "Comparison of ROS and JT65," by Rex Moncur, VK7MO

For more information on *DUBUS*, see its website: http://www.dubus.org/>.

I have only scratched the surface of the many mentors in EME communications. I am sure you can see that my answer to my opening rhetorical question is that with these mentors furthering the technology envelope for EME communications, I find a resounding positive for the future of weak-signal VHF. In future columns I will highlight others.

Current Contests

There are two important contests this month: The **ARRL UHF** and **Above Contest** is scheduled for August 7–8. 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*.

Current Events

The 14th International EME Conference will be held this year in Irving, Texas, August 12–14, at the Westin at the DFW airport. This conference will be an excellent opportunity to meet a number of international EME enthusiasts. For more information and registration, see: http://www.ntms.org/eme/.

The annual **Huntsville**, **Alabama**, **Hamfest** will be August 21–22 in the South Hall of the Von Braun Convention Center. There are several VHF-related forums scheduled. For more information, see: http://www.hamfest.org/>.

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. The following organizations or conference organizers have announced a call for papers:

Annual ARRL and TAPR Digital Communications Conference to be held September 24–26 in Portland, Oregon and publication in the conference *Proceedings*. Presentation at the conference is not required for publication. Submission of papers is due by July 31, 2010 and should be submitted to: Maty Weinberg, KB1EIB, ARRL, 225 Main Street, Newington, CT 06111, or via the internet to <maty@arrl.org>. For suitable topics and submission guidelines also contact Maty via e-mail and check <http://www.arrl.org>.

This year's **Microwave Update** conference will be held in Cerritos, California the weekend of October 21–24, at the Sheraton Cerritos. This is a call for papers and talks. They are looking for presentations on all aspects of microwave equipment and antenna construction, theory, propagation, operating, and design modes, just to name a few. Frequency range is 900 MHz through LASER. They have already had

quite a few early volunteers, which they always appreciate, but they are looking for more presenters. If you are interested in presenting, please contact Frank Kelly, WB6CWN, via the website link. They are also looking for papers for the *Proceedings*. You do not have to be a presenter to have your paper included in the *Proceedings*. Papers for the *Proceedings* can also just be short topics on anything microwave related. If you are interested in making a contribution to the *Proceedings*, please contact Frank Kelly, WB6CWN, at the website link on the conference website at: http://www.microwaveupdate.org/. The deadline for papers is Monday, August 31. The *Proceedings* Style Guidelines page can also be found on a link on the conference website.

Eastern VHF/UHF Conference Proceedings Available

Proceedings for the Eastern VHF/UHF Conference are available on CD at a cost of \$7.00. To order, go to: http://www.newsvhf.com/confcd.html and follow the directions on the website.

Meteor Showers

Beginning around July 17 and lasting until approximately August 24, you will see activity tied to the *Perseids* meteor shower. Its predicted peak is between August 12 at 2330 UTC and August 13 at 0200 UTC. The κ -Cygnids meteor shower is expected to peak on August 18. The visually-impossible γ -Leonids is expected to peak August 25, around 1600 UTC. However, this shower may have gone dormant. The α -Aurigids is expected to peak around September 1.

For more information on the above meteor-shower predictions see Tomas Hood, NW7US's propagation column in this issue. Also visit the International Meteor Organization's website: http://www.imo.net/calendar/2008>.

Propagation and Tee-Shirts

As usual, hamfests are a place where T-shirt vendors sell their products. Ham-Com in Dallas in June was true to form. However, what was an exceptional T-shirt that caught my attention was the one that read: "On the Fourth Day ... God Created Sunspots—Genesis 1:14." I think that if you read this month's propagation column you might become a believer, because concerning the long-awaited sunspots, there is good news coming—at least from NASA, which predicts that the sunspot slumber will end in 2013. For more information on this vendor's creative products, see: http://www.HamApparel.com.

And Finally . . .

Education Partnerships with Public Schools: The ominous headlines this past April warned of massive layoffs of teachers and staff of public schools. Secretary of Education Arne Duncan warned that between 100,000 and 300,000 public school jobs could be lost due to budget cuts.

While the public school situation is dire, I believe that this is a tremendous opportunity for small religious congregations, and other groups, to respond to the immediate needs of local public schools. My wife, Carol, and I have been involved as education partners through our church with a local public school for more than six years.

Our involvement began during a local economic crisis for Tulsa Public Schools. The crisis was met by a local philanthropist's \$1-million matching grant challenge. My congregation's lay leadership decided to give \$200 to the matching grant. Additionally, we became education partners with Hamilton Middle School, which is near our church.

Education partners in Tulsa Public Schools include banks, faith-based organizations, the local Bar Association, the local medical association, museums, universities, Tulsa Air and Space Museum, and the Oklahoma Air National Guard.

We began our involvement by contacting the principal and asking what supplies the school needed. He gave us a list and we went to work, providing over \$200 worth of pencils, paper, and other school supplies. Over the years we have given other supplies, furnished volunteers for testing, and filled a unique opportunity for a couple of seasons as a football-game announcer. The football-game announcer job came about because of Carol being blind. At one of the football games I went about my usual activity of describing the game to Carol. My descriptions to Carol caught the attention of the principal and assistant principal. The assistant principal approached me with a job offer. He said to me, "I hear you doing such a good job in describing the game to Carol that I wonder if you would not mind doing them for the school from the press box." Thus began my short career of announcing the local football games.

Ironically, Carol became my spotter. I converted the list of players and their jersey numbers into Braille so that when I called out the jersey number to her, she would give me the player's name. Then, I could announce, "Touchdown! Jeremy Smith, number 34, ran for 11 yards to pick up 6 points for the Falcons." Unfortunately, my announcing career ended a couple of years ago when my schedule conflicted with the school's game schedule.

Because Carol and I are both amateur radio operators, one way in which our hobby has played a role in our education partnership with Hamilton occurred a few years ago in connection with the International Space Station (ISS) and the ARISS program.

In December 2004, Keith Pugh, W5IU, the satellite columnist for CQ VHF magazine, notified me that the nearby Tulsa Air and Space Museum was scheduled to be in contact with the ISS later that month. Several students were already scheduled to ask questions during the 10-minute contact. I got the okay from Keith about the possibility of some of the Hamilton students being observers of the contact. Then I

contacted Ms. Rita Balleu, one of the science teachers, to see if she could arrange for a few students to go to the museum despite the school being on winter break. She got four students to be observers during the contact.

Following the contact, Keith wrote an article for the Winter 2005 issue of *CQ VHF*. As its editor, I made sure that Ms. Balleu and her four students' photos were in the article.

Most recently, the Oklahoma Air National Guard piloted an after-school program at Hamilton. Known as Starbase 2, the program is sponsored by the Office of the Assistant Secretary of Defense for Reserve Affairs (see: http://www.starbasedod.com/index.php). Hamilton was one of five pilot sites for the new program which included STEM and social skills instructions for the students.

Carol and I became mentors. For two hours during several Wednesday afternoons last spring we and others from the Air National Guard, Tulsa Technology Center, Langston University, and classroom instructors mentored Hamilton students. Nationally the program has been deemed such a success that it will be expanded to ten schools across the country next fall and will include a return to Hamilton.

Just before we left for Dayton this past May we learned that another Starbase 2 pilot site was in Dayton and is sponsored by Wright-Patterson AFB. Therefore, we visited that site a couple of days before the Hamvention® began. It was very interesting to compare the two sites.

My encouragement is this: The dire times for public schools can be huge opportunities for amateur radio clubs. Club members can be volunteers. Club sites can be locations for after-school programs. Your club's involvement is only limited by your imagination. Incidentally, the ARRL has lots of resources for amateur radio in the classroom. For more information, see: http://www.arrl.org/amateur-radio-in-the-classroom>.

Our involvement with Hamilton began through an established education partner program. Even though there may not be a program in your area, I am sure that your local school officials will be appreciative of your offer of assistance.

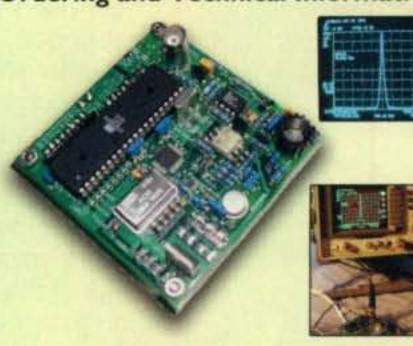
This month I expect to be at the Huntsville Hamfest. I hope to see you there. If you have a story to tell related to the wonderful world of VHF-Plus, please look me up at the hamfest or e-mail me at: <n6cl@sbcglobal.net>.

Until next month . . .

73 de Joe, N6CL

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Publicizing Your Awards

he rules, design, and fee for your brand-new award have been developed and approved. Your work is just beginning, however, because nobody knows it exists. You have to catch the attention of people who are interested in earning your award and displaying the certificate of achievment. Publicity, or advertising your "product," is the key to your success. Here are some hints that may help you:

 Use the club/group website. Dedicate at least one separate page showing the rules and a goodsize image of the award certificate.

Club/group QSLs. Add a brief description/ image on groups' cards. At least encourage participation by adding the words "Good For The XXXXX Award."

- Send rules and a sample certificate to those with award-oriented websites: K1BV, SM6DEC, QRZ.RU, etc.
- Tie-in with State QSO Parties and other appropriate contests.
 - Notify your ARRL Section Manager.
- Tell online DX newsletters such as QRZ.DX, the Ohio/Penn DX Bulletin, and 425 DX.
- Notify the Yahoo Group, Ham Radio Awards Reflector.
- Provide labels/stickers with award rules to the club or group's members for their outgoing QSLs.

If you follow all of these steps, you may get a brief flurry of activity, followed by one or two applications a month; if you are lucky. However, it's often said that you make your own luck, and continual promotion plays a big part of that luck. The principal benefit is the publicity you bring to the event or activity and the challenge you offer to your fellow amateurs. Consider the awards that follow in this column, and in each month's column. Look at the value of the publicity they bring to their group or locality.

Germany: DARC 60th Anniversary Diploma

It took five years to recover after the end of WW II, but the German Amateur Radio Club (DARC) was re-established in 1950 and now celebrates 60 years of service to German amateurs. The requirements of the 60th Anniversary Diploma are challenging, although German amateurs are numerous and quite active.

This short-term award is available to all amateurs and SWLs for contacting stations as noted below from January 1, 2010 to July 24, 2011. Applications will be processed up to December 31, 2011.

USA-CA Honor Roll

500

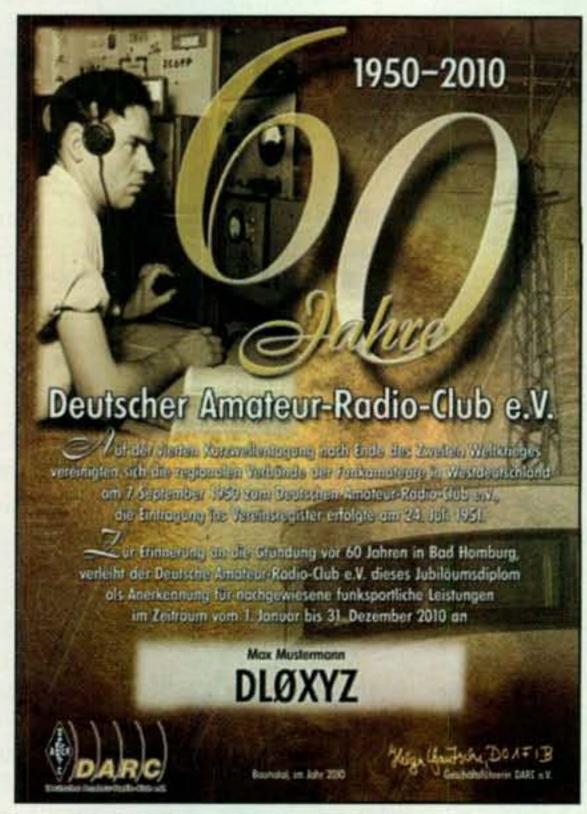
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The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is \$6.00. For nonsubscribers it is \$12.00. To qualify for the special subscriber rate, please send a recent CQ mailing 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.

Earn a total of 60 points for this award by working the following:

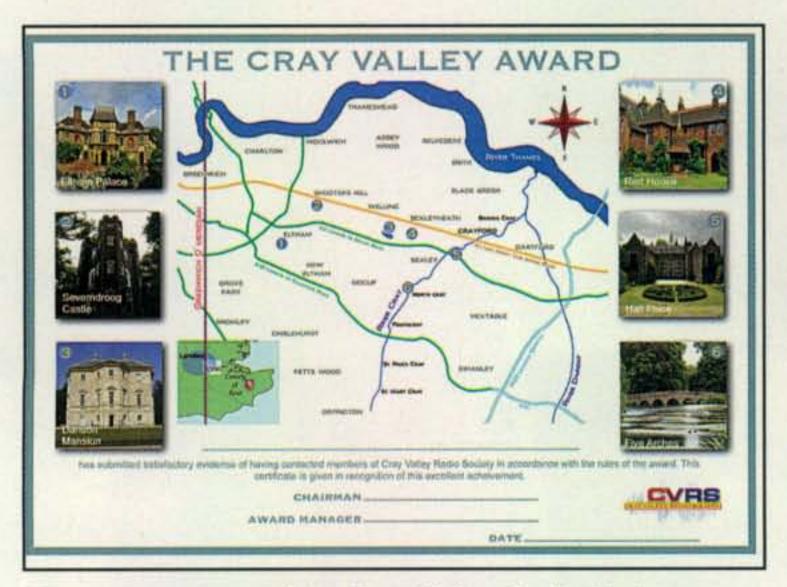
- a. 1 point for a contact with a club station of each of the 24 DARC districts.
- b. 1 point for a contact with an OM, or 2 points for a contact with a YL of each of the 24 districts. A missing station in a district may be substituted by "joker," 1 point, by working the district chairman (e.g., special DOK "DVA") or directors ("DARCVO").
- c. 2 points for contacts with tDARC-specific stations DAØRC, DBØHQ, DFØAFZ, DLØDL, and DAØHQ.
 - d. 3 points for DL6ØDARC.

The application should be sent with a log extract and the fee of 10 Euros to: Martin Koehler, DL1DCT,



The DARC 60th Anniversary Diploma, a short-term award, is available to all amateurs and SWLs for contacting stations as noted in the text from January 1, 2010 to July 24, 2011.

^{*12} Wells Woods Rd., Columbia, CT 06237 e-mail: <k1bv@cq-amateur-radio.com>



Contact members of the Cray Valley Radio Society on or after January 1, 2000 to earn this award from England.

Wideystr. 1b, 59174 Kamen-Heeren, Germany. Internet: http://www.darc.de/referate/dx/diplome/darc-60/darc-60-award/.

England: Cray Valley Award

This award is issued by a club that provides both a small-scale and a large-scale map to depict its unique location, which lies astride the Greenwich Meridian and the Thames River, not too far from London. Once you have a good idea of the location, you can view the six small images of the castles and mansions, now mostly owned by the National Trust, which are found nearby.

Contact members of the Cray Valley Radio Society on or after January 1, 2000. All QSOs must be made from the same country. All bands and modes. Endorsements for all one band or mode. No use of internet links or repeaters allowed. SWL OK.

Each contact with a member = 1 point. Special stations G3RCV, GX3RCV, G1RCV, GX1RCV, M8C, or a special event station operated by the Cray Valley society = 3 points.

Point requirements and fees for each of the five classes of the award are as follows:

	Basic	Bronze	Silver	Gold	Diamond
G Stations	20	45	60	75	100
EU Stations inc.					
GD, GI, GM, etc.	. 10	30	40	50	60
All others	5	15	20	25	30
Max. of 3					
point QSOs	1	3	4	5	6

Award fee:

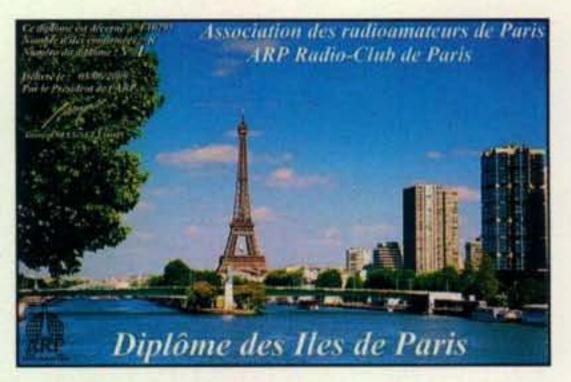
Basic Award: £5, 8 Euros, \$US10, or 12 IRCs Other Levels: £1, 2 Euros, \$US2, or 3 IRCs

The award is free to registered blind or disabled persons. To apply, send GCR list and fee as noted above to: Cray Valley Award Manager, 93 Elibank Road, Eltham, London SE9 1QJ, England. Internet (member list is on the website): http://www.cvrs.org. E-mail: <a wardmanager@cvrs.org>

France: Association of the Radio Amateurs of Paris Series

The following award is just one of a series offered by the

The Diplôme
des Iles de
Paris DIP. is
just one of the
awards
offered by the
Association of
the Radio
Amateurs of
Paris.



Association of the Radio Amateurs of Paris (ARP). All of the awards require contacts with location specific monuments, grid locators, quarters, communes, arrondissements, and other somewhat obscure (to us) political subdivisions used in this most famous and beautiful city. The award listed below may be the easiest to earn, although it will require waiting for a mobile or portable operation from a station located on one of the little fresh-water islands on the designated Parisian rivers. Check with the various DX bulletins, especially during the summer months.

General Requirements: All bands and modes OK. No date limitations. SWL OK. Contacts with mobile stations (for the other awards) or via relay, a repeater, or a transponder are not valid. A contact with the "joker" station F6KVP or F6KVP/p or any other station operating for the Association des Radioamateurs de Paris counts once per band.

Cost of each award delivered by e-mail is 5 Euros, and 10 Euros by regular mail (paper). Apply to: Diplômes de l'ARP, Jean Pierre Dutheil, 138 rue du Faubourg Saint Antoine, F-75012 Paris, France.

Diplôme des Iles de Paris DIP. Contact two stations on islands in the Seine, Bois de Boulogne, and Vincennes Rivers. DIP #1 is issued for all the islands of Paris.

Japan: Worked All Okayama Wards Award

The term "ward" refers to the smallest unit of governmental subdivision found in Japan. Basically, wards are local governmental entities involved with health and property taxes. The title of the award is somewhat misleading, since the award requirement only calls for contacts in Okayama City. Look in your JA4, JG4, JH4 card collection. This is a hand-some award that is not terribly difficult to attain and also will attract attention hanging on your wall.





Contact four stations in Okayama City plus one Japan Awards Group (JAG) member to earn the Worked All Okayama Wards Award.

Contact four stations in Okayama City plus one Japan Awards Group (JAG) member on or after April 1, 2009. If the JAG member contact is one of the four in Okayama City, the fifth contact is not necessary. Send the completed application form, which can be found on the website, plus the fee of 2 IRCs or \$US2 to: Ms. Kurosaki Yuriko, JR4IKP, 12-6, Handa-cho, Kita-ku Okayama City, 700-0003 Japan. Internet: http://oag.rakurakuhp.net/i_541445.htm

We're always interested in hearing from clubs, special interest groups, and individuals who sponsor an award. Please contact me at the e-mail address shown on the first page of this column.

73, Ted, K1BV

Duane A. Puro, K8AO USA-CA All Counties #1197, March 27, 2010

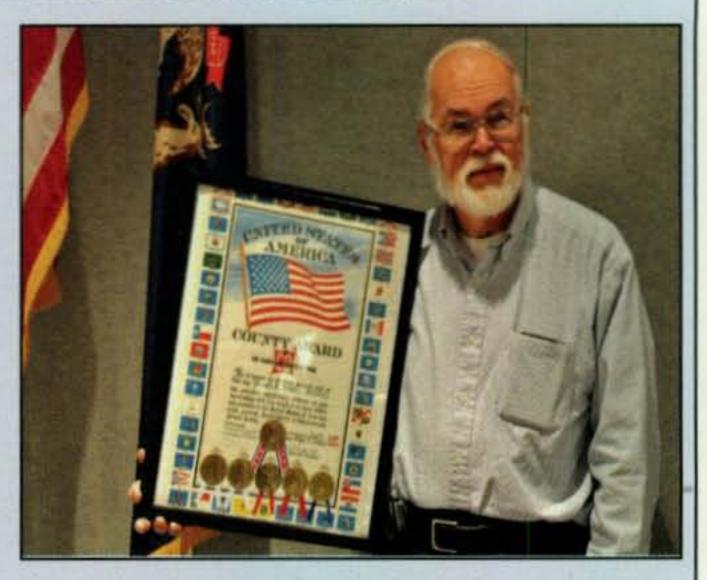
I was first licensed as a Novice in 1961 while in high school. Four of my best friends in school were also licensed. I was bitten by the contest bug early on. I participated in the Novice Roundup and several Sweepstakes. Also, hunting DX was a primary activity. County hunting was a natural extension of DX for me, always searching for that "new" one, either country or county.

I discovered county hunting while tuning around the 80-meter phone band. Back then there was an active 80-meter county hunting net.

I started consciously collecting county confirmations in 1976 just after starting my career with the federal government. By 1979 I had achieved the 500 county level, but with family and work I did not really get serious about county hunting until I retired during the summer of 2006. It took me 34 years to achieve USA-CA #1197, but I did it.

I went mobile for the first time in 1987. Having no idea what 100 watts in a mobile rig could do, I was shocked when my first contact on the net was with Eddie, G4KHG, from his home in England. My next contact was with Hollis, KC3X. There have been thousands since then.

My biggest challenge in county hunting was becoming comfortable with the CW mode. I had thought I would work them all on SSB, but it was taking so long I bit the bullet and jumped in on CW. Five percent of the 3077 counties were on CW. I may even try CW from the mobile someday. The next challenge was working the "close in" counties. It seems like few mobiles carry 80-meter resonators, which are needed for those close-in



Duane A. Puro, K8AO, USA-CA All Counties #1197.

counties. I worked most of the close ones during contests.

Finishing all counties would not have been possible without the mobiles. Eighty percent of my confirmations were from mobiles. I want to also thank the net controls for all the hours they devote to helping us all achieve our goals.

I have attended three National Conventions of the Mobile Amateur Radio Awards Club (MARAC) and several of the Michigan Mini-conventions. It really makes a difference being able to put a face with a call. Friendships are made and strengthened at the conventions. I encourage everyone to attend one at some point.

I would like to thank the mobiles who gave me my last two counties. Jack, N7ID, went the extra mile for my second to last in Camas, Idaho, in the winter no less. The last county for the "whole ball of wax" was Manistee, Michigan put out by the mobile team of W8TVT and K8ZZ. The last county came via Joe, W8TVT. Thank you all very much!

—73, Duane, K8AO

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A DXer's Success Story

didn't. We got a blast of solar wind and a lot of aurora lights. However, we're still waiting for the rise in solar activity that would give us those wall-to-wall signals on 12 and 10 meters. Hmmm, for those with 6-meter capability, there has been a lot of activity on that band, including some U.S. to EU reports.

Those in the northern areas are now enjoying warm weather after a pretty cold winter season, so it's not all bad news. With not much on the radio, I personally have been enjoying going out to watch my two grandsons play baseball; one is four and the other is seven. Ah, youth and all that energy.

Defying the Odds

While I'm on the subject of solar activity, or the lack thereof, I want to mention a guy who has defied the "sun" and its erratic behavior over the last two years.

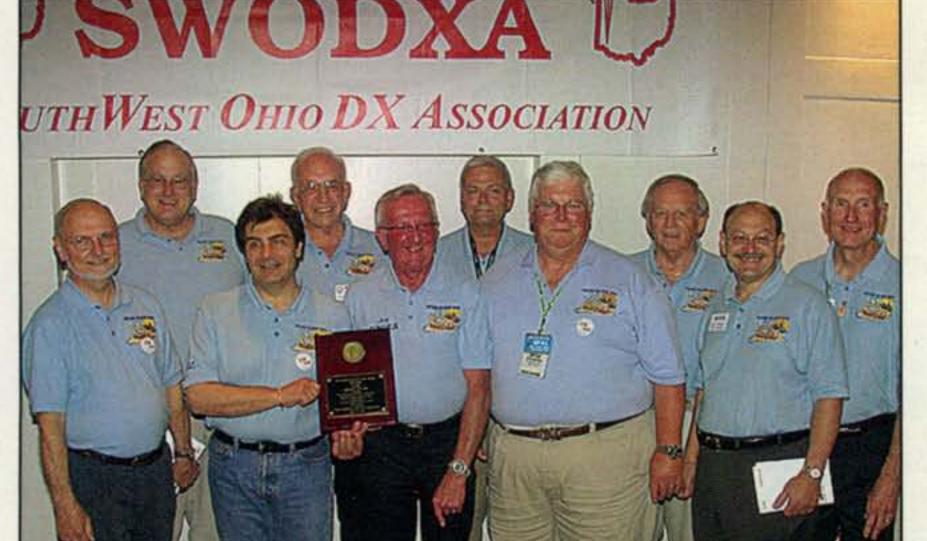
Dave Wade, W5DAW, of Saucier, Mississippi was licensed as a General Class licensee with the callsign KE5VAH on June 11, 2008. He says, "No contacts were made with that callsign." On July 12, 2008, he received a change of callsign to W5DAW, and on August 15, 2008 he passed the Extra exam. His first contact was with VE6AO on September 11, 2008. Since then he has added 2888 entries to his

*P.O. Box DX, Leicester, NC 28748-0249 e-mail: <n4aa@cq-amateur-radio.com> log. He has confirmed 789 of those using LoTW (Logbook of The World) and 330 with eQSL. The interesting part of this story follows:

To date Dave has worked 202 entities on SSB and 167 on CW for an overall total of 230 individual entities. To date he has confirmed 158 on SSB and 64 on CW for a total of 172 entities. He has worked and confirmed all 50 states on SSB, and has worked 45 on CW with 35 of those confirmed. For WAZ, he has 38 confirmed on SSB and 37 on CW. For 5 Band WAZ (Worked All Zones), he has 140 worked. Floyd Gerald, N5FG, the WAZ Award Manager, issued Dave his WAZ Mixed Award on May 12, 2010. That's less than two years after his first contact on the air! For WPX his log shows 963 worked with over 300 confirmed. He has WAC (Worked All Continents) on SSB, CW, and 5 bands Mixed. He lacks one band in Asia to get a 6-band endorsement.

Considering all of the above, you might expect Dave to have a *major* station setup. Well, friends, read on. Dave tells me, "All contacts except for three or four have been made from *my* QTH using a Hustler 6BTV vertical with a 17-meter trap added later. The WAS, WAC, and DXCC numbers were made with 100 watts without a logging program or spots from a DX cluster. I didn't know about DX clusters back then. I didn't get a 2-meter radio until I had 98 countries."

Now we have to give credit where credit is due. Dave learned the code from a CW class that Randy, W5UE, taught. Dave says, "Without CW I would not be nearly as far up the ladder as I am."



SWODXA DX Dinner award for the DXpedition of the Year went to members of K4M Team. (Photo courtesy of David Bower, K4PZT)

DX Activity

We do have some DX activity going on, and we hope those involved have good luck with their attempts to bring many of us a new one.

E4X is up and running from Palestine as of this writing in early June, and we'll have a report on how that went for them next time.

Pierre, **ZS1HF/ZS8M**, is making some noise from Marion Island and that will make a lot of folks happy. Remember he will be there until April of next year. At least he is reported on several bands, and that will help many fill in the Marion Island block on their band charts.

From the rumors I'm hearing about the Netherlands Antilles group of islands, they are going to be overflowing with DXpeditioners in the month of October. As far as I know, at least five different groups are staking their claim to one or more of the islands, which are expected to become new ones on October 10, 2010.

While the "t's" still have to be crossed and the "i's" still have to be dotted on the famous "dotted

The WPX Program

CW
3249.....V51YJ

SSB
3076....V51YJ

Mixed
2112....V51YJ 2114....OK2JOW
2113....N7QU 2115....G4FKA

CW: 350 V51YJ. 2350 VE6BF. 4550 N4NO. 5850 WA2HZR. SSB: 550 V51YJ. 950 VE6BF. 3750 N4NO.

Mixed: 650 WT6X. 700 N7QU. 750 G4FKA, V51YJ. 850 OK2JOW. 1400 K7UA. 2500 VE6BF. 5100 N4NO. Digital: 6600 WT6X.

80 Meters: OK2JOW 40 Meters: OK2JOW 20 Meters: V51YJ

Asia: OK2JOW Europe: OK2JOW

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS 18YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, N3XX, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, NN1N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ. HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ, S55SL, RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR. W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU HIBLC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH N6JV, ONL-4003, W5AWT, N3XX, F6BVB, YU7SF, DF1SD K7CU, I1POR, K9LJN, YBØTK, K9QFR, W4UW, NXØI, WB4RUA I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, NN1N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS N4GG, UA4RZ, 7K3QPL, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UR5FEO N3RC, UT3IZ RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage for airmail) to "CQ WPX Awards," P.O. Box 355, New Carlisle, OH 45344 USA. Note: WPX will now accept prefixes/calls which have been confirmed by eQSL.cc. Other electronic QSL confirmation means are not accepted.

*Please Note: The price of the 160, 30, 17, 12, 6, and Digital bars for the Award of Excellence are \$6.50 each.

5 Band WAZ

As of June 1, 2010, 821 stations have attained the 200 zone level and 1687 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

GØDQS EA3ATM UA3AIO AA6G

The top contenders for 5 Band WAZ (zones needed, 80 or 40 meters):

N4WW, 199 (26) W4LI, 199 (26) K7UR, 199 (34) IK8BQE, 199 (31) JA2IVK, 199 (34 on 40) IK1AOD, 199 (1) VO1FB, 199 (19) KZ4V, 199 (26) W6DN, 199 (17) W3NO, 199 (26) RU3FM, 199 (1) N3UN, 199 (18) W1JZ, 199 (24) W1FZ, 199 (26) SM7BIP, 199 (31) N4NX, 199 (26) N4MM, 199 (26) EA7GF, 199 (1) N6HR/7, 199 (37) JA5IU, 199 (2) RU3DX, 199 (6) N4XR, 199 (27) HA5AGS, 199 (1) VE3XN, 199 (26) N5AW, 199 (17) JH7CFX, 199 (2) K7LJ, 199 (37) RA6AX, 199 (6 on 10m) RX4HZ, 199 (13) KØGM, 199 (17)

KQØB, 199 (2 on 10) K9OW, 199 (34 on 10) G3NKC, 199 (31 on 10) IN3ZNR, 199 (1) EA5BCX, 198 (27, 39) G3KDB, 198 (1, 12) JA1DM, 198 (2, 40) 9A5I, 198 (1, 16) 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) F5NBU, 198 (19, 31) OE2LCM, 198 (1, 31) W9XY, 198 (22, 26) KZ2I, 198 (24, 26) W7VJ, 198 (34, 37) W9RN, 198 (26, 19 on 40) W5CWQ, 198 (17, 18) I5KKW, 198 (31&23 on 20) IV3MUC, 198 (1&31 on 40) UA4LY, 198 (6&2 on 10) IK4CIE, 198 (1, 31) JA7XBG, 198 (2 on 80&10) K8PT, 198 (18, 26) HB9ALO, 198 (1, 31)

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

JA3GN (159 zones)

S58Q, 199 (31)

G3NKC (199 zones)

5 Band WAZ updates:

K2FF (196 zones) GM3YOR (200 zones) K2IXQ (170 zones) KØKG (200 zones)

*Please note: Cost of the 5 Band WAZ Plaque is \$100 shipped within the U.S.; \$120 all foreign (sent airmail).

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, P.O. Box 449, Wiggins, MS 39577-0449. 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>.







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lines," we can look forward to the pileups that will add at least two new ones to the DXCC list. I'm not going to get into the details of which island is going to be counted for what. I'm sure we will have a full accounting of all that in due time and in plenty of time for everyone to get ready for the onslaught. Gosh, that DXCC List is getting "heavy," as it appears that with two new ones it will have the total up to 340.

Dayton Recap from the DX Side

Oh, yes, the Dayton Hamvention® has come and gone yet again. Although I

could not make it this year, a lot of my friends did and I have a few photos from them this time.

One very close friend, Lynn Lamb, W4NL, was inducted into the CQ DX Hall of Fame, and I congratulate him on reaching that level of recognition. He really is a good guy.

I also would be very remiss if I didn't mention the other person inducted into the DX Hall of Fame this year, Bob Locher, W9KNI. Bob is well known in DX circles. He has written some books on the subject, he has spoken all over the country, and he is noted for selling a bunch of ham-related products, too. As a matter of fact, Bob took a look at the DX awards available these days and, according to the preface in his latest book (A Year of DX), "suggested to Dick Ross, K2MGA, the publisher of CQ Magazine, a new operating award—an annual contest to work as many CQ zones and CQ entities as possible." Bob Locher is not a man to be taken lightly. Again quoting from his new book, "I

The WAZ Program 80 Meter SSB 95KF2O 20 Meter CW 596.....RZØAF 597.....VE2TZT 160 Meters 350VE2TZT (34 zones) **All Band WAZ Diamond Jubilee** DK3GG 045.....W8DO 047 046K9WA Mixed 8694N6ML 8703F6DKQ 8704UA3AIO 8695HB9SLO 8696DS4DRT 8705RA2FF 870614MKN 8697.....KF6A 8707IZ8JAI 8698.....W5DAW 8708AL7TC 8699N7JXS 8709.....7N4UOJ 8700 KN6TC 8701K5HGX 8710 K8ESQ 8702SP2DTO SSB 5131IK1MDF 5132.....HB9/K5WDW 5135.....K6EGF 5133N3SMT 593AB1J 594GM4KGK 596.....WA9PIE 207KF2O Rules and applications for the WAZ program may be ob-

tained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449.

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

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CQ DX Awards Program SSB

2551......IV3GOW 2552.....W9GD

CW

1107......AB1J 1108......YT1VN

SSB Endorsements

330K4CN/339	310W5GT/308
330HB9DDZ/337	300AD7J/300
320W9GD/329	275WA5UA/278
310IV3GOW/316	3.5/7 MHzK8ZEE

CW Endorsements

330K4CN/338	330W1FK/331
330HB9DDZ/336	250YT1VM/263

RTTY Endorsements

330.....OK1MP/330 310.....K4CN/31

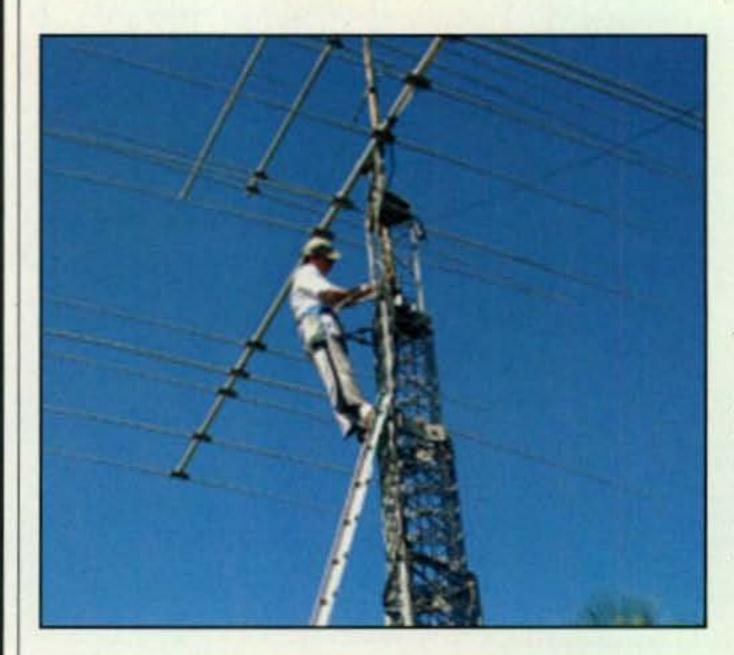
The basic award fee for subscribers to CQ is \$6. For nonsubscribers, it is \$12. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00 each plus SASE. Updates not involving the issuance of a sticker are 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 339 active countries. Please make all checks payable to the award manager. Photocopies of documentation issued by recognized national Amateur Radio associations that sponsor international awards may be acceptable for CQ DX award credit in lieu of having QSL cards checked. Documentation must list (itemize) countries that have been credited to an applicant. Screen printouts from eQSL.cc that list countries confirmed through their system are also acceptable. Screen printouts listing countries credited to an applicant through an electronic logging system offered by a national Amateur Radio organization also may be acceptable. Contact the CQ DX Award Manager for specific details.



CQ DX Hall of Fame inductees for 2010 (left to right): Lynn Lamb, W4NL, and Bob Locher, W9KNI. (Photo courtesy of David Bower, K4PZT)



Dave Anderson, K4SV, the after-dinner speaker for the Dayton DX Dinner. Dave has participated in a number of major DXpeditions—A5, 3YØ, etc. (Photo courtesy of David Bower, K4PZT)



"Wild Bill" N2WB was on his way to Iraq as part of the YI9PSE DXpedition. Enroute he stopped off to help a fellow DXer, Don, W2ZI, repair a rotor. (Photo courtesy of Don, W2ZI)

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CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 339 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is \$1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CIM

CW								
NØFW338	K4MQG338	K9BWQ337	K9OW337	K2JLA334	W4UW332	F6HMJ328	WA4DOU316	W2JLK277
WB4UBD338	W8XD338	N4MM337	K20WE336	F3AT334	KBSIX331	YU7FW328	YO9HP316	K4EQ277
K3UA338	K2TQC338	W7OM337	K8LJG336	PA5PQ334	W7IIT331	WG5G/QRPp322	ON4CAS314	WA2VQV275
K9MM338	N7RO338	W7CNL337	K9IW336	NC9T334	K1FK331	IKØTUG321	WD9DZV312	
W40EL338	F3TH338	WØJLC337	W4MPY336	G4BWP334	N7WO330	W9IL321	KØKG310	
EA2IA338	DL3DXX338	VE3XN337	K5UO336	W1JR334	W6OUL329	OZ5UR320	KT2C304	
OK1MP338	WK3N338	K4JLD337	K7LAY336	I4LCK334	KE3A329	CT1YH320	N2LM297	
N7FU338	N5FG338	N5ZM337	N6AW336	G3KMQ334	K6CU329	W9IL319	HA5LQ287	
N4JF338	YU1AB338	N4AH337	KA7T336	K6LEB333	W1DF329	EA3ALV319	N2VW283	
K4IQJ338	K4CN338	N4CH337	K3JGJ336	K5RT332	KA3S328	RA1AOB317	XE1MD280	
K2FL338	UAØMF338	PY2YP337	HB9DDZ336	JA7XBG332	IKØADY328	W6YQ316	4Z5SG279	
				CCD				
				SSB				
K4JLD339	K4MQG339	N5FG339	AA4S338	W4UW337	K5RT334	KD5ZD326	RA1AOB312	AD7J300
EA2IA339	N4MM339	YU1AB339	PY2YP338	K1UO337	WA4WTG334	W1DF326	N2LM312	W4EJG295
XE1AE339	K9MM339	K4CN339	K9OW338	HB9DDZ337	ZL1BOQ334	PY2DBU325	G3KMQ312	W9ACE294
IN3DEI339	OZ5EV339	UAØMF339	VE3MR338	K8SIX336	W9IL334	KE4SCY325	KD2GC311	AE9DX294
NØFW339	VE2PJ339	K5TVC338	VE3MRS338	KE3A336	VE4ACY333	W4MPY325	RW9SG310	W6MAC292
DU9RG339	K3JGJ339	KZ2P338	XE1L337	K9IW336	K9PP333	K6GFJ324	IØYKN310	W5PVE288
K3UA339	N5ZM339	W6BCQ338	OE3WWB337	N2VW336	YV1KZ333	TI8II324	KU4BP310	HB9DQD285
K6YRA339	N7RO339	W6EUF338	N6AW337	W2CC336	F6HMJ333	YO9HP324	XE1MW309	VE7HAM285
IK1GPG339	KE5K339	W7OM338	IK8CNT337	N7WR336	YV1AJ332	KW3W324	AA1VX308	N8LIQ284
DJ9ZB339	IØZV339	K9BWQ338	EA4DO337	JA7XBG336	VE4ROY332	W6OUL322	W5GT308	N3RC280
N7BK339	OE2EGL339	W8AXI338	CT3BM337	K3LC336	YV1JV331	XE1RBV321	4Z5FL/M306	WA5UA278
4Z4DX339	W4ABW339	W9SS338	K8LJG337	PA5PQ335	K7HG331	XE2NLD321	K7SAM305	HS0/EA4BKA276
WB4UBD339	DL3DXX339	VK4LC338	W3AZD337	XE1VIC335	N5YY331	WØROB321	13ZSX304	K9DXR275
OZ3SK339	IBKCI339	K7LAY338	KØKG337	NC9T335	N1ALR330	VE7SMP320	JR4NUN303	
OK1MP339	VE1YX339	WS9V338	W2FKF337	CT1EEB335	W9GD329	ON4CAS319	W4PGC302	
K2TQC339	The second secon	All distances and beauty	W7FP337	W1JR335	K4DXA328	LU3HBO317	EA8AYV302	
K4MZU339	EA3BMT339	VE3XN338	YU3AA337	14LCK335	SV3AQR328	N8SHZ316	4X6DK301	
N4JF339		A STATE OF THE STA	W7BJN337	ZL1HY335	VE7EDZ328	IV3GOW316	WD9DZV301	
W4WX339	K4IQJ339	K2FL338	AB4IQ337	K5UO335	XE1MD327	W6NW314	K7ZM300	
K5OVC339	WK3N339	VE2GHZ338	W4UNP337	WØYDB334	YV4VN326	KA1LMR312	XE1MEX300	
				RTTY				
WIDALIED DOT	NECO OOF	MONTH COOK	TIAMET COO	- Comment	VOCIV COO			
WB4UBD337				K4CN316	K8SIX300			
NI4H336	N5ZM333	OK1MP330	G4BWP320	PA5PQ311				

score of 321 points for 2009 was a total of 281 countries and 40 zones. For a bird's-eye view of his location in Oregon, check page 28 of the June 2010 issue of CQ. A Year of DX is available on Bob's website: http://www.idiompress.com/yearofdx.php. If you don't already have a copy of his other great book, The Complete DXer, it is still available, too.

DX Conventions

Several more DX conventions are coming up this year: the W9-DXCC, September 10–11 at the Elk Grove Holiday Inn in Chicago, followed by the SEDCO sponsored W4-DXCC in Pigeon Forge, Tennessee September 25.

The W4-DXCC convention is now ARRL sanctioned and will have some expanded features. As it has been for the past five years, The MainStay Suites in Pigeon Forge will be the site for all convention activities, including a catered buffet dinner on Saturday evening. You can call anytime for suite reservations and say "SEDCO" for the convention rate. There now is also an RV park right across the

street from the main building! The MainStay's phone number is: 865-428-8350. For the convention and dinner, call Rosie Lamb, KA4S, at 865-681-2279. She will take reservations for both the event (\$25 each) and dinner (\$25 each).

These are two great events that draw a large number of folks, not only from their "local" areas, but also from far away places, too. If you can't make it to both, try to make it to at least one. You won't regret it. I've been a regular at both and can assure you that they are fun and educational events.

For more information about these events, see the W9-DXCC website: http://www.w9dxcc.com/ and for SEDCO-W4DXCC: http://sedco.homestead.com/.

Until next time, enjoy the chase, andplease do Have Fun!

73, Carl, N4AA

QSL Information

A71A via A71AN A71AA via DJ9ZB A71AD via A71AN A71AM via DJ9ZB A71AU via DJ9ZB A71AW via W3HNK A71BR via A71AN A71BU via NI5DX A71CO via EA7FTR A71CV via A71AN A71CW via A71AN A71EL via A71AN A71EQ via A71AN A71QND via A71CO A92GH via IZ8CLM A92GQ via NI5DX

AA4VK/CYØ via AA4VK AD5YS via G3SWH AHØ/AH2Y via HL1IWD AHØBT via 7L1FPU AHØJ via JA1NVF AHØS/KH2 via JH1DVG AH2R via JH7QXJ AH6HY/PJ5 via AH6HY AH900 via DJ9ZB AI5P/VK9N via AI5P AL5A/WHØ via JA7JEC AL7DB via NI5DX AL7R via K9IT AM1HQ via EA4URE AM1LE via EA4URE AM1M via EA1DR

AM1VIG via EA1RKV
AM2HQ via EA4URE
AM3GI via EA4URE
AM3HQ via EA4URE
AM3SSB via EA3JW
AM4BA via EA4URE
AM4HQ via EA4URE
AM4HQ via EA4URE

(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>; <http://golist.net/>.)

Practical Methods to Develop Better CW Skills

August's Contest Tip

Taking the lead from this month's topic of improving CW skills, consider using the summer contest season as a training ground for CW operating. There are many fantastic operating events including the Worked All Europe, NAQP, IOTA, and others that will be a great help in building improved skills for the prime-time fall/winter contest events! The saying goes, "practice makes perfect," and a 5-wpm increase in CW skill will make a bigger difference in your future scores than any large Yagi or new transceiver. Give it a try!

ast month we focused on improving SSB operating skills, so it only seems right to continue the discussion by taking a look at CW this time. Over the years, my experience has taught me that there are a few basic truths in ham radio, one of them being that some operators excel at CW operating and others need quite a bit of work to succeed. There are many, many theories about why this is the case. Many feel that it's "just in your genes." Others believe that competence simply reflects one's operating preference. Additional theories include ideas such as inherent musical ability, age at which Morse code is first learned, motivation, equipment, and so on.

In my case, CW always came easily to me. Like many of my contesting peers, I entered the ranks of ham radio at a relatively young age-13 years old. Unlike the training tools of today, I had to learn the code the old-fashioned way. Maybe you remember that old, red-covered ARRL Morse code training book? I lived on Long Island at the time and was in relatively close proximity to the ARRL's W1AW transmitting station. It was ideal for copying the Morse code practice sessions. I had further challenges to my learning environment in that the shortwave receiver I was using did not have a BFO. Imagine the demands of copying CW as pulsating bursts of "white noise" through a 3-inch speaker! I'm convinced that these early trials were the precursor to the contesting spirit I have today.

Today there is still serious debate in our hobby about the merits of Morse code, especially from a license requirement standpoint. While CW has disappeared as a required licensing criterion in the U.S. and elsewhere, it will always exist as a form of communication used by hams. As you might expect, too, this particularly will be the case with contesters. Can you imagine only one CQ WW each year? What would we do on Thanksgiving weekends?

Well, enough of the history lesson. Many years ago, I had the pleasure of reading a practical commentary on improving your Morse code skills originally authored by Jim Reid, AH6NB (now W6KPI). While there are probably scores of other ideas you can think of for improving your CW, Jim captured

July 17-18 North American RTTY QSO Party July 24-25 **RSGB IOTA Contest** Aug. 1 SARL HF Phone Contest Aug. 7 European HF Championship Aug. 7-8 ARRL UHF Contest North American CW QSO Party Aug. 7-8 Aug. 14-15 Worked All Europe CW Contest Maryland-DC QSO Party Aug. 14-15 SARTG RTTY Contest Aug. 21-22 Aug. 21-22 North American SSB QSO Party Aug. 21-23 New Jersey QSO Party Aug. 28-29 YO DX Contest Aug. 28-29 SCC RTTY Championship Aug. 28-29 Ohio QSO Party Aug. 29 SARL HF CW Contest Sept. 4-5 All Asian SSB Contest Sept. 11-12 Worked All Europe SSB Contest

Calendar of Events

CQ WW VHF Contest

CQ DX Marathon

All year

July 17-18

Sept. 25-26

the essence of the issue better than anything I've read since. What follows is his commentary:

CQ WW RTTY DX Contest

Improving your CW Contesting Skills by Jim Reid, W6KPI

You can become a high-speed CW operator! How? Practice. What kind of practice? Read on, only if you really want to become a good QRQ CW operator—that is, one who is comfortable working DX at 30 to 40 words per minute and wants to try to compete in contests with the ops who whistle along at 40 to 50 wpm, and sometimes even faster. What is the best, most efficient way to achieve these sorts of operating speeds? How best should you use your available practice time?

To begin, let's assume your skill level is at least 13 wpm. With that in mind, here are some practical tips for improving CW skills and how much to practice:

1. Experience on the Air—Making QSOs

Lots of CW operating outside of contests works wonders and is the best place to start. Put the microphone away for several weeks and eliminate SSB, SSTV, digital modes from your mind for the same time period. This is to be a time of pure CW skills improvement.

2. QRQ Receiving Practice

While waiting to acquire and set up some of the practice programs (more on that later), start your adventure by engaging in on-the-air receiving practice. Find QSOs in progress at a speed you can comfortably copy with a pencil/pen. Now put the pen/pencil down and just start listening. Yes, try to recognize the letters as they come along, and group them into words on your mind's "blackboard." Not easy to do, but well worth trying anyway. It is going to take some time, maybe even three or four weeks, before you can follow these high-speed QSOs in your head without writing everything

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down! Jot down the call, the op's name, QTH, and report while just listening to the rest.

While doing this, if you can find a willing friend, there is a way to augment this sort of practice completely apart from normal CW operating. Ask a friend/spouse to spell words from a story or newspaper article to you! Their assignment is to read the story to you, but not the word sounds, only by spelling the words to you. In essence, this is what is going on when one is "reading CW in his/her head"; words are being spelled to you, and you must form these spelled words into meaningful thoughts. Start at one letter/word space every second as sounded by your helper. Have a letter spoken every tick of the clock. This is a speed of 12 wpm (at the Paris standard, of 100 letters/ word spaces per minute equaling 20 wpm CW speed). Tune in WWV to get exact beats every second.

When you have no trouble forming the thoughts of the story/article in your mind as the words are spelled to you at this rather slow pace, then ask your friend to double the rhythm—that is, two letters/word spaces per second spoken two per tick. This, of course, doubles your word reading rate to 24 wpm. A big jump for CW, but not for learning to read words spelled out to you in clear, plain English! When you know the story comfortably at this rate, your actual "in the head" CW reading speed should be close behind, and you may well be on your way to QRQ operation.

When using high-speed CW, you'll be receiving letters/word spaces at 3 per second at a 36-wpm CW rate or greater. Maybe your friend can get the rhythm going at 3 letters/spaces per clock tick, and you will know exactly what 36-wpm CW sounds like. This is a typical QRQ DX and contest operation speed. Of course, using a musician's metronome would allow you to exactly set the number of beats per minute, 20 wpm being 100 beats, 36, 180 per minute, 50 wpm, 250 letters/spaces, and so on. My mechanical metronome has a highest beat rate of 208 per minute, or a bit over 41 wpm.

Computer-generated CW such as that from the RUFZ program produces top scores that originate from over 450 letters/numbers/spaces per minute! Of course, only callsigns are being sent, and these guys already know all the prefix CW sounds!

Computer-aided CW training programs are also available. They will send code groups, random words, text, and typical QSOs. They are advertised,

nearly monthly, in the ham magazines. Morse Academy and Codemaster V are two good examples of these products. Their "canned" CW doesn't last long at high speeds, but is very helpful for "in-the-head" CW reading practice. Using Codemaster V, for example, you can also input via the keyboard, or text (.txt) file input, kilobytes of text for very long high-speed CW listening practice runs. I have taken lots of long text files directly from various internet sites and copied them directly into a text file for this sort of high-speed practice. In my

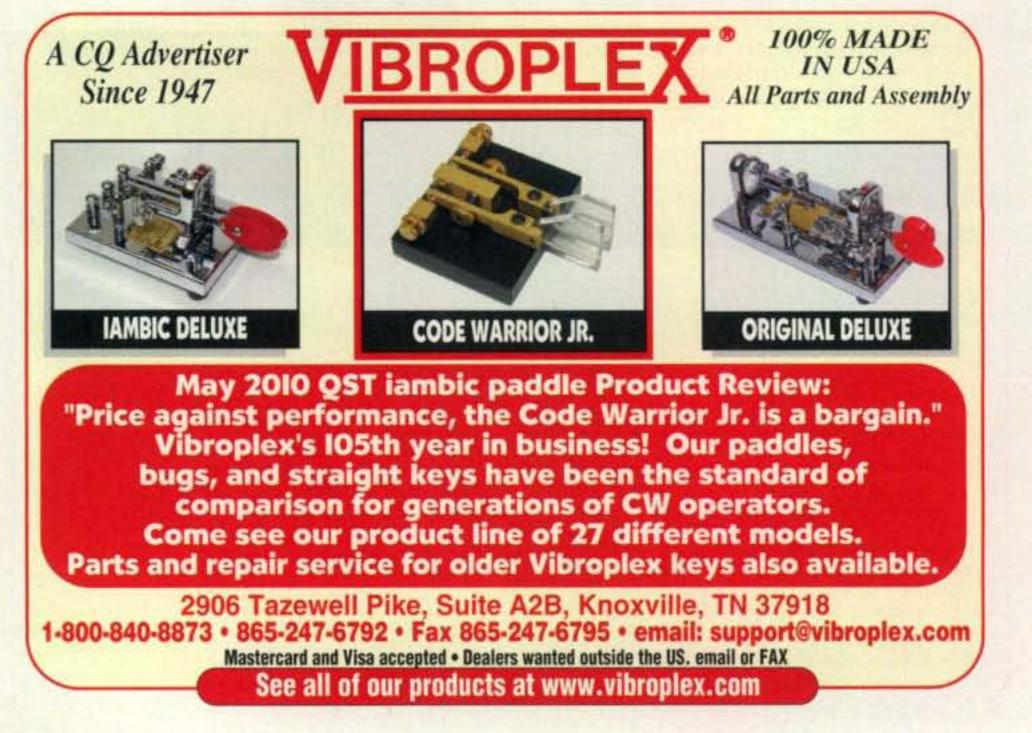
case, I remove unusual punctuation marks from the text.

3. Using the Computer for Practice

If you have CM V or MA, or another, here is how to use it to become QRQ qualified. Remember that we're focusing on methods to read CW mentally, not writing down or typing anything as you receive it. That comes later.

With lots of CW text stored in your computer program, you are ready to begin. Once you have determined your present 100% comfortable hand copying speed using pencil or pen, set your





computer program to send clear text at about 5 wpm faster than your hand copying speed. Begin sending text at this speed, sit back, and just listen for 30 minutes twice per day. First you will only be catching a letter every now and then. While this happens, you will miss the next several letters! But keep at it. Soon you will get all the letters of a single word, although there will still be many letters/words going on by unrecognized! But you are making progress. In a couple of weeks or so, especially if you were able to get a friend to spell the words of stories/text, you will under-

stand the text being sent. As soon as you do, raise the speed another 5 wpm. Keep it up, and in three or four months you may be up to 40 or more wpm! Try it. It works, and you'll be amazed.

At some point, you must add in the typing and contest-program practice. The RUFZ program mentioned above will send the callsigns of the world to you at ever-increasing speed. Your assignment is to enter them correctly via the keyboard to score. Another program called PED is a pile-up simulation training program. Many contest logging programs have simulator programs built in

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for training in the use of the program. Current XP/VISTA versions of RUFZ can be downloaded from http://www.rufzxp.net/>..

4. CW Sending Practice Helps Loads

Don't practice sending using the keyboard for these practice ideas! Use an electronic iambic keyer and paddle setup. Unlike a bug or hand key, the electronic keyer sends "perfect" CW characters, spacing, and rhythm, a big help in your mental training activity.

Adjust the paddle to very light action. You don't want to be slapping the key all about the tabletop! Good paddle keys are heavy just for this reason. Also put it on a mouse pad to help keep it in place.

Now begin practice by attempting to send fast. This sending practice also works wonders as you begin your progress toward becoming a QRQ operator. Why? The exercise forces you to form words to express ideas in your mind, while simultaneously sending the thoughts as CW. This inverts what has been going on in your mental processes to receive CW. As you increase your speed ability, you will not even be thinking "letter to CW" translation, but will be mentally and automatically sending CW as if it were another language with which you have become quite comfortable.

Your mind will be training on CW in such a way that when it can send fast, it will use the same subconscious patterns to also receive fast. KE7V has told me he raised his QRQ speed to 55+ wpm (275 letters/word spaces per minute) using this specific practice method!

There is more to encourage you to practice. Once you are able to mentally send at QRQ speeds and type accurately into a contest logging program, you may want to also practice clear text copying to the keyboard, and copying behind many, many words. Your QRQ mental rate will increase even more, and you will be well on your way to being a competent, competitive CW contest op!

By having fun, practicing daily, engaging in frequent CW QSOs, you will get there. I am still working on it, but I am probably older than 90% or more of you reading this!—73, Jim, K6KPI

Final Comments

CW is hardly a dead mode. As amazing as it sounds, a large number within our midst actually prefer it. I firmly believe that contesters and DXers together will be the group that ultimately drives the preservation of CW in our hobby. Only time will tell.

See you in the next contest!

73, John, K1AR

Kanga US will be closed for vacation during the months of July and August.
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Sunspot Cycle 24: Slow but Sure

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots

Observed Monthly, May 2010: 9
Twelve-month smoothed, November 2009: 8

10.7 cm Flux

Observed Monthly, May 2010: 74
Twelve-month smoothed, November 2009: 75

Ap Index

Observed Monthly, May 2010: 8 Twelve-month smoothed, November 2009: 5

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots

Observed Monthly, May 2009: 3 Twelve-month smoothed, November 2008: 2

10.7 cm Flux

Observed Monthly, May 2009: 71 Twelve-month smoothed, November 2008: 68

Ap Index

Observed Monthly, May 2009: 4 Twelve-month smoothed, November 2008: 5

ou have probably heard the rumors that sunspot Cycle 24 was short-lived and that it died a horrible death. There are speculations continuing that this cycle is over, or at least will not be very energetic and that this may even trigger extreme global environment change. We may be at the doorstep of a mini-ice age.

This speculation continues to flourish because of the "odd" behavior of the sun during the last three years or so. During our lifetimes, solar sycle minimums (those periods, approximately every 11 years, when there are few if any sunspots) lasted a mere half-year to at most a year and a half. This last minimum between Cycles 23 and 24, however, lasted at least three years. Some find this very odd. However, as reported in past editions of this column, such long periods of solar quiet are not that unusual in the overall view of our observational history. There have been a number of cycles that have had such long periods without sunspots.

So far in 2010 we've seen a slow, yet steady increase in the number of sunspots observed during any given month, although we have seen these numbers swing widely from very active months to months with rather few sunspots. However, when you compare the number of sunspots observed during any of these months with the same months during 2009, it is clear that we're seeing an increase in activity.

Another measurement of solar activity, of course, is the 10.7-cm radio flux. This measure-

*e-mail: <nw7us@arrl.net>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for August 2010

	Ex	pected Sig	gnal Quali	ty
Propagation Index	(4)	(3)	(2)	(1)
Above Normal:1-18, 23, 26-31	A	A	В	C
High Normal: 20-22, 24-25	A	В	C	C-D
Low Normal: 19	В	C-B	C-D	D-E
Below Normal: N/A	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:

- A—Excellent opening, exceptionally strong, steady signals greater than \$9.
- 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

- Find the propagation index associated with the particular path opening from the Propagation Charts appearing in The New Shortwave Propagation Handbook by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.
- 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 2 will be good (B) on Aug. 1st through the 18th, fair-to-poor (C-D) on Aug. 19th, etc.
- 3. As an alternative, the Last-Minute Forecast may be used as a general guide to space weather and geomagnetic conditions through the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet and space weather should be mild. On the other hand, days marked as Disturbed will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these conditions. In general, when conditions are High Normal to Above Normal, signals will be more reliable on a given path, when the path is ionospherically supported.

ment is useful to the radio amateur because it provides a somewhat accurate way to assess how much energy the sun is radiating. Since long-range DX depends on the ionospheric refraction of our shortwave radio signals and since the ionosphere depends on solar energy for its existence, the more solar energy available, the better the DX.

The late Robert Brown, PhD, NM7M (see sidebar), proposed an even more accurate way to assess the level of energy available for ionization of the ionosphere on a given day (see his great introduction to radio signal propagation at: http://www.astrosurf.com/luxorion/qsl-hf-tutorial-nm7m. htm>). He explained that the hard X-ray energy present from the wavelengths of 1 to 8 Ångstroms provided the most effective ionizing energy throughout all of the ionospheric layers in our atmosphere. The GEOS satellites measure these wavelengths, and the resulting measurements are reported as the "background X-ray level" throughout the day. A daily average is reported, as well.

Just like X-ray flares, the background hard X-ray level is measured in watts per square meter (W/m²), reported using the categories A, B, C, M, and X. These letters are multipliers; each class has a peak flux ten times greater than the preceding one. Within a class there is a linear scale from 1 to 9.

Dr. Brown recorded the daily background X-ray levels for several sunspot cycles, and discovered

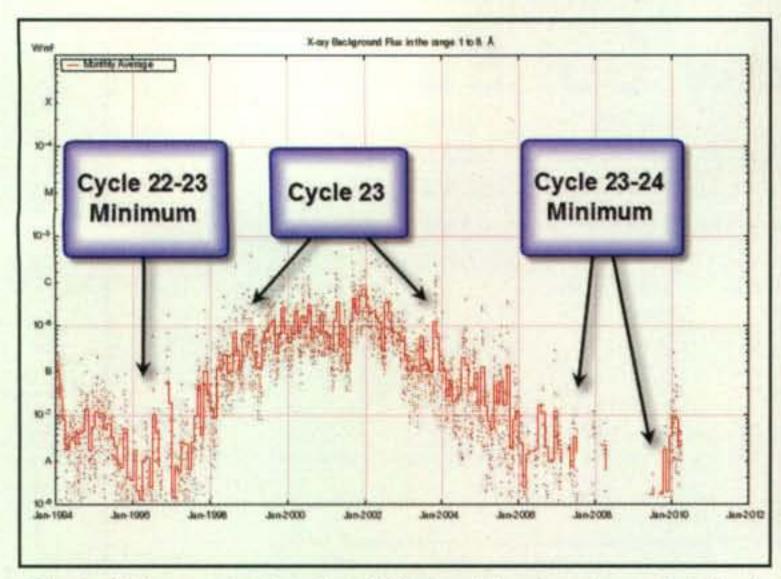


Fig 1– This graph plots the daily (red dots) and monthly (red line) average of the background "hard" X-ray energy in the 1 to 8 Ångstrom wavelengths, as measured by the GEOS satellite. It is clear from this plot that sunspot Cycle 24 energy is rising. (Source: GEOS-14 data, plotted with the gnuplot program)

that during solar cycle minimum periods the background X-ray levels remained at the A class level. During the rise and fall of a solar cycle, the background X-ray energy levels remained mostly in the B range. During peak solar cycle periods, the background energy reached the C and sometimes even M levels.

Armed with this information, can we discover any clues as to the current status of sunspot Cycle 24? Fig. 1 is a graph plotting the background hard X-ray energy reported by the GEOS satellites since the end of sunspot Cycle 22. Clearly, we see a noticeable rise in Cycle 24 activity. We're seeing the energy rise to the B level more often as 2010 progresses, supporting the view that Cycle 24 is alive and moving along toward an eventual sunspot cycle peak in several years.

As reported last month, this is an exciting cycle to watch. With the stunning high-definition imagery being captured by the new Solar Dynamic Observatory (SDO), we can see in nearly real-time breathtaking views of the living sun. This affords us great opportunity to learn more about how the sun works, and aids in our understanding of the sun-Earth connection. As radio amateurs, having a greater understanding of this science equips us to be more effective communicators. The latest SDO images, as well as live space-weather information and commentary on current conditions, are available at my website, http://prop.hfradio.org. Each month, this column will continue to report and discuss this fascinating science.

August Propagation

The late August early September timeframe is a difficult time of year during 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. When you add equinoctial conditions that can begin as early as late August, we often experience optimum openings between the Northern and Southern Hemispheres on the one hand, but

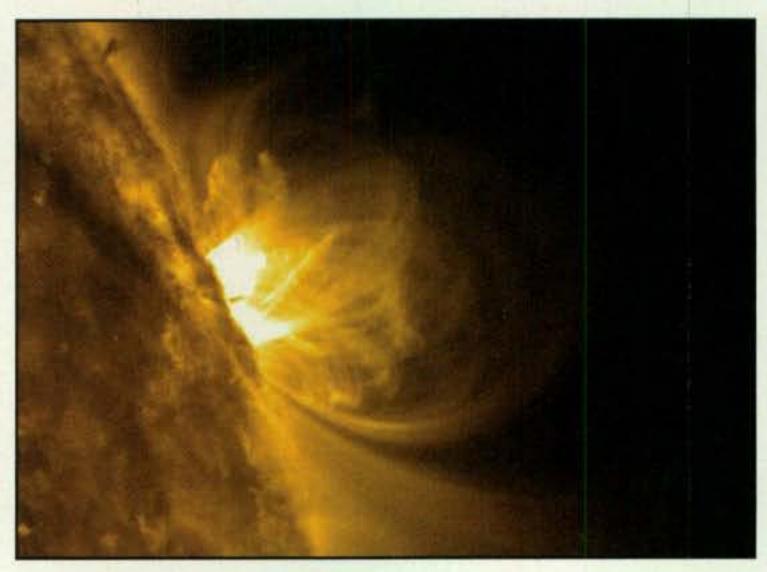


Fig 2— The stunning view (at the 171 Ångstrom wavelength) of the magnetic field lines looping above a sunspot region on June 15, 2010. We can see these magnetic loops because solar plasma is captured by the magnetic fields. When these magnetic fields break, plasma is ejected out into space. (Credit: SDO/AIA [Solar Dynamics Observatory Atmospheric Imaging Assembly])

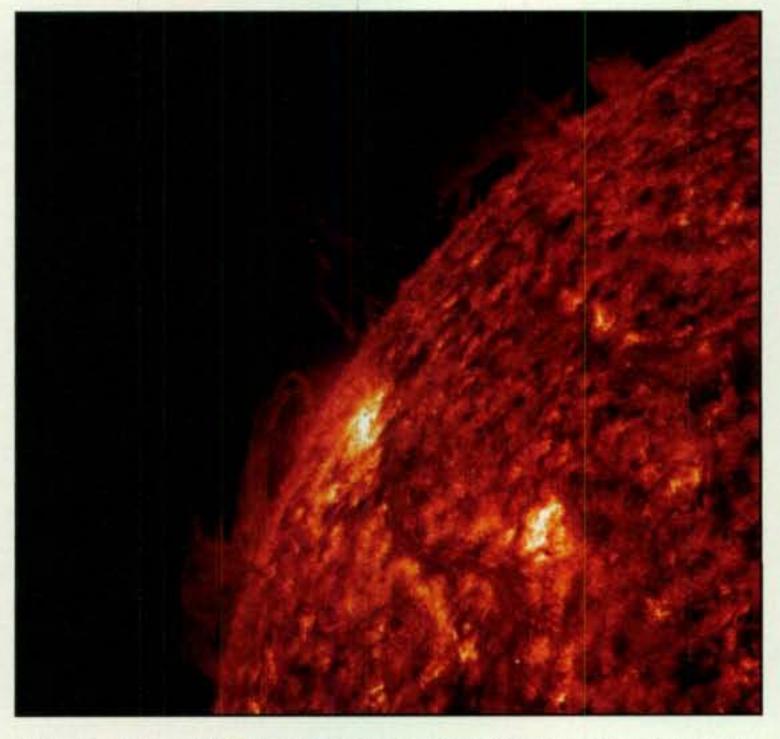


Fig. 3- Incredible view of solar plasma "clouds" and prominences above the sun's corona, as seen at the 304 Angstrom wavelength by the Solar Dynamics Observatory on June 15, 2010. A prominence is a large, bright feature extending outward from the sun's surface, often in a loop shape. Prominences are anchored to the sun's surface in the photosphere, and extend outwards into the sun's corona. While the corona consists of extremely hot ionized gases, known as plasma, which do not emit much visible light, prominences contain much cooler plasma, similar in composition to that of the chromosphere. A prominence forms over timescales of about a day, and stable prominences may persist in the corona for several months. Some prominences break apart and give rise to coronal mass ejections. Scientists are currently researching how and why prominences are formed. The new SDO is enabling scientists to unlock the inner workings of the Sun. (Credit: SDO/AIA)

periods of active to stormy conditions on the other.

With the noticeable increase in sunspot Cycle 24 activity, good DX conditions should be possible on several bands: 15, 17, and 20 meters during daylight hours. 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.

Between sundown and sunrise 20 meters is expected to be the best DX band. Occasional nighttime openings are possible to many areas of the world, some with surprisingly strong signal levels. For North American stations, good DX conditions should be found for openings toward Latin America, the far Pacific, and into Asia, until midnight. You might even catch some activity on 17 or even 15. 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 mid-

Bob Brown, NM7M, SK



Vicky, AE9YL, and Bob, NM7M, in 1999 at Bob's house on Guemes Island. (Photo by Carl, K9LA)

On Sunday, May 23, Bob Brown, NM7M, of Anacortes, Washington passed away. Bob retired from the University of California at Berkeley in 1982, where he was a Professor of Physics. His early research work centered on the measurement of x-ray bursts with balloon-borne equipment (see "Over Coffee & Cognac," July CQ).

After retirement, Bob signed on as a columnist for several amateur radio publications, starting with his "Over the Horizon" column for *The Canadian Amateur*, followed by his "Propagation and DX" column for *QRP Quarterly* and his "Propagation" column in *WorldRadio* (which ran from April 1989 through December 1996). He also contributed propagation articles to most of the other amateur radio publications, including *CQ*.

Bob wrote five books for radio amateurs.

His first (Long-Path Propagation, 1992) involved a year-long study of long-path on the 20-meter band. The Little Pistol's Guide to HF Propagation (1996) was a general work covering the ionosphere and ionospheric HF propagation. Bob's third book for hams (Long-Path Propagation Revisited, 2000) dug deeper into long path, including the difficult long path on 160 meters. His fourth book (The Big Gun's Guide to Low-Band Propagation, 2002) addressed 160-meter propagation. His last book (On Ion Chemistry and Propagation, 2002) dug into the chemistry of the atmosphere and how it ties into propagation.

Bob's most recent interest was studying the impact of galactic cosmic rays on 160meter propagation. He wrote several articles on this topic that were published in this magazine (the most recent, "On Forbush Decreases and 160-Meter Propagation," appeared

this past June).

Bob was a great teacher, and his contributions to amateur radio in the field of propagation are appreciated worldwide.

-Carl Luetzelschwab, K9LA

Carl, a longtime friend and collaborator of NM7M and propagation expert in his own right, is Bob's successor as Propagation Editor of WorldRadio, now WorldRadio Online, and a frequent CQ contributor as well.

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Bringing Communication to Education Since 1980 night 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

VHF Propagation

A Practical Guide For

Sporadic-E propagation usually begins to taper off during August, but it should continue to occur fairly frequently. 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 to 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* meteor shower starts during the beginning of August and peaks the night of August 12. It is most

observable in the Northern Hemisphere. The maximum hourly visual rate should reach 80.

For the very patient, check the 6-meter band for possible transequatorial (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 Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 74 for May 2010. The 12-month smoothed 10.7-cm flux centered on November 2009 is 74.5. The predicted smoothed 10.7-cm solar flux for August 2010 is about 90, give or take about 7 points.

The Royal Observatory of Belgium reports that the mean monthly observed sunspot number for May 2010 is 8.8, slightly up from April's 7.9. The lowest daily sunspot value during May 2010 was zero (0) on May 9 through May 20. The highest daily sunspot count for May was 32 on May 4. The 12-month running smoothed sunspot number centered on November 2009 is 7.6. A smoothed sunspot count of 31 is expected for August 2010, give or take about 8 points.

The observed monthly mean planetary A-index (Ap) for May 2010 was 8. The 12-month smoothed Ap index centered on November 2009 is 4.5. Expect the overall geomagnetic activity to be unsettled to stormy during August. Refer to the Last-Minute Forecast at the beginning of this column for the outlook on what days that this might occur.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at http://hfradio.org/forums/. If you are on Facebook, check out http://tinyurl.com/fb-nw7us. Speaking of Facebook, check out the CQ Amateur Radio Magazine fan page at http://tinyurl.com/fb-cqm.

Now that the new solar cycle is active, I'll be keeping my ears to the radio, hoping to hear you on the air. Happy DX! 73, Tomas, NW7US

VHF Propagation Handbook

VHF Propagation Handbook
The Practical Guide for Radio Amateurs
by Ken Neubeck, WB2AMU & Gordon West, WB6NOA



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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.)

2009 SSB RESULTS SINGLE OPERATOR

		RTH AMER			
K1LZ K1DG K5ZD/1		6,265,620 5,933,696 4,005,504	3635 3162	125	485 386
KIRX		3,988,912		117	41
K8PO/1	19	2,632,824	2205	95	36
WB1DX	- 4	1,192,464			30
N1DD	-	1,099,692			29
KtKI	-	1,044,568			24
		1797-0300-077	1	Op: K	MIP
W5WMU	71 .	857,280	955	86	29
WIHIS		519,168		73	23
NIYX	- 6	498,980	635	77	22
WIEBI	-	356,265	484	66	20
KIRM	1.0	305.739	561	53	15

	United States						
K1LZ K1DG	A	6,265,620 5,933,696					
K5ZD/1		4,005,504			386		
			- ((dp: W	(JUE)		
KIRX		3,988,912					
KBPO/1	12	2,632,824					
WB1DX	-	1,192,464					
N1DD	8	1,099,692	1045	97			
KIKI		1,044,568	1166	77	245		
			1	Op: K	M1P)		
W5WMU/1		857,280	955	86	294		
WIHIS		519,168		73			
NIYX	1.0	498,980	635	77	228		
WIEBI		356,265	484	66	207		
KIRM		305,739	561	53	154		
K1BV	1.5	276,018	539	39	140		
KIKNU	1.5	177,029			161		
W1FM		156,864		48			
WIRPG KISND		138,370		58			
KISND		114,048		54	138		
AD1DX	12	90,720	235	55	134		
KB1RDL	20.00	89,075	241	. 54	121		
K1CN	0	70,152	178	41			
KTYSY		56,760	175	34			
BARRET	- 0	0.72 (S.S. E.	100000	9.60	- Brak		

W1EBI		356,265	484	66	207
KIRM	1.0	305,739	561	53	154
K1BV		276,018			140
KIKNU	- 1	177,029	950	8025	194019
W1FM	1.0	156,864	329 312	48	144
WIRPS	15	138,370	264	58	144
KISND		114,048	246	54	138
AD1DX		90,720	235	55	134
KR1RDI		89,075	241	54	121
KICN	-	70,152	178	41	107
W1EBI K1RM K1BV K1KNJ W1FM W1RPS K1SND AD1DX KB1RDL K1CN K1YSY N1ITT K1SEZ W1MK AA10 KA1VMG WA1QUI W3EP/1 K1IM	¥	56,760	175	48 58 54 55 54 34 34	QE.
BUITT		37 004	202	37	21
MICE.		37,994	105	77	66
MIGEL.		21,497	193	22	50
WINK.	100	11,375	03	36	23
MATU		10,224 9,430	50	20	40
KATYMU		9,430	. 90	23	28
WATQUE	100	8,580 3,900	64	24	41
W3EP/1	28	3,900	59	9	21
KTIM	14			28	104
AB1EP		54,054	215	21	78.
W1XX	7	87,662	319	24	82
AA1BU	3.7	157,257	575	19	82
WATQUI W3EP/1 K1IM AB1EP W1XX AA1BU K1HAP *K1BX *N1UR	1.8	3,500	52	- 8	107 95 81 56 59 45 59 41 21 104 78 82 27 346 356
*K18X	A	1,994,512		100	346
*N1UR	*	1,657,082		101	356
*MIPGA		546 822	654	75	221

AA1BU	3.7	157,257	575	19	82
KIHAP	1.8	3,500	52	- 8	27
*K18X	3,7 1.8 A	157,257 3,500 1,994,512 1,657,082	1598	100	346
*N1UR	*	1,657,082	1376 664	101	356
		TAE DOG		-	231
*N1PGA *KK1F		477,620	602	69	217
*WZJU/1		304,460	434	65	195
*W1J0	- 5	253,798	424	59	167
*K1HT		304,460 253,798 227,930 185,175	365	59	171
*NTIX		185,175	313	61	154
*K1VSJ	7	183,214	333	. 54	148
*W1AD		156,338		45	137
*NETH		72,280	-543	15/0	100
*KA1C	White and the first test the same and	52,125	170	38 30 32 41 30 30 34	87
TNM1W		51,480	:161	30	87
-WIDYJ		37,740	138	32	79
*KB1JDY		36,386	137	41	72
*KT1VT		31,815	119	30	71
*W1SKB	16	28,560	125 87 112 99	30	72
"N1LU	.5	18,900	87	34 18	56
*WB1FJH	1.0	17,640	112	18	54
*KB1SNB		15,912	99	22	50
*W3SM/1		14,773	81	30 24 17	49
*KB1FRK	17	10,868		24	52
*KB1JUF	- 1	9,240		17	39
"N1HTS		9,039		26	43
*AAYAR	. 9	7,810		27	44
*K1HI		6,480		20	39 43 44 34 31
*K1VU		3,479		18	31
*N1NN	. 6	3,403	34	11	30
	100	4,144	100	. 22	100

2,013

85,028

24,420

4,284

754

*W:KX

K30

K31

N31

N3F

KSF

N3L K3A

K3T

W2

WE

W3: W3: K3F WB

K31

WIZ

K38 NA3 WA

K35

K3R

AA1 NA3 ADE KM

W3

* W.

*KD3HN

*W3CQ8

*NY3C

"N3YW

"N3ALN

"NS3T

"NZUS/3

13

29

260

119

WA1JAE

21

*W1BJ

*K1EP

*N1NK

*N1WRK

*KB1FCB

*W1NK *W1WBB	7	3,196 1,716 385		9	1
N2RJ	A	1,422,717		74	28
WAZNHA		670,530	819	73	23
KM20		592,176		71	24
NQ3N/2		347,686			19
N2ED		222,070			19
KW2J	- 0	186,428			
K3QDV/2	- 1	181,332			15
AF2K	-	105,885			12
K2FU		95,018			
WB2KLD		94,913			11
W2FUI		82,397			10
KM2L		81,554			. 9
K2BBQ	12	70,992			10
N2USM	100	18,492	94	28	- 5
AA20I	- 5	14,697	109 73	21	-4
N2GC	- 5	14,430			. 5
A STATE OF			46		3
KC2KZJ		2,993		16	- 2
WZRR	28	Statement Statement		-	2
NZPP	21	557,039			
WZOSR	14	53,856			- 8
WS9M/2		12,825	101	13	4 1 5
WA2A0G	3.7	1,224	22	10	3
W2MF	1.8	14,784	115	14	- 5

nearou.		7 W, 17 HZ.	EMB.	34	1100
N2USM:	10	18,492	94	28	64
N2USM AA20I	.0	14,697	109	21	48
N2GC		14,430	73	21 24	54
W2MC	- 4	5,995	46	23	32
VP2VZ1	10	2,000	31	16	26
KC2KZJ	28	2,993			25
W2RR	20	360		4	
N2PP	6.1	557,039	1380		121
WZOSR	14	53,856	212	22	80
WS9M/2		12,825 1,224	101	13	44 14
WAZAOG	3.7	1,224	22	10	14
W2MF	1.8	14,784	115	14	50
*K2CS	A	492,252	616	79	244
*N2RRA		307,142		60	193
*WB2SiH	15	130,713	270	52	135
*N2RRA *WB2SIH *N2GA		118,064	264	38	119
*AR2TC		110,840	283	32	104
*K2DBK		83,720	205	47	114
*K9CHP/7		83,520	245	40	105
*AB2TC *K2DBK *K9CHP/2 *KA2LIM *K2DSL *KC2QJB *N2ZN *N2MTG *KA2ANF *WA2MCR *WZVU *WZKD *WA2NLL *AI2N		66,738	175	40	107
*K2051		57,685	171	38	101
*KC2O IB		52,948	167	30	94
*10278	16	49,530	149	35	92
*NOMEO		48,510	169	43	83
*WADAME	2	48,070	170	31	84
THERMAN		46,070	170	21	07
THEREINGE.		46,107	155 116	49	92
WZVU		32,928	110	34	78
WEND		27,300	129	28	72
WAZNLL.	- 0	27,192	108	32	71
ALZN		32,928 27,300 27,192 26,892	104	39	69
*WN2Y	- 17	22,927 16,942	105	33 28	68
*KC2KTZ		16,942	81	28	58
*KC2KTZ *WY1H/2	100	16,686	85	24	58 57
*WAZLXE *NZXPW		14,931	77	24 25	54 57
"N2XPW		14,553	97	20	57
*WV2ZQW	1.8	10.010	63	27	50
A CONTRACTOR		- Commercial			

*N2VM	*
*KC2UCJ	.0
"NZNOM	*
*N2CK	*
*KD2MU	
*KC2JRQ	4
*N2QLQ	7
*K2DL	*
*KA2IBN	
*K2RNY	
*K2PAL	
"WAZART	*
*N6MWX/2	
*WB2RIS	
*K2AMP	
*WB2ZEX	
market make his	

2DL A2IBN 2RNY 2PAL VA2ART		2.030	24	13	22
A2IBN		2,030 1,350	24 25 19 20 16 13	13	17
2RNY		1,173	19	80.99	15
2PAL		598	20	9	17
VA2ART -	*	550	16	11	14
6MWX/2		1,173 598 550 522 247 204 198 132 100	13	10	B
VB2RIS		247	16	7	6
VB2RIS 2AMP		204	7	7 5	7
VB2ZEX	12	198	12	7	11
V2X	-	132	6	6	- 5
T2D	*	100	3	- 6 mm	3
VB2ZEX V2X T2D C2QNA		16	16 7 12 6 3 2	2	2
VZEQ	21	35,188	157	18	65
VZLHL		8,648	73	18 12 5	22 17 15 17 14 8 6 7 11 5 3 2 65 35 10
V3EH/2	21	210	157 73 10	5	10

9,028

8,631

7,370

5,145

2,320

61

57

54

44

33

16.03	40	INT-OD	
20	41	*W5MIC/3	2/
24	39	*ND3R	*
18	37	*KB3LVH	
22	27	*W30D	
10	19	*WA3ERQ	A
12	20	*N3KR	
13	22	*N7NJ0/3	
20 24 18 22 10 12 13 10	39 37 27 19 20 22 17 15 17	*K3VED	*
80.09	15	*NBNA/3	á
9	17	*WB3IGR	*
- 11	14	*KA3UOL	
10	В	*NOMSB/3	7
7	6	*N3KUN	
7576	7	*AB3GY	7
7	11	*NV3V	
6	5	*WM3L	
3	53	*W3SE	21
2	2	*N3JDQ	-
18	65	*N3GH	14

N3MMH

*N3GL

46 *NY3B *

0.011.00	7.79	1000		
34,000 32,207 28,512	127 153 110	33	67	
32,207	153	34	73	
28.512	110	31	68	
27,270	126	23	67	
26.400	110	25	63	
26,400 23,206	121	34	48	
22.746	110 121 94 74	38	64	
22,746 14,450	74	34	51	
10.726	25	-20	60	
10,736	00	90	24	
4,753	45	15	34	
4,358	65 46 37	19	29	
4,116	43	22	27	
4,116 950	43 15	10	15	
130	- 8	7.	- 6	
100	92	33 34 31 23 25 34 38 34 36 15 19 22 10 7	67 73 68 67 63 48 64 51 52 34 92 715 62	
56 475	220	200	67	

57

9.918

69,869

14,490

3,420

38.186 146 47

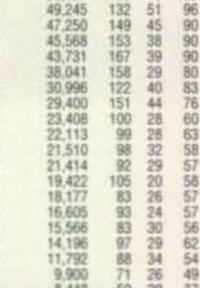
		777 NEWSTERS 1 1
23	67	KF4ZS
25	63	NB4M
34	48	NC4MI
34 38	64	K4PIC
34	51	AE4EC
34 36 15 19	52	NX9T/4
15	34	K4CX
19	29	NEBJ/4
22	51 52 34 29 27	N2Y0/4
10	15	KU46W
7	- 6	N4DE
34	62	W4ZYT
29	62 67	KI4VCT
29 15	43	NY40
24	85	K7WLF/4
15	48	N4MJ
12	26	WD8RYC/4

K4NLL

WA4ZXV

N3UA/4

WA2EMF/4



53,603

52,397

170

196

41

80

103

57,404

50,337

47,815

17,640

7,522

7,434

7,326

6,110

1,768

374

100

73

26

277 276

192

34

11

15,104

1,711

75,147

71,604

54,774

21,335

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128

731	167	39	90	
341:	158	29	80	
196	122	40	83	
100	151	44	76	
408	100	28	60	
113	99	28	63	
510	98	32	58	
731 941 996 408 113 510 414 422 177 505 966 196 992 948	167 158 122 151 100 99 98 92 105 83 93 83 97 88 71	39 29 40 44 28 28 32 29 20 26 24 30 29 34 26 29	90 80 83 76 60 63 58 57 57 56 62 54 49 37	
122	105	20	58	
177	83	26	57	
505	93	24	57	
566	83	30	56	
196	97	29	62	
792	88	34	54	
900	71	26	49	
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			200	



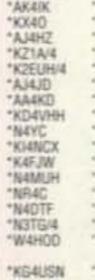
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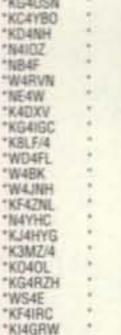
*N4W0

*Al4GR

*W4UDX









K5ER

K5EWJ

K5LAD

KSQEA

KE3D/5

AD5XD K5MV

N5VU

K5KM

N5VK

KZ5J KD5RXN

*AI5G

*KD5J

*W5VDM

*KB5DRJ

22

18

8,250

6,666

3,476

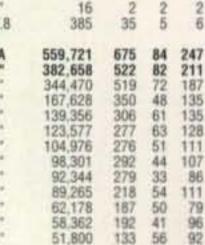
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2.024

374

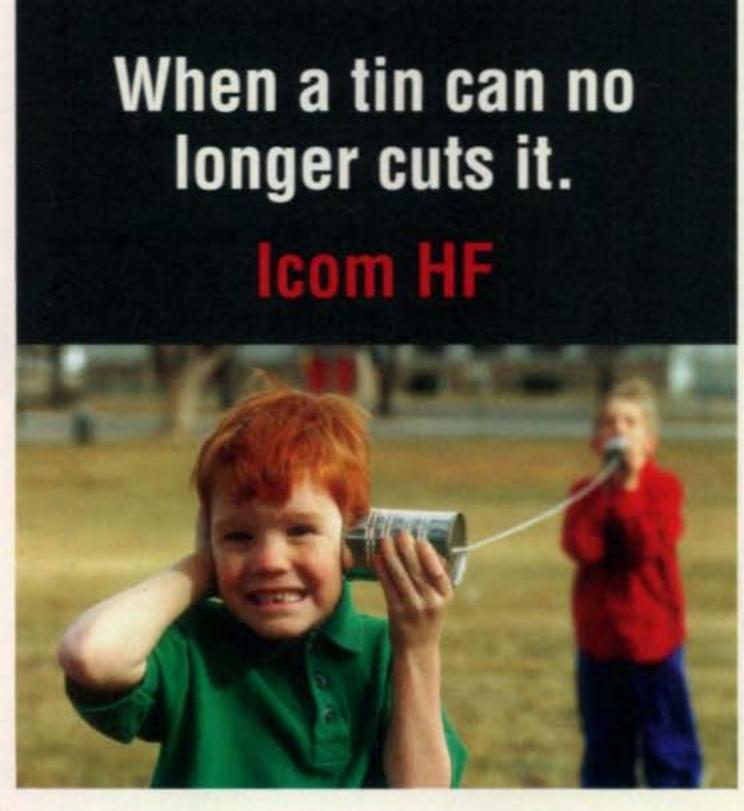
*AJ4RK

*KJ4KVC



		200.4		
*	104,976	276	51	111
	98,301	292	44	107
+	92,344	279	33	86
	89,265	218	54	111
	62,178	187	50	79
	All And and an artist			
	58,362	192	41	96
-	51,800	133	56	92
	8,424	66	29	43
	1,711	22	12	17
	84	- 8	. 6	- 6
85	35,368	274	17	.43
24	454 470	466	29	106
6.0	154,170	400	4.0	199
14	and the late of the best late.	3.77		187
14	168,885	452	32	187
14	168,885 13,496	452 99	32 20	1222
14 .8 A	168,885 13,496 2,925	452 99 39	32 20 14	107 36 25
14 A	168,885 13,496 2,925 587,860	452 99 39 674	32 20 14 94	107 36 25 229
14 A	168,885 13,496 2,925 587,860 246,594	452 99 39 674 425	32 20 14 94 63	107 36 25 229 156
14 A	168,885 13,496 2,925 587,860 246,594 212,283	452 99 39 674 425 382	32 20 14 94 63 56	107 36 25 229 156 163
14 A	168,885 13,496 2,925 587,860 246,594 212,283 192,207	452 99 39 674 425 382 327	32 20 14 94 63 66 69	187 36 25 229 156 163 168
14 A	168,885 13,496 2,925 587,860 246,594 212,283 192,207 162,138	452 99 39 674 425 382 327 357	32 20 14 94 63 66 69 60	197 36 25 229 156 163 168 123
14 A	168,885 13,496 2,925 587,860 246,594 212,283 192,207 162,138 125,139	452 99 39 674 425 382 327 357 311	32 20 14 94 63 66 69 60 58	107 36 25 229 156 163 168 123 119
28 21 14 A	168,885 13,496 2,925 587,860 246,594 212,283 192,207 162,138	452 99 39 674 425 382 327 357	32 20 14 94 63 66 69 60	197 36 25 229 156 163 168 123





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2MFY	14	158,877	417	26	113	*K3LAB		2,112	34	-11	21
ZAW		122,884	399	28	96	*WA2VQV/3		208	10	8	8
/DBCQB/2		106,140	342	26	96	*K3TW	1.8	340	22	- 5	5
X2S		46,800	170	25	75						
2HVE	200	330	21	6	16	K4ZW	A	4,654,793	3077	124	435
EZT	7	10	2	1	2	K4SSU		1,970,232	1760	111	328
282	3.7	1,440	35	8	16			Termone and	(0)	p: NA	48W)
						K1T0/4		1,491,472	1529	94	294
CR	A	3,901,908	2694	121	406	N6AR/4		1,363,173	1139	106	361
		TANK TANK OF	((Op: L7	ZAAX)	K4AB		1,335,880	1166	109	346
WR/3	*	1,002,848	1049	80	272	N4PQX		1,175,040	909	110	370
TC		949,871	916	94	309	K5RQ/4		1,078,436	1332	82	277
UM	10	452,412	589	65	219	NN3W/4		967,190	1132	82	255
RJ	. 6	449,790	621	70	212	KH1Z		820,973	828	88	285
RJ PU	4	360,450	507	70	200	N60R/4		784,125	880	98	277
LH	- 0	267,441	435	54	175	K1GU/4		686,408	696	91	268
OTA	7.	227,356	400	48	178	AG4W		627,606	696	92	265
TUF		163,614	279	62	160	KABQ/4		609,960	701	72	240
TN/3		88.815	256	57	134	N4RA		577,281	653	85	252
3F		66,456	184	40	102	N4MM		553,660	631	80	230
SQ		57,546	178	39	99	KZ2U4		522,013	593	82	255
iGNΩ	1.00	55,352	165	46	102	N4UU	100	480.095	612	75	226
RMB	4	33,465	123	40	75	AB4GG		474,655	636	74	221
34PWZ/3		30,345	117	32	73	K4R0		464,120	552	92	236
ISH		28,560	125	25	60	WK4P		355,792	501	83	213
2E/3	*	15,747	82	27	60	N4CW		337,937	459	70	201
MRG	1.0	11,440	71	21	44	K90M/4		293,940	427	74	202
3F		7,616	53	26	38	K4FYM		221,235	340	72	173
L3MKB		7,198	71	21	38	KY4P		202,391	370	47	156
SWZ	21	67,718	253	20	78	NJ2F/4		197,262	314	69	165
RWN		24,178	155	18	59	NE4M		170,344	305	64	150
1K/3	14	885,222	1947	38	131	W4XDX		160,650	370	49	121
3M	7	57,434	241	21	73	KA3FZ0/4		131,596	288	49	148
6J/3	2	13,515	101	13	40	KJ4B/X		120,564	247	63	141
13.1	3.7	3,960	57	11	25	W4GHS		116,484	258	56	148
IGH	1.8	5,687	188	14	33	W9FW/4		102,200	199	57	143
ISLL.	A	938,587	878	96	307	K4PHE		98,098	225	57	125
B3LIX	7	190,400	329	55	169	N4BJ		97,983	203	54	137
ACTION AND ADDRESS OF THE PARTY		100,700	100.0	200	1. 95000 -	CALLEDON.		31,303	6.362	100	0.000

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200 54 121 N4LZ 213 37 111 W4UF0

W200/4

AE4TE

KAAPG

WW4CP

1,970,232	1760	111	328
	(0)	p: NA	48W)
1,491,472	1529	94	294
1,363,173	1139	106	361
1,335,880	1166	109	346
1,175,040	909	110	370
1,078,436	1332	82	277
967,190	1132	82	255
820,973	828	88	285
784,125	880	98	277
686,408	696	91	268
627,606	696	92	265
609,960	701	72	240
577,281	653	85	252
553,660	631	80	230
522,013	593	82	255
480,095	612	75	226
474,655	636	74	221
464,120	552	92	236
355,792	501	83	213
337,937	459	70	201
293,940	421	14	202
221,230	340	12	1/3
202,381	3/0	70	100
197,262	314	- 00	100
170,344	220	90	130
121,600	500	40	140
101,090	247	92	140
116.484	258	56	148
102 200	100	57	143
98.098	225	57	125
97 983	203	54	137
88 184	224	40	111
84.510	243	37	96
84.212	209	45	103
1,491,472 1,363,173 1,363,173 1,335,880 1,175,040 1,078,436 967,190 820,973 784,125 686,408 627,606 609,960 577,281 553,660 522,013 480,095 474,655 464,120 355,792 337,937 293,940 221,235 202,391 197,262 170,344 160,650 131,596 120,564 116,484 102,200 98,098 97,983 88,184 84,510 84,212 81,326 75,048 74,676 56,889	205	111 NA 109 109 10 10 10 10 10 10 10 10 10 10 10 10 10	116
75.048	262	45	114
74,676	192	41	106
56.889	1529 1139 1166 909 1332 1132 828 880 696 696 696 696 553 631 593 612 636 552 636 552 636 552 637 370 370 370 370 370 370 370 370 370 3	45	328 48W) 294 361 346 370 277 255 285 277 268 265 220 252 221 236 213 201 202 203 203 203 203 203 203 203

KR4RO

K4ALE

KU4VY

WC2Z/4

W4RKC

K4YRK

WF71/4

1,081

675

315

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21 10

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*AA5TB * *K80Z/5 21	96 4 4 4 56,644 213 25 73	N7TL *	6,630 55 21 30 2,482 31 15 19	*NBBV *KC8WGA	1,904 39 11 17 645 34 10 11	*W9ELN/Ø :	180 10 5 5	VA7RN 10,260 73 21 33 VA7BS 3,312 57 18 18
*N4IJ/5 *AA5.IG	56,644 213 25 73 35,599 148 25 72 2,232 36 13 18	NN7D KB7UJI	2,482 31 15 19 1,748 29 17 21 1,620 24 14 16	*W3GEG/8 *	645 34 10 11 280 56 24 32 2 1 1 1	*KCØROH 21 *NØCKC 14	3,876 43 14 24 7,182 72 16 26	VA7BS 3,312 57 18 18 (Op: VE7HBS) VE7VR 2,546 34 17 21
*W2FCP/5 14 *W5Z0 7 *W5RI	192 9 6 6 14,539 101 22 45	W7VS K7MY 21	638 11 11 11 56,964 215 26 75	*K8GVK 21 *K8IR	31,200 144 21 59 28,194 140 19 55	*KBØUBZ *	1,078 29 10 12 580 27 5 5	VE7ZZF 14 280,165 931 34 103 *VA7BEC A 281,180 810 59 111
LOWANNA .	8,308 61 19 43	N7VF	89,919 501 28 69 87,349 330 31 82	*KABWQL 14 *AF8C	71,338 253 25 81 7.497 54 17 34	*KFØIQ *N9HDE/Ø	154 21 3 4 20 2 2 2	*VE7BC 144,705 356 59 106 *VA7CRZ 130,734 337 56 106
K6XX A K6NA W6TK	1,301,688 1351 111 247 1,206,373 1119 126 287 310,500 551 81 144		38,130 152 28 65 13,370 76 24 46 7,105 74 16 19	*N8WAV *KG9Z/8 3.7	1,080 22 13 17 1,260 41 9 19	*KCØFUE	8 5 2 2 Alaska	"VE7IN 38,584 137 41 65 "VE7AX 36,569 160 35 62 "VE7FCO 20,020 127 31 39
W6AQ *	310,500 551 81 144 244,868 459 81 140 215,853 371 64 147	W7WA 7 33	7,105 74 16 19 36,720 930 33 105 36,335 928 34 103	W9RE A	4,187,780 2740 125 440 458,440 597 76 216	AL1G A KL2RG	80,865 835 20 25 15,281 141 28 31	*VE7FCO * 20,020 127 31 39 *VE7RSV * 17,700 121 35 40 *VE7WEB * 5,904 64 21 20
WA6KHK - WC6H	173,000 367 67 133 170,128 370 73 123		18,752 546 30 66 594 14 8 10	K9MMS N9WKW	409,600 609 66 190 215,423 360 65 162	*KL2R A	28,196 162 37 39 (Op: KL1JP)	*VA7CPC
N6NF WE6Z	167,739 347 65 122 155,792 354 66 116	*N7IR * 19	81,980 546 93 191 90,674 335 73 141	N9UY KF9T1	138,198 297 56 130 109,395 256 40 113	*WL7BD0 :	18,800 166 24 26 8,715 108 17 18	*VE7HJ : 984 19 12 12 *VA7CE : 264 16 6 5
WW60 WERFF N6IFR	136,784 326 51 115 127,065 258 74 123 117,645 290 65 100	*N78K 1	74,124 329 67 135 26,420 332 50 97 01,752 250 56 105	N9GH NJ9Z KB9NKM	104,880 226 57 127 68,856 205 54 97 67,840 160 42 118	*KL1SF 14 *WL7UQ *	17,390 216 18 19 5,472 57 16 20	*VE7CV 14 72,280 301 30 74 VY1EI/8 A 99,120 628 35 49
K9JM/6 W6FA	69,414 194 55 83 50,964 140 54 83	*WX78	97,500 279 54 96 91,010 199 66 124	K9JIG WI9WI	67,840 160 42 118 47,704 149 47 87 45,387 155 47 76	*V25Z A	ligua & Barbuda 710,924 1554 59 164	VY1EI/8 A 99,120 628 35 49 Cayman Islands
KF6T KW6N	43,554 141 48 74 35,385 129 42 63	*KKTAC *	85,715 234 59 96 84,474 199 67 104	KC9IL :	34,048 125 38 74 31,680 137 24 64		Bahamas	ZF2AH A 2,225,186 3199 84 249
WB6TFD KG6D	34,200 147 43 71 28,518 120 42 56	*W70N *	54,404 172 49 85 50,932 185 42 77	K90KK KC9ELU	21,840 93 28 63 1,280 24 17 23	"AA5R/06A A	2,560 118 9 7 (Op: N6DQ)	*TI7DBS 21 61,972 372 19 52
W60P0 W6SX	22,185 95 28 57 18,576 113 31 41 18,509 95 35 48	*WF7K * :	43,569 130 44 97 31,512 125 43 61 31,302 136 37 57	W9EXY 21 N9U WB9Z 14	222,318 587 28 110 14,674 96 16 42 991,660 2110 37 142	8PSA A	Barbados 12.098.900 7949 147 500	*TI2WMP 14 3,146 78 9 13 Cuba
AJ6V **	18,509 95 35 48 13,908 80 32 44 13,179 74 33 36	*K6UM/7 - *	29,792 124 44 54 28,017 131 38 61	K9SH 3.7 N4TZ/9 1.8	991,660 2110 37 142 9,222 83 13 40 6,533 83 16 31	erun n	12,098,900 7949 147 500 (Op: W2SC)	*COSZZ 7 178,893 889 21 78
AF6NI KG6ZHC	9,536 66 29 35 7,840 64 21 28	*K7AW8 *	23,530 112 42 43 20,164 113 24 47	*KD9MS A *NGLYE	336,924 464 83 211 90,240 227 51 109	"W3TB/VP9 A	Bermuda 548,877 1550 53 124	*HISPJP 28 1,044 43 5 7
KI6T K6RR	6,888 59 23 33 5,246 60 30 31	*WA7PVE *	19,875 117 34 41 19,184 121 35 53	"WASZ "W9OA	86,940 236 41 99 80,008 204 40 106		(Op: W3TB)	*HI3K 21 631,289 2249 27 104 *HI3CCP 14 240,100 1182 23 77
KX4E/6 KGIII N68Y	1,073 17 15 14 100 37 16 18	*W17F *	18,954 103 34 44 18,032 118 46 52 15,660 100 28 32	*W9QL *W9YT *W9VQ	65,008 184 39 97 46,620 146 38 88	VE9HF A VO2NS *	Canada 467,781 857 58 183 399,056 1033 52 144	French St. Martin FS/K1XM A 5,194,319 4458 114 367
KE1BYL/6 28 W6YA 21	364,820 949 33 112	*N7MZW * *KN7S *	13,858 83 37 45 11,764 81 32 36	*WD9CIR *	39,438 138 42 84 31,920 115 39 73	VA1MM '	329,868 878 58 129 31,464 159 18 58	(Op: K1XM)
KSJAT KSHNZ 14	37,807 199 23 54 152,460 467 34 87	*WE6EZ/7 *K7RPW	10,008 71 34 38 8,965 67 27 28	*K90R -	26,510 91 39 71 23,184 124 31 61	VYZLI VO1HE 28	29,400 116 34 71 4,914 64 7 28	OX2A A 1,677,960 2391 72 223
KSLRN KDSHTN WSYI 7	59,385 237 30 81 2,720 43 16 18 316,288 1091 30 82	*K7DNH *AD7UP	7,802 82 24 23 7,353 69 26 31 6,255 67 22 23	*KC9IRQ * *K9XE *	23,128 100 36 62 21,750 90 32 55 19,980 89 32 58	VY2ZM 3.7 VE1ZJ	573,780 1765 25 106 (Op: K1ZM) 29,016 165 18 60	(Op: 0X3KQ) Grenada
K5KT/6 AF6RT	21,330 104 29 61 80 4 4 4	*KE7XM *	6,222 43 25 36 6,104 70 29 27	*KD4ULW/9 *	18,955 82 28 57 12,172 75 28 40	*VE1ZA A *VE1SQ *	312,288 527 64 183 77,363 213 37 106	J37K A 387,655 1237 46 109 (Op: AC8G)
N2NS/6 1.8 *N6RV A *WN6K *	315 18 8 7 265,650 480 74 157 155,496 327 72 114	*KD7SWL * *VE6TDW7 * *K7TR *	4,284 47 15 21 4,128 50 21 22 3,956 48 18 25	*W9FF * *N9WEW * *N9SJ *	9.249 57 26 51 8.618 62 26 36 5.600 41 21 35	*V018BN *VE1TRI *V01GXG *	61,701 173 29 102 12,402 93 27 51 5,376 70 16 32	"337T 14 10.494 101 17 36 (Op: VE3EBN)
*AA6K *N6IEF	134,166 296 65 112 121,626 279 63 111	*AE7RW *	2.888 56 20 18 2.244 31 16 18	*N9VPV * *KCBREY/9	5,600 41 21 35 4,277 37 18 29 3,969 39 21 28	*VE9IS * *VE1ADE 7	5,035 49 21 32 3,528 61 9 19	*FG1PP A 53,820 233 48 67
*AF6EV	61,410 202 52 63 56,280 193 56 64	*K09G/7 *K7PRW	2,044 33 15 13 1,944 33 16 20	*K9TCD :	3,600 34 19 29 2,322 31 21 22	*VE9ZX 3.7	32,627 260 11 48	Guatemala
*K7XE/6 *KE6SHL *W6KY	53,016 226 35 59 52,767 182 53 70 46,125 151 56 67	*K7WX0 * *N7\Z * *AD7XV *	1,876 32 13 15 1,815 39 17 16 1,080 20 14 13	*WR9Y *KB9YGD *KA9JAC	2,220 36 16 21 1,961 23 17 20 1,488 20 13 18	VE2IM A	6,091,774 4358 116 422 (Op: VE3DZ) 754,075 1640 58 159	*TG9AJR 14 315,900 1470 26 82 *TG9AJR 4,218 48 15 22
*AA6EE *K6DEX	44,520 144 45 75 30,900 143 41 59	*WBPAN/7 * *KE7NVA *	960 20 11 9 765 18 8 9	*NV9X *K9QH	1,344 22 14 18 918 24 12 15	VA2WDO :	266,178 511 61 161 70,889 207 46 87	HQ9R 7 369,728 1714 25 81
*K3FIV/6 *K6RJP	30,051 135 37 44 28,141 137 38 69	*KGPWDL *KGBAL/7	152 11 4 4 144 10 9 9	*N9IZ *KA90BZ	405 10 6 9 180 9 6 9	VE2FXL *VE2XAA A	36,312 141 32 70 786,221 1048 80 257	(Op: WQ7R)
*N6FD *W6GS *AE6YB	19,280 115 35 45 18,966 93 41 46 16,685 103 32 39	*W7SST * *N7AM *	112 6 4 4 110 5 5 5 104 5 4 4	*KC9NBE * *WB9CHY *	72 4 4 4 8 2 2 2	*VE2DX *VE2AWR *VA2RIO	199,342 506 48 139 168,640 390 42 128 55,518 199 32 82	TO7A A 6,543,120 5386 138 459 (Op: UTSUGR)
*KN6OP *AF6JX	16,182 76 38 55 9,163 73 22 27	*K7GIM * *KB7QQA *	100 17 11 10 6 1 1 1	*W9ILY 21 *W9TY	79,897 274 23 86 19,200 104 18 57	*VE2MAB *VE2LX	21,504 109 29 55 14,282 94 21 53	FM5AN 115,702 278 55 111 *FM5CW 14 7,824 69 15 33
*KGWSC *KQ6X *KD6PQF	9,072 61 29 34 8,515 75 31 34 8,007 63 22 29	*K7ZD * :	57,128 226 27 78 29,640 151 23 55 896 20 8 8	*K9PY *	17,617 91 22 57 2,310 28 10 20	*VE2GLA *VE2PLJ 14	1,170 20 11 19 6 1 1 1	Mexico XE2S A 716,598 1437 93 153
*KI6WOX *KE6QR	5,831 60 24 25 4,356 49 16 17	*W7FP 14 9	98,304 298 31 97 57,316 240 29 63	*WB8BZK/9 14	3,060 42 12 24	VC30 A	6,606,719 5099 114 397 (Op: VE3AT)	XE2K 467,454 1327 63 106 XE1GRR 445,550 1204 67 108
*AE6XC *KE6GFI *	2,555 35 17 18 2,494 33 15 14	*K7ACZ *W7ASF	47,851 182 28 81 22,253 120 22 55	KORH A	537,600 661 87 233 534,360 560 97 268	VE3CX VE3BW	1,759,320 2295 99 263 291,126 519 73 169	XE1MM 64,440 349 36 54 *XE2AU A 170,017 526 50 87
*K6CRC *K6RM *K6CSL	2,220 29 16 21 2,015 24 15 16 1,968 41 20 21	*KC7AQZ	3,038 51 14 17 1,848 31 13 15	KØAP NØIRM NCØB	373,266 507 64 203 274,890 424 75 180 254,187 505 55 128	VE3FSJ VE3MM VE3AAQ 14	115,866 295 42 115 106,863 302 52 127 994,194 2197 35 136	*XE2MX * 121,128 285 71 125 *XE1AY * 85,914 595 39 35 *XE2AUD * 14,700 120 36 39
*KI6DRN :	1,968 41 20 21 1,344 19 15 17 812 20 14 14		89,536 1250 109 323 01,561 700 91 280	NØKV WE8P/Ø	254,187 505 55 128 228,276 418 69 135 208,372 354 64 162	VE3KZ *	(Op: VO1AU) 594,400 1403 33 127	*XE1TDX : 12,483 99 31 42 *XE1ZTW : 10,248 72 29 32
*KI6ORO *	104 8 4 4 100 6 5 5	K8FL 54	44,401 595 98 253 42,133 694 73 218	KØPK NØUU	158,598 309 65 133 152,308 289 54 148	VE3MMQ * VA3TTU *	297,472 962 25 103 1,650 27 13 20	*XE1GZU 21 8,428 68 16 33 *XE1BY 14 158,310 871 21 69
*N1KR/6 *NS6T	90 5 4 5 56 7 4 3	WD8EOL . 2:	82,858 512 70 217 10,420 447 56 154 78,157 315 63 154	WØRIC WAØN KØFA	132,618 307 58 128 118,116 280 63 130	VA3XH 7 VE3PN 1.8 VE3BY	12,096 84 18 45 76,626 549 13 53 20,070 375 10 20	*XE2ANT 7 100 11 6 4
*W1BUD/6 * *W6AFA 21	20 2 2 2 159,732 538 31 77	K8DD 14	78,157 315 63 154 48,934 268 69 157 20,120 243 46 136	WØBH WØOR	105,818 305 41 116 94,350 222 53 117 71,592 198 47 105	"VA3YP A	20,070 375 10 20 593,917 1047 66 167 462,280 742 79 201	HT2N A 6,926,848 5816 129 383 (Op: K9NW)
*N6HE *N4DLA/6	2,288 38 12 14 406 14 7 7	K8MJZ K8VUS	77,550 202 48 93 64,801 194 41 96	NFØN KØGAS	53,382 162 38 85 52,578 192 49 78	*VE3TW *VA3SWG *	190,000 392 51 139 160,992 477 46 110	Panama
*K6PZB * *NY6U 14 *KI6LZ 7	260 9 6 7 297 25 5 4 39,280 199 26 54	AASBV *	64,416 219 57 126 54,522 180 28 89 36,974 117 46 93	KØALT NYØT NØUY	52,224 171 52 76 51,590 141 58 96 38,308 141 46 76	*VE3OBU *VE3AD *VE3BDN *	152,687 335 50 129 151,600 306 54 146 143,995 390 39 116	*HP3FTD A 33,616 149 34 54 *HP1RIS 28 7,888 103 11 18 *HP1RAT 100 3 3 3
*WA6WPG 3.7	2,944 43 14 18	K8QF W8HMK	31,719 124 35 74 31,610 149 35 74	WØZQ WØLSD	27,144 108 43 61 22,250 99 29 60	*VE3FH *VA3WU	125,396 274 53 135 124,763 312 52 127	*HP1BYS 21 103,016 515 24 55 *HP1ALX 14 11,819 92 16 37
K7RL A K5RR/7	2,557,412 2276 125 317 1,233,585 1226 112 283	N9RC/8 K8ME	28,314 102 30 69 28,302 124 36 70	NAØBR W7KU/Ø	9,724 68 25 43 8,576 67 24 43	*VE3TU *VA3GD *	117,162 434 50 88 105,576 271 49 117	*HP1DCP 7 4 1 1 1 Puerto Rico
K7UA K7EDX W7AT	488,244 670 83 193 458,172 757 71 163 408,676 566 100 184		28,080 114 37 71 17,936 102 22 54 7,442 57 23 38	WDØE WBCEM 14	4,606 48 22 27 3,440 33 15 25 56,079 236 24 69	*VE30M *VE3BVA *VA3TPS	82,062 217 36 105 74,408 213 46 96 71,136 199 46 98	NP4Z A 4,368,168 4261 117 369 WP4WW 21 64,854 664 17 37
NN7ZZ *	354,250 590 79 171	W8MET 21 39	6,664 43 26 42 98,426 960 28 121	WØPPF WØUA 7	14,885 86 18 47 285,824 978 32 96	*VE3RER *VE3KPP	55,296 189 36 92 48,732 386 22 40	*NP3CW A 331,968 916 52 116
WA7LT :	327,712 641 66 158 304,587 430 79 182	W8TWA 14 26	29,784 154 18 55 56,213 626 33 118 42,266 407 29 102	NØUNL *	42,300 165 27 73 (Op: WDØ8G2) 36,162 156 27 71	*VE3RCN *VE3VID *VE3JOF	32,400 126 38 70 30,305 117 28 67 30,030 145 34 71	*WP3GW 97,888 289 51 110 *KP4JFR 42,084 168 39 87 *WP4NEG 18,525 153 31 44
W7V0 :	260,253 473 82 161 253,916 429 84 163	WD8E 7 ND8DX 3.7 2	3,382 35 11 27 24,834 148 13 48	*KBCN A	308,805 460 74 181 247,902 399 72 165	*VE3MCF * *VE3YXO *	14,364 86 27 49 8,636 64 29 39	*NP3HM * 17,510 104 32 53
W7TSQ N6TW/7	216.153 405 77 142 135,915 271 69 126	W8IQ ** *N8AA A 1,25	1,606 40 8 14 92,231 1094 107 336	*WØETT *	215,830 392 72 154 166,734 360 54 123	*VE3AJ *VA3PL 21	7,384 71 24 47 15,918 146 7 35	Sint Maarten PJ7MF 7 74,586 353 22 71
NF7E KI7M WD7K	123,794 276 67 120 102,306 250 73 104 100,724 328 60 89	*KBSUHN *	92,850 563 74 196 93,760 235 47 113 83,691 242 51 102	*ABBLR *KBJJM *WABLJM	161,704 313 78 154 149,145 322 54 129 65,706 194 50 91	*VE3KF *VE3RHO 14 *VE3RSA 7	192 6 6 6 14,274 99 15 46 3,895 34 11 30	*PJ7/AH8DX 21 539,532 1833 28 98 (Op: AH8DX)
KO7X NE9Z/7	99,528 238 60 114 96,960 253 64 128	*KCBBOM * 6	69,600 198 48 112 69,020 207 39 106	"WBELT "	52,204 172 40 84 48,922 162 38 84	*VE3FRX 3.7 *VE3LKV	26,961 448 9 24 17,214 264 9 29	St. Kitts & Nevis A 3,771,108 3863 107 321
KD7MSC KS7T W78JB	95,956 251 64 97 94,809 228 58 111 93,150 230 54 108	"WS6K/8 "	83,318 186 33 89 54,540 175 49 86 50,375 159 43 82	*KØKP *	40,020 144 33 82 25,112 104 30 56 21,266 102 41 57	"VE3EDY 1.8 VE4EAR A	4,770 194 7 8 631,224 1101 79 185	U.S. Virgin Islands
K9JDV/7 K7LV	59,040 171 51 72	*KD8GOX *	43,732 150 35 81 30,414 107 40 71	TLYBW"	21,054 128 31 56	*VE4YU A	96,543 252 48 105 15,824 100 39 47	NP2N 14 342,496 1411 25 87
N9RV/7 N6TR/7	52,136 148 51 82	*W8GOC *	30,388 131 38 66 26,361 108 33 68 23,569 107 28 63	*WBØIEL *WØRO	18,785 78 30 55 18,060 102 27 57	VESCPU A	28,314 232 31 35	*NP2KW A 982,926 2033 73 188 *KP2DX 224,081 737 50 93
WG7X NG7Z	37,050 156 38 57 36,920 158 56 74 36,176 128 44 68 34,814 152 37 66 21,896 97 39 53	*KDBHNI * **********************************	30,388 131 38 66 26,361 108 33 68 23,569 107 28 63 17,670 83 34 61 15,554 80 27 50	*KDØCVZ *NØGOS *NØYAX	13,937 85 31 46 6,063 65 20 23 5,934 56 18 28	VESFX 14 *VESZX A *VESAAD	69,696 197 30 102 417,502 1034 65 134 6.160 70 19 21	AFRICA (Op: KP28H)
K7XV KN7K	21,896 97 39 53 20,400 117 34 41	*W88LZA *	13,494 72 33 45 12,267 82 31 56	"WS8Z "KABLL	5,450 57 19 31 5,280 64 25 30	*VASLF	1,680 29 16 14	African Italy IG9/IZADN 28 110,850 547 17 58
KI7DG KE7DX W7PU	19,440 97 32 49 18,011 104 33 50 16,815 84 31 64	*N8000 * *KDBJAM * *N20PW/8 *	9,520 76 28 40 8,949 71 19 38	*WOHBH * *KJØP * *WBØGAG *	4,140 39 17 28 3,772 82 23 23	VESFN A VESJY 14	119,472 472 53 78 580,272 1516 37 131 (On: VESMX)	*IH9YMC 21 17,055 130 9 36
W7UG W7CAR	15,296 110 25 39 14,931 106 24 39 13,140 80 36 37	*KD8GRG *N8NOE	7,192 63 28 34 6,633 73 26 41	"WBGLB "	3,655 40 20 23 3,486 47 20 22 3,330 34 17 28	VE6WQ 7 "VE6BF A	(Op: VE5MX) 69,125 435 25 54 71,445 235 52 83	Canary Islands EASKK A 777,101 959 72 227
W7TYN WR5G/7	12.320 72 33 47	*WFBP	5,768 42 27 29 5,250 44 15 35	*N020/8 *	1,960 24 16 19 1,927 39 18 23	*VE6ZC	30,108 201 37 41	EABCOI 109,548 265 49 104 EABCER 60,794 198 33 80
NB7V AD7XZ N7VS	9,750 102 18 21 9,384 78 31 38 8,313 84 24 27 7,089 63 26 25	*NRSU *KBEM *KDBHHG	5,141 48 26 27 4,816 50 22 34 4,472 39 21 31	*WBNFS * *KABLDG * *NBZC *	3,330 34 17 26 1,960 24 16 19 1,927 39 18 23 1,800 30 15 21 1,326 26 15 19 380 14 10 10 336 13 8 8	*VE6KX	2,691 33 18 21 143 6 6 5 100 22 9 8	EASKV 53,730 219 41 94 EASKV 18,040 104 26 56 EASMT 21 582,840 1682 28 92
KG7P	7,089 63 26 25	*WASUMT *	2,808 37 11 25	-KBBW *	336 13 8 8	VA7ST A	414,580 1020 61 129	*ECSAFM A 192,030 329 56 166

CONTRACTOR ASSESSMENT																					
*EA8AJO *ED4R/8	143,6 124,8		*UA9CIM *RA9MLR *RZ9YF	28 20	925 276 1,800	15 10 9 5 173 16	15 *BG1ES 7 *BG8G 48 *BG6B		363 360 260	34 14 12 7 16 10	4 19 7 8 0 10	*JH1FNU *JJ1WWL		3,534 2,178 1,725	47 24 31	18 20 15 18	*JR6GIM *JA6DIJ *JS60FT	14	88,290 50,310 2,356		1 78 8 62 2 19
*EABEU *EABDD	119,6 13,6	30 262 54 133 18 62 35 49	*RA9RR *RU9WZ	14	4,208 0,332	102 17 103 18	47 *BG4M 45 *BD4JV	VU -	252 252	18 S	9 12	*JA1LBZ *JM1RQS *JN18B0		729 720	24 14	12 15 8 12	*JS6RTJ	3.7	6	32 1	1 1
*EASBGO *EASIK *EASUP	14 100,4 35,5 7 9,5	18 154 21 65	*RA9UAG *RU9UG *UA9JMB		323 1,150	69 14 12 9 374 21	34 *BG5DI 8 *BG4A0 78 *BD7RI	. v.	196 176 147	14 6 8 5	6 8 6 8	*JR1AHP *JA1HG *JL1CNY	101	638 500 492	11 14 16	8 12	JA7NVF JA7BME JA7COI	A	1,436,925 549,046 501,521		6 241 8 173 0 151
D44AC	Cape Ve	de	*RA9FEL *UA9AX *UA9OF	65	5,518 5,100 2,802	318 15 151 25 196 14	67 *BG4EF 75 *BA4VE 57 *BG6J0	V	96 90	6 4	4 4 6	*JN1DNV *JN1IZR *JA1WWE	28	286 16,728 11,616	10 169	6 7 20 35 19 29	JATIC JATAKH JATKY	-	463,882 341,130 330,330		0 184 8 108
D44AC		(Op: IK2NCJ)	*RW9U08 *UA9QCQ	14 497	7,645 7,490 1	182 13 1147 36	44 *BG6IC 125 *BD4RI	0 :	84 80 75	12 6	5 5	*JA1MYW *JI1HFJ		6,622 6,068	72 68	17 26 16 25	JG7AMD JA7JH	28	13,482 7,339	91 2 73 1	9 34 5 26
EAGIE	THE RESERVE AND ADDRESS OF THE PARTY OF THE	00 2478 74 276	"RV9JR "RX9FG	. 66	2,195 5,174 3,848	472 21 328 18 250 13	74 *BG6JI 64 *BG3NI 59 *BG4ID	OT *	56 45	7 5	4 4	"JA1SKE "JA1AAT		2,500 630 290	18 11	7 7 5 5	JA7DOT JE7YSS	21	101,031 56,304	278 2	3 86 4 48 N4TEN)
SR8FU	A 875,7		*RA9AP *RX9KD *RA9UGU	* 32	5,582 2,500 5,176	204 13 283 14 131 15	54 51 *BG4S0 41 *BD7N		24 40,020	(Op: BG 5 3	3 3 7 41	*7K4XNN *JI1ALP *JH1S8E	21	85,600 25,631 18,496	353 150 124	30 70 25 46 23 41	JA7FTR JH7XMO JA7XBG	14	487,778 484,560 424,280	1376 3 1424 3 1122 3	7 105 7 107 5 105
*CT3HF *CT3FJ	Madeira Is A 198,2	31 315 35 94	*UA9OKM *UA9ODE *RW9CD	15	5,080 2,225 9,800	119 11 68 23 364 16	47 *BD4SS 52 *BA6IV 68 *BL7IN		12,818 12,150	0.000	9 39	*JM1IMF *JATRYC *JK1BII		13,166 12,900 3,348		20 38 19 35 15 21	JA7BJS JG7EHM JA7KQC		162,564 3,570 234	668 2 39 1	7 66 4 21
*388GT	Mauriti 14 138,6	ıs	*RW9RA *UA9FKH *RK9XA	12	2,384 1,540	107 10 43 4 10 9	38 *BA1G! 10 *BA7C!	14	114,958 38,175	611 30 264 17		*7K1EQG *JA1JLP		2,475	41 32	13 20 10 12	*JH7CU0	A	88,956 35,640	133 4	6 64 6 64
	Moroco	0	*UA9ACJ	3.7 11 1.8 2	418 1,168 2,047	103 7	33 *BD4J8 18 *BG5U0	ig .	1,378	35 12	7 58 2 14 3 3	*JE10CL *JM1KNI *JP10DH	*	1,300 720 16	27 20 2	8 12 6 10 2 2	*JA7HYS *JA7SSP *JI7EMD	14	28,072 13,561 5,292	74 2	1 65 1 40 10 29
CN2R *CN8YE	A 13,526,0 A 168,6	(Op: W7EJ) 70 393 47 120	RZØSR RKØUT		5,976 1	1559 83	*BG6A) 332 *BG1T) 201 *BD4IB	OU T	1,848	40 5	9 19	*JF1TEU *7M1MCT *JE1G28	14	42,640 31,974 11,495	161	26 54 22 51 21 34	*JI7GYU JABECS	A	798	Contract of	0 11
*CN4P	14 56,9	50 353 14 50 (Op: CNBNK)	RWOLT RWOUU	346	8,960 8,394 7,548	940 88 523 107 852 64	247 195 138 C4M	3.7	Cyprus 95,844	461 13	3 71	*7K1PTO *JK1ECO *JG1GCO		8,796 6,535 3,880	103 67 48	20 33 19 30 17 23	JABDIV JABRWU JH8SIT	14	116,643 767,998 20,865		6 111 6 118 9 46
6W1RY *6V70	A 6,046,5 A 2,846,8	50 4451 110 400	RABFU RWBAG RUBLL	152	1,878 2,424 4,384	621 81 529 60 371 70	145 114 *H2E 122 *58/HA	A	534,882 806,680		4AGM) 7 147	*JL7FBV/1 *JH1RDU *JG1LMT	7	1,804 396	30 13	10 12 6 5	*JABMXC *JABCSY	7 A	1,872- 122,988 53,020	30 1 298 6 211 4	2 12 4 108
0470		(Op: F8LJV)	RABJBL UABACG	121	1,524 8,640	359 56 204 52	108 °C4Z 100	41. 41	450,424	1256 33		*JE1SPY *JG10WV	3.7	2,117 608	47 15	14 15 7 9	*JEBKKX		12,709 357	106 3	0 41
*S79MI	A 11.7	65 27 45	RVBCD RWBCF RXBAK	38	7,190 8,841 2,402	241 39 149 40 79 26	71 81 52 4L8A	14	Georgia 1,452,378	3124 38	8 136	JA2PAC JR2PMT	Ä	1,263,100 321,724	1595 1 491	14 226 99 170	*JISBUR *JHSDHV *JKSNIP	21	22,620 1,920	148 2 33 1	
9L18TB	Sierra Le	75 67 32 43	UABCW RUBAK RABUF	. 4	0,974 4,725 304	89 26 55 27 29 8	34 *4L1FP 36 *4L6DL	14	342,820 137,952	1090 25 578 21		JAZBNN JEZDJC JGZCNZ		231,858 187,488 135,622	382 318	75 123 71 145 77 89	JF9KVT JA9CCG	A 14	59,685 1,809	239 4 30 1	7 68 3 14
ZS1EL ZS2I	South Aft A 138,8 93,4	52 311 48 126	RKBAB RABAA UABSW	* 95	5,661 0,560	503 24 518 20 402 19	93 61 VR2VIY 65 VR288	9EAG 25	Hong Kong 480 88,464	35 12 728 20	2 18 0 56	JAZIVK JFZQNM JHZBTM	21	89,265 132,587 26,320	257	68 97 27 64 23 47	JH9URT *JA9EJG *JH9KVF	7 A 21	11,610 2,625 139,113	94 2 26 1 500 3	0 34 3 22
ZS1SR *ZS4JAN	14 98,5 14 22,5	23 305 34 89	*UABSDX *UABCNX *RWBAA	A 328	9,585 0,925	585 64 695 58	197 *VR2P) 107 *VR2IZ 126 *VR2Z	A	228,592 50,398 155,701	579 68 299 49 929 21	8 140	*JA2CUS *JR2ECF	A	288,288 97,755	501 244	90 162 63 84 JF1EQA)	*JA9TQY *JE9M8V/9 *JA9QQY	1	50,736 4,944 1,952	240 2 45 1 26 1	5 59 6 32 5 17
ST2KSS	21 2,029,6		*UABAKY *RABSMS *RABLE	115	5,391 3,324 2,888	339 60 306 54 289 45	113 *VR2PI			175 26		*JA2GHP *JA2KPW *JR2PAU		75,628 61,177 57,130	219	61 85 53 78	*JR9GMS *JR9NVB	14 7	41,958 21,168	222 2	3 58 4 39
cuper	Tanzan	a	*UABSR *BABAY	55	5,266 1,910	227 41 176 33	81 VU2PAI 77 VU2SW	S T	3,577,172 180,264	2906 114 317 63		*JA2CPD *JG2SON	28	5.096 7,600	44 75	54 91 26 26 16 24	JABJHA JRØWZR	A	4,342,832 157,934	3848 12 325 7	8 304
SH3EE	21 1,164,8	(Op: DL4SM)	*RZØSB *UAØAPV *RWØCOA	26	2,942 5,228 3,146	153 24 132 20 115 32	57 *VU2R0 59 *VU3U8 54 *VU3D	N .	38,888 30,475 15,447	122 33 148 34 110 14	4 81	*JH2MYN *JA2PFO *JG2CNS	21	3,471 22,050 3,300	52	16 23 21 42 12 21	JABGCI JABUMV JRDGUY	28	7,785 72,956 14,147	330 2 128 2	8 27 9 63 10 27
*3VBSF	14 Tunisi 14 49,2	80 324 11 53	*UADZC *UADSQX *RUBSU	. 2	2,700 2,088 3,745	33 17 34 14 60 13	28 15 22 4X/EA5	RM A	Israel 1,527,708	2195 60	0 213	*JR2AAN/2 *JQ2OUL *JF2FKJ		1,400 1,000 16	29 28 3	9 16 10 10 2 2	JARRD JARGEY *JHRNEC	14 A	391,635 5,031 261,118	1139 3 51 1 439 8	16 99 13 26 19 153
EWNEA	ASIA	3	*UAGOD *RNBCF *RWECV	14 232	1,189 2,960 1	36 11 1017 29 289 21	18 *4Z5LZ 83 *4Z5PJ 47 *4Z5LX	A	179,416 41,538 33,354	407 50 134 39 165 40	0 114	*JG2KKG *JF2WXS *JE2OTM	14 7	335,988 19,908 1,914	138	37 116 28 56 13 16	*JAØNFP *JAØRCK		35,750 23,100 5,974	128 3 117 4 37 2	18 72 11 59 14 34
EK3SA EK6YL *EK3GM	A 769,6 A 3,7	98 14 9 13	*RAØWU		7,686	83 11	31 *4Z5TK *4Z5FI	21	21,437 17,860	97 33 144 12	3 64	JA3AOP JR3NZC	A	829,274	1185	92 186	*JAGAVS *JROBUL	28	5,405 2,054	50 1 35 1	9 28
				ASIBIIC	rurkey		*4Z5M\	1	11,664	82 9	9 45	JHONZE				87 178	*JHØEPI	14	196,650	642 3	0 84
RC90	Asiatic Ru A 6,629,0	93 4717 127 420	TAZZAF	28 18	1,492	140 8 (Op: OK1)	38 MU)		Japan			JA3IKG JA3EY	-	679,725 186,989 161,130	397 343	87 178 69 122 74 131	*JGØEKW	9.	14,364		3 40
UA9QA	A 6,629,0 - 1,207,8	93 4717 127 420 (Op: UA9PC) 84 1202 86 296	YM3A *TA2/DL780	28 18 7 237	7,873	(Op: OK1) 846 26 (Op: LZ1	MU) 85 JQ1BVI NK) JE1LFX	A	1,320,462 1,060,113	1665 111 1415 100	0 191	JASIKG	21	186,989 161,130 792 26,574	397 343 14 150	69 122		A 21	14,364 Jordan 1,004,542		2 190
UA9QA UA9JDP RA9FTM RA9AAA	A 6,629,0 1,207,8 1,025,0 931,9 885,1	93 4717 127 420 (Op: UA9PC) 84 1202 86 296 80 1452 61 219 53 1061 78 263 89 1066 87 240	YM3A *TA2/DL780 *TA4AU *TA7EB	28 18 7 237 C A 1,198 198 171	3,492 7,873 3,528 1 9,189 1,990	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30	MU) 85 JQ1BVI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI		1,320,462 1,060,113 694,860 483,360 473,204	1665 111	0 191 9 251	JASEY JASEY JASEY JASEQ JASEZ JHSGCN JFSGKE	21 14 7	186,989 161,130 792 26,574 63,245 43,424 6,946	397 343 14 150 254 191 68	69 122 74 131 11 11 26 60 26 65 28 64 22 24	*JYSCC *JY4NE	A 21	Jordan 1,004,542 410,146 Kampuchea	97 2 1509 5 1411 2	3 40 32 190 4 79
UA9QA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5	(Op: UA9PC) (Op: U	YM3A *TA2/DL780 *TA4AU	7 237 C A 1,198 196 171 21 43	7,873 7,873 8,528 1 8,189 1,990 1,998 104	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39	MU) 85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1FNO		1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160	1665 111 1415 100 739 119 815 76 669 98 358 58 187 55 129 49	9 251 6 164 8 183 8 117 5 91 9 75	JASING JASEY JASAVO JASPCQ JASLEZ JHSGCN JFSGKE *JHSCUL *JMSPLL *JOSPSJ/3	21 14 7 A	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670	397 343 14 150 254 191 68 661 1 139 166	69 122 74 131 11 11 26 60 26 65 28 64 22 24 00 205 49 78 40 55	*JGSEKW	A 21	Jordan 1,004,542 410,146 Kampuchea 93,465	97 2 1509 5 1411 2 595 2	3 40 32 190 4 79
UA9QA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9QQ	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6	4717 127 420 (Op: UA9PC) 84 1202 86 296 80 1452 61 219 83 1061 78 263 89 1066 87 240 98 1002 90 276 72 689 53 179 94 570 72 205 19 513 77 202 19 513 77 202 10 442 56 174 10 388 42 145	*TA2/DL780 *TA4AU *TA7EB *TA2IK/6	28 18 7 237 C A 1.198 198 171 21 43 Azerba A 29	7,873 7,873 8,528 1 8,189 1,990 1,998 104	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1FNO JA1IXY 74 JO1SIN 53 JF1AZO		1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177	1665 111 1415 100 739 119 815 76 669 98 358 58 187 58 129 49 118 55 125 36 79 23	9 191 9 251 6 164 8 183 8 117 5 91 75 79 6 52 3 34	JASING JASEY JASAVO JASPCQ JASLEZ JHSGCN JFSGKE *JHSCUL *JMSPLL *JOSPSJ/S *JASHBF *JOSRCK *JASUWB	21 14 7 A	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027	397 343 14 150 254 191 68 661 139 166 133 104 75	69 122 74 131 11 11 26 60 26 65 28 64 22 24 00 205 49 78	*JGGEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM	A 21	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232
UA9QA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9QQ RW9DX RA9MJ UA9AGX	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2	4717 127 420 (Op: UA9PC) 84 1202 86 296 80 1452 61 219 83 1061 78 263 89 1066 87 240 98 1002 90 276 72 689 53 179 74 570 72 205 75 689 53 179 76 570 72 205 77 202 78 388 42 145 78 388 42 145	*TA2/DL780 *TA4AU *TA7EB *TA2IK/6 *TA2/TA1CM	28 18 7 237 C A 1.198 198 171 21 43 Azerba A 29	7,873 3,528 1,890 1,990 1,098 104 aijan 1,197 5,354	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30 370 16 4 4	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1FNO JA1IXY 74 JO1SIM		1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139	1665 111 1415 100 739 119 815 76 669 98 358 58 187 58 129 49 118 58 125 36 79 23 71 28 29 19	9 191 9 251 6 164 8 183 8 117 5 91 75 79 6 52	JA3IKG JA3EY JA3AVO JA3PCQ JA3LEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *J03PSJ/3 *JA3HBF *J03RCK *JA3UWB *JI30GI *JR3SZZ/3 *JN3CSF	21 14 7 A	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715	397 343 14 150 254 191 68 661 139 166 133 104	69 122 74 131 11 11 26 60 26 65 28 64 22 24 00 205 49 78 40 55 33 60 44 57	*JGØEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J	A 21 21 A	14,364 Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114
UA9QA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9QQ RW9DX RA9MJ	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8	4717 127 420 (Op: UA9PC) 44 1202 86 296 50 1452 61 219 53 1061 78 263 59 1056 87 240 58 1002 90 276 72 689 53 179 54 570 72 205 59 513 77 202 59 513 77 202 50 442 56 174 51 388 42 145 51 348 40 123 58 316 45 138 58 316 45 138 59 236 37 95	*TA2/DL780 *TA4AU *TA7EB *TA2IK/6 *TA2/TA1CM *4K9W *4K8M BD2BT *BD1TCC *BA1SN	28 18 7 237 C A 1.198 198 171 21 43 M Azerba A 29 28 16 Chit 7 A 239 " 224	1,492 7,873 8,528 1,89 1,990 1,998 104 aijan 9,197 6,354 na 672 9,749 1,432	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1RO JA1XY 74 JO1SIN 53 JF1AZO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JA1MJI JN1RO JN1R		1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134	1665 111 1415 106 739 119 815 76 669 98 358 58 187 55 129 49 118 58 125 36 79 23 71 28 28 13 127 19 74 16	9 191 9 251 66 164 88 183 88 117 75 91 75 79 66 52 33 34 46 9 24 11 9 30 6 25	JA3IKG JA3EY JA3AVO JA3PCQ JA3LEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *J03PSJ/3 *JA3HBF *J03RCK *JA3UWB *JI3OGI *JR3SZZ/3	21 14 7 A	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651	397 343 14 150 254 191 68 661 139 166 133 104 75 24	69 122 74 131 11 11 26 60 26 65 28 64 22 24 00 205 49 78 40 55 33 60 44 57	*JGEEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF	A 21	14,364 Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102
UA9QA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9GO RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9UPG	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 109,3 77,1 76,6	4717 127 420 (Op: UA9PC) 84 1202 86 296 80 1452 61 219 83 1061 78 263 89 1066 87 240 88 1002 90 276 72 689 53 179 94 570 72 205 19 513 77 202 19 513 77 202 10 442 56 174 10 348 40 123 10 348 36 37 95 (Op: RZ900) 154 29 106 10 35 102 22 51	*TAZ/DL7BC *TA4AU *TA7EB *TAZIK/6 *TAZ/TA1CM *4K9W *4K8M BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7	28 18 7 237 C A 1.198 196 171 21 43 A 29 28 16 Chir 7 239 24 206 152 65	1,492 7,873 8,528 1,890 1,990 1,098 104 aijan 1,197 5,354 na 672 1,749 1,432 5,438 2,523 5,835	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1KY 74 JO1SIN 53 JF1AZO JA1MJI JN1RQV 9 7J1ABC 128 JH10CI 137 JA1VR 152 JA1QGI 124 JH1CM 87 JJ1RDX	28	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100	1665 111 1415 100 739 119 815 76 669 98 358 58 187 58 129 49 118 55 125 36 79 23 71 28 29 10 28 13 127 16 62 17 58 14	9 191 9 251 164 8 183 8 117 75 79 75 79 75 79 6 52 33 46 46 24 11 30 66 77 22 4 5 5	JASING JASEY JASAVO JASPCQ JASLEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *J03PSJ/3 *JA3HBF *J03RCK *JA3UWB *JI30GI *JR3SZZ/3 *JN3CSF *J03MXH *JL3MCM *JA3KDJ *JF3BFS *JR3RIY	7. A	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160	397 343 14 150 254 191 68 661 139 166 133 104 75 24 15 77 4 77 24 524 504	69 122 74 131 11 11 26 60 26 65 28 64 22 24 9 78 40 55 33 60 44 57 25 26 9 14 10 11 6 7 4 4 17 24 10 15 32 76 75	*JGBEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J UN7PL	A 21 21 A	14,364 Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196	97 2 1509 5 1411 2 595 2 (Op: JJ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: 1503 2 2800 3	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133
UA9QA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9QQ RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9UPG UA9UPG UA9CGL RA9DR RV9CQ	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6	4717 127 420 (Op: UA9PC) 44 1202 86 296 30 1452 61 219 33 1061 78 263 39 1056 87 240 38 1002 90 276 72 689 53 179 04 570 72 205 49 513 77 202 90 442 56 174 91 388 42 145 91 348 40 123 58 316 45 138 44 273 60 141 59 316 46 85 92 236 37 95 (Op: RZ900) 35 154 29 106 58 102 22 51 14 60 17 37 75 20 14 17 74 11 7 10	*TA2/DL786 *TA4AU *TA7EB *TA2IK/6 *TA2/TA1CM *4K9W *4K8M *BD2BT *B01TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI	28 18 7 237 C A 1.198 198 171 21 43 M Azerba A 29 28 16 Chii 7 A 239 152 152 152 153 153 153	1,492 7,873 3,528 1,890 1,990 1,998 104 aijan 1,197 5,354 na 672 1,749 1,432 5,438 2,523 5,835 5,240 7,630 5,186	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1AJK JA1AJK JA1KY 74 JO1SIN 53 JF1AZO JA1MJI JN1RON 9 7J1ABO 128 JH10CI 137 JA1VR 152 JA1OG1 124 JH1CM 87 JJ1RDN 65 JN1ND 70 JA1LZR 68 JF1DM	28	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112	1665 111 1415 100 739 119 815 76 669 98 358 58 187 58 129 46 118 55 125 36 79 23 71 28 29 16 28 13 127 19 74 16 62 17 58 14 7 19 58 31 598 31 598 31	0 191 9 251 6 164 8 183 8 117 75 79 75 79 5 52 34 46 9 24 11 9 30 6 25 7 7 15 5 103 1 71 6 43	JASING JASEY JASEY JASEY JASEY JASEZ JASEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3PL *JM3PL *JM3PL *JM3PL *JM3PL *J	7. A	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324	397 343 14 150 254 191 68 661 139 166 133 104 75 24 15 7 4 77 24 524 524 504 261 132 37	69 122 74 131 11 11 26 60 26 65 28 64 22 24 00 205 78 40 55 33 60 44 57 25 26 9 14 10 11 6 7 4 4 17 24 10 15 32 76	*JGBEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10	A 21 21 A	14,364 Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488	97 2 1509 5 1411 2 595 2 (Op: J/ 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: U 2800 3 (Op: U 2530 3 373 2	2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91
UA9GA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9GO RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9CD UA9UPG UA9CGL RA9DR RV9CQ UA9CSA UA9FGJ RA9CB	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 28 10,1 21 229,2 168,6	4717 127 420 (Op: UA9PC) 34 1202 86 296 30 1452 61 219 33 1061 78 263 39 1066 87 240 38 1002 90 276 72 689 53 179 34 570 72 205 49 513 77 202 442 56 174 91 388 42 145 10 348 40 123 58 316 45 138 44 273 60 141 59 316 46 85 92 236 37 95 (Op: R2900) 35 154 29 106 58 102 22 51 60 17 37 75 20 14 17 71 19 45 38 709 25 97 90 668 20 80	*TA2/DL786 *TA4AU *TA7EB *TA2IK/6 *TA2/TA1CM *4K9W *4K9W *4K8M BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG4MCG	28 18 7 237 C A 1.198 198 171 21 43 A 29 28 16 Chir 7 A 239 24 206 152 65 45 37 36 36 36 36 36 37 36 37 36 37 38	1,492 7,873 8,528 1,890 1,990 1,998 104 aijan 1,197 5,354 na 672 1,749 1,432 5,438 2,523 5,835 5,240 7,630 6,186 0,470 9,700 5,500	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1KY 74 JO1SIN 53 JF1AZO JA1MJI JN1ROV 128 JH1OC 137 JA1VR 152 JA1OG 124 JH1CM 87 JJ1RD 65 JN1ND 70 JA1LZR 65 JG1QK 65 JG1QK 65 JG1QK	28 21 14	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596	1665 111 1415 100 739 119 815 76 669 98 358 58 187 58 129 45 118 55 125 36 79 23 71 28 29 10 28 13 127 16 62 17 58 14 7 4 18 62 17 58 14 598 38 598 38	0 191 9 251 6 164 8 183 8 117 75 79 75 79 5 52 34 46 9 24 11 9 30 6 25 7 7 15 5 103 1 71 6 43	JASING JASEY JASEY JASEY JASEY JASEZ JASEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *J03PSJ/3 *JASHBF *J03RCK *JASUWB *JI30GI *JR3SZZ/3 *JN3CSF *J03MXH *JL3MCM *JASKDJ *JF3BFS *JR3RIY *JASBBG *JR3RAH *JASPYH *JI3CJO *JN3DSH	7. A	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 134,160 50,908 14,016 2,324 2,030 629 75,810	397 343 14 150 254 191 68 661 139 166 133 104 75 24 15 7 4 77 24 524 504 261 132 37 32 20 313	69 122 74 131 11 11 26 60 26 65 28 64 22 24 00 205 78 40 55 33 60 44 57 25 26 9 14 10 11 6 4 17 24 10 15 76 78 10 15 76 77 10 77 10 77	*JGGEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8FT *UN6LN	A 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: U 2530 3 373 2 188 1 272 1 702 3	2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100
UA9QA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9QQ RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9CGL RA9DR RA9CB UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMO	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 28 10,1 21 229,2 168,6 120,7 120,4 21,6	4717 127 420 (Op: UA9PC) 44 1202 86 296 1452 61 219 53 1061 78 263 59 1066 87 240 98 1002 90 276 72 689 53 179 74 570 72 205 442 56 174 91 388 42 145 90 442 56 174 91 388 42 145 91 348 40 123 58 316 45 138 44 273 60 141 59 316 46 85 92 236 37 95 (Op: RZ900) 35 154 29 106 58 102 22 51 74 11 7 10 75 20 14 17 75 20 14 17 77 11 7 10 77 19 45 78 709 25 97 90 668 20 80 58 489 24 97 55 442 24 85 48 138 14 52	*TAZ/DL780 *TAZ/DL780 *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *4K9W *4K8M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG6AHU *BG6AHU *BG4MCG *BT4NG *BG4MR	28 18 7 237 C A 1.198 196 171 21 43 A 29 28 16 Chir 7 239 224 206 152 65 45 37 36 36 37 36 37 36 37 36 37 38 37 38 38 38 38 38 38 38 38 38 38 38 38 38	1,492 7,873 8,528 1,890 1,990 1,998 104 aijan 1,197 5,354 na 672 1,749 1,432 5,438 2,523 5,835 5,240 7,630 6,186 0,470 9,700 6,186 0,470 9,700 4,840 4,014	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28	74 JA1AJK JA1AZO	28 21 14	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 398,125 103,836 61,596 520 96 11,394	1665 111 1415 106 739 115 815 76 669 96 358 58 187 55 129 46 118 58 125 36 79 23 71 28 28 13 127 16 62 17 58 14 598 31 598 31 598 31 102 26 832 33 414 31	0 191 9 251 164 8 183 8 117 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 75 75 75 75 75 75 75 75 75 75 75 75	JASING JASEY JASAVO JASPCQ JASLEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3PLL *JM3PLL *JM3PLL *JM3PLL *JM3PSJ/3 *JA3HBF *JM3CK *JA3UWB *JI3OGI *JR3SZZ/3 *JM3CSF *JM	7 A 28 21	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,818 60,480 49,056 45,920	397 343 14 150 254 191 68 661 139 166 133 104 75 24 15 7 4 77 24 524 504 261 132 37 32 20	69 122 74 131 11 11 26 60 26 65 28 64 22 24 9 78 40 55 33 60 44 57 25 9 14 10 15 76 75 28 61 27 75 28 61 27 75 28 61 27 75 28 61 27 75 28 61 27 75 28 61 27 75 28 65 28	*JGGEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN6G *UN6G *UN6H *UN7JX *UN7JX *UN7RL *UN7CN	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: 1603 2 2800 3 (Op: 12530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 63
UA9GA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9GO RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9UPG UA9UPG UA9CGL RA9DR RV9CQ UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMD UA9XLC UA9CLB RZ9OJ	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 28 10,1 21 229,2 168,6 120,7 120,4 21,6 8,6 14 918,8 111,4	4717 127 420 (Op: UASPC) 44 1202 86 296 1452 61 219 53 1061 78 263 59 1066 87 240 98 1002 90 276 72 689 53 179 74 570 72 205 442 56 174 91 388 42 145 91 348 40 123 58 316 45 138 44 273 60 141 59 316 46 85 92 236 37 95 (Op: R2900) 35 154 29 106 58 102 22 51 60 17 37 75 20 14 17 75 20 14 17 75 20 14 17 75 20 14 17 75 20 14 17 75 20 14 17 75 20 14 17 76 11 7 10 77 19 45 78 709 25 97 90 668 20 80 58 489 24 97 58 489 24 97 58 489 24 97 58 489 24 97 58 489 24 97 58 489 24 97 58 489 31 33 50 2295 37 129 58 475 19 70	*TA2/DL786 *TA4AU *TA7EB *TA2IK/6 *TA2/TA1CM *4K9W *4K8M *4K8M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG4MCG *BT4NG *BG4MR *BG4MCG *BT4NG *BG4MR *BG4MCG *BT4NG	28 18 7 237 C A 1.198 198 171 21 43 A 29 28 16 Chii 7 A 239 24 206 152 65 45 37 38 38 38 38 38 38 38 38 38 38 38 38 38	1,492 7,873 8,528 1,890 1,990 1,998 104 aijan 1,197 5,354 na 672 1,749 1,432 5,438 2,523 5,835 5,240 7,630 5,186 0,470 9,700 5,500 4,840 4,014 3,351 1,856 1,856 1,856	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1AJK JA1AJK JA1KY 74 JO1SIN 53 JF1AZO JA1WI 152 JA1OG1 124 JH1CM 87 JJ1RD 65 JN1ND 70 JA1LZR 65 JG1GK 46 7K4QOI NU) JR1BAS 46 7K4QOI NU) JR1BAS 49 JH1APP 51 JQ1OCF 45 *JQ1AE 46 *JJ1VR	28 21 14 14 17 A	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 388,125 103,836 61,596 520 96 11,394 360 280,296 261,602	1665 111 1415 100 739 119 815 76 669 98 358 58 187 58 129 16 28 13 127 16 62 17 74 16 62 17 58 14 77 18 62 17 74 18 62 17 74 18 62 17 74 18 62 17 74 18 77 18 78 18 79 28 71 28 71 28 71 28 72 18 73 18 74 18 75 18 76 18 77 18 77 18 77 18 77 18 77 18 77 18 78 1	0 191 9 251 164 8 183 117 75 79 55 79 55 79 55 79 55 79 55 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 70 70 71 71 71 71 71 71 71 71 71 71 71 71 71	JASING JASEY JASAVO JASPCQ JASLEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *J03PSJ/3 *JA3HBF *J03RCK *JA3UWB *JI3OGI *JR3SZZ/3 *JN3CSF *J03MXH *JL3MCM *JASKDJ *JF3BFS *JR3KJ *JF3BFS *JR3RIY *JF3IYW *JA3BBG *JR3KAH *JA3PYH *JI3CJO *JN3DSH *JJ3JHP *JA3DAY	7 A 28 21	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,818 60,480 49,056	397 343 14 150 254 191 68 661 139 166 133 104 75 24 15 7 4 77 24 524 524 524 524 524 524 524 524 524	69 122 74 131 11 11 26 60 26 65 28 64 22 24 20 205 78 40 55 33 60 44 57 25 26 14 10 15 7 24 10 15 32 76 78 40 17 40	*JGGEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J UN7QF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6LN *UN7JX *UN7CN *UN7CN *UN9GD	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 6 58 9 63 2 26
UA9GA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9QQ RW9DX RA9MJ UA9QQ RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9CD UA9CD UA9CGL RA9DR RV9CQ UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMO UA9KLG UA9CLB RZ9QJ RK9DM RK9YWE	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 28 10,1 21 229,2 168,6 120,7 120,4 21,6 8,6 141,4 105,5 71,9	4717 127 420 (Op: UASPC) 44 1202 86 296 1452 61 219 3 1061 78 263 39 1066 87 240 38 1002 90 276 72 689 53 179 74 570 72 205 49 513 77 202 442 56 174 91 388 42 145 91 348 40 123 388 42 145 91 348 40 123 58 316 45 138 44 273 60 141 59 316 46 85 92 236 37 95 (Op: RZ900) 35 154 29 106 58 102 22 51 46 0 17 37 75 20 14 17 74 11 7 10 75 20 14 17 77 10 77 77 11 7 10 78 79 25 97 90 668 20 80 58 489 24 97 58 475 19 70 12 398 24 85 13 398 24 85 10 398 24 85 11 398 25 66 (Op: RASPYTX)	*TA2/DL786 *TA4AU *TA7EB *TA2IK/6 *TA2/TA1CM *4K9W *4K8M *4K8M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG4MCG *BT4NG *BG4MR *BG4MCG *BT4NG *BG4MR *BG4SYB *BG1QEX	28 18 7 237 C A 1.198 198 171 21 43 M Azerba A 29 28 16 Chii 7 A 239 152 152 153 153 154 154 155 156 157 157 158 158 158 158 158 158 158 158 158 158	1,492 7,873 8,528 1,890 1,990 1,998 104 aijan 1,197 5,354 na 672 1,749 1,432 5,438 2,523 5,835 5,835 5,240 7,630 6,186 0,470 9,700 5,500 4,840 4,014 3,351 1,856	(Op: OK1) 846 26 (Op: LZ1) 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK	28 21 14 14 15 A 16 A 18	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596 520 96 11,394 360 280,296	1665 111 1415 100 739 115 815 76 669 98 358 58 187 58 129 45 118 55 125 36 79 23 71 28 29 16 28 13 127 16 62 17 58 14 7 4 18 62 17 58 34 102 26 832 33 414 31 309 21 14 4 79 22 12 8 88	0 191 9 251 164 88 183 88 117 75 79 75 70 70 70 70 70 70 70 70 70 70 70 70 70	JASING JASEY JASAVO JASPCQ JASLEZ JH3GCN JF3GKE *JH3CUL *JM3PSJ/3 *JASHBF *JOSPSJ/3 *JASHBF *JOSPSJ/3 *JASHBF *JOSPSJ/3 *JASUWB *JISOGI *JRSSZZ/3 *JNSCSF *JOSMXH *JISMCM *JASKDJ *JF3BFS *JRSKAH *JASBBG *JRSKAH *JASPYH *JISCJO *JRSKAH *JASDAY *JISJHP *JASUBW/3	7 A 28 21	186,989 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,818 60,480 49,056 45,920 6,432 3,026	397 343 14 150 254 191 68 661 139 166 133 104 75 24 15 7 4 77 24 524 524 524 524 524 524 524 524 524	69 122 74 131 11 11 26 60 26 65 28 64 22 24 00 205 78 40 55 33 60 44 57 25 26 14 10 11 6 7 4 24 10 15 76 29 75 28 61 22 75 28 61 27 75 28 61 29 75 20 75 20 75 20 75 20 75 21 17 10 21 17 10 22 73 23 66 26 56 27 73 28 61 29 73 20 73 20 73 21 21 21	*JGGEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN6G *UN6G *UN6H *UN7JX *UN7JX *UN7RL *UN7CN	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 63
UA9GA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9GO RW9DX RA9MJ UA9GO RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9CB RA9DR RV9CQ UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMD UA9KSA UA9CLB RZ9GJ RK9DM RK9YWE UA9KAA *RX9AM	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 28 10,1 21 229,2 168,6 120,7 120,4 21,6 8,6 141,4 105,5 71,9 1.8 32,3 A 961,2	4717 127 420 (Op: UA9PC) 4 1202 86 296 30 1452 61 219 33 1061 78 263 39 1066 87 240 38 1002 90 276 72 689 53 179 74 570 72 205 49 513 77 202 442 56 174 91 388 42 145 10 348 40 123 388 42 145 10 348 40 123 58 316 45 138 14 273 60 141 59 316 46 85 92 236 37 95 (Op: R2900) 35 154 29 106 58 102 22 51 14 60 17 37 75 20 14 17 74 11 7 10 74 11 7 10 75 20 14 17 77 19 45 78 709 25 97 78 668 20 80 58 489 24 97 18 138 14 52 18 39 25 66 18 239 25 66 19 234 9 10 398 24 85 11 339 25 66 (Op: RASYTX) 19 234 9 18 900 110 314	*TA2/DL786 *TA4AU *TA7EB *TA2IK/6 *TA2/TA1CM *4K9W *4K9W *4K9M *4K9M *4K9M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG8HU *BG4MCG *BT4NG *BG6AHU	28 18 7 237 C A 1.198 196 171 21 43 A 29 28 16 Chir 7 239 224 206 152 65 45 37 36 37 36 37 36 37 37 38 37 38 37 38 37 38 37 38 37 38 38 38 38 38 38 38 38 38 38 38 38 38	1,492 7,873 8,528 1,890 1,990 1,998 1,098 104 aijan 0,197 5,354 na 672 1,749 1,432 5,438 2,523 5,835 5,240 7,630 6,186 0,470 9,700 6,186 0,470 9,700 6,186 1,856 1	(Op: OK1) 846 26 (Op: LZ1) 424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 126 28 98 29 81 18 100 23 50 17	85 JQ18VI NK) JE1LFX 252 JK10PL 132 JF1SEK 117 JA10VI 50 JH1HIC 4 JA1AJK JA1KY 74 JO1SIN 53 JF1AZO JA1MJR JN1RON 128 JH1CK 137 JA1VR 152 JA1OG 124 JH1CM 87 JJ1RDN 65 JR1CM 65 JG1OK 46 7K40OH VU) JR1BAS 46 JJ1VR 46 JJ1VR 47 JJ1VR 48 JJ1VR 48 JJ1VR 49 JH1APH 51 JG1OK 46 7K40OH VU) JR1BAS 48 JJ1VR 48 JJ1VR	28 21 14 7 A B B B B B B B B B B B B B B B B B B	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596 520 96 11,394 360 280,296 261,602 255,780 207,324 142,128 118,932 114,400	1665 111 1415 100 739 115 815 76 669 96 358 56 187 56 129 45 118 56 125 36 79 23 71 26 28 13 127 16 62 17 58 14 62 17 58 14 79 26 832 33 414 33 908 36 598 31 102 26 832 33 414 33 909 26 14 7 12 6 503 86 410 101 441 90 350 86 315 66 348 66 269 66	9 191 9 251 164 183 117 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 77 79 75 77 77 77 77 77 77 77 77 77 77 77 77	JASING JASEY JASAVO JASPCQ JASLEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3PL *JM	7 A 28 21 14	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 134,160 50,908 14,016 2,324 2,030 629 75,810 60,480 49,056 45,920 6,432 3,026 1,825	397 343 14 150 254 191 68 661 1 139 166 133 104 75 24 15 7 4 77 24 524 524 524 261 132 37 32 20 313 249 222 225 64 37 34 34 34 34 34 34 34 34 34 34 34 34 34	69 122 74 131 11 11 26 60 26 65 28 64 22 24 90 205 78 40 55 33 60 44 57 25 9 14 10 11 7 4 17 17 24 10 15 32 76 29 61 21 17 13 16 7 73 30 66 26 58 26 56 29 13 11 11 17 12 13 13 16 14 17 10 15 17 10 16 58 17 10 18 10	*JGGEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J UN7QF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6LN *UN7JX *UN7CN *UN7CN *UN9GD	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: 1 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1	2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 63 2 26
UA9QA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9QQ RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9CGL RA9CGL	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 186,6 120,7 120,4 21,6 8,6 141,4 105,5 71,9 1.8 32,3 A 961,2 866,9 692,2 616,7	4717 127 420 (Op: UASPC) 44 1202 86 296 1452 61 219 53 1061 78 263 59 1066 87 240 98 1002 90 276 72 689 53 179 74 570 72 205 49 513 77 202 90 442 56 174 91 388 42 145 91 348 40 123 58 316 45 138 44 273 60 141 59 316 46 85 92 236 37 95 (Op: R2900) 35 154 29 106 58 102 22 51 60 17 37 75 20 14 17 75 20 14 17 77 10 71 19 45 78 709 25 97 78 11 7 10 78 11 7 10 78 11 7 10 78 20 14 17 78 20 14 17 78 20 14 17 78 20 14 17 78 20 14 17 78 20 14 17 78 20 14 17 78 20 14 17 79 25 97 88 709 200 200	*TAZ/DL786 *TAZ/DL786 *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *4K9W *4K8M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG6AHU *BG4MCG *BT4NG *BG4MCG	28 18 7 237 C A 1.198 196 171 21 43 A 29 28 16 Chii 7 239 24 206 152 65 45 37 36 36 36 37 36 37 36 37 36 37 36 37 36 37 37 38 37 38 37 38 38 38 38 38 38 38 38 38 38 38 38 38	1,492 7,873 8,528 1,890 1,990 1,998 104 aijan 1,197 5,354 na 672 1,432 5,438 2,523 5,835 5,835 5,835 5,835 5,835 5,835 5,835 5,835 5,835 5,835 5,835 5,835 5,835 5,835 5,835 1,856 1,864 9,728 7,852 1,856 1	(Op: OK1) 846 26 (Op: LZ1) 424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 107 35 110 24 (Op: BD4J) 118 28 104 28 104 28 105 23 106 35 126 28 107 116 28 108 35	### 100 ### 10	28 21 14 7 A R R R R R R R R R R R R R R R R R R	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 398,125 103,836 61,596 520 96 11,394 360 280,296 261,602 255,780 207,324 142,128 118,932 114,400 79,851 57,276 47,520	1665 111 1415 100 739 115 815 76 669 96 358 56 187 56 129 45 118 55 125 36 79 23 71 28 127 16 62 17 74	0 191 9 251 164 183 117 75 75 77 9 75 77 9 77 9	JASING JASEY JASAVO JASPCQ JASLEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3PL	7 A	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,818 60,480 49,056 45,920 6,432 3,026 1,825 182,660 28,463 18,632 23,068 60 88,312 65,856	397 343 14 150 254 191 68 661 139 166 133 104 75 24 15 7 4 77 24 524 504 261 132 37 32 20 313 249 222 225 64 37 34 34 34 42 45 46 46 46 46 46 46 46 46 46 46 46 46 46	69 122 74 131 11 11 26 65 28 64 22 205 78 20 205 78 20 205 40 55 33 57 40 10 17 40 11 7 417 24 10 11 7 417 24 110 15 76 29 61 12 17 13 16 17 10 32 75 18 22 11 17 19 38 24 25 19 13 11 12 13 79 131 19 38 24 54 25 90 25 75 90 26 56 56 29 90 27 90 90 90 90 90 90 90 90 90 90 90 90 90	*JGGEKW *JY5CC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6G *UN8PT *UN6LN *UN7JX *UN7RL *UN7CN *UN9GD 9K2K EX8MAT	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: 1 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: 1 986 7	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 63 2 26 0 137 9K2GS)
UA9GA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9GO RW9DX RA9MJ UA9GO RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9CGL RA9DR RV9CQ UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMO UA9KLC UA9CB RA9DR RV9CQ UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMO UA9KLC UA9CB RA9DM RK9YWE UA9CB RZ9GJ RK9DM RK9YWE UA9CB RZ9GJ RK9DM RK9YWE UA9CB RZ9GJ RK9DM RK9YWE	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 7,6 18,6 120,4 21,6 8,6 141,4 105,5 71,9 1.8 32,3 A 961,2 692,2 616,7 411,2 284,2 160,9	4717 127 420 (Op: UASPC) 44 1202 86 296 1452 61 219 13 1061 78 263 1061 78 263 1061 78 263 1062 90 276 72 689 53 179 74 570 72 205 149 570 72 205 149 570 72 205 149 513 77 202 140 348 40 123 158 316 45 138 144 273 60 141 159 316 46 85 122 336 37 95 (Op: RZ900) 154 29 106 158 102 22 51 144 60 17 37 15 20 14 17 17 10 15 18 709 25 97 18 19 45 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 138 14 52 18 18 18 18 18 52 18 18 18 52 18 18 18 52 18 18 52 18 18 52 18 18 52 18 18 52 18 18 52 18 18 52 18 18 52 18 18 52 18 18 52 18 18 52 18	*TAZ/DL786 *TAZ/DL786 *TAZIK/6 *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *4K9W *4K8M *4K8M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG4AHD *BB8ATI *BD6QDR *BG6AHU *BG6AHU *BG4MCG *BT4NG *BG4MCG *BG4MCC *BG4MCC *BG4MCC *BG4MCC *BG4MCC *BG4MCC *BG4MCC *BG4MCC *BG4MCC *BG4MC	28 18 7 237 C A 1.198 198 171 21 43 M Azerbi A 29 28 16 Chii 7 A 239 152 152 165 152 165 165 165 165 165 165 165 165 165 165	1,492 7,873 8,528 1,890 1,990 1,998 104 aijan 1,197 6,354 na 672 1,749 1,432 5,835 5,835 5,835 5,240 7,630 6,186 0,470 9,700 5,500 4,840 4,014 3,351 1,856 1	(Op: OK1) 846 26 (Op: LZ1) 424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 107 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 126 28 98 29 81 18 100 23 50 17 116 28 41 21 106 19 63 17 50 24 88 30	### 100 ### 10	28 21 14 14 7 A B C C C C C C C C C C C C C C C C C C	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 360,296 261,602 255,780 207,324 142,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,710	1665 111 1415 100 739 119 815 76 669 96 358 56 187 56 129 16 125 36 79 23 71 28 127 16 28 13 127 16 58 14 598 31 5	0 191 9 251 164 183 117 75 79 6 8 183 117 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 79 75 75 76 76 77 77 78 78 78 78 78 78 78 78 78 78 78	JASING JASEY JASAVO JASPCQ JASLEZ JHSGCN JFSGKE *JHSCUL *JMSPSJ/3 *JASHBF *JOSPSJ/3 *JASHBF *JOSPSJ/3 *JASHBF *JOSPSJ/3 *JASHBF *JOSPSJ/3 *JASHBF *JOSPSJ/3 *JASHBF *JASKDJ *JFSSYW *JASKDJ *JFSSYW *JASHBG *JRSYW *J	7 A	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,818 60,480 49,056 45,920 6,432 3,026 1,825 18,632 23,068 88,312 65,856 12,168 4,830 3,069	397 343 14 150 254 191 68 661 139 166 133 104 75 24 157 7 4 77 24 524 504 261 132 37 32 20 313 249 222 225 64 37 37 34 34 34 34 36 37 37 37 37 37 37 37 37 37 37 37 37 37	69 122 74 131 11 11 26 60 26 65 28 64 22 205 78 40 55 33 57 40 11 7 4 24 10 7 4 17 24 10 15 32 75 28 61 29 61 10 7 7 11 15 16 7 17 7 18 29 61 19 29 131 19 29 131 10 20 131 10 20 131 10 20 131 10 20 131 10 20 131 1	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN6G *UN6G *UN6G *UN6G *UN7JX *UN7RL *UN7CN *UN7RL *UN7CN *UN9GD 9KZK EX8MAT EX80 EX2X	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 295,779	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: U 986 7 78 3 692 3 693 2	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 63 2 26 0 137 9K2GS)
UA9GA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9QQ RW9DX RA9MJ UA9QQ RW9DX RA9MJ UA9AGX RZ9HA RO9O RU9CD UA9CGL RA9DR RV9CQ UA9CGL RA9DR RV9CQ UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMO UA9CLB RZ9QJ RK9DM RK9YWE UA9KAA *RX9AM *RZ9OQ *RX9CLB RZ9QJ RK9DM RK9YWE	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 18,6 120,7 120,4 21,6 8,6 140,5 141,4 105,5 71,9 1.8 32,3 A 961,2 866,9 141,2 160,9 135,9 130,0 124,9	4717 127 420 (Op: UASPC) 44 1202 86 296 1452 61 219 13 1061 78 263 158 1066 87 240 168 1002 90 276 172 689 53 179 174 570 72 205 189 513 77 202 189 513 77 202 189 513 77 202 180 442 56 174 181 388 42 145 181 388 42 145 181 388 42 145 181 388 42 145 181 381 45 138 184 273 60 141 189 316 46 85 182 236 37 95 184 29 106 185 102 22 51 184 60 17 37 185 709 25 97 185 709 25 97 186 489 24 97 187 442 24 85 188 709 25 97 188 709 25 97 188 709 25 97 188 709 25 97 189 388 14 52 180 398 24 85 181 339 25 66 181 339 25 66 182 398 24 85 183 398 24 85 183 398 24 85 183 398 24 85 183 398 24 85 184 398 296 185 420 59 109 187 398 24 85 187 398 24 85 188 398 310 33 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 34 85 189 398 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398 189 398 398 398 398	*TAZ/DL7BG *TAZ/DL7BG *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *AK9W *AK9W *AK9W *AK9W *AK9W *AK9M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG4MCG *BT4NG *BG4MCG *	28 18 7 237 C A 1,198 196 171 21 43 M Azerba A 29 28 16 Chin 7 A 239 152 152 165 152 165 165 171 171 171 171 171 171 171 171 171 17	1,492 7,873 3,528 1,890 1,990 3,098 104 3,197 5,354 104 3,197 5,354 104 3,197 5,354 104 3,197 5,354 104 3,197 5,354 104 3,438 2,523 5,835 5,240 7,630 5,186 0,470 9,700 5,500 4,840 4,014 3,351 1,856 1,664 9,728 7,852 5,669 4,420 4,165 4,474 4,420 4,165 4,074 3,351 1,856 1,664 9,728 7,852 6,699 4,407	(Op: OK1) 846 26 (Op: LZ1) 424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 126 28 98 29 81 18 100 23 106 19 63 17 50 24 88 30 69 16 96 36 64 15	### 100 ### 10	28 21 14 14 15 16 16 16 16 16 16 16 16 16 16 16 16 16	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 360,296 261,602 255,780 207,324 142,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,710 29,321 28,704 27,720	1665 111 1415 100 739 115 815 76 669 96 358 56 187 56 125 36 79 23 71 28 13 127 16 28 13 127 16 58 14 79 26 1832 33 144 31 309 26 1832 33 144 31 309 26 1832 33 144 31 309 26 1832 33 144 31 309 26 1832 33 144 31 309 26 1832 33 144 31 309 26 1832 33 144 31 309 26 1832 36 1833 36 1834 46 1839 36	0 191 9 251 164 183 117 75 75 76 183 117 75 75 75 75 75 75 75 75 75 75 75 75 75	JASING JASEY JASAVO JASPCQ JASLEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JUSPSJ/3 *JASHBF *JUSPSJ/3 *JASHBF *JUSPSJ/3 *JASHBF *JUSPSJ/3 *JASUWB *JISUWB *JISUBWB *JISUBW	7 A	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,810 60,480 49,056 45,920 6,432 3,026 1,825 182,660 88,312 65,856 12,168 4,830	397 343 14 150 254 191 68 661 139 166 133 104 75 24 157 4 77 24 504 261 132 37 32 20 313 249 222 225 64 37 34 34 153 144 245 245 257 267 267 267 267 267 267 267 267 267 26	69 122 74 131 11 11 26 60 26 65 28 64 22 205 78 40 55 33 57 40 10 11 7 4 24 10 11 10 11	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7QF UN5J UN7QF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6LN *UN7JX *UN7CN *UN7CN *UN7CN *UN7CN *UN9GD 9KZK EX8MAT EX80 EX2X EX2T	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 205,779 186,030 Lebanon	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 (Op: I 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: I 986 7 78 3 692 3 693 2	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 6 58 9 63 2 26 0 137 9 8 25 1 9 6 1 9 7 1 9 8 1 9 6 1 9 7 1 9 8 1
UA9GA UA9JDP RA9FTM RA9AAA UA9TF UA9XL UA9BS RV9AZ RA9XU UA9GQ RW9DX RA9MJ UA9GQ RW9DX RA9MJ UA9GCB RA9DR RV9CQ UA9CGL RA9DR RV9CQ UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMO UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMO UA9CSA UA9FGJ RA9CB RA9JP RV9LM RA9AMO UA9CSA	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 18 918,8 111,4 105,5 71,9 1.8 32,3 A 961,2 8,6 141,2 156,6 141,2 156,6 141,2 156,6 141,2 156,6 141,2 156,6 141,2 156,6 150,7 150,4 160,5 171,9 18 32,3 18 961,2 18 962,2 18 963,9 18 963	4717 127 420 (Op: UASPC) 44 1202 86 296 1452 61 219 33 1061 78 263 39 1066 87 240 38 1002 90 276 72 689 53 179 74 570 72 205 49 513 77 202 90 442 56 174 91 388 42 145 10 348 40 123 388 42 145 10 348 40 123 58 316 46 138 44 273 60 141 59 316 46 85 92 236 37 95 (Op: RZ900) 35 154 29 106 58 102 22 51 14 60 17 37 75 20 14 17 71 19 45 78 709 25 97 78 11 7 10 78 709 25 97 78 12 398 24 97 85 442 24 85 88 138 14 52 88 138 14 52 88 138 14 52 88 138 14 52 88 138 14 52 88 138 14 52 88 138 14 52 88 138 14 52 89 310 33 10 2295 37 129 86 668 20 80 87 129 59 142 88 101 18 314 88 101 33 89 25 66 99 39 39 39 144 89 305 39 144 89 306 36 205 89 305 39 144 80 306 36 112	*TAZ/DL780 *TAZ/DL780 *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *AK9W *AK9W *AK9M *AK9M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG6AHU *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BG4MCG *BT4NG *BG4MCG *BG	28 18 7 237 C A 1.198 196 171 21 43 A 29 28 16 Chii 7 A 239 24 206 152 65 45 37 36 36 36 37 36 37 36 37 36 37 37 38 37 38 37 38 37 38 38 38 38 38 38 38 38 38 38 38 38 38	1,492 7,873 3,528 1,890 1,990 1,998 1,098	(Op: OK1) 846 26 (Op: LZ1) 424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 177 35 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 18 18 100 23 16 36 17 50 24 18 18 106 19 16 36 17 50 24 18 18 106 19 16 36 17 50 24 18 18 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 63 17 19 64 15 19 65 16 19 65 16 19 65 17	### 100 ### 10	28 21 14 7 A A T E Q S U V V V Z S H R X	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596 520 96 11,394 360 280,296 261,602 255,780 207,324 142,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,732 114,400 79,851 57,276 47,520 46,364 44,488 40,732 114,400 79,851 57,276 47,520 46,364 44,488 40,732 128,704 27,720 25,232 25,110 23,440	1665 111 1415 100 739 115 815 76 669 96 358 56 187 56 129 45 129 15 125 36 79 23 71 26 28 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 79 26 102 26 832 31 102 26 832 31 103 86 414 90 14 79 26 162 162 163 86 162 163 86 162 163 86 163 164 163 165 164 165 165 166 1	0 191 9 251 164 183 117 75 75 76 34 46 117 175 175 187 187 187 187 187 187 187 187 187 187	JASING JASEY JASAVO JASPCQ JASIEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3PLL *JM3PLL *JM3PSJ/3 *JASIMBF *JM3CK *JASUWB *JISOGI *JR3SZZ/3 *JM3CSF *JM3CS *	7. A	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,818 60,480 49,056 45,920 6,432 3,026 1,825 182,568 18,632 23,068 24,420 4,386	397 343 14 150 254 191 68 661 1 139 166 133 104 75 24 15 7 4 77 24 524 524 524 524 524 525 54 37 32 22 22 22 53 54 15 37 32 24 25 54 54 54 54 54 54 54 54 54 54 54 54 54	69 122 74 131 11 60 26 65 28 64 24 205 78 20 205 78 40 55 56 40 57 57 40 10 7 4 17 10 76 17 10 76 17 10 76 18 22 11 17 16 17 17 18 16 10 18 22 11 17 18 16 10 18 22 11 18 18 18 18 18 18 18 18 18 18 18 18	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6LN *UN7JX *UN7KL *UN7CN *UN9GD 9KZK EXBMAT EXBO EXZX EXZT OD5WPX	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 205,779 186,030 Lebanon 1,976,405 Macau	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 1603 2 2800 3 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: 1 986 7 78 3 692 3 693 2 2277 6	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 90 6 58 9 102 2 26 0 137 9 8 55 1 100 9 90 6 58 9 63 2 26 0 137 9 8 63 2 26 0 137 9 8 63 2 26 0 137 9 6 80 2 249
UASUA UASUA UASUA RASAAA UASUA UASUA RASUA UASUA RASUA UASUA RASUA UASUA R	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 186,6 120,7 120,4 21,6 8,6 141,2 168,6 111,4 105,5 71,9 1.8 32,3 A 961,2 10,1 21,6 11,4 105,5 71,9 1.8 32,3 4 91,6 91,1 11,4 105,5 71,9 1.8 32,3 4 91,6 91,6 91,6 91,6 91,6 91,6 91,6 91,6 91,6 91,6 91,6 91,6 91,7 91,9 108,2 91,6 91,6 91,7 91,9 108,2 91,6 91,7 91,9 108,2	4717 127 420 (Op: UASPC) 44 1202 86 296 1452 61 219 13 1061 78 263 158 1066 87 240 168 1002 90 276 172 689 53 179 174 570 72 205 175 689 53 179 176 570 72 205 177 177 202 177 188 42 145 177 100 178 11 7 10 179 12 71 19 45 178 12 71 19 45 188 12 71 10 10 10 10 10 10 10 10 10 10 10 10 10	*TAZ/DL786 *TAZ/DL786 *TAZIK/6 *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *4K9W *4K8M *4K8M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG	28 18 7 237 C A 1.198 196 171 21 43 M Azerbia A 29 28 16 Chii 7 A 239 24 206 152 65 45 37 36 36 36 36 36 36 36 36 36 36 36 36 36	1,492 7,873 3,528 1,189 1,990 1,998 1,098	(Op: OK11 846 26 (Op: LZ1 424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 126 28 98 29 81 18 100 23 50 17 116 28 41 21 106 19 63 17 50 24 88 30 89 16 96 36 64 15 52 15 52 15 52 16 68 19 30 18	### 100 ### 10	28 21 14 7 A * * * * * * * * * * * * * * * * * *	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 398,125 103,836 61,596 520 96 11,394 360 280,296 261,602 255,780 207,324 142,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,710 29,321 28,704 27,720 25,232 25,110 23,440 21,960 21,758	1665 111 1415 100 739 115 815 76 669 96 358 56 187 56 129 45 129 16 28 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 79 26 832 33 414 309 26 832 37 414 40 415 40	9 191 9 251 164 183 117 75 75 75 164 183 117 75 75 75 165 167 167 168 167 168 168 168 168 168 168 168 168 168 168	JASING JASEY JASAVO JASPCQ JASIEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3CK *JM3CK *JM3CK *JM3CK *JM3CK *JM3CK *JM3CK *JM3CSF *JM3CK *JM3CK *JM3CK *JM3CK *JM3CK *JM3CK *JM3CK *JM3CK *JM3CSF *JM3CK *JM3	7. A	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,810 60,480 49,056 45,920 6,432 3,026 1,825 182,568 18,632 23,068 18,632	397 343 14 150 254 191 68 661 139 166 133 104 75 24 524 524 524 524 524 524 524	69 122 74 131 11 26 65 26 65 28 24 20 205 78 40 55 33 57 40 55 40 55 40 55 40 10 7 40 17 15 76 29 61 17 13 16 17 13 16 17 13 16 17 13 16 18 22 29 18 22 29 19 21 21 19 22 30 10 6 4 4 4 5 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6G *UN8PT *UN6LN *UN7JX *UN7RL *UN7CN *UN9GD 9KZK EXBMAT EXBO EXZX EXZT OD5WPX *XX9AU	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 205,779 186,030 Lebanon 1,976,405 Macau 3,267 Maldives 1,375 Mongolia	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 1603 2 2800 3 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: U 2877 6 88 1 2277 6 88 1 2277 6	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 63 2 26 0 137 9 8 23 1 100 9 90 6 58 9 63 2 26 0 137 9 6 80 2 26 0 137 9 6 80 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
UASUA UASUA UASUA RASAAA UASUA UASUA RASUA UASUA RASUA UASUA RASUA UASUA R	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 18,6 120,7 120,4 14,9 18,8 111,4 105,5 71,9 1.8 32,3 A 961,2 692,2 616,7 411,2 284,2 160,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 130,0 124,9 135,9 135,9 136,9	4717 127 420 (Op: UASPC) 44 1202 86 296 1452 61 219 13 1061 78 263 158 1066 87 240 168 1002 90 276 172 689 53 179 174 570 72 205 175 689 53 179 176 570 72 205 177 177 202 177 188 42 145 177 100 178 11 7 10 179 12 71 19 45 178 12 71 19 45 188 12 71 10 10 10 10 10 10 10 10 10 10 10 10 10	*TAZ/DL7BG *TAZ/DL7BG *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *AK9W *AK9W *AK9M *AK9M *AK9M *AK9M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG4AHD *BD8ATI *BD6QDR *BG6AHU *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BG4MC	28 18 7 237 C A 1.198 198 171 21 43 M Azerbia A 29 28 16 Chii 7 A 239 152 153 165 153 165 165 165 165 165 165 165 165 165 165	1,492 7,873 3,528 1,189 1,990 1,998 1,098 1,098 1,098 1,098 1,097 5,354 1,432 1,432 1,438 1,523 1,438 1,523 1,438 1,523 1,438 1,523 1,523 1,535 1,630 1,630 1,630 1,664	(Op: OK11 846 26 (Op: LZ1 424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 126 28 98 39 179 36 170 24 (Op: BD4J) 118 28 104 28 90 33 108 35 126 28 98 39 179 63 170 24 (Op: BD4J) 118 28 90 33 108 35 126 28 98 39 81 18 100 23 50 17 116 28 41 21 106 19 63 17 50 24 88 30 89 39 16 80 36 81 17 50 24 81 18 81 18 8	### 100 ### 10	28 21 14 14 TEQUEUNWYU ZSHRXIQGINI	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 11,394 17,112 308,125 113,940 21,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,710 29,321 28,704 27,720 25,232 25,110 23,440 21,960 21,758 21,063 19,380 17,085	1665 111 1415 100 739 115 815 76 669 96 358 56 187 56 129 45 129 15 125 36 127 74 16 128 17 74 16 127 74 16 128 17 74 16 127 16 128 17 129 16 127 16 128 17 129 16 127 16 128 17 129 16 120 16 130 16 140 10 141 90 121 122 16 133 16 133 16 134 16 135 16 135 16 136 16 137 16 138 16 139 16 138 16 139	9 191 9 251 164 183 117 175 175 183 117 175 183 183 183 183 183 183 183 183 183 183	JASEY JASEY JASEY JASEY JASEY JASEZ JASEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JUSPSJ/3 *JASHBF *JUSPSJ/3 *JASHBF *JUSPSJ/3 *JASHBF *JUSPSJ/3 *JASHBF *JUSPSJ/3 *JASEZ/3 *JUSPSJ/3 *JASES *JUSPSJ/3 *JASES *JUSPSJ/3 *JASES *JASE	7. A	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 134,160 50,908 14,016 2,324 2,030 629 75,810 60,480 49,056 45,920 6,432 3,026 1,825 192,060 20,463 18,632 23,068 45,920 6,432 3,026 1,825 192,060 20,463 18,632 23,068 45,920 6,432 3,026 1,825 192,060 20,463 18,632 23,068 45,920 4,480 49,056 45,920 4,480 49,056 45,920 6,432 3,026 11,825	397 343 14 150 254 191 68 661 1 39 166 133 104 75 24 157 24 504 261 132 37 32 20 313 249 222 225 64 37 34 182 37 34 182 37 37 38 38 38 38 38 38 38 38 38 38 38 38 38	69 122 74 131 11 26 60 26 65 28 64 22 205 78 40 55 33 57 32 75 32 75 32 75 33 66 34 24 37 75 38 24 38 25 38 26 38 27 38 28 28 38 38 28 38	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6LN *UN7JX *UN7CN *U	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 205,779 186,030 Lebanon 1,976,405 Macau 3,267 Maldives 1,375 Mongolia 1,525,935 150,765	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 1603 2 2800 3 (Op: I 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: I 35 1 3276 4 (Op: I 2392 9 692 3 693 2 2277 6 88 1 2392 9 692 4	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 90 6 58 9 102 2 26 0 137 9 8 55 1 100 9 58 9 63 2 26 0 137 9 8 63 2 26 0 137 9 8 63 2 26 0 137 9 102 1 100 1
UASUA UASUA UASUA RASETM RASETM RASEA	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 18,6 111,4 105,5 71,9 1.8 32,3 A 961,2 866,9 141,2 160,9 130,0 124,9 130,0 130,0 124,9 130,0 130,0 124,9 130,0 130,0 130,0 124,9 130,0 130	4717 127 420 (Op: UASPC) 41202 86 296 1452 61 219 13 1061 78 263 153 1061 78 263 153 1066 87 240 168 1002 90 276 172 689 53 179 174 570 72 205 175 13 77 202 176 1388 42 145 177 10 348 40 123 177 10 348 40 123 178 159 166 85 178 29 106 178 20 14 17 179 10 177 174 11 7 10 175 20 14 17 175 20 14 17 177 10 17 177 11 7 10 178 11 7 10 179 45 179 25 97 179 25 97 179 26 80 179 279 279 179 179 45 179 179 45 179 179 45 179 179 45 179 179 45 179 179 45 179 179 45 179 179 170 179	*TAZ/DL7BG *TAZ/DL7BG *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *AK9W *AK9W *AK9W *AK9M *AK9M *AK9M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG8HW *BG4MCG *BT4NG *BG4MCG *	28 18 7 237 C A 1,198 196 171 21 43 M Azerbi A 29 28 16 Chii 7 A 239 152 152 153 153 153 153 153 153 153 153 153 153	1,492 7,873 3,528 1,890 3,998 1,990 3,998 1,098	(Op: OK11 846 26 (Op: LZ1 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 90 33 108 35 126 28 98 18 100 23 106 19 63 17 106 19 63 17 50 24 88 30 89 16 96 36 41 15 42 15 52 15 53 16 88 30 89 39 16 81 31 81 32 81 32 81 33 81 34 81 35 81 36 81	### 100 ### 10	28 21 14 14 TE QSUVW VU ZSHRXEREN	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 287,264 142,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,710 29,321 28,704 27,720 25,232 25,110 23,440 21,960 21,758 21,063 19,380	1665 111 1415 100 739 115 815 76 669 96 358 56 187 56 129 45 129 15 125 36 127 74 16 128 17 74 16 127 74 16 128 17 74 16 127 16 128 17 129 16 127 16 128 17 129 16 127 16 128 17 129 16 120 16 130 16 140 10 141 90 121 122 16 133 16 133 16 134 16 135 16 135 16 136 16 137 16 138 16 139 16 138 16 139	9 191 9 251 164 183 117 175 175 183 117 175 183 183 183 183 183 183 183 183 183 183	JASING JASEY JASAVO JASPCQ JASIEZ JH3GCN JF3GKE *JH3CUL *JM3PSL/3 *JASHBF *JOSPSL/3 *JASHBF *JOSPSL/3 *JASHBF *JOSECK *JASUWB *JISOGI *JRSSZZ/3 *JNSCSF *JOSMXH *JLSMCM *JASKDJ *JF3BFS *JRSKDJ *JF3BFS *JRSKAH *JASBBG *JRSKAH *JRSKA	7 · A · · · · · · · · · · · · · · · · ·	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 134,160 50,908 14,016 2,324 2,030 629 75,818 60,480 49,056 45,920 6,432 3,026 1,825 182,668 20,463 18,632 23,068 45,920 6,432 3,026 1,825 192,060 20,463 18,632 23,068 45,920 6,432 3,026 11,825 102,060 20,463 18,632 23,068 45,920 4,386 277,065 12,168 4,830 3,069 110,622 24,420 4,386 277,065 119,970 4,680 1,176 2,272 28,520 1,752 10,572	397 343 14 150 254 191 68 661 139 166 133 104 75 24 157 24 504 157 24 504 261 132 27 20 313 249 222 225 64 37 37 32 32 37 32 32 31 32 32 33 34 34 35 36 37 38 38 38 38 38 38 38 38 38 38	69 122 74 131 11 26 65 28 64 22 205 78 40 55 33 44 25 9 10 6 4 76 17 10 76 17 10 77 18 10 78 19 11 76 10 32 75 10 10 78 11 10 78 12 10 78 13 10 78 14 10 78 15 76 16 29 21 17 10 78 18 22 21 18 22 22 18 22	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8FT *UN6LN *UN7JX *UN7CN *UN7CN *UN7CN *UN9GD 9K2K EXBMAT EXBO EX2X EX2T OD5WPX *XX9AU *BQ7EJ JT1CJ	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 205,779 186,030 Lebanon 1,976,405 Macau 3,267 Maldives 1,375 Mongolia 1,525,935 150,705 30,712 Ogasawara	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 1603 2 2800 3 (Op: I 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 272 1 702 3 524 2 304 1 275 1 702 3 524 2 304 1 277 6 88 1 2376 4 (Op: I 2392 9 602 4 285 3	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 58 9 63 2 26 0 137 9 8 23 1 16 0 15 1 16 0 15 1 16 1 16
UASGA UASJOP RASSTM RASAAA UASTF UASSL UASSS RVSAZ RASSU UASSOO RWSDX RASMJ UASSOO RWSDX RASMJ UASSOO RUSCD UASCGL RASSOR RVSCO UASCGL RASSOR RASJP RVSLM RASSOO RUSCO UASCGL RASSOR RASSOO	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 18,6 120,7 18,6 14,8 111,4 105,5 71,9 1.8 32,3 A 961,2 8,6 141,2 156,6 141,2 156,6 141,2 156,6 141,2 156,6 141,2 156,6 150,7 150,4 160,9 160,9 173,7	## 1202 ## 296 ## 1202 ## 296 ## 1202 ## 296 ## 1202 ## 296 ## 1203 ## 263 ## 1203 ## 263 ## 1204 ## 263 ## 1205 ## 263 ## 1205 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1207 ## 205 ## 1208 ## 206 ## 120	*TAZ/DL786 *TAZ/DL786 *TAZ/K/6 *TAZ/K/6 *TAZ/TA1CM *4K9W *4K8M *BO2BT *BO1TCC *BA1SN *BG4AHD *BD8ATI *BD9AFM *BG8AHD *BD8ATI *BD9AFM *BG8IK *BD1ISI *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BG4MCC *	28 18 7 237 C A 1.198 196 171 21 43 A 29 28 16 Chi 7 A 239 15 15 16 15 16 15 16 16 17 17 18 18 18 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 18 18 18 18 18 18 18 18 18 18 18 18	1,492 7,873 3,528 1,189 1,990 1,998 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,438 1,523 1,634 1,438 1,523 1,630	(Op: OK11 846 Op: LZ1 1424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 65 288 46 309 39 179 36 255 43 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 90 33 106 28 90 33 106 28 91 18 100 23 106 28 91 18 100 23 106 36 106 36 106 36 106 36 107 50 108 36 108 3	### 100 ### 10	28 21 14 14 7 A T E OSUV V Z SHR X D G T A T B	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 398,125 103,836 61,596 520 96 11,394 360 280,296 261,602 255,780 207,324 142,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,710 29,321 28,704 27,720 25,232 25,110 23,440 21,960 21,758 21,063 19,380 17,085 16,924 13,778 12,285 12,276	1665 111 1415 100 739 115 815 76 669 96 358 56 187 56 129 45 129 15 125 79 23 127 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 74 16 62 17 75 18 79 36 103 36 10	9 191 9 251 164 183 117 175 184 184 187 175 187 187 187 187 187 187 187 187 187 187	JASING JASEY JASAVO JASPCQ JASIEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3PL *	7 · A · · · · · · · · · · · · · · · · ·	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,810 60,480 49,056 45,920 6,432 3,026 1,825 102,060 20,463 18,632 23,068 45,920 6,432 3,026 1,825 102,060 20,463 18,632 23,068 45,920 4,386 277,065 12,168 4,830 3,069 110,622 24,420 4,386 277,065 119,970 4,680 1,176 2,272 28,520 1,752 18,837 4,184 74,782	397 343 14 150 254 191 68 661 1 139 166 133 104 75 24 524 524 524 524 524 524 524	69 122 74 131 11 26 65 26 65 28 24 205 78 25 60 25 60 27 78 25 78 27 78 27 79 131 79 131 70 132 70 133 70 133 70 134 70 135 70 135	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6LN *UN7IX *UN7RL *UN7CN *UN7RL *UN7CN *UN9GD 9KZK EXBMAT EX80 EXZX EXZT OD5WPX *XX9AU *BG7EJ JT1ZO *JU75BSI *JT1CJ *JU18LA	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 205,779 186,030 Lebanon 1,976,405 Macau 3,267 Maldives 1,375 Mongolia 1,525,935 150,765 30,712 Ogasawara 2,074 Oman	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 1603 2 2800 3 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 277 6 88 1 23 1 2392 9 602 4 285 3 43 1	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 63 2 26 0 137 9 8 25 1 92 6 80 2 249 1 16 0 15 1 92 6 80 2 249 1 16 1 92 6 80 7 133 1 100 1 10
UASGA UASJOP RASSTM RASAAA UASTF UASSL UASSS RVSAZ RASSU UASSO RASSO RAS	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 120,4 111,4 105,5 71,9 1.8 32,3 A 961,2 8,6 141,2 151,6 151,4 111,4 105,5 71,9 1.8 32,3 A 961,2 100,4 111,4 105,5 112,7 113,9 113	## 1202 ## 296 ## 1202 ## 296 ## 1202 ## 296 ## 1202 ## 296 ## 1203 ## 263 ## 1203 ## 263 ## 1204 ## 263 ## 1205 ## 263 ## 1205 ## 263 ## 1206 ## 263 ## 1206 ## 263 ## 1207 ## 205 ## 1208 ## 206 ## 120	*TAZ/DL7BG *TAZ/DL7BG *TAZIK/6 *TAZIK/6 *TAZIK/6 *TAZ/TATCM *AK9W *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG4AHD *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BT4NG *BG4MCG *BG4MCC *B	28 18 7 237 C A 1.198 196 171 21 43 A 29 28 16 Chi 7 A 239 15 15 16 15 16 15 16 16 17 17 18 18 18 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 18 18 18 18 18 18 18 18 18 18 18 18	1,492 7,873 3,528 1,189 1,990 1,998 1,098	(Op: OK1) 846 26 (Op: LZ1) 424 55 449 39 440 30 370 16 4 4 132 23 106 21 33 7 860 69 627 71 473 81 548 46 309 39 179 36 288 46 309 39 179 36 171 38 173 43 177 35 110 24 (Op: BD4J) 118 28 104 28 104 28 105 28 106 35 126 28 107 50 36 108 35 1	### 100 10	28 21 14 14 15 7 A T E G SUNWYU Z SHR X D G D T A T BY U	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 142,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,710 29,321 28,704 27,720 25,232 25,110 23,440 21,960 21,758 21,063 19,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 11,380 17,085 16,926 16,926 11,380 17,085 16,926 16,926 11,480 21,758 21,063 19,380 17,085 16,926 11,480 21,768 2	1665 111 1415 100 739 115 815 76 669 96 358 56 125 36 79 23 127 16 62 17 74 16 62 17 75 8 78 30 79 22 832 33 414 31 79 22 832 16 832 16 832 16 832 16 832 16 833 16 833 16 834 16 835 16 836 16 837 16 838 16 8	191 9 251 164 183 175 175 183 183 183 183 183 183 183 183 183 183	JASEY JASEY JASEY JASEY JASEY JASEZ JASEZ JASEZ JASEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3PL *JM3P	7. A	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,810 60,480 49,056 45,920 6,432 3,026 1,825 102,060 20,463 18,632 23,068 45,920 6,432 3,026 1,825 102,060 20,463 18,632 23,068 45,920 6,432 3,026 1,825 102,060 20,463 18,632 23,068 45,920 6,432 3,069 110,672 24,420 4,386 277,065 12,168 4,830 3,069 110,672 24,420 4,386 277,065 12,168 4,830 3,069 110,672 24,420 4,386 277,065 119,970 4,680 1,762 27,000 5,588 158,873	397 343 14 150 254 191 68 661 139 166 133 104 75 24 504 261 132 37 32 20 313 249 222 225 64 37 34 182 183 183 183 183 184 185 185 185 185 185 185 185 185	69 122 74 131 11 26 65 26 65 28 24 20 20 25 78 14 15 16 20 25 75 14 24 25 26 17 10 76 29 18 22 20 18 24 24 17 10 76 29 18 22 20 18 22 20 18 24 24 18 25 26 18 26 26 18 27 28 28 28 28 28 28 28 28 28 28 28 28 28	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6LN *UN7JX *UN7CN *U	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 205,779 186,030 Lebanon 1,976,405 Macau 3,267 Maldives 1,375 Mongolia 1,525,935 150,765 30,712 Ogasawara 2,074 Oman 599,788 Saudi Arabia	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 1603 2 2800 3 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: U 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: U 2530 3 43 1 1048 5	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 63 2 26 0 137 9 8 26 0 137 9 8 26 0 137 9 8 26 0 137 9 102 1 16 1 16
UASGA UASJDP RASSTM RASAAA UASTF UASSL UASSS RVSAZ RASSU UASSO RASSO RAS	A 6,629,0 1,207,8 1,025,0 931,9 885,1 861,1 410,8 374,5 343,4 235,2 185,6 141,8 132,8 109,3 77,1 76,6 51,4 17,9 7,6 18,6 120,4 111,4 105,5 71,9 1.8 32,3 4 961,2 108,2 111,4 105,5 71,9 1.8 32,3 4 961,2 108	## 1202 ## 296 ## 1202 ## 296 ## 1202 ## 296 ## 1202 ## 296 ## 1203 ## 260 ## 120	*TAZ/DL7BG *TAZ/DL7BG *TAZIK/6 *TAZIK/6 *TAZIK/6 *TAZ/TA1CM *4K9W *4K8M *4K9W *4K8M *BD2BT *BD1TCC *BA1SN *BG4AHD *BD8ATI *BD2SH/7 *BD9AFM *BG8AHU *BD9AFM *BG8IK *BD1ISI *BD6QDR *BG6AHU *BG4MCG *BT4NG *BG4MCG *	28 18 7 237 C A 1.198 196 171 21 43 A 29 28 16 Chi 7 A 239 15 15 16 15 16 15 16 16 17 17 18 18 18 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 19 18 18 18 18 18 18 18 18 18 18 18 18 18	1,492 7,873 3,528 1,189 1,990 1,998 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,098 1,438 1,523 1,630	(Op: OK1) 846	### 101 10	28 21 14 27 A TEQSUVWVU ZSHRXMGMTAT BY UW	1,320,462 1,060,113 694,860 483,360 473,204 157,325 70,810 42,160 38,726 21,120 9,177 8,954 3,139 1,368 13,230 7,134 5,616 3,480 100 287,454 147,594 17,112 308,125 103,836 61,596 520 96 11,394 17,112 308,125 103,836 61,596 520 96 11,394 142,128 118,932 114,400 79,851 57,276 47,520 46,364 44,488 40,710 29,321 28,704 27,720 25,232 251,100 23,440 21,960 21,758 21,063 19,380 17,085 16,324 13,778 12,285 12,276 11,480 7,616	1665 111 1415 100 739 115 815 76 669 96 358 56 125 36 79 23 127 16 62 17 74 16 62 17 75 16 79 22 832 33 414 35 102 26 832 35 112 16 113 16 162 162 16 162 162 16 162 162 16 162 162 16 162 162 16 162 16 162 16 162 16 162 16 162 16 162 16 162 16 162 16 16	9 191 9 251 164 183 177 175 175 175 175 175 175 175 175 175	JASEY JASEY JASEY JASEY JASEY JASEZ JASEZ JASEZ JH3GCN JF3GKE *JH3CUL *JM3PLL *JM3CM *JM3CK *JM3C	7. A	186,969 161,130 792 26,574 63,245 43,424 6,946 480,680 37,846 36,670 26,133 21,715 9,027 1,288 651 169 96 6,519 1,325 139,752 134,160 50,908 14,016 2,324 2,030 629 75,810 60,480 49,056 45,920 6,432 3,026 1,825 182,658 18,632 23,068 45,920 6,432 3,026 1,825 182,658 18,632 23,068 45,920 4,420 4,386 277,065 119,970 4,680 1,176 2,272 28,520 1,752 18,637 4,420 4,386 277,065 119,970 4,680 1,176 2,272	397 343 14 150 254 191 68 661 139 166 133 104 75 24 524 504 261 132 27 28 29 20 313 249 222 225 64 37 32 32 31 32 32 33 34 34 36 37 38 38 38 38 38 38 38 38 38 38	69 122 74 131 11 26 65 26 65 28 24 205 78 25 29 205 78 24 25 20 205 78 21 21 21 21 22 22 22 22 22 22 22 22 22	*JGGEKW *JYSCC *JY4NE XU7FMZ UN9L UN7MMM UN2E UN7OF UN5J UN7PL UP6P UN8GV UP2L UP8L *UN10 *UN6G *UN8PT *UN6LN *UN7IX *UN7RL *UN7CN *UN7RL *UN7CN *UN9GD 9KZK EXBMAT EX80 EXZX EXZT OD5WPX *XX9AU *BG7EJ JT1ZO *JU75BSI *JT1CJ *JU18LA	A 21 21 A	Jordan 1,004,542 410,146 Kampuchea 93,465 Kazakhstan 2,236,012 1,589,211 710,700 273,288 77,112 47,196 482,866 407,624 1,141,210 1,045,265 106,488 15,980 41,902 232,525 148,512 56,794 39,196 3,078 Kuwait 1,590,699 Kyrgyzstan 643,530 18,564 205,779 186,030 Lebanon 1,976,405 Macau 3,267 Maldives 1,375 Mongolia 1,525,935 150,765 30,712 Ogasawara 2,074 Oman 599,788 Saudi Arabia	97 2 1509 5 1411 2 595 2 (Op: J/ 1995 10 1997 5 800 8 671 5 220 4 269 1 1410 2 1603 2 2800 3 (Op: I 2530 3 373 2 188 1 272 1 702 3 524 2 304 1 205 1 35 1 3276 4 (Op: I 986 7 78 3 692 3 693 2 2277 6 88 1 2392 9 602 4 285 3 43 1 1048 5 2194 18	3 40 2 190 4 79 4 69 A1FMZ) 2 331 7 232 5 260 5 138 8 114 6 53 9 102 UN6P) 6 90 7 133 UN9LG) 5 134 5 91 0 24 8 55 1 100 9 90 6 63 2 26 0 137 9 8 26 0 137 9 8 26 0 137 9 8 26 0 137 9 102 1 16 1 16

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*7Z100 *HZ1DG	14	117 62,976	7 294	6 22	7	*EW80J *EW2A0		42,195 40,326	223 34 111 249 30 111	*OK2BEN *OK1JOC		314,880 256,959	772 61 267 737 51 228	*64WPD *64FSU	21	19,040 37,752	217 15 216 18	53 70	*UA3DW *UA3FDX	*	175,802 152,243	385 61 2 527 45 1	01
20.000000000000000000000000000000000000		Singapore		1227		*EW3LN		22,098 15,390	150 35 92 150 25 89	*OK1MKU *OL2T		226,424 135,148	458 73 259 510 43 183	"GURAH	14	11,742 47,229	129 12 379 19	45 72	*UA4CNZ *RW6AH		149,688 147,177	552 49 1 528 42 1	49 65
*9V1DE	A	25,100 South Korea	123	41	59	*EU1EU *EU4AG *EW6DX	28	12,865 2,624 11,550	140 21 62 32 16 25 209 9 41	*OK4DZ *OK2PYA *OK1LX	*	118,770 107,060 96,944	483 36 149 418 43 159 696 21 125	*68RCK *63VYI *2EBRCV	7	7,700 2,250 68,060	96 16 47 11 638 16	39 19 75	*RA3LO *RW3WX *RN3ZQ	*	138,670 129,786 125,758	331 55 1 360 51 1	86 68 76
HL5UCB HL5UCG DS5QLJ	A	31,351 16,146 10,586	146 92 75	42 30 29	65 48 50	*EW1KV *EW6AF *EW8DA	21	1,608 79,200 8,850	61 4 20 517 27 83 105 18 41	*OK1AXB *OK2CSU *OK2KG		76,670 76,066 70,680	393 33 154 333 28 118 318 38 148	-MBJEK	1.8	506 3,663	24 4 116 3	18 34	*U1BA *RD3DS *UA4PCM		121,584 113,525 109,282	393 48 1	59 91 44
DSSDNO HL1/WX80	14	7,254 943	41 19	25	37 13	*EU6AF *EW6CU	14	47,138 29,250	328 25 73 276 18 60	*OK1SI *OK2WYK		67,614 57,624	268 40 137 310 41 127	ES4A	A	Estonia 504,750		288	*RW3XZ *RA3MB		108,756 106,932	306 51 1 274 56 2	77
*DSSFNE *DSSTOS *6K5AQY		252,723 185,562 84,626	1020 538 440	66 62 60	117 121 71	*EW80G *EW60M	-	16,884 5,175	245 18 53 150 8 37	*OK1DKR *OK2PBG *OK1UDJ		43,326 40,552 34,250	173 45 129 191 39 109 209 31 106	ES2IPA ES2DJ		37,859 18,408	(0p: ES 261 25 195 18	106	*RX3VF *RW4C8G *RV3ZN	:	88,555 87,680 87,120	378 38 1 335 44 1	56 22 54
*HLTVAU *HL5YI	14	65,766 6,004	384 95	17	21	007T 005A	A	716,310 402,776	1578 75 248 909 65 188	*OK1DUT *OK1VHV *OK1BLU		34,160 34,055 33,552	204 35 105 179 33 106 206 36 108	ESSTJM ESSTX ES7FQ	14	12,936 94,374 55,151	140 15 441 38 198 31	69 96 100	*RA4WC *RA6FUZ *RN4NF		83,694 78,343 76,200	350 37 1	28 20 47
BUZAU BXSAA	A 14	Taiwan 90,132 338,184	529 1198	37 33	74 99	ON7ON OQ5M	3.7	30,996 78,228	208 32 91 795 15 67 (Op: ON5ZO)	*0K2SWD *0K1MNV *0K2BJ		20,979 16,168 7,992	173 24 87 92 29 65 53 29 43	ESSMC ESSAN ESBQZ	7	550,848 5,916 5,232	2663 36 124 12 139 7	136 39 41	*RSAA *RKSDU *UA4AAC		68,544 65,928 61,236	313 35 1	39 29 29
*BV4VR *BV1EK	A	64,827 3,780	214 44	53 23	94	*0N3RPL *0040	A	847,248 408,200	1257 93 363 813 68 257	*0K1ZHV *0K2VX		7,772 4,956	96 17 50 52 23 36	*ESSDB	A	271,040 7,500	656 63 73 23	217 52	*RV3YR *RL3DX	:	60,680 59,860	205 45 1 293 39 1	19 25
*BUZAE	14	1,023 Tajikistan	29	12	19	*0T7E *0N5UJ		198,170 190,156	(0p: ON4APU) 494 60 206 391 62 212	*0K2BND *0K2TE0 *0K2HZ	28	1,677 735 15,663	46 15 28 41 10 25 162 13 56	*ES6L *ES1LS	28	4,020 8,865	63 15 (Op: ES6J 167 10	35	*RV3L0 *RW1AM *RK3TS	*	54,060 51,356 50,544	169 42 1 251 32 1	04 06 12
*EY8CC *EY7BJ *EY8AJ	21	27,081 14,406 7,250	198 147 104	11	40 31 36	*ON3ND *ON6LS *ON6FC		163,064 153,860 150,975	615 42 176 418 60 185 413 55 170	*OK1XYZ *OK1KZ *OK2QX		3,159 2,610 780	64 9 30 91 5 25 31 5 15	*ES1LBK *ES1CN *ES5JR	21	301,112 41,300 189,927	1139 35 232 23 913 33	117 77 108	*RL3AW *RX3AU *RA1AGU	-	49,786 49,665 48,600	166 46 1	93 19 24
"EY8DD		1,175 Thailand	23	6	19	*ON3AR *ON4VMA *ON5JD	1	124,068 20,295 15,696	465 41 155 163 26 97 125 29 80	*OK2ZAW *OL9M	14	176,660 21,655	743 31 115 197 16 55 (Op: OK1MMN)	*ES6KW *ES6PA	3.7	15,677 12,250	254 9 219 9	52 41	*RZ3ATE *RN1NW *RU3XY		48,411 45,650 44,550	216 43 1	22 23 27
HSØZEE HSØZDR *HSØZHC	A 21	947,805 30,960 1,142,560	1429 181 1917	101 17 78	252 55 218	*005D *0N7BBR		4,930 38,070	69 15 14 (Op: ON5SD) 245 22 68	*OK2HBY *OK1JDJ *DK1WCF	,	14,606 1,426 226,738	168 15 52 30 8 23 1301 30 116	UA4WKW	Eur	opean Rus 2,358,199	3038 122	455	*RA3NK *RN3TT *RZ3VV		44,384 44,156 43,904	197 37 1 220 36	15 97 55
*HSØZCW *HSØZIN	28	598,500 14,168	1377 150	78 17	174	*ON4AEY *ON4LWX	1	16,962 2,030	148 19 47 36 10 25	*OK1UG *OK2BRS		42,282 15,189	450 13 68 202 9 52	RO4W UA6UDV		1,679,940	2432 119 (Op: RD- 2391 113	4WA) 397	*RA3RGO *RX3MM	1	39,664 38,220	143 51 154 41 1	97 06
*HS8JYX	UK	6,720 Bases on Cy	77 prus	16	26	*00en	3.7	25,260	442 9 51 (Op: ON6UU)	*OK1FPS *OK1CRM *OK1AY	3.7	75,960 35,980 12,027	975 13 59 548 11 59 203 6 51	RU3UR RM3F		1,330,610 1,240,906	1593 119 2240 97 (Op: UA3	423 312 DPX)	*RW6HKF *UA3MOM *UA6GO		36,449 35,844 31,373	240 19 186 39	95 97 98
ZC4LI	21	704,990 ed Arab Emi	1810	35	108	E74AA E71A	Bosn A 28	1,790,212 312,741	2523 95 392 1704 27 116	*OK2YT *OK2BJC *OK5AD	1.8	4,796 2,079 192	105 5 39 63 4 29 15 4 12	RN3ZC RV4HC RK3DH		1,206,020 1,176,448 1,097,820	1894 103 2147 101 1354 113	367 315 427	*RD3DG *RU3BU *RX3XA		30,360 29,516 29,452	213 31 1 125 47 1 116 48 1	10
A61C A61BK A65BM	A.	724,686 261,670 103,356	1075 520 380	59 48 29	210 143 79	E77XZ E78DX E74IW	21 14 7	1,007,868 102,582 122,100	2766 37 151 557 29 94 1110 24 87	OZ28KK	A	Denmark 383,022	783 77 269	RASAUM RN4WA RA6GW	*	927,200 742,665 619,770	1834 85 1614 90 839 104	295 295 334	*RV4HV *RA3VE *RX3AEX	:	29,008 28,670 27,744	137 37 191 27 153 38	75 95 98
A65BP A62ER	3.7	23,668	159 15	11 4 RV6	50 12	*E74WN *E78C8 *E71M	A	119,004 20,800 15,060	410 50 161 108 35 69 146 13 47	OZSEV OZ2PBS OZ7EA	*	308,800 139,520 100,360	483 91 295 491 54 164 379 46 147	UA3A8 RW4HP	-	589,536 553,284	699 117 1163 81	297 201	*RZ6BU *RA3XI *RZ3ARO	-	25,420 24,970 24,200	109 39 217 23	15 17
*A65CA	A	35,046	(Op 121	38	80	*E790 *E73X	7	338,541 7,473	1772 31 116 146 9 38	OZ1HHH OZ6EI		65,601 7,872	246 44 153 110 30 66	RA3RK RK4FM RA1AGL		504,622 494,716 440,865	1004 86 1024 76	297 281 227	*UA3QLQ *RZ3ABC		23,478 23,424	148 32 164 32	17
*UK7AZ *UK9AA	A 14	785,925 751,518	987 1807	87 35	228 127	*E73PY		1,377 Bulgaria	41 / 20	OZBPI OZ7X	7	3,245 231,855	79 14 41 1197 30 115 (Op: OZ5KF)	UA3BZ RA6XV UA3VFS	1	408,900 375,870 362,880	770 82 1144 60 836 66	266 195 249	*RZ3AIA *RW4PY *UA3QIX		21,867 21,203 18,704	174 23 105 30	16 52
XV1X	A	Vietnam 404,838	847	69	174	LZ3FN LZ2JR LZ1BJ	•	2,820,853 683,753 625,666	3875 129 433 1325 82 289 1517 66 241	OZ1GJS OZ7AEI *OV3X	A	50,986 5,045 387,720	99 12 42 676 86 274	RA4AAO RW3DL RU3ZV	1	353,760 319,573 281,039	647 81 700 65 582 82	254 248 237	*RK3FM *RA6AAW *RW6CW	*	16,235 15,423 13,585	74 37 78 30	10
3W1M	28	110,607 Vest Malays	826 ia	16	53	LZ1MS LZ3HI LZ26ZA		258,984 128,700 34,375	568 71 145 646 41 115 249 33 92	*021AC8		231,384 209,838	(Op: OZBAE) 642 54 194 861 51 195	RA3FC RF4M		258,192 254,625	558 77 716 65	249 226	*RV1AE *RV1CB *RU3AT		13,350 13,230 13,175	138 20 97 25 76 34	19 55 51
9M2JKL *9M2TO *9M2DRL	A	60,515 149,786 451	248 559 32	46 58	87 124	LZ1VVV LZSZ	21	28,888 51,064	(Op: LZ3GA) 181 30 62 305 27 77	*0Z4NA *0Z1JVX *0Z6AGD		185,238 122,512 99,897	624 46 200 355 56 192 388 42 159	UA3GZ		253,506	725 69	184	*UA3DCM *UA4ASE *RA1AOP		12,556 11,985 11,790	84 20 116 24 117 21	56 51 89
SINCUITE	2.5	EUROPE				*LZZHN *LZZ\$X	A	238,136 212,592	512 68 221 565 59 199	*0U2P *0Z1KKH		71,242 61,750	321 38 141 189 42 148	RV3NA UABLJ U1BD	*	171,738 169,877 134,070	345 72 399 65 532 45	189 192 160	*RN6DR *RN3QVG *RA3TUT	:	9,213 8,927 8,715	80 28 108 18	55
онвх	14	Aland Island 713,971	2118	36 p: OH	137 (ZTA)	*LZ1BY *LZ1AQ *LZ1IKY	*	190,176 165,726 154,105	524 54 170 557 54 189 569 51 194	*0Z5WQ *0Z1LFI *0Z5HZ		50,544 37,120 6,300	237 36 126 247 26 90 108 12 58	RD3DT RW3DA UA4NC	4	127,743 125,904 124,659	305 61 426 54 411 60	170 190 183	*RW4PK *RX3MX	:	7,616 7,384	48 29 52 27	19
OHBJFP	7	456,754 Andorra	2489	32	107	*LZ2NG *LZ10NK *LZ1VCT		78,840 35,500 18,421	361 50 166 215 37 105 119 35 74	*0Z1DGQ *0Z7DK *0Z2MD		4,284 1,760 1,221	56 14 28 47 13 31 28 14 19	UASTCJ UASQFU RZSDA	1	122,450 114,240 89,300	322 54 227 80 248 66	104 192 169	*RN3ZIN *RL3AJ *RV3FU	*	5,780 5,720 5,472	59 16 76 12	40 39 45
*C31CT *C31CA	À	51,012 3,068	421 100	23 11	86 41	*LZ2FQ *LZ3TL *LZ2A	21	16,714 6,020 189,967	176 13 48 77 20 50 514 33 110	*OZ/DJ1XT	7	8,160 62,749	123 14 37 (Op: DJ1XT) 381 30 101	RASTT RG6G RU3DM	7.4.8	83,200 75,545 69,426	299 37 349 37 177 57	123 108 146	*RASBQ *RASMT *RASDT		5,100 4,554 4,488	84 17	32 52 33
OE4VIE OE4WWL	A	Austria 346,164 49,468	1086 212	57 44	216 122	*LZ1DNY *LZ2ZY *LZ2FM	14	3,588 20,010 7,076	64 11 28 179 14 55 86 12 49	*0260M *5PØ0	3.7	9,360 4,995	105 15 50 133 6 39	RK3FQ RA4PO RA1OD		60,965 49,612 47,094	341 32 208 46 148 48	105 112 119	*RA1AUW *RA3TJX *UA6YI		4,437 4,350 4,032	53 13 51 18 34 20	38 40 28
OE2IJL		34,584		OETV 39		*LZ3GH	3.7	51,429 224	551 10 69 22 4 12	G3TXF	A	England 825,216	1316 96 352	RA10D RV1CC	1	39,688 37,506	214 38 167 34	126 80 82	*RW3MA *RA3QG *RA4YEW	:	3,404 2,915 2,494	49 16 66 12 92 12	30 41 31
OE/LZ1UF OE3WMW *OE3DMA	14 A	176,128 268,445	809 718	30 56	98 209	SV9CVY	A	Crete 1,590,408	3117 71 262	GØBNR		470,532 387,020	1059 66 273 (Op: G4FAL) 700 80 290	RA3BT UA3DAM RV6FA		35,584 33,282 31,750	102 57 208 30 111 45	99 82	*UA4FER *UA3DLD *RN3REA		2,356 1,978 1,218	32 14 46 12 32 9	24 34
*OE2UKL *OE5JKL *OE1MCU		114,736 31,866 25,773	389 212 170	34 34	160 107 87	*SV9DJO *SV9COL *SV9GPV	A 28	456,280 314,061 62,000	1276 64 241 707 70 237 771 16 64	MØWLF G3VPW MØGHQ		306,071 285,600 273,360	870 47 134 736 53 187 537 68 204	RW3AFY RZ3GU RK3QS	-	28,013 21,850 20,758	146 34 150 29 147 29	75 86 78	*RN3DGI *UA9QCP/3		1,092	50 18 27 7	17
*OE6HLF *OE9NRH *OE2PTN	6	23,421 4,189 1,734	196 74 37	22 16 16	89 43 35	9A4WY	A	Croatia 506,954	754 73 270	G3LUW GØAZH MØMDR		173,826 133,672 59,495	450 55 167 496 48 169 328 34 129	RA4UVK RA1AR UA6FW	-	20,492 9,728 8,772	85 34 135 20 62 23	60 44 45	*RA4NCC *RN3ZNO *RZ3AAO		667 627	26 7 26 6 19 6	15 17 13
*OE1HHB	14	120,744 Azores	556	26	103	9ASM 9ASMT	14	451,276 105,256	1820 36 106 (Op: 9A38VT) 565 26 92	MONNH MOOXD G4JSR		37,128 18,810 16,940	369 22 80 97 30 65 149 25 85	UA3RAI RA3EG UA3EAY	-	6,780 5,796 5,346	101 15 42 17 36 23	45 29 31	*RU3GS *RV4LC *RW1CX	28	120 117 10,266	7 6 134 13	7
CR2X CUZAF	A 28	10,006,334 42,387	-	145 p: OH		*9A588 *9A6KTB *9A6Z	A	311,240 192,448 172,974	692 65 245 569 51 197 439 63 191	G4BUO GØAEV G3RAU	28 21	3,510 96,247 268,478	36 18 27 727 21 88 800 33 118	UA6FF UA3LIA RU4CO	-	3,927 3,393 3,285	53 34 35 18 39 15	43 21 30	*RU3DD *RA4LZ *RW3VA	*	5,346 2,660 2,607	89 12 32 14 40 8	42 21 25
*CUSCQ	28 A R	268,550 alearic Islan	388 790	58	204	*9A4W *9A5ST *9A7YY		119,301 76,560 55,614	252 69 178 265 42 132 195 45 141	G40C0 G4ERW	14	34,131 127,746	282 21 72 697 24 70	UA1AAF RV6ALI		1,798 1,508	40 7 20 12	22	*RN3DY *RV1AC *RZ4AG	21	108,624 89,400 81,740	488 38 1 328 32 1 368 28	16 17 94
EABAZ EABXQ	A	493,415 391,238	1236 924	56 69	211 242	*9A1MM *9A9OR *9A3ALD	* * *	50,240 43,624 38,497	261 42 118 138 49 103	G3YBY G8HVQ *G4LDL	3.7 A	63,638 27,974 482,677	601 18 76 316 13 58 890 72 275	RZ300 UA3AGB	28	561 256 9,577	9 7 79 14	9 47	*RZ3AV *UA4LW *RL3FO		51,837 32,016 25,284	315 22 205 19 198 17	89 73 69
EAGAFM EEGE	7	6,760 165,770	1131	23 26 p: EA	95 600)	*9A2QF *9A3SM	-	37,674 35,332	241 33 105 155 50 96	*G4ENZ *G4DR *G4ADJ	*	251,220 214,011 207,459	675 53 212 672 51 186 613 48 211	RV3FN RZ3AXX	14	1,227,648	The Company of the Co	96 148 198A)	*RA3DGH	*	22,908 18,827	169 21 187 13	62 54 65
*EAGSX *EAGDB *EAGOM	1.8 A 28	15,795 368 12,716	232 18 130	11 7 16	54 16 52	*9A7IUP *9A3Q8 *9A6A/8		10,707 6,386 3,132	151 18 65 84 17 45 48 18 36	*G4KIU *G4WGE *G7BRZ		166,540 154,124 92,112	562 49 171 543 42 170 489 37 165	RZ1ZZ UA6GP RV6LFE		415,480 285,665 221,977	1778 31 1245 37 1200 30	105 118 103	*RD6LP *UA3VVB *RW4LQ		16,856 14,136 5,170	91 18 38 16	58 31
EVZA	A	Belarus 1,168,452		112	445	*9ASAGO *9A1DL *9A3BPP		1,554 1,419 841	47 12 30 44 11 22 36 8 21	*G8ZRE *GØCER *G6UBM		72,675 67,981 63,580	382 30 141 327 33 124 321 40 130	RX3AW RV2FW/1 RU300		81,399 20,412 3,198	317 30 147 18 68 7	99 63 32	*UA3YAA *UA3AKI *RA6YJ	*	4,320 3,431 3,320		31 40 24
EW8KY EW8DX	* *	1,007,216 596,046		p: EW 82 66	2AA) 309 297	*9A3VM *9A3TN *9A1CMS	28	30,723 4,797 9,222	516 10 47 80 10 31 96 13 40	*G3RSD *G4NXG *2EØPLA	1	62,304 59,920 51,208	294 31 146 192 46 94 286 31 117	RASWCG UASKA RW6CF	7	391 101,890 42,552	17 4 675 24 264 24	13 91 84	*RA4LK *RW6AHO *RX6AH	14	1,375 512 149,800	19 10 20 4 710 32 1	15 12 08
EW4MM EW80M EW2E0	* * *	563,832 198,468 118,854	1219 677 416	77	251 178 169	*9A2GA	3.7	1,836	(Op: 9A6KZH) 46 7 29	*G4DDL *G4DDL		42,920 42,381 39,744	232 34 111 216 35 118 277 30 114	RV3IC UA4WI RX30M	3.7	3,198 37,114 4,640	71 8 435 13 98 7	31 64 33	*RA3DCT *RN3DDR *RX3DBG	-	25,886 20,468 15,057	165 20 177 15 151 13	66 53 50
EW7BR EV1Z		110,561 62,248	342 444	57 28	196 96	OK7Y	Cz		1329 92 317	*G4DDX *MØRBE		31,280 28,875	198 27 109 175 33 92	*UA3BL *RW1CW *RK3IM	A	772,179 739,815 715,232	1258 85 998 96 1122 90	352 369 344	*RA3SI *RV6ACC *UA4SJK		9,912 8,635 7,296	89 23 138 13	61 42 60
EW8DD EW2EG	4	55,008 3,124	737 69	12	60 35	OL5Q OK1TFH	4	637,732 119,574	(Op: OK1HRA) 395 39 143	*MØGKC *G4LWB *MØSDY		28,083 23,736 23,364	170 24 68 177 26 92	*RW6HJV *UA4PAN	**	583,626 402,150	890 86 874 77	336 273	*RU3UW *RA1TV *RN3AMF	-	6,466 2,665 128	80 12	41 34 10
EW6GL EW4AA EW8A	28 14	3,741 87,241	57 711	12	18 31 79	OK2SAR		60,997 6,360	355 33 148 (Op: OK2EC) 106 11 49	*G3WRR *G7RTI *MØGEJ		22,533 20,855 17,877	148 27 84 151 23 74 156 22 79	*RK4FAD *UA3ABJ *UA1CEI		394,092 352,179 345,886	797 85 732 82 823 76 787 59	271 277 250	*RU3VD	7	49,945	304 24	1 89 68
EU8KP EW6GF EU1AZ	7	56,606 42,559 256,662	500 458 1481	18 16		OK2ABU OK1XC OK4AZ	28	9,802 68,922 2,960	152 10 48 312 29 97 49 12 28	*GØPHY *MØRYB *GØCPA		17,199 14,058 13,536	89 32 59 136 21 78 134 24 70	*UA3LHL *RX6LD *UA3UNP	1	320,382 319,894 299,268	656 66 600 73	247 241 253	*RU3WR *RK6BBZ *RA6XB		37,668 23,104 8,928	241 14 82 14	52 58
EW2DN EW8ZA EU3AR	1.8	5,049 3,300	133 103 668	9 7 13	42 26 61	OK4RQ OK4FD OL3X	14	134,413 15,048 78,165	459 34 105 170 15 29 878 15 66	*GØRPM *GØCMP *G4MKR	1	12,090 11,488 8,128	139 16 62 157 28 93 86 20 44	*UA1AFT *RU3SE *RU6YZ		283,917 281,996 269,961	454 86 719 57 664 70	237 229	*RU3AWK *RA3DRI *RZ3AUL	3.7	4,056 2,760 16,900	98 8 242 10	31 38 55
EW8RR "EU2MM "EU6AA	A	19,170 791,348 357,080	374 1283 906	8	46 342 248	OK1NI *OK6Y	1.8 A	37,800 770,350	(Op: OK1FC) 572 11 61 1190 89 345	*M3PZT *2EØTQR *GØFPU		5,720 5,400 2,548	81 16 39 70 16 44 47 15 34	*RA4CSP *UA1CUR *UA6LN	6,40	241,374 229,858 215,340	518 77 601 56 435 74	225	*RW6MT	Euron	814 ean Turke	26 6 By	16
*EU1DZ *EW1EA		194,796 145,928	552 467	52 49	200	*OLEP	-	492,804	(Op: OK2PTZ) 996 69 282	*MØWTD *G4VMM	28	399 20,876	16 8 11 201 13 55	*RA6L00 *RK4PB	4.4	180,681 176,412	511 51 496 62	178	TA1FA *TA1HZ	14 A	70,720	686 16	69 94

Part	DF5BX	182,361 316 78 189 169,670 474 54 181 164,008 400 59 188 156,630 546 43 184 142,011 281 71 208 134,388 430 49 172 132,840 481 48 188 126,540 281 48 189 126,2742 474 43 159 123,714 310 56 181 116,560 261 61 174 112,944 401 41 167 76,950 285 41 109 71,757 285 41 109 71,757 285 49 152 63,690 287 37 128 62,429 158 53 190 60,800 199 50 110 52,670 296 53 11 194 46,340 306 31 199 45,105 278 35 120 44,226 138 35 120 44,226 138 36 91 30,005 245 31 96 39,006 149 30 119 32,004 183 36 91 32,289 179 31 170 32,004 183 36 91 32,289 179 31 170 32,004 183 36 91 32,289 179 31 170 32,004 183 36 91 32,289 179 31 170 32,004 183 36 91 32,289 179 31 170 22,825 155 31 88 18,711 86 36 63 18,711 87 29,79 21,786 110 77 31,584 1144 12 61 31,282 265 13 54 334,720 1007 35 125 160,232 167 17 55 262,482 712 56 233 177,080 610 49 184 177,112 603 44 12 177,080 610 49 184 177,112 603 49 165 156,386 1992 69 311 177,080 610 49 184 177,112 603 49 165 157,760 147 33 97 402,160 1329 36 131 566,398 63 37 73 196 196,398 64 74 177 773,584 1144 12 61 19,628 181 177 17,180 610 49 184 177,177,190 1940 39 47 196 177,386 649 42 156 177,490 394 47 177 773,584 1144 12 61 19,628 181 177 17,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177,980 610 49 184 177,177	*DK1TS *DL1ARD *DL5ANS *DL1VJL *DJ5ANS *DL1VJL *DJ5ANS *DL1VJL *DJ5ANS *DL1VJL *DJ5ANS *DL1VJL *DJ5ANS *DL1VJR *DJ5ANS *DL5JSP *DJ7YR *DJ6UP *DL6BUP *DL6BUP *DL6BUP *DL6BUP *DL6BUP *DL6BUP *DL1NUX *D01DJJ *DF8TI *DL1DF *DL9HB *DD1DF *DL9HB *DD1CO *DD5AWE *DD6AWE *DD6AWE *DD6AWE *DD6AWE *DD1CO *DD5AWE *DD1CO *DD5AWE *DD1DXF *DJ1DXF *DL1DXF *DL1DXC *DL1DXF *DL1DXC	40,689 227 29 108 40,589 170 40 109 38,488 184 38 98 38,740 231 27 84 36,237 167 36 105 35,000 245 31 109 34,194 220 32 107 32,718 125 46 87 32,708 192 30 100 30,155 163 46 81 30,628 192 30 100 30,155 163 46 162 22,184 163 30 66 28,025 200 26 69 26,508 177 25 69 26,502 131 30 93 25,038 167 36 77 24,600 156 34 86 24,289 128 35 72 23,736 207 19 73 24,840 118 38 77 24,600 156 34 86 24,289 128 35 72 23,736 137 22 86 24,289 128 35 72 23,736 137 22 86 24,289 128 35 72 23,736 137 22 86 24,289 128 35 72 23,736 137 22 86 24,289 128 35 72 23,736 137 29 71 21,505 136 20 71 19 73 21,100 116 20 60 21,312 163 32 79 20,544 197 16 65 19,982 195 20 83 19,190 182 22 79 20,544 131 33 20 78 19,100 182 22 77 14,014 133 20 78 11,404 101 27 65 11,404 101 27 65 11,404 102 14 66 11,404 162 14 64 11,505 19 60 11,404 19 60 60 11,404 19 60 60 11,404 19 60	HABLLK A 9 HA1CA - 33 HABTP 7 104 HG3W - 68 "HASNU - 113 "HASOU - 113 "HASOU - 88 "HASTT 28 27 "HG3M - 31 "HASTT 28 27 "HG3M 21 554 "HG3FMZ - 14 "HG3FMZ - 14 "HG3FMZ - 14 "HG3FMZ - 85 "HASW - 37 "HASH - 14 "HG8FMX - 37 "TF3CW - 27 "TF3CA 14 182 "TF3CW - 27 "TF3CA 14 182 "TF3GC 1 4 568 E12CN 14 568 E12CN 1 568 E12KA - 27 "E12VNO - 125 "E12KA - 27 "E14JZ - 33 "E12KA - 28 "E14GNB - 13 "E12KA - 28 "E14GNB - 13 "E12KA - 28 "E14GNB - 13 "E12KA - 28 "E14GNB - 11 "E15JQ 14 88 "ILAI "I	941 714 21 78 920 180 15 47 773 38 19 30 580 889 22 83 804 580 20 83 (Op HA3AUI) 322 1651 7 301 322 387 50 152 147 290 46 147 (Op N18CL) 880 354 19 75 8910 92 46 642 43 25 37 654 47 22 41 066 295 17 61 876 295 17 61 876 295 17 61 876 295 17 61 876 295 17 61 876 295 17 61 876 295 17 61 876 295 17 61 876 295 17 61 876 295 17 61 876 295 17 44 141 94 7 34 152 166 174 7 34 152 167 7 32 160 174 71 238 160 7 35 161 175 40 201 840 316 43 135 164 175 40 201 840 316 43 135 165 174 71 238 160 7 32 161 174 71 238 160 7 32 161 174 71 238 160 7 32 161 174 71 238 160 7 32 161 174 71 238 160 7 32 161 174 71 238 160 7 32 161 174 71 238 160 7 32 161 174 71 238 162 174 71 238 164 105 73 30 175 80 97 8 40 084 316 43 135 167 7 32 168 177 77 258 169 18 30 112 176 105 98 304 176 105 98 304 1776 105 98 304 176 105 98 304 1776 105 98 304 1776 105 98 304 178 12 14 31 188 25 17 77 258 189 388 52 179 160 157 65 22 160 157 65 22 160 157 65 22 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 157 67 258 160 158 36 122 1776 105 98 307 160 150 160 254 275 43 113 1888 255 52 175 160 160 260 160 66 23 37 170 173 43 90 160 160 260 160 160 270 170 170 49 30 170	*UA2FHZ A *RN2FO * *RA2FU * *RA2FU * *RA2FB 1.8 YL3DR A YL2PA * YL2TD 14 YL2BJ 7 YL3FT 3.7 YL3FT 3.7 YL2SM 1.8 *YL2TQ A *YL2TQ * *YL2TQ * *YL2TQ * *YL2TB * * *YL2TB * * **YL2TB * * * * **YL2TB * * * * * **YL2TB * * * * * **YL2TB * * * * * * * * * * * * * * * * * * *	30,592 184 29 99 29,376 117 50 86 26,180 165 33 77 26,136 186 28 104 25,953 97 4 24,768 186 30 99 24,516 163 28 85 23,744 185 22 84 23,241 185 22 84 23,200 172 31 94 21,320 172 31 94 21,320 172 31 94 21,320 172 31 94 21,320 172 31 94 21,320 172 31 94 21,320 172 31 94 21,320 175 22 82 20,384 152 32 80 17,557 124 31 66 17,290 88 32 80 17,557 124 31 66 17,290 180 24 90 17,557 124 31 66 17,290 180 24 19 76 16,942 140 269 28 103 13,940 67 28 54 12,516 136 23 61 11,830 37 56 10,509 99 28 62 11,833 77 56 11,830 79 27 58 11,433 86 37 66 10,509 99 28 75 11,433 86 37 66 10,509 99 22 71 10,349 84 23 56 10,150 68 22 35 8,480 87 23 57 7,475 80 17 48 7,313 68 17 48 7,706 51 24 38 6,984 52 28 44 6,930 91 23 54 6,984 52 28 44 6,930 91 23 54 6,984 52 28 44 6,930 91 23 57 7,475 80 17 45 6,192 72 21 51 5,546 56 24 35 5,546 56 36 37 5,546
DL4MCF A 1,561,368 2053 106 DL2DX 1,227,564 1014 122 DF1IAQ 1,053,240 1587 92 DJ4PT 1,036,472 1526 87 DL5MEV 997,563 1177 99 DL9GWD 819,180 1011 107 DL1DTC 670,653 911 84 DF5ZV 578,956 795 92 DK1KC 543,915 1056 70 DJ9HX 517,832 644 94 DL0WH 457,002 854 88	*37 *DK1LRS ** 310 *DK9VA ** 257 *DL2AL ** 370 *DL4EBA ** 385 *DL8N8J ** 337 *DO8TB ** 342 *DL8YR ** 342 *DL8YR ** 325 *DL2DQL ** 298 *DF6RI ** 315 *DD1BEN ** 315 *DD1BEN ** 315 *DD1APX ** 487 *DL7FQQ ** 487 *DL7FQQ ** 487 *DL7FQQ ** 487 *DD1OP ** 50X) *DK3YD **	64,965 320 38 145 62,092 314 35 137 61,985 256 43 118 61,957 330 35 132 61,500 285 44 161 59,094 326 29 105 55,601 217 41 128 55,278 232 42 124	*DL8DUL *DL1AZA *DN4MH *DL8AAM 7 *DG1NI *DM5Z *DLE71DX *DL5HP 3.7 *DL5HP 3.7 *DL3KZA 1.8 *DL2VSF *DG8FAY *DG8FAY	782 33 6 17 644 26 7 16 532 24 5 14 26,010 236 18 72 2,701 63 6 31 682 32 4 18 121 11 2 9 5,217 101 8 39 11,480 218 7 49 4,280 112 4 36	*IKZHLM 156 *IK7RVY 143 *IZ1KGY 104 *IZ1NBX 99 *IK3SSW 89 *IN3ADW 86 *IZ5IMD 76 *IZ5IMD 76 *IZ5IMMK 71 *IZ1MHX 71 *IZ1JMN 68 *IZ2LST 60 *IZ2NZZ 600 *IZ2NZZ 600 *IZ2NZZ 57 *IWØEAC 55 *IZ3LES 54 *IZ2KPI 43 *IWØQO 41 *IZ2KRZ 37 *IK8TEM 34 *IWZNRI 33 *IZØGVR 32 *IWZMYH 32	570 497 50 205 376 574 44 162 838 422 41 161 716 405 43 151 726 350 41 141 430 342 40 161 692 244 51 115 775 298 38 127 309 233 50 117 442 192 55 128 910 245 47 122	LY20U LY4CW LY2T LY2VA 21 LY2NE 7 LY2BKT 1.8 *LY2N 1.8 *LY9A A *LY2K * *LY3B * *LY2ND *	759,728 1427 99 362 571,236 1255 71 291 487,669 1071 61 238 48,174 212 25 81 46,550 429 17 78 24,288 325 10 59 24,829 381 9 59 2,249,140 2767 113 422 232,518 677 50 221 150,234 488 52 167 94,128 394 45 167

									The Delt							0.00					
LY2KZ LY2O	3.7	98,448 10,696	731 197	23 8	48	LASTJA LASIJ		176,000 80,510	558 53 19 324 39 15		:	11,904 11,696	107 30 63 100 20 66	*Y03YB	:	60,894 60,816	292 36 117 248 45 138	*OM3OM *OMØTT	28	11,832 3,672	160 11 80 7
X1SG	A L	uxembourg 113,400		45 1	35	LA6KOA LA38PA LA7SKA		64,600 58,480 45,592	395 25 12 167 55 11 199 38 12	*5N2M		10,692 9,559 9,384	140 15 51 79 28 51 82 23 45		*	54,270 40,793 35,866	290 37 125 255 26 87 299 35 123	*OM7ANT *OM3TB *OM6TX	14	28,328 28,336	29 9 256 13 311 14
Z35W	A 1	Macedonia 177,912	506	68 1	84	LA7SI LA20KA LA5PRA	*	25,168 12,376 11,049	171 30 9 151 29 7 84 29 5	*SQ5EBM	:	9,292 8,701	(Op: SP2XF 75 39 53 73 26 51			26,432 22,388 21,109	107 45 67 137 46 70 173 22 79	*OMØWR *OM7AB *OM8AQ	3.7	24,308 41,473 1,624	359 9 611 9 74 4
Z35G	7	9,576		21	51	LN9Z	14	661,920	1920 37 13 (Op: LASKO	*SD6MNX *SP5MDB	-	6,900 5,952	83 23 46 54 21 43	"Y05CZZ "Y05FMT		21,012 20,618	114 33 70 162 32 90			Slovenia	****
RSGB ER2RM	A	Moldova 467,041 332,304	1153 718		262	LA7WCA	,	268,755 19,250	2010 26 9 (Op: L810 254 11 5		:	5,917 5,684 5,610	54 23 38 103 13 45 74 21 45	*YOBRKP		19,656 18,486 17,343	199 15 89 148 34 83 143 32 91	SSBA SSBM SSBAA	•	5,484,636 1,549,908 95,480	2064 111 226 65
ER3CT ER1DA ER5DX		152,317 94,915 44,064	433 324 200		174 156 106	LAZXPA LAGBM *LA7GNA	3.7	30,976 12,064 163,947	291 16 7 208 7 4 558 49 16	*SOZLYS	:	5,605 5,162	(Op: SQ9ZM 73 12 47 98 15 43	"YO2MHJ "YO2MIL "YR2TM		15,984 14,162 14,060	108 38 73 92 35 62 140 23 72	\$51ZZ \$53F0 \$56M	28	50,616 33,120 255,576	218 40 137 44 1396 27
ER3MM ER4LX	21 7	18,240 75,600	111 645	23 21	57 87	"LATTN "LASALA	-	74,534 72,930	375 32 13 422 40 15	*SP2GTJ *SP6LMQ	1	5,047 4,800	47 21 28 41 24 46	"Y078G8 "Y088DQ	*	11,869 8,968	143 19 64 58 24 35	\$57S \$53MM	21	155,172 830,450	832 26 2447 36
R3HW	1.8	10,441 Monaco	194	7	45	*LASHFA *LASVPA *LASCF		59,032 53,700 46,169	341 32 12 321 31 11 146 41 9	*SPEDHD		4,712 3,869 3,168	63 20 42 50 19 34 63 10 34			8,820 5,412 2,881	74 25 45 109 8 36 68 8 35	SS7AL SS3M	7	1,074,597 441,062	2968 37 1647 38 (Op: \$51
A2MG		118,854 Montenegro	-800	55 1	158	*LATVNA *LATDSA *LABOKA		25,488 11,500 6,272	186 27 9 124 27 7 81 15 4	*SP3BVI *SP9AUV	-	2,961 2,650 2,640	39 18 25 44 17 36 371 38 138	"YO3DLK "YP2W	-	2,756 2,350 1,696	50 18 34 50 16 31 33 10 22	\$53SL \$530 *\$51F	1.8	43,120 65,529 1,287,728	488 15 835 13 1468 105
33A		10,373,592	7630 1	165 5 p: ES5	TV)	*LA1YPA *LA2GN	*	5,940 5,733	60 20 4 85 17 4	*SP6PLH *SP2IKP	1	2,499 1,952	48 16 35 30 11 21	"YO4RIW "YO4ATW	28	288 31,312	14 8 10 327 17 59	*S568 *S58RU	3	229,887 83,328	613 59 603 21
03Z	^	65,685 Netherlands		31 1	114	*LA4GY *LA4AAA *LA1PHA	:	3,876 3,528 3,224	52 23 4 65 15 4 48 16 3	*SQ3RJP		1,911 1,599 837	28 18 21 50 11 28 19 10 17	*Y05PCY *Y068ZL *Y02IS		22,338 21,238 7,200	238 15 58 210 18 64 147 8 37	*S53QD *S57NTR *S57YX	:	26,544 14,602 8,568	118 42 81 32 96 16
3AAV 7M 2MRT	A	1,991,616 1,116,284 526,815	2094 1 1935 906	86 2	441 296 262	*LASTIA *LASTIA *LASZA		1,054 504 260	34 9 2 25 10 1 19 7 1	*SP5IT *S02LYF	:	308 255 121	8 6 8 9 7 8	"Y09HJY "Y08AXP "Y050H0	21	1,508 1,500 92,430	51 5 24 36 8 17 410 30 100	*S57LR *S56DX *S570	21	3,577 126 137,268	64 12 10 5 615 34
MUNH TMO		295,120 161,028	683 443	63 2 51 1	247 162	*LB9LE	14	95 3,312	16 7 1 84 7 2	*SQBNZB *SP3LWP	28	42,679	17 9 11 380 19 72	*Y05BB0 *Y04SI	-	84,016 25,840	412 26 92 177 23 62	*S57RTH *S520T	14	362,934 239,443	1707 28 1002 33
Ø0 ØCOR ØLSK		160,796 134,368 57,378	294 439 243	48 1	165 160 109	*LA5FH	1	72 Poland	13 3	*SP3MEP *SQ2LXK *SP9DSD	21	6,336 4 64,602	129 10 34 2 1 1 305 28 83	*YR8V	14	362,411	1621 35 126 (Op: YO8CT)	*S56ZZZ *S53XX *S56AA	7	3,312 160 14,742	76 11 9 5 238 11
3GCV 9DD 48		52,394 32,968 17,098	206 192 111	43 32 24	91 72 59	SP9LJD SP3LPG	A	3,975,482 409,545	3574 134 50 1012 70 21	*SP2GCE *SP9CLU *SP9CTW		60,604 35,815 35,547	298 28 81 215 23 72 132 31 92	*Y048EX *Y078EM *Y050DL	7	5,253 1,750 20,202	98 11 40 43 7 28 245 14 64	*S58MU	3.7	8,000	212 4
ØVST 3CMF ØWDG		12,150 8,549 3,328	73 140 92	34 20	47 63 39	SP2GJI SP1JPQ SP2GWH		286,011 230,700 183,904	662 63 23 452 76 22 413 60 16	*S09L *S09A0R		32,384 28,635	238 25 63 (Op: SP9UML 190 23 60	*YO5PEZ	*	480 Sardinia	23 4 16	EA1DR EA3CI	A	Spain 2,532,152 1,728,628	3032 100 2594 78
1NHZ 1JHP	21 7	66,768 15,180	278 200	27	88 56	SP3PJY SP5XOR		145,197	518 44 17 (Op: 3Z3AHK 345 55 12	*SN5Q		7,876	117 11 33 (Op: SQ5RDX	IMB/IKBFI *ISBGRB	NB 21	367,540 183,467	1974 26 89 519 54 217	EA4EER EA4KD		1,112,032 1,101,000 983,645	1455 99 1688 85 1285 94
ABAGA ASKW AGOI		469,828 395,240 392,904		71 2	222 257 246	SP5GMM SP1QY SP4ICP	-	100,497 97,750 80,004	261 57 18 271 54 11 391 33 14	*SP4MPA *SP4LVK *SP9DNO	14	72,030 54,378	15 8 11 400 24 81 315 21 85		14	4,387 Scotland	.83 8 33	EE3R		948,720 839,097	1163 106 (Op: EA3 1170 83
F9A A3T	*	224,282 184,000	597 613	58 47	AA) 196 183	SP1MWN SP3RBG		60,690 51,324	256 48 12 151 44 9	*SQ9IAU *SN1C	0	49,572 48,672	356 23 79 338 22 74 (Op: SP1RFC	GA2MP MM1D	A	2,670,376 168,606	2999 110 431 (Op: GM3WOJ) 548 38 136	EA1AKS		723,030	(Op: EA3 1088 104
D7BZ AØGJV D1KSA		175,112 170,430 163,652	503 504	40.00	185	SPSICS SQ18HH SP3LYN		40,350 34,055 23,843	183 41 10 214 37 10 86 46 6	*SN3C		41,268	198 28 86 (Op: SP3ASN	GM7R	7	322,230	(Op: MM1DHU) 1710 27 111	EF1A EA1EVR		581,640	1083 84 (Op: EA 1298 72
AGRD E1LGZ		154,580 132,608	395 451	57 1	179 174	SP9IVQ SP9W SP5EWX	28	12,069 4,704 43,688	184 15 60 53 18 3 378 18 74	*SQ9HQ *SQ2GX0 *SQ1MNF	:	38,626 29,184 23,068	259 15 61 232 12 61	GM4FAM *GAØNBM	1.8 A	16,388 111,200	(Op: GMBNAI) 204 12 56 458 39 161	EA3EIQ EA7TG EA5ARC		356,832 289,226 261,354	916 63 495 73 617 62
B7XYL HØAS G1R		132,540 128,880 99,792	387 321 411	57 1 39 1	174 183 159	SQ6R SP9EWM SN7Q	21	93,160 1,920 382,850	382 38 10 28 10 2 1589 32 9	*SP6DMI *SP8NR *SP8CGU		21,942 15,311 14,416	248 15 54 122 18 43 150 13 55	-ewello	28 14	2,464 134,552	60 5 27 871 28 93 (Op: K4IIO)	EASEV EA1KE		244,528 169,728	540 68 580 52
E1LTY E2KM E2JMR		91,224 87,400 83,472	362 397 373	39 1 37 1 38 1	129	SN70	14	136,524	721 27 9 (Op: SP7IVO	*SN8J *SP5DRE *SQ3JVW	-	12,462 11,820 6,255	170 12 50 144 12 48 91 9 36	*MADBQI	1.5	1,856	40 7 22 (Op: MM(IBQ))	EASOTD EBSGGB EASIY		80,990 23,244 22,999	314 49 192 21 138 28
A2W A43J	9	76,779 75,628	327 368	35 1	136	SP3CFM SP1NY SP2FAP		111,836 89,707 46,397	415 33 113 563 23 8 301 18 6	*SQ9OKV *SPEGTN		3,570 2,001	84 10 32 52 7 22		1.0	Serbia		EA1CDI EA1BNF EA3CEC	8	18,000 15,756 100	122 34 98 38 7 3
A3DBS D5L0 DØHM		73,445 70,528 65,968	346 442	45 1 34 1 27 1	140 118 106	SP4KDX SN3S	7	270 285,430	9 7 1 1653 33 11: (Op: SQ3LVO	*SP6FIB *SN4@DVP	7	354 150,548	1138 25 97 (Op: SP6DVP	YUTAU YU1PJ YT2AA		297,838 39,576 29,355	622 69 221 230 34 102 183 20 83	EA4COT EA2IF EA7AKK	28 21	3,600 33,812	2 2 131 7 280 24
D1TV A3EWG A7BAS		64,083 62,062 39,825	404 299 212	24 33 1	99 121 98	SQ6000 SP9PTG		57,200 2,028	485 24 8 50 5 3	*SP5AUY *SP1FFC *SP9IKN	:	47,747 23,375 16,632	236 31 102 245 16 69 180 9 75	YUZZIX YTZRX YT1BB	28	38,628 536,536	4 3 2 478 13 61 2071 34 120	EASET AO3A	14	13,167 163,380	129 22 1183 25
D5JFK A2CVD D1RP		36,058 36,036 34,615	247 293	27	94 90	SP3GTS *SP9NWN	3.7 A	15,921 585,104	(Op: SP9tKN 256 9 5: 905 86 30:	*3Z7ØRG *S02Q	1	12,462 5,778	177 12 55 116 9 45	The second of the second	7	391,818 774,400	1883 32 181 2963 36 140 (Op: YU1EA)	EA7ATX EA3DW	3.7	51,574 18,894	(Op: EA38 376 23 256 10
4MRC		34,102	197	32 0p: PF		*SP90YB *SP2AYC *SN9P	:	372,237 352,170 336,312	602 83 29 856 60 25 578 78 24	*SP9JZT	:	4,590 4,173	(Op: SP2UV 59 10 44 69 10 29			500,975	2503 30 115 (Op: YT7WM)	EA4DEC EA2AFV EA5KA	1.8	15,912 9,576 22,557	192 13 171 10 383 13
A3JD A4SDV A3HFJ		32,860 31,899 31,008	200	38 1	90 109 85	*SP5PX *SP5EOT	19	291,148 223,440	(Op: SQ9GA) 685 63 22: 632 55 23	*SP4AVG *SP6FIK *SQ5NPX	*	1,770 528 330	24 5 17 16 5 10	-YT3E -YU1EL -YU1CC	?	250,536 233,282 173,628	755 65 227 503 70 196 444 63 210	*AO3K	Ā	20,016 789,276	311 11 1976 70 (Op: EA30
E1KL A3ARM E2AE		30,855 30,135 29,070	146 208 199	34 29 30	87 94 84	*SP20VQ *SQ8IFG		216,630 177,816	554 58 200 564 48 19	*SP4SHD *SP6TRX *SP5CJY	1.8	35,074 2,257 16,506	446 9 62 56 7 30 258 9 54	*YT2VPA *YT2U *YU1B		119,595 38,591 29,800	515 44 157 182 45 104 140 36 64	*EC1AIJ *EA4DAT		731,136 498,858	774 100 1380 67
AØGRU A1AK		28,829 28,024 27,965	196 219 167	31 29	96 95	*SP3HZG *SP4DDS *SQ3RX		166,950 152,269 140,335	575 52 213 501 48 173 519 42 173	*SN5J	,	3,600	101 4 32 (Op: SP5JXK	YU70NE YU2MMA	20	10,266 6,966	116 26 61 73 32 49	*EA3AKA *EA7HLU *EE7R		475,741 434,934 429,524	1159 69 920 77 717 75
A3HK A5VK		27,661 27,500	175 189	35 1 31	104 79	*SQ7MHN *SP5ØAAZ *SQ30GZ		136,406 127,553 117,208	423 55 188 447 54 179 480 46 150			Portugal	33 3 21	*YT2B *YU7KM *YT2SMS	28 21 14	114,080 27,448 28,512	177 24 70 265 18 63	*EA1BP *EH2R *ED4A	-	389,019 289,332 212,800	912 64 609 63 501 62
AØRBO AØFEI G2D		22,184 20,385 19,080	157 113 127	30 31 30	76	*SP8DIP *SP6CCI *SN3B		113,844 111,756 107,712	296 59 15 399 45 156 443 43 149	CT180L CT1FJL	A	1,345,073 91,876	1481 114 433 331 38 168		1	210,240 29,234 10,335	997 35 125 224 19 75 165 8 45	*EA1ET *EA1AAW *EA3RCB	-	203,300 182,900 169,596	563 51 547 59 516 58
AØTCA A2MI A3GMM		16,614 15,549 14,972	112 165 100	28 16 28	43 57 48	*SP6NVK		103,790	(Op: SQ3JPV 402 42 153	CT1CDP CT2KCO CT1EOD	21	20,976 1,330 360,960	102 36 78 24 15 23 1494 30 111	*YT3R	3.7	53,331 24,163	559 14 73 (Op: YT1HA) 328 10 63	*AM7C		166,752	(Op: EA3) 370 54
ASESO ASSDZ STA		14,935 11,999 11,928	150 89 88	22 24 26	81 47 58	*SP6JZP *SQ9LOM *SQ3WW		100,553 97,584 90,288	434 39 15 399 47 16 329 43 13	CT1JLZ CT2CRP	14	1,082,900	3022 38 144 (Op: OK1RF 142 15 54				(Op: YU7QL)	*EA1JO *EA1HLL	1	162,634 161,469	(Op: EA7H 434 57 548 47
D2LLS E1NCP		11,520 11,421	111	23 18	57 63	*SP9RTL *SP3SPK *SP8LXE		85,176 83,952 80,794	407 37 13 344 45 15 308 51 15	*CR5M	7 A	11,248 861,714	149 15 61 1365 84 357 (Op: CT1DHM	GZ5Y	A	nd and Fai 116,424	412 43 173 (Op: GM4SSA)	*EA4FLY *EA2RW *EA4FQQ		134,160 130,438 126,000	344 50 346 64 480 49
DSURK ASGEO		11,097 10,098 9,882	87 123 107	20	46 62	*SP4ICO *SQ9ANS *SP1I		73,538 73,500 73,444	327 36 130 297 40 130 212 43 120	*CT1AOZ	-	103,332 90,090	290 54 183 309 44 138	"MAGXAU	A	98,784	462 37 159 (Op: MMBXAU)	*EA4/UY70 *EA2MH *EA2JE	w:	120,785 114,742 102,771	456 45 405 47 335 42
A3HGF DØDK k1JIM		8,806 8,640 8,393	79 119 75	24 17 24	50 55 53	*SQ8LSC *SQ2EAN		71,595 71,149	321 43 143 354 32 13	*CT1DIN *CT2JYX *CT7/CUBA	5	74,080 19,734 220	304 40 120 219 18 60 11 10 10	*IT9PQJ	A	Sicily 395,479	724 81 262	*EA30DC *EB3FLY	-	101,712 92,259	384 48 358 44
4WLD 03GSN		7,931	98 (Op:	17 PAOM 14	60 (R)	*SP9MAN *SP9FT		55,500 50,312 49,926	263 35 113 254 35 113 254 38 119	*CT1ENV *CT1JRZ	14	84,482 16,133 15,209	579 22 84 138 18 55 146 17 56	*IT9WTY *IW9FI *IT9JOH		162,000 142,623 100,111	621 55 161 582 47 160 424 43 166	*EA2CE *EB1ERK *A05SP	5	91,640 91,164 90,132	332 35 413 45 382 41
INBD		6,784 5,270	109	12 20	52 42	*S030GP *S09G *SP9CL0		48,580 39,760 36,150	311 33 10 247 36 10 170 41 10	*CT1DZY	7	11,130 20,574 2,700	152 10 43 174 16 65 69 5 31	"IT9RZU "IW9HLI "IT9AXQ		26,082 6,600 2,968	574 7 39 77 23 52 50 15 38	*EA1ASG *EBSCNK	*	86,184 75,848	(Op: EA5) 248 47 317 35
000YF 05B N3CVR	9 9	4,300 3,869 3,200	68 65 51	15 16	29 38 34	*SPSNVX *SN1A	*	34,894 33,899	203 34 112 168 39 71 (Op: SP1EG			Romania 338,712		*IT9LKX *IT9LKX *IT9RYJ	28	33,448 18,450 169,600	622 10 45 179 19 56 811 30 98	*EC1AE *EA3G00 *EA5AWJ	*	75,601 73,440 69,560	291 36 317 38 315 37
E3MK DØLBH A9HR	100	2,418 2,223 840	81 39 35	13 15 9	49 24 26	*SP1DMD *SP3GHK	*	32,428 31,453	201 31 9 389 42 15	YRØR		326,802	891 67 197 941 56 195 (Op: YO3HKW	*IT9ICS *IT9YAO	14	47,971 38,313	503 23 66 386 17 64	*EA7MK *EA2AP	-	65,637 59,220	315 37 261 49 235 36 236 36
A1W DØHVL B1TT	28	50 11,426	28 8 158	9 3 12	23 7 45	*SP5UAR *SP2FUD *SQ1W0		29,646 28,310 27,071	212 31 64 205 25 8	YO4AUP YO8RIJ YO9OL		104,682 100,280 87,770	336 49 170 320 59 171 402 34 100	*IT9MYY	7	26,052 24,726 2,340	246 16 62 233 14 64 80 6 30	*EA5KGD *EA3GEO *EA3WX		44,240 41,820 38,130	158 42 163 36
4DIG	14	6,240	97 (Op:	14 PAØM	38 IR)	*SP5DPD *SP4FMD *SP7TES		24,766 22,491 19,197	136 44 7/ 188 28 9/ 93 28 5/ 96 31 8/ 100 36 7/	Y02AQB	28 21	87,770 756 5,778 106,518	24 11 17 106 13 41 491 27 96			Slovakia 143,591	285 65 216	*EA3NA *EA1NE *EA5GVZ		37,520 33,280 30,160	197 30 154 37 181 36
A2REH A3EMN	3.7	48,312 6,837	120	7	46	*SP3VSE *SQ9DXN		18,870 18,480	96 31 8 100 36 76 168 19 6	Y02R		53,821	255 24 83 (Op: YO2RR)	OM7PY OM8DD		35,112 17,340	162 38 94 225 17 43	*EA4BZ *EA7VJ *EA4BM		29,232 28,556 27,560	192 26 144 32 196 24
5K	3.7	N. S. T. S.	2562 (Op:	27 1 MIØL	LL)	*SP5ELW *SQ6LJV		17,688 17,296 17,177	168 19 69 90 30 60 91 37 50 142 35 80 165 29 70	YO3CZW YR8D	•	1,398,186 568,560	2507 96 353 1131 80 288 (Op: YO8DAR	*OM3IAG *OM7ZM		247,194 155,041 146,544	676 53 226 529 45 182 419 61 197	*EA4EQ *EA5DIT		26,928 25,764	282 33 119 35
MIOM BITAXB	A .	685,720 301,965	1389 (Op:	64 2 MIBS 52 1	216 (AI)	*SO9R *SP7MJX *SP1MWK	*	16,905 16,590 15,370	69 43 60	*YOSAIR		414,564 184,623 184,212	822 72 286 554 52 185 638 47 205	*OM4DA	104	120,832 86,240 58,788	392 51 185 442 36 160 390 26 116	*EA1MX *EA3TJ *EA7HHS	*	25,047 23,478 22,932	138 40 151 36
SIØKVQ		159,896 86,870 35	522	41 1	117	*SP9IBJ *SP5BUJ		15,035 13,888 13,776	69 43 60 120 29 60 148 14 50 109 22 60	*Y04US *Y07NW		134,088 112,448 110,160	471 47 175 303 58 166 458 40 164	*OM3TLE	8.878	18,762 5,103 3,400	419 61 197 392 51 185 442 36 160 390 26 116 186 29 89 73 16 47 55 16 34 51 18 35 23 15 20 32 9 17	*EA1GPL *EA4WD *EA5GX		20,996 20,720 20,367	119 29 165 34 119 26
14AAM 116GTY	7					*SQ1NDW		13,529	91 31 50 57 33 50	*YOSRFS		105,840	432 50 160 449 53 189 313 39 129			2,544	51 18 35	*EA3FYD	*	20,114	130 31

PEANING P	19 420 104 20 01	1 +cuay	. 500	20 8 47	*1111511	20 25 002	227 24 55	+VCC IDT	4 249 717	E14 E0 453	75/000		E41 200	1552 21 102
*EA3ATO *EA5GSW	18,430 104 36 61 17,136 217 40 104 14,168 92 31 61	*SMØY	165	22 6 17 (Op: SM8OY) 11 6 9	*US7IA *UR5WHD	28 25,992 16,650 12,118	227 21 55 138 17 58 107 16 57	*YESJRT *YESTJ *YESUUN	A 342,717 197,780 78,680	614 60 153 345 78 142 222 54 86	ZV2C PY2KJ		541,628 172,380	1552 31 103 (Op: PY2CX) 701 22 63
*EC7DDZ *EA7NW *EA5HKA	12,702 87 29 58 9,944 70 30 58 8,460 95 25 65	*SG5A *SM6C	28 8,712 21 13,464	143 7 37 (Op: SM5ERK) 100 18 48	*UTSEL *USSZCW *UTZIV	12,000 9,486 21 64,489	179 13 47 138 17 45 350 24 100	*YB3IZK *YB2UTX *YB0EIN	68,340 66,048 36,396	232 44 90 233 45 84 134 43 65	PR7AR PX5E	7	137,700 289,542	563 24 78 915 31 92 (Op: PY2LSM)
*EATGAZ *EATGFT *EATIT	8,256 142 24 62 8,025 73 24 51 7,257 70 17 42	*SM7ATL *SM3AGO	2,604	(Op: SM6CTQ) 43 11 20 20 14 19	*UYBLM *UT3EK *UZ5UA	* 53,352 * 43,554 * 3,536	325 23 81 248 25 77 42 13 21	*YB7BAE *YC5OUB *YB8EL	8,190 21 184,192 56,640	55 18 27 460 23 65 301 27 53	PR/7AP PWZP	3.7	46,332 1,984	236 21 57 52 14 18 (Op: PYZXAT)
*EB3EPP *EASEI	7,182 69 19 35 7,056 88 23 49 6,888 92 26 58	*SM5MX *SM5DQE *SA5ATV	14 59,534 30,003 2,860	369 22 81 303 16 57 83 12 32	*UXBIX	104 98,413 63,757	22 8 18 633 27 92 383 23 80	"YCBCOX "YC1DYY "YC1BYX	50,940 24,090 23,460	236 24 66 130 23 50 157 18 51	*PYZSEI *PY1RY *PV80R	A	133,556 105,984 36,247	316 60 113 432 35 61 244 26 41
*EA2DOT *EA4JJ *EA2JB	6,873 89 24 55 6,771 65 24 37 6,424 91 21 52	*SMEWZH *SMEYAT *SMZEKA	2,414 195 7 11,892	74 8 26 15 3 10 179 9 50	*UT4Q	56,244	570 14 72 (Op: UR5QRB) 377 23 79	"YCTUDK "YCTBRS "YCZLEY	14,307 4,056	111 18 39 45 14 25 86 14 27	*PY2PT *PY2NA *PY3TIO		21,655 20,748 19,504	156 31 40 201 18 20 117 40 52
"EBSGIV" "EA3HAN"	5,472 68 23 53 5,310 99 26 64	*SA7AOM	608 Switzerlan	23 7 12	*USBIM *UXBIXX	11,590 1,880	150 14 47 92 7 33	"YB2VTO "YB1WR	14 6,642 7 5,070 3.7 999	54 16 23 22 12 15	*PYZUDX *PYSAP		16,281	114 33 48 121 27 38
*EATHOD *EAZDNR	3,692 48 20 32 3,416 77 18 43 3,300 58 13 37	HB9EFJ HB9TTX	A 235,936 3,185	561 61 231 32 20 29	*UR7TZ *UR8QR	7 83,246 28,900	(Op: USBIGC) 672 22 85 262 16 69	Nort *KHB/JK2V00	TO A STREET WATER TO SERVE THE STREET	2341 89 155	*PU3KNG *PY2ZR *PY2QA		6,960 6,439 5,995	86 22 38 96 17 30 61 27 28
*EA1EA *EA5GVV *EA4CU	3,071 37 12 25 2,867 57 13 34 2,280 36 12 26	HB900P HB9AAP "HEBAWS	21 61,376 14 294,840 A 144,526	297 24 88 1397 26 100 516 48 206	*UR3UI *UU2CW *UU4J	26,820 21,868 19,650	239 18 72 229 15 62 237 13 62	*KKSWW/KH		83 13 33	*PYZDEZ *PU3SVA *PYJATR		5,917 4,559 4,230	72 26 35 57 19 28 61 23 22
*EA/OH400 *EASPS *EC1AJV	2,150 35 14 29 2,091 27 18 23 1,911 33 16 23	"HESTOC "HESTOU" "HESTSU	71,050 69,030 66,725	301 47 156 343 30 147 303 37 120	*UR7IKV *UT3L 1	18,480 1,7 36,038	(0p: UU4J0) 254 17 60 455 11 63	ZL4QS ZL2U0	New Zealand A 14,697 9,916	87 29 42 61 26 41	*PYZASS		3,430	71 24 25 (Op: PY2AXH) 60 15 21
*EA2CHL *EA3GYE *EC1AGT	1,260 19 10 26 1,222 24 10 16 1,066 31 15 26	*HB9SVT *HB9BGF *HB9TSA	17,061 6,864 4,186	152 28 93 49 24 42 50 16 30	*US6IPD *UT7VR 1	1,550 1,8 6,096	(Op: URSLO) 43 6 25 173 7 41	ZL3A *ZL2MM *ZL3DXT	7 788,000 A 31,244 10,125	1775 32 128 136 47 60 66 34 41	*PY3KIM *PY2SRL *PY28F	1	2,584 1,364 1,131	50 14 20 32 14 17 33 13 16
*EAZAOS *EA7HYL *EA5FBD	1,056 42 13 19 1,008 18 11 13 899 23 16 15	*HB9JAQ *HB9ERV *HB9OHG	3,813 1,872 21 67,872	57 15 26 40 17 31 405 26 86	GW48LE	Wales A 4,622,391	3791 127 446	*ZL2ACG *ZL3DW *ZL4CR	3,713 1,764 1,170	45 22 25 28 16 20 18 13 17	*PY7ZY *PY2RDZ *PP7LL	10	1,120 672 656	21 11 17 37 13 15 29 18 23
*EASGZM *EA3HEU *EA1GCF	600 24 7 18 378 14 9 12 360 16 6 12	USSD	Ukraine A 3,583,884	4072 136 470	GW9T	1,355,532 14 567,312	1979 103 341 (Op: GW3NAS) 1898 37 122	*JJØLYY/ZL1	Papua New Gui		*PU3MPV *PU2MTS *PY1NX	28	201,983 185,500	737 24 79 687 21 79
*EB1AIR *EA1DFP *EA7FUN 28	253 15 10 13 192 18 9 15 17,340 156 16 52	UYØZG UY7MM	1,669,910 1,520,456	(Op: UT7DX) 2292 108 409 2079 116 416	*MWØLAO *GWØANA	A 215,040 127,232	(Op: MW0ZZK) 561 56 200 399 48 176	*P29CW	A 56,832 Philippines	223 54 74	*PU2SDX *PU2WDX *PU5AAD		42,660 26,432 14,688	219 22 68 200 15 41 115 20 52
*EC7DZZ *EA3OP *EA1CBX 21	7,326 80 12 25 36 6 2 4 195,480 741 25 95	UV5U UR4U	1,308,654	1705 117 405 (Op: UX1UA) 1347 112 433	*MWØCVT *MW1MDH *MWØRZC	62,775 59,004 3,364	291 36 119 329 30 119 47 22 36	DU1BP DX1J	A 860,469 7 284,780	1321 83 150 962 31 85 (Op: DU1IST)	*PU2UAT *PU2UTG *PY2FDX		2,294 2,272 1,862	27 11 20 76 11 21 30 13 25
*A01B " *EA1CCM * *EA3KN *	184,920 838 25 95 150,255 549 30 105 148,352 511 33 119	UR3IQO	426,972	(Op: UR4UDI) 600 87 304	*GWØTSM *GW4EVX :	21 39,221 3.7 11,804	321 20 71 (Op: GØTSM) 215 6 46	*DU1LC *4D1N	A 882,464 75,621 26,726	1280 88 165 370 33 58 175 33 50	*PU2RKP *PU2UJG *PU1LND	1	1,743 1,674 432	50 11 10 44 13 18 35 7 9
*EASEOR * *EH1K * *EA7GSU *	102,039 429 27 102 90,616 520 22 72 55,020 275 23 82	UTGEE UYSAA UR4IXM	421,860 258,077 218,688	706 78 278 542 69 254 523 62 206		OCEANIA Antarctica		*DU1VHY *DU1EG *DW1VKT	2,091 87,360 3,040	32 17 24 505 20 44 44 13 19	*PY3YD *PP5TR *PY5JO	21	447,104 90,055	1 1 1 1601 27 85 395 23 60
*EB4FJV *EA7HHV *EA1QT	35,512 255 20 72 22,599 224 22 71 21,182 105 21 68	US7UX UX5U0	198,792 147,018	675 67 184 342 55 174	*R1ANB *R1ANC	A 27,146 14 18,069	108 40 58 129 22 35	+DU1JI	14 115,280 Tonga	547 26 54	*PY1SX *PV8RF *PP5MQ	14	39,836 10,340 17,101	171 22 70 88 18 37 157 19 38
*EA7FRX *EA3BCX *EA5FCW	15,795 137 14 51 10,920 99 15 37 9,296 96 15 41	UTØNT URØQX UR7EQ	139,004 102,836 90,306	453 53 183 344 44 144 442 29 145	VK4CZ VK7ZE	Australia A 1,842,000 969,000	1867 119 256 1263 96 204	*A31KK	A 523,824	1141 59 109 (Op: XE1KK)	*PSBET *PY7GK *PY3APY		8,960 2,291 1,512	52 19 51 26 13 16 38 13 15
*EQ3PL * *EA5DT * *EA5HIR *	8,109 105 11 42 350 29 6 19 112 7 7 7	UTSERV UT2IW US7IB	87,466 69,255 16,434 6,767	391 43 159 229 46 125 96 34 65	VK3TDX VK3AVV VK3IO	758,725 148,740 91,140	1029 85 190 319 71 114 245 56 99	RIANY	Antarctica 14 18,660	128 21 39	*PYZZA *PTZQP *PY4XYZ		1,020 400 368	21 9 11 15 7 9 12 7 9
*EA4UV 14 *AN1A	96,424 410 31 185 59,580 539 19 71 (Op: EA1AST)	USBLW URSWJW	4,272	(Op: UX1RX) 42 19 29	VK3GK VK4HG VK6GG	70,889 9,454 2,664	206 52 81 69 22 36 29 17 20		Argentina	(Op: RASMAK)	*PY1EJ *PR7DZ *PY2WAS	7	86,950 60	10 3 4 371 24 70 5 5 5
*AO7T *	48,060 442 17 73 (Op: EA7KJ) 41,199 312 23 70	UR4EI UR5ZRB UU1DX	1,344 156 28 178,852	42 8 24 7 6 7 1138 25 97	VK2PN VK7GN *VK8NSB	612 14 143,616 A 412,335	13 8 9 399 33 99 1036 45 101	LT1F LU7MCJ	A 5,021,460 700,470	3848 118 341 (Op: LU1FAM) 1070 76 182	*PVBADI *PVBAA	3.7	10,080	20 9 15 122 10 22 (Op: PV80X)
*AM3CS *	25,813 221 18 65 (Op: EA3CS) 12,474 189 13 41	UTTGL USSEX	20,350 21 182,106 72,670	206 17 57 742 33 118 342 26 102	*VK2BJ *VK4EJ *VK3TZ	299,450 223,672 88,752	524 81 145 584 50 96 231 74 98	LU1MSD	600,820 583,220	1216 82 138 (Op: LU9ESD) 1182 61 159	CE48		Chile 340,219	712 78 127
*EB1EVX *AN4A	7,992 116 12 42 7,590 74 14 32 (Op: EA4CWN)	URZVA USTIID URSZMK	8,526 14 54,924	77 13 45 366 22 70	*VK4BL *VK4IU *VK3MDX	59,024 31,080 21,488	199 52 72 159 32 42 122 37 42	LU9MDH LU7FTS LS4DX	294,619 78,926 4,592	718 56 117 373 54 80 100 33 49	CESJZO *CE4UJU	21	211,876 99,110	(Op: CE4ETZ) 1003 24 68 489 38 47
*EF5W * *EC4AHX * *EA5GUK *	4,522 72 11 27 520 23 5 15 392 10 7 7	EOSI UTSKL UT1KY	7 65,912 27,520	509 20 68 418 15 65 232 7 37	*VK2HBG *VK3LM *VK2NR	19,923 19,173 6,783	125 42 45 98 37 40 52 24 27	LU1DZ LU1HF	3,404 28 881,784 21 1,131,599	34 12 25 2162 30 118 2916 31 108	"CASDEV "CA68MF "XQ5CIE	28	84 108,216 16,020	32 14 14 584 28 61 152 13 32
*ANSTN *	165 8 4 7 49,060 368 23 87 (Op: EASDM)	UW5U UT3SA	9,636 3.7 132,396 80,360	1095 19 83 (Op: UY2UA)	*VK8HPB *VK4VCH *VK4FJ	6,732 5,304 4,242	53 29 37 40 32 36 38 14 28	LU2QC L33M	404,378 14 185,433	(Op: LU1FDU) 2208 36 115 639 29 84	*CE4SES *CE3DNP *CE1KR	14	14,812 129,458 4,028	133 16 30 530 32 66 49 14 24
*EA3KT *EA1AQE *	40,940 369 18 74 18,673 215 12 59 9,114 151 8 41	UY1HY UR5AKU UY3AW	23,400 19,118 8,736	288 13 52 190 15 64 124 10 46	*VK7FWAY *VK3BUH *VK6FDX	2,805 984 180	45 17 16 21 12 12 7 6 6	LU9MBY	. 157,386 1.8 1,782	(Op: LU3MAM) 667 27 75 31 10 17	нкзілн		Colombia 493,734	992 58 125
*EA7ICN 3.7 *EA4IS " *EA3LA 1.8	19,162 230 12 55 18,156 207 9 59 836 44 2 20	UU7J	1.8 65,685 A 669,465	686 16 71 (Op: UU1AZ) 1197 88 317	*VK4AN *VK2ACC *VK3VTH	74,538 7 8,131	238 33 90 1 1 1 78 19 28	*LT7H *LV5V *LU7HW	A 1,423,434 * 604,732 * 367,081	1564 185 249 1472 35 111 809 62 125	HK3Q HK3J HK1KXA	7	130,240 30,171 336,746	302 52 133 126 39 74 1033 29 108
SEØX A	Sweden 1,107,605 1931 94 351	*UTZUU *UT4EK *USØSY	657,944 532,884 525,140	1155 81 298 1048 80 287 929 78 307	*VK4VDX	5,588 Brunei	60 18 26	*LU5CAB *LR1A *LW5DFR	88,740 86,240 68,442	270 62 108 281 57 97 292 37 65	HK1NK *HK8EA *HK3W	3.7 A 14	79,348 494 58,100	372 18 65 20 13 13 249 26 74
SM50 " SM6BGG	1,107,605 1931 94 351 (Op: SMBMDG) 813,120 1139 93 355 599,592 1130 79 222	*UT3UZ *UR5ETN *UR8IDX	422,776 422,095 314,170	845 73 271 849 67 288 602 70 283	*V8AQM	28 15,984 East Malays	161 10 26	*LW1HR *LU1IBL *LU7DSU	46,238 19,530 16,200	204 48 74 123 26 44 80 27 45	HC2GF		Ecuador 293,136	1526 20 73
SI3A *	198,436 502 57 209 (Op: SM3LIV) 138,496 381 63 183	*USBIBS *US7LM *UT2LU	214,903 208,824 208,152	623 54 217 509 59 205 661 48 204	9M8Z 9M6XRO	A 4,923,019 21 761,262	3814 126 335 (Op: 9M6DXX) 1895 34 108	*LU1MPK *L73DX *LU6KA	15,174 11,470 7,896	124 21 33 82 32 42 126 26 30	*HC5VF *HC7AE *HC1JQ	A 14	208,810 20,615 631,180	439 59 131 141 39 56 1523 32 119
SB6A SM6AHU SM5BMB	52,326 341 24 90 46,648 218 38 98 46,332 168 43 119	*UR7GO *UT8IT *UR5EPG	191,296 158,144 150,430	398 73 171 447 44 180 369 64 181	9M8YY *9M6YBG	7 201,762 21 580	726 28 71 (Op: JR3WXA) 17 7 13	*LU9DO *LR6H *LU6FOV	3,922 1,809 28 193,860	39 21 32 37 14 13 789 22 68	"HC2A	Gala	67,954 pagos Islai	450 22 39 nds
SEZT SD3A	28,072 114 45 76 26,128 152 38 104 (Op: SM3FJF)	*UX7U *US5IND *UR5TW	129,398 110,760 105,000	481 42 152 414 40 173 261 64 146		Fiji 14 34,476	182 27 51	*LUZUE *LUZUF *LTBD	141,732 103,572 30,857	595 21 72 504 20 64 208 17 42	HC8A	A 1	No.	7891 166 521 (Op: N6KT)
SM5V · SM7HVQ ·	22,491 171 33 86 (Op: SM5ELV) 20,256 89 39 57	*UX7FC *USSISV *UXBIB	104,370 101,808 99,405	391 45 165 362 39 163 311 56 179	3D2KJ	7 55,071	268 31 56 (Op: SPSDRH)	*LU6EVD *LO7D *LU1EXR	1,081 420	31 9 14 27 6 6 (Op: LW1DRH)	0A4SS	A		2270 94 187
SD2G SM7DXQ SMØBXT	18,574 176 19 55 13,968 96 32 65 5,644 66 21 47	*UR5WHT *UY5TE *UU2JG	97,658 87,792 86,478	413 42 151 397 32 145 224 57 156	*FORRZ	French Polyne A 646,920			21 64,530 5,265 14 158,040	442 18 36 49 16 29 548 34 86	PZ5M		Suriname 5,463,040	3904 124 388 (Op: AJ9C)
SMBUQL 28	3,285 69 14 31 144 10 3 5 (Op:SM1TDE)	*UT4EN *US7NW *US3W0	84,564 67,425 65,325	336 41 121 293 32 123 251 48 147	WH2X	Guam 21 397,536	1427 28 73	*LW7HE	1,147 Aruba	35 14 17	9Y40		dad & Toba 1,372,409	ago 3051 36 137
SMSCEU 21 SMSBRG 14 SM7C	126,084 416 34 124 87,561 351 32 109 33,856 194 24 68	*UX2KA *UTSJCE *URSXMM *UR6MX	59,466 58,812 55,809 55,040	220 43 116 302 34 135 270 37 122 160 39 121	KH7XS KH6LC	Hawaii A 7,948,992	6103 141 315 (Op: K4XS) 3159 127 242	P43A *P48A	21 1,583,113 A 7,129,408	3437 34 127 5053 112 382 (Op: KK9A)	CX4DX	28	Uruguay 1,377	36 8 9
SE6Y 7 *SM3C A	42,596 428 18 74 485,520 936 73 284 (Op: SM5CCT)	*US2IW *UX5TQ *UW7M	52,520 51,042 49,749	252 33 97 276 30 111 252 37 124	20000	21 611,429	(Op: N6GQ) 2376 38 65 1670 37 83	*P43E	211,890 Bolivia	755 42 63	CX4BW CX1AV *CX2ABP *CX9AU	14 A 21	328,776 208,656 147,828 416,847	954 32 101 811 30 78 474 50 77 1239 27 96
*787V * *SJ7M * *SE6W	324,684 812 67 244 144,636 462 45 159 136,864 550 43 165	*utsuky *uteck	47,012 46,494	(Op: UR3MP) 167 46 115 224 36 126	NH6P *KH7T *KH6CO	1.5 1,904 A 281,780 28,960	60 8 8 451 70 101 140 39 41	CP1FF	A 19,885 Brazil	104 33 64	CXSTR CX1CCC		68,400 53,480	381 19 56 515 16 24 (Op: CX2AM)
*SM3EAE *	97,750 390 39 131 96,500 355 44 149	*UTBEL *UYDCA *UTSUN	36,685 32,500 24,676	205 31 114 138 39 86 137 29 95	*NH6YK *KH6/W6PH	21,420 16,502	(Op: KH600)	PYZEX PP1CZ PY3DX	A 1,133,616 - 894,040 - 599,912	1532 88 176 1207 78 202 945 76 160	*CX2CC	7	98,388 Venezuela	367 27 81
*SEBC *	61,457 334 34 117 (Op: SM6CDN) 58,934 298 34 124	*UR7CT *US9PA *UT7MD	23,688 21,070 20,470	144 40 86 148 25 73 116 29 86		28 3,220 2,450	109 35 50 109 29 45 67 13 15 39 11 14	PY3DX PP5JY PY2KP PY2ZY	312,000 119,462	670 62 133 327 55 106 360 20 68	YW5T YV68FE YW5L	A 28 14	1,234,114 22,214 543,204	1388 104 239 220 17 41 1366 34 124
*SM5NVF *SM5NVF	51,516 299 35 127 47,716 209 38 120 31,175 199 28 117	*US1IV *UT5ULX *UU2JA	18,810 14,664 14,017	86 35 75 138 32 72 99 27 80	YC9MDX YBØAI	Indonesia A 1,096,688 - 634,923	1378 81 215 1035 69 168	PY7VI PY5KA PY3VB	70,136 55,144 52,402 33,975	208 42 71 196 43 90 104 51 100	4M5IR YV5MSG	3.7	498,593	1647 32 107 (Op: YV5KG) 46 7 13
*SM5ISM *SAØAEK *SE5S	30,508 159 30 86 27,911 211 25 88 22,844 184 31 80	*US2YW *UUSTN *UT3NA	7,047 4,692 4,352	78 23 58 50 22 46 86 16 48	YB4IR YB1AR YB30X	457,292 429,840 79,624	786 67 142 730 85 185 240 52 96	PY1WS PY3CAL PV8DX	32,640 16,533 15,247	129 40 56 120 43 56 110 36 43	YY5APA YY1ROC YV6BTF	A 28 21	483 1,170 97,728	15 10 11 61 8 10 452 25 71
*SA6AIN *SM3SJN *SE2A	10,355 125 23 72 9,912 121 22 62 6,372 96 14 40	*UT5UNZ *UX3IO *UX5IZ	3,355 2,982 2,024	54 19 36	YC1LA YC5VB YBØBCU	21 112,230 31,326 14 16,124	620 23 67 186 23 46	PPSBK PW5G	8,316 28 807,552	51 29 48 2134 28 116 (Op: PP5WG)	YYIMTX YV5IAL YW7A		31,930 11,861 486	222 22 40 172 11 18 14 7 11
*SA7A01 *SA3BGM *SM50SZ	4,920 45 18 23 3,120 72 11 37 2,982 47 14 28	*UTSUQN *UR4MH *UT9FJ	2,014 1,184 1,140	37 12 26 33 15 22 17 14 16	YBØMWM YB8FL YC2VRG	7,128 7 29,522 234	75 16 28 215 20 38 10 6 7	ZX5J ZV2V	21 2,456,622 - 782,322	4415 38 163 (Op: PP5JR) 2887 32 106	*YY5AEA *YW4A	3.7	108,120 12,586 3,672	325 23 97 85 13 45 61 10 24
*SM7RPU *	2,496 26 17 22	The second state of the se	280	8 6 8	A THE		(Op: N1MM)	1	TOLIDEE	(Op: PYZLED)	1 -10000	- 5511	1.587.6	(Op: YY4RN)

RX1CQ A 489,775 1050 66 259 Y1 14 15 15 15 15 15 15 15 15 15 15 15 15 15	16DX 37,017 353 16 65 4PZP 26,344 219 17 57 T1CS 24,624 277 11 61 PSDDJ 24,309 220 15 58 M6CRM 20,300 182 15 55 4FLQ 16,500 181 18 57	N2SS 402.705 W2NY 396,347 N2SQW 383,625	(Op: N2MUN) N3FP/4 * * * * * * * * * * * * * * * * * * *	84,010 219 42 113 AL 82,264 188 50 132 K7 82,167 207 64 119 K7 78,498 203 47 100 W 74,798 195 45 104 N	7WM 24,871 142 38 81 07YT 22,796 162 35 47 7MZ 18,432 97 33 39 7SA 8,875 51 30 41 7A7LNW 7,119 52 29 34 7AZ 1,664 25 13 13
RW3AI 223,746 657 51 216 U IZ1JLF 220,542 469 66 201 YI NBKE 188,088 375 73 131 P UA30Q 186,150 578 44 211 12	P3DRM 16,065 184 14 49 D4W 13,662 84 21 48 A1CEC 13,500 197 9 45 P3CW 12,390 85 22 37 P5CW 7,398 115 12 42 ZBRMV 6,321 99 10 38		517 66 207 K1ZW/4 * 430 75 223 W4GHD * 338 59 184 KA40TB * 478 42 134 W6U8/4 * 294 71 204 N4EEB * 350 57 161 K8YC/4 * *	67,398 194 48 93 K8 66,138 194 43 103 W 63,365 163 43 102 K0 57,717 141 50 109 K7	/8TX/7
N1TM 156,140 306 52 159 EI E77R 129,140 396 54 166 12 JR4DAH 118,856 304 62 104 0 EA1GT 112,320 438 38 157 BI	TTIESG 4,922 90 11 35 C1ABR 4,408 68 11 27 Z2QKG 3,344 99 6 35 MBJP 2,990 60 10 36 SD4EXL 1,716 59 10 16	K2BX 176,272 K2CJ 167,328 NG2P 163,718 WA3AFS/2 162,756 KC2NB 159,996	358 45 139 W3ZL/4 * 269 54 170 KE4UW * 279 62 156 K3K0/4 * 250 81 193 AA4D * 314 43 158 KI4TZU *	42,090 143 33 89 AF 37,692 139 28 80 37,125 99 38 97 W 36,600 138 39 81 AJ 25,365 117 35 60 N	F7DX 18,620 93 22 54 /BMJ A 1,643,544 1269 112 392 ABLL 769,404 747 98 290 4TX/8 369,768 583 56 192
PEZKP 109,416 528 35 153 U G3UFY 106,704 344 43 165 S IKSRUN 99,308 221 67 177 J LY2OM 97,760 387 43 165 K N8XA 96,807 343 54 129 V	#\$9J\$Q	COURTS CONTRACT	211 71 180 WB4MAK 268 53 147 W4JVN 248 50 130 WA2BCK/4 231 38 115 AF1E/4 (Op: WB2NVR) KG4ZOO 163 45 107 N4VA	21,079 82 40 67 NS 19,783 113 21 52 W 16,915 83 28 57 W 15,224 78 35 53 KJ	780HT 249,486 410 69 189 D8L 223,955 379 59 176 78TN 148,708 237 56 170 78TE 134,616 263 62 151 A8PTT 84,600 177 47 133 9TRV/8 73,528 165 44 138
KG4JGQ 89,994 224 45 114 M G4DBW 89,199 349 44 143 IX SP5FKW 88,476 294 47 155 O OK1ES 88,182 358 41 166 B		K2SI	128 36 86 KBCOP/4 * 135 43 81 KC4H * 114 30 80 N4MIO * 100 27 78 W4KPG * 103 25 52 K2SD/4 *	12.993 69 26 45 K8 8.960 57 27 43 W 7.839 50 29 38 W 7.638 51 20 37 K8 2,400 28 10 20 NB	BLY 71,296 221 39 89 /5UHQ/8 62,790 189 49 133 /8EH 26,814 98 34 75 8GT 24,885 99 36 69 8KOJ 8,880 59 27 47
NDBC - 83,793 216 52 187 E1	A1POS 35 3 2 3 RUGLA 7 37,168 274 21 80 W7DK 29,700 339 11 64 DN3DI 12,027 198 7 50 HABGK 11,000 181 9 40 //E6EX 10,608 162 15 19	K2A 216 NJ1F/2 60	64 28 53 KC4MYV 58 31 45 W4VIC 5 16 7 11 N4PN 21 (Op: W2YWC) N3JT/4 5 5 5 5 K4RAY 14 583 29 119 W3BP/4 7	70 5 5 5 N8 310,560 770 30 130 27,938 95 27 95 W 100 5 5 5 K8	/BCZN 14 291,525 719 34 135 BAGU 31,354 102 26 96 /O9Z A 1,234,383 997 107 372 9IMM 1,048,968 966 94 314 2BJ/9 1,006,434 1007 91 283
KT8K 63,546 200 37 82 12 UT5UUV 63,318 318 34 149 R RD3AJB 63,012 289 36 141 K8ZT 57,812 163 47 102 K SP2DNI 56,950 276 38 132 F	A2EY	N2ZX 7 340,272 KN6DV/2 92,532 W2JJ 3.7 7,498	308 24 90 838 30 114 W5YAA A 373 27 105 WA5ZUP " (Op: E78WW) N6AQ/5 " 80 12 34 AD5VJ " (Op: WA2VUN) N1CC/5 "	542,100 615 82 243 W 461,480 648 70 208 NS 387,891 522 99 230 NS 267,786 439 75 186 ND	/E9R 937,416 863 100 317 /9IU 524,300 640 86 264 9ZM 514,064 624 81 223 S9I 407,835 571 70 215 D9E 236,895 364 75 180 A9FOX 209,118 303 86 187
RW6F0 55,806 294 32 110 E1	C2WBF 3,225 45 17 26 S1WST 2,970 87 6 27 R3AU 2,450 51 8 27 R3AU 350 10 7 7 R4DUT 96 12 4 12	K3WW A 3,503,694 AA38 - 2,741,760 N3RS - 2,535,702 K3PP - 2,284,240	2218 124 462 N5ZK N5ZK N5ZK W5WZ K7IA/5	179,690 292 62 176 KI 151,866 425 31 112 W (Op: W5ASP) W 146,680 330 61 132 KS 133,400 284 63 121 W	19A 121,011 248 56 137 19GIG 91,868 196 51 142 149IVH 64,860 188 42 99 19DUR 33,396 135 43 78 149V 32,574 105 42 80
PY2BN 43,112 188 55 81 U F4FLF 41,984 291 40 124 G SA3V 36,696 240 30 102 (Op: SA3ARL) KZTTT 30,749 128 28 69 S	0K2BYW 3.7 31,463 367 11 62 US21Z " 20,724 269 8 58 UL4W " 15,848 255 7 45 0L4W " 13,509 238 8 45 (Op: OKTIF SP2QOT " 12,168 251 5 47	K2PLF/3 2,105,675 N3AD 1,834,716 W3CC 1,550,856 N3ZA 1,428,350 K9RS/3 1,074,740 W3GM 991,256	1614 108 367 K5DU 1472 109 385 NA5Q 1061 119 418 AE5PW 1059 107 383 WT5U 761 117 428 KG5VK 846 97 337 NSKR	37,296 117 50 98 K8 34,902 192 47 79 K3 32,230 110 43 67 K9 23,280 105 25 72 W 16,704 72 33 63	79JA 23,422 122 34 64 89KEG 3,948 45 21 26 9IJ 2,380 27 13 22 K9V 28 663 20 6 7 79IIX 14 113,979 336 29 102
VK4ATH 25,452 116 40 44 H KKEQ 24,645 113 40 53 0 N4RP 24,075 116 39 68 JI CT1ELF 23,064 156 35 89 JI	HOVDZ 11,024 196 8 45 K3YD 1,860 26 11 15 HA5BA 1,134 59 4 23 OM7SM 986 41 5 24 IM1NKT 663 27 8 5 F2MBF 558 14 8 16	K3IPK 937,500 N3AM 923,520 K3MD 918,400 W3KL 871,682	(Op: K3ND) K5WW 903 78 297 K1GMD/5 WW2PT/5 WW2PT/5 1050 93 307 KB5YEG W5OV	12,852 64 32 52 W 11,520 70 30 50 NI 9,933 62 32 45 W 6,148 45 25 28 NI	BKX A 1,861,068 1363 121 385 (ABMHJ * 884,197 862 97 292 (BAT * 685,032 661 99 292 (VBM * 496,340 565 90 242 (BOK * 387,872 545 74 198 (BPC * 350,322 492 70 196
VE30W0 18,732 112 27 57 SI WBSNMZ/4 17,808 99 33 51 U ON7CC 15,322 158 21 73 K	GQ2BXI 1.8 2,464 98 3 25 GQ2RGB 868 40 4 24 JA9QCZ 328 15 4 6 G7SS 279 25 5 4 JJ3GE 104 18 2 6	K3TEJ 693,933 K3WI 642,492 K3FT 545,776 N3GNW 501,456	774 99 314 NSUW1 635 97 323 KM5Z . 736 73 266 AASAU . 722 74 250 N7FF/5 . 704 69 239 WASWFE 21 550 82 255 WØVX/5 .	864 14 10 14 No 756 15 6 15 AC 247 8 5 8 W 33,490 138 23 62 KG 21,312 114 19 55 KJ	BHR 337,836 465 82 200 D1C/B 259,182 422 68 174 PBTT 240,033 353 71 196 BXB 223,860 343 75 185 NBR 173,040 279 67 173 BYR 96,195 234 54 111
	ASSISTED NORTH AMERICA United States N3UA/1 A 3,666,817 2557 112 427	W3GK 472,570 W30U 426,818 W3KB 409,815 W0BR/3 375,092 WA3G 238,050 K1RH/3 220,796	536 73 228 KA5M 496 76 239 K5NU 3.7 462 77 239 W5AJ 1.8 415 58 167 436 38 153	101,790 273 29 106 W 29,088 105 25 76 K3 1,380 29 9 14 K3 396 15 7 11 K8	78,732 209 54 108 5VYT/Ø 58,499 167 39 98 ØMPH 33,040 132 45 67 EØL 27,713 100 36 71 CØX 26,964 97 34 73
USØYA 10,950 58 29 46 N M3GWO 10,275 129 14 61 K RNØJX 9,888 112 23 33 K UAØSBQ 8,970 96 19 46 K EW4PA 8,624 92 29 59 W	VIENOCIT 1,522,688 1101 105 407 CETE/1 1,490,332 1175 101 357 CG1E 1,368,900 1128 101 345 C1LI 1,104,705 994 95 346 VIBV 985,496 1018 84 292	K3SV 181,118 K3TN 159,445 K3QF 157,608 N3NA 144,364	536 71 220 KETA A 297 54 184 NT6X 288 66 157 N600 339 50 148 KC6X 284 44 143 N6IC	683,735 795 99 236 NG 682,290 739 101 260 W 489,168 596 93 223 AJ 271,872 417 86 170 KG 226,023 400 70 159 NG	BIR 25,935 102 31 64 BBK 25,760 115 37 55 /GBM 25,466 115 43 76 ABA 24,552 107 30 69 BMD 24,400 99 47 75 RBL 22,368 94 40 56
UR3PGW 7.560 100 13 41 K MM3XXW 6,760 85 17 48 W KC5WA 6,417 61 32 37 W EG4M 4,984 57 18 38 W DF3SM 4,836 91 16 23 W	V1CTN 809,472 767 101 307 (A2KON/1 777,938 792 79 283 V1CSM 710,264 703 87 285 V1STT 656,930 710 82 276 V1GK 589,008 660 80 256 V1KQ 569,487 668 72 237	K300 139,893 W2GPS/3 129,770 K3VA 129,285 K3PG 96,720 K3DNE 83,995	231 67 154 K6MM 255 51 139 KI6CG 325 42 127 W6SR 254 45 141 K6ST 207 40 117 K6RIM 256 49 110 K9YC/6	195,952 519 49 99 NG 138,193 282 62 125 AI 131,516 298 75 121 AA 102,663 215 55 128 KS	ØLDS 19,190 95 35 60 ØIM 17,160 89 32 56 I1P/Ø 14,536 92 29 63 AØAW 13,230 77 28 42 SØT 9,000 56 30 42 ØKK 3,710 34 20 33
NE1RD 3,082 30 20 26 W JA1KEB 3,045 35 15 20 W G6CSY 3,025 39 17 38 K PD2K 1,892 51 10 33 W	V1LD 534,546 583 79 263 V1KT 481,536 533 82 260 V1RZF 452,448 576 64 224 (V1J 402,590 484 81 236 V1NT 393,954 603 61 193 VE1H 370,182 457 73 236	WM30 48,484 N1SZ/3 32,984	149 43 95 K6GEP (Op: K2YWE) N6AN 141 28 96 NF6P 101 35 89 N6AJR 96 35 81 KI6QDH	71,780 190 68 80 W 68,951 156 71 120 KG 53,788 186 43 70 W 42,900 171 45 65 KG 34,100 137 45 55 W	70DD 3,192 37 16 22 CØRET 2,400 31 18 22 74RK/Ø 1,980 29 14 16 DØDOS 1,914 24 10 19 70LM 1,170 20 14 16
PD7EAT 1,755 51 10 29 W RX3DIS 1,716 58 9 30 N RA9AT 1,485 40 7 26 KS RW3XS 1,428 41 10 24 K SQ8MFB 1,160 102 13 45 KS	V1NR 317,844 375 83 241 V1API 303,744 504 48 176 VS1J 257,796 405 55 176 VITR 256,910 409 61 169 VT1B 240,051 415 43 170	K3QX	103 21 53 W6SC 55 21 33 W6BT 56 18 32 N6ER 14 9 14 W6SZG 272 23 99 W6ONV NE6I	31,360 128 44 54 KG 22,480 101 28 52 KN	ØKBD 1,000 18 12 13 167,000 311 28 97 17 18 18 18 18 18 19 19 19 19 19 19 19 19 19 19 19 19 19
IK8TOY	(K1L 230,508 409 66 162 V1DX 229,599 350 62 201 (Op: W1AN 1JB 219,207 319 72 195 (31U/1 200,872 375 49 162 V1RM 196,084 267 89 205	N4LA A 3,272,337 W3GQ/4 * 1,636,404 W4MYA * 1,574,766 K5KG/4 * 1,497,807	1956 132 475 K6BIR 1236 108 375 K6VVA	3,776 46 16 16 AL 3,468 34 22 29 1,876 24 14 14	Belize 31MW A 4.200,657 4763 183 294 (Op: NØHJZ)
LU7VCH " 16,762 123 16 42 W UT7NW " 14,885 166 11 54 W JA2DLM " 8,022 85 17 25 N UT2AB " 2,183 55 7 30 W	N1ZZ 186,295 253 62 203 N3IZ/1 146,459 316 41 126 N1JR 132,720 222 72 168 NE1B 125,312 278 55 121 N1CCE 124,821 237 61 146 NB1EDI 121,380 223 59 151	WJ2D/4 1,209,006 W30A/4 1,113,189 N3MK/4 1,041,900	921 115 400 NK6A 1023 108 331 AC6DX 978 97 330 W6GRV 939 103 350 W6GRV 727 122 384 N6WM 14	18,711 120 20 43 18,612 105 24 42 VE 12,540 85 19 36 VA 1,020 21 8 12 VE 331,360 864 37 123	Canada E10P A 483,406 648 63 238 A1CHP 403,332 446 80 268 E1BVD 165,436 291 57 179
W6GMT/8	N1MAT 115,104 242 48 128 (A1GEU 85,324 201 50 116 (1RV 66,360 157 52 106 (1EMC 64,782 157 61 116 (1TH 39,458 140 27 82 (NA1ZYX 37,200 141 26 67	N4VV 847,450 KSEK/4 821,788 KG4W 706,221 W2YE/4 550,088	735 91 334 752 103 315 669 95 298 625 80 249 AB7E A 731 60 219 K6LL/7 563 76 261 K7WP	4,797 53 16 23 VA 882,147 1080 89 264 VE	E3XD A 544,005 694 78 237 A3EC - 517,408 642 71 225 A3DX - 320,320 443 88 232 E3XAT - 98,530 221 43 124 E3RZ 14 449,196 1031 33 131 E3HG 7 30,968 116 22 76
SP4GFG 40,824 265 19 65 N RZ6HX 36,100 303 22 78 K JH3DMQ 31,063 132 20 39 K JR1NKN 19,320 142 22 38 W UA9UHN 18,250 116 20 53 N	#E1F 33,480 110 41 79 (1GE 33,120 131 28 68 (E1V 32,712 131 34 8) W1MAW 29,281 130 22 60 #1GFS 29,082 118 33 78	# KADXA	507 95 278 AA7A 622 67 211 KG7H 563 73 214 W7SW 620 82 229 K7ABV 570 64 203 NW7E	506,511 564 96 241 384,970 559 85 196 349,168 469 86 192	ESTN A 98,440 360 29 86 ESTR 13,731 78 23 46 A7FC A 941,325 1561 90 185 A7TT 168,412 538 42 100
SN7P 15,264 89 25 47 K 7N4WPY 14,884 114 20 41 K W5JBV/4 12,404 49 17 34 K WA6FGV 10,282 77 17 36 IV3AOL 8,160 97 14 37 N	MV1M	338,855 W4FDA 331,526 K4XD 294,783 KC4HW 293,540 KU4V 284,859	424 80 225 WU9B/7 384 82 229 N7RK 405 84 207 KØTO/7 436 67 193 KI7AO 434 80 199 K7VIT	203,360 329 76 172 198,450 333 81 144 162,720 302 74 152 124,836 243 61 141 122,830 301 64 109	E7IO 92,945 301 48 97 E7KS 14 65,340 209 32 89 Dominican Republic I3TEJ A 4,342,871 3989 106 351
UT6IS 5,950 73 14 36 W E21A0Y 4,256 60 14 24 KO RA9MU 3,074 44 7 22 A JK1TCV 1,917 27 10 17 W	W1GD/2 1,975,815 1346 112 417 NZIRT 1,449,420 1096 103 387 (F20 1,386,231 919 118 443 NB3CX/2 1,373,130 1135 90 348 N2YR 1,076,496 833 113 379 N2RD 1,044,639 862 107 340	N3BM/4 270,974 NF4A 262,995 W4PFM 260,896 K7SV/4 236,124 NV4A 198,660	438 59 167 K725 401 74 193 K7EKM 400 63 200 KR7RK 357 68 184 KG7C 352 57 163 W6SA/7 316 68 180 K7QYY	78,624 286 52 116 F7 77,390 280 60 82 74,875 221 40 85	Martinique M5CD A 168,468 230 80 198 Mexico
JO7FGZ 56 9 3 4 W BA6QH 6 1 1 1 K KB1FIY 4 1 1 1 N K2DB 0 0 0 0 K DL4VCG 14 56,724 314 27 89 W	V6XR/2 925,754 814 100 333 (A2D 786,457 742 92 305 V11BM/2 616,344 655 85 281 (2EP 586,046 600 92 266 V2LE 585,707 734 70 223	N4IG 176,172 K2SX/4 163,976 W4ZW 140,657 AD4IE 139,425 K5VIP/4 133,608	321 60 152 K7EG 1 330 49 157 NI7F 1 273 58 151 NO7T 1 300 44 125 K7RF 1 226 64 164 KE7FBY 1	72,280 214 40 90 XE 70,420 208 58 82 XE 58,919 236 48 85 XE 45,600 168 37 63 XE 45,024 138 52 82 XE	E1R A 641,954 1450 77 162 E1MEX 238,524 323 85 201 E1YYD 78,108 290 45 93 E1TRP 36,234 113 45 77 E3N 21 99,286 678 21 52 E1EE 38,226 254 21 48
CT7/LZ3ND * 39,396 267 21 77 K	V1EU/2 498,126 490 81 285 (2GN 464,512 588 74 230 V2FF 411,536 552 62 210	K1MIJ/4 96,913	236 42 124 AD7KG 245 65 134 KE7YF 189 51 132 W7WHY	32,832 130 39 57 XE 30,336 127 41 55 XE 28,028 129 41 57 XE	E1CO 7 293,508 1232 29 95 E2WWW 13,950 228 13 18

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WP4SK	Puerto F A 410,1	72 131		JR2FJC JR2ALA	21 7	6,578 780	72 17	17 9	9 OL8R 1 OL9Z	21 14	527,434 695,799	1370 2327	38 143 36 135	OH1MM OH8KA		82,644 61,230	228 55 139 304 38 119	DL2ARD DL4CF	14	1,286,220 258,057	796 3	9 155 35 124
KP4US	\$t. Lut	la		JA2YKA JL3RNZ	A	297,990	548	74 1		7	20,519 8,178	272 92	9 62 13 45	OH5KW OH28P OH6RE	21 14	43,788 51,013 101,594	132 61 117 200 32 107 342 36 122	DL2QT DL4JYT DH6JL		88.326 30,084 9.828	249 2 109 1	27 99 21 71 12 42
AL83L	A 154.	Islands	0 60 109	JN3SAC JA3PYC JA3VUI		180,096 10,658 3,382	374 58 36	36 17	32 OK1CD. 37 OK1T		84,830 61,636	1003 826 (Op	12 73 13 63 OK1TP)	OH2BO	1.8	8,208 9,856	124 9 48 135 11 53	DJ1AA DJ601 DK9HN	3.7	267,180 9,324 20,586		12 114 13 50 12 61
KP2B	A 24,		6 37 53 (Op: WP3A)	103000	21	480,095 149,292 85,635	1263 503 373	34 1 34 28	11 OK1HM 13	P	50,682 Denmark	708	11 62	TMØT F48KV	A	France 2,340,060 1,967,504	2384 116 400 1784 125 491	DMBA	1.8	10,440 22,680		7 51 8 55 (38QA)
iner	AFRIC African	taly		JESPRE JESPRE	3.7	4,212 2,325	33	16	0 OZ1AXI 0Z4RT OZ1ADI	*	24,696 16,290 37,556	104 113 395	45 80 27 63 14 58	F5VJK F4FKJ F6BNH		888,650 645,663 623,505	1293 75 275 1184 78 295 586 120 471	SYZV		Greece 538,118		0 263
IG9S IG9R	7 933.			JH1GU0/4 JR4FLW	A 14	150,288 22,236	378 151	72 1			England 760,699	043		F1RHS F4CPF F4FDA		372,585 335,800 317,520	608 76 219 433 89 276	SV3AQR	21	340.288 30.240	(Op: \$1 1180 5	VZGJV) 55 153
EA88ZH	Canary Is		1 33 68	JA68Z) JH6WHN	Ā	602,386 7,791	709 76	111 2	5 GØVXE 11 G3UEG	:	559,602 495,864	975 747	95 398 91 296 88 300	F5JFU F8CRH	12	254,232 178,605	487 71 193 599 37 98	SV1NK SV2DCD	7	352,871	255 1 1316 3	19 61 16 131
EAB/OHECS EABCMX	21 871,	28 210	2 31 115 Op: OH6CS	JA7ZP JR7MAZ	A	219,880 4,840	368 32		M9C 60 G3SVD		348,500 129,129	756 (Op: 286	73 267 MBUTD) 69 204	FBCRS F4FEP F4FSV	1	134,687 126,654 51,708	270 66 205 366 49 153 213 37 102	MUBFAL	A	Guernsey 99,102	343 4	10 159
Sharma	Ceuta and	(0	p: OH2BYS)	JA70WD JH8SLS	28 A	32,384 310,254	231 451	22	MOTOV G3WW G4PIQ		71,103 56,984 26,986	300 174 147	37 136 44 92 28 75	F6FLU F4CGJ F4EIZ		22.695 9,918 3,036	105 31 58 113 24 63 25 21 23	HA7VK HA3OU	Ā	Hungary 488,229 265,212		73 274 17 251
EA980	28	120 1	7 8 12	JR8AMF JF9JTS	14	34,272	160		MOTZO G2F	14	13,912 163,674	131	25 69 26 100 MØCHK)	TM2T TM9R	21	437,276 1,262,450	1350 35 126 (Op: F4FPG)	HG8C HABLC		123,541	682 3	12 89 HABEK)
ZS4U ZS9T	South At A 2,621,3 816,6	76 274		THƏTTD	21	1,680	33	14	6 M1DST MOBJL	7	23,400 186,446	248 1077	19 59 29 113	F5UFX.	14	113,810	(Op: F5FLN) 547 26 69	HA3LI	28	11,418 95,748 10,152	764 2 101 1	2 42
3V8SS	Tunis 21 534,		8 27 95	ЗНОМНЯ	A	97,920 Kazakhstan	214	69 1	G7TWC G8DYT	3.7	11,288 8,835 121,392	115 126 754	14 54 9 48 21 87	F8CGL	1	35,763 Germany	348 18 73	HAGPX HAGHW HG7T	21	561,720 23,310 396,708		8 56 14 122
	ASIA			UP4L UN4PG	A 21	1,888,770		102 3: p: UN7L 23		A	Estonia 1,208,314	1897 1	00 402	DC4A DK5DQ	A -	3,720,680 1,866,352	2550 156 608 (Op: DL4NAC) 1749 112 424	HA5X HG2W	7	580,374 45,568	2304 3	HA7TM) IS 136 6 73
RG9A	AND THE PARTY OF	10 375	7 139 546 Op: UA9AM)	UN9PQ		41,175 Kyrgyzstan	231	14	ES1XQ		180,774 156,804	484 950	59 190 46 173 ES1NI)	DLØWW DL2YL DD2ML	-	1,650,046 1,543,275 1,535,394	1431 119 419 1718 108 367 1989 107 419	HABBE	1.8	Eddus	(Op: H	9 54
RU9AC UA9MC RM9RZ	1,795,1 1,037, 555,	50 90 79 72	0 82 237	EX7ML EX2M	21 14	47,360	276 103		57 ES2MA ES5MG	14	46,020 118,932	186 420	36 120 34 125	DL80H DG3EK	100	1,512,480 1,395,204	1389 130 418 1543 102 397	TF3DC	A	Iceland 11,259	98 1	9 62
RA9DZ RK9KWI UA9MD	339, 326, 289,	00 54 08 51	1 64 192 8 73 201	JT1DA	A	Mongolia 2,485	53	14	ES8ZP ES5RY ES5RW	3.7 1.8	17,004 160,920 110,584	188 1081 1095	19 59 25 95 15 77	DL5AN DL7ON DL3EA		1,289,820 1,125,044 978,580	1162 118 463 1097 116 432 1009 113 339	TF3A0	21	15,235 Ireland		4 41
RZ9CJ RA9MX RU9CC	274, 263, 222,	04 51 96 42	5 56 187 7 72 195	7Z1AL	A	Saudi Arabia 4,859	39	13	10 RM30	Eu	ropean Rus 1,288,794	2084 1		DL5JS DK1FW DK6CQ		950,208 838,704 824,256	1250 89 359 725 118 488 986 104 373	EI/W5GN EI/CC EI/GXB	A	258,944 170,090 44,756	640 5 454 5 180 4	7 215 4 179 4 123
RV9UF RN9MA	203,	75 46 80 36	3 50 145 5 40 130	HL1/W02C	7	South Korea	4	4	8N1NU 4 BU4WD	:	491,360 409,028	746 841	90 325 82 267	DK9DA DL1RG DL5GAC	-	796,096 783,582 752,415	933 98 350 1048 92 346 968 105 382	EI4CF EI9HX EI9ES	21 14	126,225 529,298 858	551 2 1857 3	8 107 5 119 6 16
RASJBA RKSDC RWSSZ	134, 120, 64,	84 27		E21YDP		Thailand	800	80 1	RA3NC RN3AC		358,905 298,248	794 694	68 269 78 211	DC2YY DK5MB	-	729,740 697,524	947 87 341 983 93 351	EIZJD	7	110,037 Isle of Man		7 102
RASCIN RWSTA RNSMZ	60. 44.	73 16	9 50 93	E20PFE	14	527,724 1,452	37		9 UASAA RZ3LC		283,662 242,616 227,328	501 583	69 240 72 192 69 227	DK1QH DK3W		606,528 575,605	1053 73 278 1027 81 334 (Op: DL6MHW)	MDBCCE	A	1,771,159		2 421
RW9WW RX9SS RV9CX	7.	77 5	0 31 46	OEBQ	A	EUROPE Austria 1,725,960	2018	187 3			213,444 207,936 187,320	425 401 455	74 178 75 229 55 225	DLBQS DF2RG DD5M		526,386 508,618 502,320	772 90 363 811 75 304 721 86 304	IW2MZX IZ1JLN	Ā	844,560 456,129	1540 8 822 8	88 344 12 280
RZ9HG	21 3.1 14 782,1	93 5 108 198	1 9 28 8 37 131	OE5MOF OE5HSN		999,590 118,342	(Op: 1300	DE85K	0) RN3AW 99 UA1AF2 84 RU3KC		185,130 172,961 169,464	331 452 366	72 234 61 196 74 233	DLBSCG DH1PS	7	427,065 394,261	(Op: 0.302Y) 539 92 309 719 76 297	IR4E IKZYGZ	74	454,020 422,188	112	84 238 K4ZHH) 85 268
RV9CP RASJR RASJM	398) 147, 79,	36 49 83 32	6 28 88 7 23 78	OE7F		40.280	229 (Op:	34 1 0E2FKI	8 RASAR		159,750 157,542 124,916	418 300 446	58 192 70 172 40 147	DF6QN DL7AOS DJ10J	1	362,576 352,936 322,077	606 80 264 852 62 252 623 66 247	IZSVA IZ10SP IZ20DM	4	379,374 341,214 306,046	644 7 947 8	78 240 80 238 75 223
RAGUAD RW9TP RAGUN	58. 17.	91 22	5 29 90	DESUAL	28	4,774 78,176	(Op:	OE1TKI 23	RASNE UAINEA		92,856 82,250	264 288	58 154 48 127	DJ9MH DL4G8A		317,016 311,091	514 77 280 579 75 288	17CS8 1Z10Q8		294,357 196,840	519 7 608 4	7 244 9 247
RASCNF RWSUSA UASOSB	7 956,1 15,0	156 13 158 234	5 35 131	OE9HGV	1.8 Ba	58,719 alearic Islan	828 ds	11	RASHJE RW4NN RA4PD		68,640 63,783 37,530	290 166 198	39 121 60 111 35 104	DEBNG DF1DX		257,610 235,002	600 60 217 (Op: DKBNC) 419 69 249	IZ1DUI IZ6NCN IN3IZT		173,727 171,000 130,592	430 7 641 4 480 4	1 220 14 184 14 168
UA9MA RWØUM	3.7 116,1 A 376,1	84 45	1 23 81	EBBAOK	Ä	376,250 98,455	973 320	50 1	RK3PW		31,080 25,740	119 162 (Op:	44 76 29 81 RW3PN)	DL5XAT DK1AX DL8UAT	1	219,114 209,308 205,785	508 57 202 568 55 213 494 58 211	IK3SCB IZ8GNR IZ8EDL	-	118,240 105,400 86,997	417 4	19 121 13 127 10 111
UABSE	359,1 132,	13 65 12 33	2 74 179 8 54 130	EV1R EU10X	A	Belarus 1,379,584 22,878		115 4			24,702 21,400 20,470	106 100 83	45 93 35 65 41 74	DF2MM DL2RTL DL9NDV		186,938 183,996 173,988	389 67 235 387 61 208 366 55 188	IWDHOU IWDGYC IZ5HPQ	4 4	74,472 47,978 46,182	170 6 167 5 168 4	
UAØWY/Ø RVØAL	21 283,1		2 13 24 4 27 96	EW4DX EW88Q		20,584 17,625	103	26 29	RW3DD	N *	13,104 12,927 11,737	69 104 96	34 50 26 67 29 68	DL1NEO DL9NCR DL6MRS	- 1	170,910 169,912 157,563	431 52 218 382 72 196 322 63 224	IK2EGL IZ1MHL IK2MLS		37,488 34,946 28,272	203 4 135 4 134 4	9 93
RAØACM UAØCM UAØAGI	14 423,1 300,2	28 123	6 26 86 5 37 115 7 36 126	EU4LY EW8CY EU1FC	21	2,444 352 68,125	313	26	8 RA4PKI UA3RW		9,462 5,544	76 53	30 53 29 43	DM3VL DL7UIO		154,812 144,200	298 75 191 434 47 153	IZ3DVU IK2GZU	9.4.	18,139 17,978	106 3	3 64 2 69
RXØAW RUØAT RAØANO	3.7			EW4AB EW2BX	3.7	20000000	249 370	8	RN3MA RN1ON RN3DF		5,248 4,400 4,355	46 87	14 36 18 47	DL9HD D01SAJ DF1HF	- 1	142,824 142,509 140,462	352 58 206 492 40 161 416 50 204	IKBYFU IZØNRG IØLTX		17,819 14,592 12,462	80 3 79 3	8 58 9 54
BDSBAJ	A Chin	1	2 68 169	0048	A	Belgium 784,020		102 3 0N4BH	UA3UB	M *	4,290 2,556 342	58 36 15	15 40 13 23 7 12	DK4WF DL1PT DL4AC	-	124,982 113,953 111,100	319 63 146 357 58 165 420 41 161	IK2WPO IZ5LDD IW7ECJ	-	8,904 8,046 2,750	58 2 63 2 32 1	9 55 4 30 8 32
BA4SD BG4ENK BD5CEC	58, 32,	82 29 177 179	7 39 75 9 42 75	OP4A ON6LR ON4VDV		536,448 392,522 249,284	990 510 505	74 3 90 3 73 2	UA6LV UA3BS	28	143,969 61,974 41,650	727 478 228	26 105 20 79 24 74	DK5AD DK6AH DJØIF		106,056 102,492 95,245	297 54 162 296 55 164 321 55 160	INSRYF IWSSAR IKSSJ	28	441 195 44,528	19 7 354 1	5 15 6 7 9 69
BD1WYL BH1BSH BG1RUH		28 72	8 4 4	ONSZO ORZA	21 14	57,785 20,093	330 144	17	RU6MD	A 21	13,926 273,120	160	15 51 34 126 RV6LJK)	DL1ECG DC6CX DC2KN	-	90,798 85,186 81,192	306 50 172 209 56 167 295 47 157	IZBDVD IZBEYP/B IO4T	21	34,656 434,890 430,976	199 2 1490 3 1256 3	
BD4CZX BD4JZY	21 11.		7 20 41	SORG	Bos	nia-Herzego	vina		RV3ZQ RASANI BASOE		112,398 82,052 67,680	466 304 309	31 112 30 116 24 96	DL7CX DO6MBA DH4PSG		76,006 74,080 73,030	290 48 130 264 43 117 259 50 168	125CML		349,999		Z4HVM) IS 134
BD4DVK BD4WZH	14 137,1 25, 18,1	16 18 16 16	7 23 49 5 21 45	E73M E73W	21		5185 2565	37 1: Op: E73	RASDN		50,546 47,712	209	27 100 24 88	DL1EJA DRØK	-	61,889 54,516	175 54 145 289 41 136	IV3JCC IW7EBE IZ8FDG		185,652 127,020 123,970	593 3 603 2	1 115
BD4AGK BA4T	7 26,			LZ5K	A	Bulgaria 339,438	1548	30 1	RXSLOU RU3PU RW680		26,496 10,797 6,405	158 107 95	22 70 14 45 15 46	DL6AG DK9TN		50,220 48,906	(Op: DG1NFO) 145 53 102 219 32 82	IZSASZ IZAAFW IKATVP	14	79,100 62,436 252,933	284 25 251 25 876 3	5 96 7 140
58/G3RXQ	A 3,424,3	24 289	4 89 335 Op: G3RXQ	LZ2NKM		139,342	275	72 1 p: LZ28 31	RN3Q0 E) RXSAM E) UA1AQ	14	671,517 379,808 164,578	2256 1337 666	38 151 34 132 34 108	DL1YFF DL2SWN DL4RCK		45,832 44,550 39,672	196 37 99 154 56 106 144 48 123	IZBBGY IUDR IO3P	7	91,597 72,625 382,157	625 2: 361 2: 1472 3:	4 101
588AD 584KH	28 524,1 21 695,2	52 151	0 29 104	LZSUU LZ1NG LZ2JA	28 21	3,192 173,396 270,417	40 1043 1095	16 1 28 1 33 1	6 RW6HA 6 UA6LU 8 RV3AZ		103,180 92,019 16,500	451 611 186	33 107 27 84 14 52	DJ5QV DL1REM D89UH	-	39,500 38,367 36,660	216 33 125 200 33 114 218 31 110	IREP	3.7	334,854 21,945	(Op: 1)	3 126 (ZBEPX) 2 65
VRZYYW	Hong K A 1,026,	89 149		LZ9X	14	201,089	831	35 1: p: LZ1R	6 RUSEN	7	6,283 582,645	73 2199	18 43 37 142 RW4PL)	DLØPE DL9GTI		25,578 22,040	211 29 97 (Op: DG3AKE) 100 29 66			Kaliningrad		
VR2XLN VR2ZRE	493, 84,	70 44		TK9R	A	Corsica 6,231,573		149 5		3	330,827 199,040	1502	36 131 33 127	DL3DRN		18,135 18,100	86 40 77 106 35 65	RA2FF UA2FT	A	14,720 288		8 64 9 9
4XBA	28 226,	90 75	0 23 87 (Op: 4X1VF)	-	No.	Croatia	-	: IKBUN	RN4SN		94,374 65,968	809 330	UA3TU) 21 86 28 105	DG1HUD DK6RS DL4NER		17,767 16,170 10,179	125 27 82 103 29 37 78 29 58	YL2GD	A	Latvia 418,953	794 8	5 274
JHINBN	A 969,	00 110	1 115 251	9AZEU 9AZU	A 28	2,528,955 199,584	1224	149 5 26 1 p: 9A3Z			18,094 14,432 11,607	184 117 79 78	17 66 14 68 19 54	DK9UMA DG28HB DC7CCC		9,828 9,116 9,108	94 25 59 94 17 36 110 20 46	YL9T YL9T	-	139,500 54,432	280 30	YL3DQ) 6 126
JO1WKO JA1HGY JA1BJI	260,0 170,0	184 56 104 391 120 373	1 102 216 8 91 163 3 82 137	9A3ST 9A5DU 9A3XV	21 14 7	32,970 416,108 405,707	160 1875 1886	26 35 1 34 1	RN4CU RX3API		3,182 257,616 64,548	1449 514	9 34 32 112 20 79	DFZAP DJ7LB DL3KDC		6,435 5,680 4,472	62 23 42 66 19 52 101 9 43	YLZPP YLZKO YLZA	28 21 7	11,859 380,019 329,804		7 50 8 139 5 129
JA1MZM JL10XH JA1XRH	87,6 55,6 27,0	99 29 62 17	4 44 79	9A2VJ		182,637 zech Republ	1281	34 1 26	n RV3MI		35,708 ropean Turi	337	13 66	DF9LJ DD1MAT DL3ZZA		3,034 2,096 1,700	31 18 19 45 9 7 36 11 23	LYIR	A	Lithuania 1,292,347	1578 112	
JS1KQQ JA1IZZ JA1CTB	28 7.5 21 41.	70 12 58 71	1 36 59 5 18 28	OK7M OL5T	A.	3,933,840	2799 1623	102 3	19	A	16,720 Finland	113	30 80	DMST DL1FAA DG2UA	1	1,472 957 100	26 13 19 27 12 21 99 24 57	LY5W LY2TS LY4Q		519,061 340,784 120,064	1441 6	8 255 8 236
JH1ACA JA1EHV JF1UVJ	14 305.4 66.5 7 25.6	88 90 88 32	0 34 104 7 26 67	OK1XQ OK1BET	*	343,905 337,025	834 760	72 2: 60 2:	11 OH4A	A	4,552,120	(Op:	50 568 DH6KZP) 28 485	DL5L DK5KMA	28	35,964	156 23 85 (Op: DGØOKW) 197 21 67	LY3CY LY7M	*	73,696 32,385	299 4 265 2	1 147 8 99
JAZXCR	A 771.	20 79	3 118 260	OK2BPU OK2PCL OK6AB		170,404 56,573 13,192	485 165 119	25	0 0G2A		2,337,369 607,695	982 (Op	98 283 OH2RA)	DL3KUM DO4DXA		26,312 5,123 1,683	61 10 37 30 11 22	LY2BOK LY2BAW LY1CM	28	21,944 60,175 990	179 2: 746 1: 17	7 66 7 15
JA2FSM JH2FXK JA2VH0	278, 207, 181,	00 36	6 77 143		-	6,783 700 306	52 21 17	12	3 OH6DX 6 OH2CK 3 OH6OS		457,980 419,363 328,434	528	11 399 93 338 89 313	DF9ZP DP4K	21	759,238 439,231	1849 39 158 1353 37 132 (Op: DL80BQ)	LY3BY LY2RJ LY3W	7	14,718 67,830 13,746	99 15 541 2 87 16	9 47 5 89 6 71
															-							

LX1ER LX7I	A	embourg 94,248 1,394,442	309 52 179 3438 39 147	YT1VP YT1TA YU1XX	6.4.4	521,207 18,172 11,475	2100 35 178 14 100 15	132 63 60	UX3MZ UZØU UW8I		764,330 598,260 221,390	2444 38 2230 38 1010 33	141 139 98	нк1х	21 Colombia 724,563	1903	31	116	XE18	Mexico 321,402 1227 5	2 86
LAM	3500	foldova	(Op: LX2A)	YT4A YT5Z	3.7 1.8	31,773 16,225	258 14 279 9	75 50	UT8IM UTSID		146,286 126,629	(Op: U 874 29 570 32		0A4AHW	Peru A 86,879	298	59	104	VP2MDG	Montserrat 6,142,374 4868 12	2 400
ER4DX	A 7	7,661,916	6061 155 583 (Op: UT5UDX)	IT9AUG	28	Sicily 83,288	607 26	90	URSIFX UZ7M	7	9,849 362,404	75 22 1568 36	45 136	9Y4W	Trinidad & Tob 21 201,082	ago 701	23	83	VP5DX	Turks & Calcos 7,786,722 5168 14	13 531
ER3ZZ ER3DX		346,580 57,285	547 81 229 152 52 119	ITSACN ITSYHR ITSRWB	14	18,480 50,394 74,676	237 13 381 27 631 18	84 80	UU7JX UR5EAW		24,552 20,164	236 19 252 13	74 58	CX7TT	Uruguay 28 320,112	994	22	92	NP2B	U.S. Virgin Islands 651,504 1041 7	18 199
PA1T PASA	A Net	526,797	1585 91 308 869 81 246	IR9P IT9XTP	2	34,000 13,511	345 17 (0p: IW9 201 10	68 HMO) 49	UW2F URBEE		16,974 2,156	208 10 (Op: UT 42 12	37	YVSEAH	Venezuela A 514,176	892	63	145	NP2Q	46,276 238 3 AFRICA	15 57
PABMIR PASC PABLOU		357,915 321,483 253,344	751 65 256 584 65 238 405 83 229	OMBLA	A	Slovakia 119,978	473 52	199	UXXX	3.7	156,648 149,380	1103 26 (Op: URS 1155 21	89	YV4BCD YV1FM YV68XN	19,339 5,814 3,7 23,320	101 46 186	33 18 14	50 39 39	EASURL	Canary Islands 3,425,296 2522 18	18 406
PEST PE4BAS PASTT	1	190,656 190,452 142,344	395 64 224 548 59 210 345 63 153	OMBOX	1	17,793	393 47 96 26	174 50	UT3UA UR5AS	1.8	44,955 39,771	(Op: UT) 562 14 498 11	2XQ) 67 70		MULTI-OPERA	TOR			EE9K	Ceuta and Melilla 1,819,416 1962 7	73 271
PD1D PE1FTV PA7RA	-	124,250 107,532 79,695	977 26 99 458 39 167 292 47 118	\$570X \$56A	Ą	\$1,477,650 1,212,862	4584 156 1236 112	554 452	GW48VE	28	Wales 25,696	276 18	55	3	NORTH AMER United State	RICA	n		CR3A	Madeira Islands 16,195,382 6965 16	3 663
PASCEV PASKT PA7MM	21	23,500 10,676 260,058	150 32 68 76 25 43 625 36 142	S56Y S51DX SS3F		965,552 331,336 150,195	1459 88 719 70 394 62	378 262 193	MWBJRX	7	OCEANIA	1680 28	102	N1HRA KA1IOR	1,354,716 580,928	1084 729	72	377 241	COST	11,030,210 6073 13 34,100 148 3	
PCSW PF5X PASO	-	181,440 25,162 6,550	607 32 112 203 14 32 122 10 40	\$59T \$50R \$50K	21 14	384 444,264 1,125,553	12 6 1181 35 3201 39	10 138 148	VK6HZ VK7XX	A	Australia 497,840 165,750	688 81 334 72	199 123	AK1Q W1CLA	105,968 437	235	6	129	CN3A	Morocco 20,052,100 8489 16	67 672
PASM	3.7	161,727	1481 17 76	\$59EIJ \$57\$U \$54X	7 3.7	110 86,838 89,952	11 3 555 26 848 18	97	VK2BCQ VK6AHR VK2BD	*	78,120 63,918 35,821	232 60 204 50 160 51	80 84 62	KZZ W3JK/Z N2RM	2,196,552 2,134,298 2,011,870	2030 1853	99 91 87	357 303 323	ZS5NK	South Africa 273,420 506 6	3 147
LA9DAA LA9TY	A	247,380 24,625	517 70 215 125 32 93	S53DIJ	***	Spain	3 2	2	VK2KDP VK2PJH VK8PDX	14	23,808 504 94,863	105 42 37 18 342 29	51 18 74	W2XL N2NGW	1,053,161 62,310	985		339	3DAØWW	Swaziland 2,800,518 2684 9	95 298
\$061		Poland 1,208,172	1521 107 425	EC2DX EA5BY	A	3,578,505 2,299,352	3310 129 2009 122		VK2IM	7	231,855 East Malaysi	738 34	89	W3BGN W3MF W3ZGD	1,957,536 193,070	1411 364	108 61	489 396 154	TS9A	Tunisia 14,632,939 6944 15	53 586
SN8F SQBJX	1	619,047	(Op: SP6JIU) 1680 81 298 1012 88 341	AO5R		557,232	1748 78 (Op: EA 1128 73	209	9M6/JJ2CJ	ВА	1,743,872 Guam	2424 84	178	W3LJ WB3CJU K30Q	147,987 46,560 43,840	282 177 178	55 32 44	148 88 93		ASIA Armenia	
SP4Z SP9LAS SP8HXN		374,680 330,630 167,005	569 83 240 735 63 258 359 68 195	EE5J EA4FSL	7	445,137 420,888	1102 68 (Op: E) 1122 59	188	KG6DX	A		2312 130	252	K3EST/4 N4WW	3,947,601 2,911,727		128 135	465 502	EK8WA	5,431,950 4785 9 Asiatic Russia	15 355
SP5XSL SN9Y		153,576 102,292	576 49 194 357 48 166 (Op: SP9UOP)	EA2BNU EE5G EA4ETW		316,287 249,796 107,328	587 68 456 99 505 44	243 218 128	YBONFL YCOBTL	A 21	165,568 704	324 74 26 7	125 15	W4NC AD4ES K4BP	1,638,104 1,434,137 1,023,178	1260 1408 1091	111 106 95	383 387 282	RN9SXX UA9UZZ RK9CYA	5,620,480 3405 13 3,927,488 3085 13 344,750 627 6	2 431
SP1MVG SP1RKR SP6FXY		80,712 75,680 29,520	166 64 113 325 46 126 168 31 89	EA4DW EA1BLA EA7ELY		93,331 82,512 61,498	266 59 247 44 297 29	140 147 58	ZL4NX	A	New Zealand 30,268	129 34	58	K4FK K4PB K4EDI	656,668 517,366 5,244	667 590 38	83 82	279 252 36	RK9JXP RWBA	57,663 226 3 6,527,268 4316 14	14 95
SP4GHL SP10 SP58NB		28,116 21,924 13,671	211 33 109 106 43 73 110 20 73	EASDKU EA4MA AN1R		32,132 30,024 22,272	149 39 103 49 130 37	77 90 79	ZL18IV ZL3PAH	-	20,400 3,403	(Op: JM1 106 33 43 20	47 21	W4UVA N2IC/5	3,034	29	14	27 465	RZØSZZ UAØSWA	498,762 912 7 17,225 210 2	1 171
SP588 SQ40LP SQ3AUA		8,910 8,804 7,254	149 11 43 76 24 47 56 30 48	EA3AQL EA2HA	:	15,604 11,564	(Op: EA1 99 34 101 34	60 64	ZL1T	21	11,920 Niue	138 17 (Op: ZL1/	23 ANH)	KSTR KSMR WSRU	3,316,324 2,468,480 1,437,479	2327 1817 1165		489 400 368	TC7KA TA2KK	Asiatic Turkey 3,576,160 3599 & 1,322,260 1518 7	
SP5GDY SQ6WWW SP2QG		5,040 4,578 1,026	50 16 29 117 8 34 37 5 22	EA4DTV EA3ALV EA1JK		10,608 7,722 4,005	105 13 50 23 42 18	65 43 27	ZKZDL	A	1,636,624	2277 98 (Op: DL2	174 FAG)	NSAA AESKT	518,408 11,096			356 42	TC3EC		178
SQ60U SPSES SP1GZF	28	783 4,868 900	17 13 16 93 10 35 37 5 15	EA1SB EA5AX EA7EN	4.	3,896 1,840 1,674	33 26 48 13 20 14	30 33 17	4H1T	A	Philippines 737,100	1370 73		N1MM/6 W7DR/6 NI6P	3,672,648 558,576 173,416	2459 730 334	120 102 80	468 222 132	B7P B7M BY5CD	4,030,390 3351 14 971,588 1782 8	17 455 86 207 90 206
SP1RKT SN3R	21 14	213,325 798,336	709 32 129 1885 40 149 (Op: SP6HEQ)	EA1EJ AM1Q	28	1,332 112,785	20 17 956 22 (Op: EA	20 81 (10A)	DUTUGZ	eni	142,240 UTH AMER	(Op: DU1 438 48	79	N6XT W6KA W6DR	94,164 53,148 41,529	327 207 142	66 50 52	111 79 75	B4TB BY4IO BY3MM		3 171 5 154
SNBR SNBX		709,508 586,775	2233 38 140 (Op: SP80NZ) 1577 37 138	EE7J EA4ZX		14,656	133 14 (Op: E) 170 14	50	DP1POL	14	Antarctica	552 26	77	NE6M KI6FTT KG6TBR	13,376 5,130 4,032	97 45 56	33 22 24	31 32 40	BY1CW BD4TU	346,320 1066 5i 41,648 236 5	6 152
SP4XON SP4DZT SP8IOV		370,912 219,510 21,962	1163 37 136 872 34 128 236 18 61	EASKY AO1J	21	645,050 276,640 111,386	1947 35 1153 32 675 21	140 101 62			Argentina	(Op: DL		W7VJ N7BT	1,181,124 897,260	1197	111	276 264	BY40X	20,562 200 2 Cyprus	
SPBBQL SN2K	7	18,072	205 17 55 1337 37 139 (Op: SP2JKC)	EA7EU EA1ASC EA1BFZ	*	86,757 32,092 16,724	437 25 157 24 146 20	96 89 54	LW3EWZ	A .	18,690	1009 72 (Op: LUX 164 24		W7VMI N7ZG	784,098 535,500	914 665	96 98	247	P33W P39P	19,388,448 8621 16 165,908 479 3	17 661 10 118
SP3GEM SQ9HZM	3.7	99,176	1929 30 115 1006 14 78	EA7CWA EB5BBA EA7ZY		14,326 9,984 3,689	107 21 175 13	37 51 24	LU6QI LU8EOT LW5EAE	28	816 14,547 11,658	13 12 171 16 100 18	12 23 49	NC7M W7TVC WX7P	398,890 303,021 286,098	707 521 483	68 82 81	158 161 165	4LBA	Georgia 14,241,535 6818 16	617
SOBR SP1S	1.8	1,786	777 12 68 (Op: SQBJLA) 55 5 33	A05V EA4TG	14	99,968 95,648	527 28 711 23	100 75	LU3JV0 LQBF	21	1,812,002	78 15 2419 33 (Op: LU	21 118 5FF)	KK7PR N7BV W7ED	268,388 250,776 134,680	484 440 291	79 77 57	150 181 125	VR2C	Hong Kong 2,422,736 2925 110	6 308
CR6K		ortugal 5,612,060	3730 152 628	ANSE EA1DVY EB1IFI	7	64,944 64,380 12,384	614 23 300 24 145 15	76 92 33	AY4D LR4E	14	738,882 52,650	1638 35 (Op: LU 236 25	127	W7KZO W7SA N7LR	92,020 8,294 1,054	278 67 21	27 8	138 31 9	JA1ZGP	Japan 224,245 598 5	3 96
CT2IVH CT1HZU	*	127,696 72,615	(Op: CT1ILT) 500 46 138 216 61 174	EG7DNX AM1C	1	130,175 69,174 63,345	802 27 424 25 442 24	97 99	LQ5H		6,348	(Op: LW 83 20 (Op: LU	26	K8AZ	3,708,750	2192	137	508	JI2ZJS JI2ZEY	2,333,865 2175 12 1,171,674 1480 11	
CT2KAL CR6T	3.7	2,046 154,980	35 10 23 906 25 98 (Op: CT1ESV)	EC7AMT	3.7	217,500 34,887	1316 24 371 14	73	ZX28	A	Brazil 5,295,108	3650 123		NØIJ/9 K9SG	1,577,160 920,400 706,318	1135 805 714		401 356 282	JA3YKC JH4UYB	877,671 1096 11- 4,053,123 3596 130	
YRSP		omania 5,268,960	4641 150 570	SM3PZG 8SØC	Ą	Sweden 919,552 473,304	1027 118 600 86	402 358	PX2T	-	876,340	(Op: PY28 1469 60 (Op: PY2	155	KC9ARR W9JWC	569,676 5,310	680	19	264 26	LADGAL	3,550,635 2832 14	11 354
YO8WW YO4CVT	:	292,160 169,092	(Op: YO9HP) 577 88 244 434 61 191	SMØQ	-	137,280	(Op: SMØ 547 39 (Op: SMØ	156 0GQ)	PW28 PT9PA		453,376 431,118	801 73		WOMA NOMA	3,852,585 850,016 673,365	2343 826 746	144 98 94	501 306 269	хи7кон	Kampuchea 185,888 657 5	9 109
YO4RST YO8ST YO2LXW		123,630 53,165 42,900	283 59 136 272 31 124 230 38 118	SM6MVE SM6FM SM5T	14	32,357 15,035 41,135	226 29 101 30 258 21	102 67 74	PYZSEX PYZMR PYZAAZ		414,726 243,660 108,698	495 103 562 66 339 53	235 120 86	KØIZ KØKU KBØNHW	91,292 58,860 51,724	352 196 171	27 46 47	89 89 87	UP9L	Kazakhstan 2,180,423 1965 10	15 362
YOSTHG YQ6A	21	18,156 250,248	100 32 70 888 35 124 (Op: YO68HN)		S	witzerland	(Op: SME		PY3PA PYZVZ ZW7A		57,728 56,472 42,704	255 48 247 38 144 47	80 66 89	KDØS	11,618 Alaska	67	34	40	9K2HN	Kuwait 8,585,690 5088 14	14 503
Y098XC YP3A	14		196 23 78 1500 32 106 (Op: Y03G00)	HB9CIC HB9IQB	Ä	356,124 315,084 39,564	504 92 742 60 168 36	262 248 90	PY20X PU90SB		19,600 14,504		7AF) 58 46	KL7AIR	96,382 Antigua & Barb	-	48	95	A47RS	Oman 1,868,412 2106 8	10 274
Y050AG Y09CWY	1	34,943 33,580	304 15 68 298 14 59	UW1M	A	Ukraine 3,361,824	3147 141		PYZBAZ PYZBAZ PUZLEP	28	7,300 3,408 235,182	76 17 36 23 784 24	33 25 90	V268	7,171,740 Canada		124	446	A73A	Qatar 7,888,240 4635 14	14 509
ISBRZG ISBIEK	AS	137,471 102,960	740 36 103 585 32 124	UWBK	*	1,616,088		457 3KW)	PUSOGE PYSKD PYSZD	* *	147,354 113,421 98,515	718 20 563 19 430 21	62 58 64	VYZTT	1,886,487	1761		332	HLØ9SEA	South Korea 22,244 177 3	13 50
ISB/K7QB	1.8	33,462 cotland	513 8 58	UT7EZ URSFEL UX0FF	1000	1,213,878 733,875 618,336	1816 129 1158 99 1010 89	485 376 363	PU2KUM PU1KGG PYZXC		64,220 53,836 53,120	353 19 260 23 334 17	57 63 47	VC2Z VA2TG	684,636 627,936	774 1148	58	190	HSBAC	Thailand 1,949,599 2403 11	16 323
MM3T MM6ADR	A 14	249,900 8,544	720 53 241 (Op: GMBELP) 168 10 38	UY7C URSMM UU2JQ UT5EO	100	486,304 354,186 320,380 272,428	1037 72 609 72 414 100 688 69	262 306 315	PU4HUD PU4MAI PY1NB	* 4 4	3,330 2,376 1,358	77 14 55 12 41 7	23 21 7	VE3EJ VE3UTT VA3SK VE3CB	11,694,880 3,793,746 2,866,700 1,884,960	2485	111	406 410		EUROPE Austria	
MMBEAX	7	146,592 Serbia	840 38 114	UX()FY UX2MF	1 1	207,760 158,976	429 64 330 73	215	ZW58 ZV5E	21	932,576 495,282	2365 34 (Op: PY 1328 32	2EL)	VE3CR VE3RM VE3NB	1,884,960 936,892 532,860 509,745	1610 980 641 768	93 84	373 305 237	OE2S OE3O OE5XIL	7,900,172 5467 16 528,220 988 8	64 669 33 302 35 205
YT3M YT7R	A 3	,227,610	3579 115 427 (Op: YU1YV) 2909 123 426	UTØEA US5UO UV5EEO		112,240 109,368 83,848	324 49 285 49 294 64	181 147 159 87 85	PY2TIM PY3OPP		154,453 109,055	(Op: PP 548 28 470 23	5KE) 81 62	VE3GYL VE6SV	509,745 2,822,250	768 3248			EW8Z0	Belarus	18 134
YU2A YT9A	:	997,491	(Op: YU7BW) 1202 123 420 1006 85 227	US3IZ UY7M		37,076 31,742	169 37 179 33 (Op: UR 163 28	85 1MN)	PY4XX ZY2C	14	32,330 784,536	213 17	126	VE7SV VE7NSR	2,422,353 49,882 24,700	2699 233	43	55	EW2WW EW8ZZ	9,317 100 1	4 63 18 27
YT7TA YT5C	21	610,272 73,304 289,410	291 51 136 994 35 130	UTØEO UX2MK UT7NY		22,977 21,632 20,826	163 32 230 25	96 64	PR7AYE PY2WC PV2P	7	1,323 432,960 151,168	24 8	19 129 98	VE7CML VE7NA	24,700 19,110		41 36	54 55	OT2A OT5P	Belgium 5,718,208 4288 15- 3,314,164 3480 11-	
YUSA YT3PL YU1ARC	14	123,190 93,010 635 908	(Op: W7BPQ) 542 26 71 437 30 101 2036 38 144	UX7LL UT2UB UR6IJ	28	15,836 5,650 384	79 10 10 7	81 40 9	PY6KY PY5QW	50	18,792 8,800	(Op: PY) 128 19 103 14		TISN	Costa Rica 2,999,025	3741	107	298	E7DX	Bosnia-Herzegovina 10,236,288 6726 17	
YU1ARC YU7ZZ YT2ACA	14	338,744	(Op: YU20RA) 1461 37 124	UZ4E	21	412,824 341,909	1755 36 1366 36 (Op: UV5	145 EOZ)	PUSATX	3.7	6 Chile	11 3	3	T46A	Cuba 1,523,900	2622	86	225	E71EZC	30,414 222 2 Bulgaria	5 86
YT2ACA YTBA	7	15,318 629,961	206 12 57 2387 35 134 (Op: YT2WW)	UX210 E030	14	978,315 879,320	3862 38 2954 39 (Op: UR3		CE3PG CE3FZ	A	479,729 29,120	1843 51 168 28	122 36	YS1YS	El Salvador 1,246,960	2038	71	215	LZ7J LZ5VK	2,161,384 2693 12 93,366 438 3	27 457 96 135

9A3B 9A1CMA	Croatia 2,628,072 9,720		29 492 26 55	CR6P CR5R	1,134,240 666,841	1923 92 31 1040 91 34		MULTI-OPERATOR TWO TRANSMITTER		IR4X IQ5LU	Italy 15,892,576 8715 173 69 1,411,480 2091 99 39		8,407,180 5294 160 466 4,029,036 3659 140 326
SHIGHN	Czech Republ		20 . 90	YP7P	Romania 1,433,586	2469 103 35	9	NORTH AMERICA		IR8A IR3Y	1,308,306 2622 90 34 1,264,032 1964 98 41	8	EUROPE
OK5W OL7T	9,592,128	5736 1	77 677 14 459	YR2X YD4KCC	345,666 226,117	818 70 24 711 56 22	Bunau	United States 5,006,925 3153 125 4,360,755 2719 124	470 471	and the same of th	Kaliningrad	OHØZ	Aland Islands 12,251,100 9926 169 673
OK10UE OK2KOJ	1,931,500 586,131	996	06 394 87 312		Scotland		K2LE/1	3,969,964 2709 115 1,452,303 1502 84		RW2F	10,104,720 7158 175 67 Lithuania	OT5A	Belgium 11,552,145 9361 167 628
OL2U OK2RVM	239,732 44,712		55 237 45 117	GM7A	630,828 Serbia	1210 73 32	WIORS	163,385 350 56		LY7Z LY2W	4,182,230 3599 144 54 3,358,860 4571 120 43	5	Bulgaria
OKSSWL	Denmark	25	13 22	YIET		2226 99 37	WZYU	2,210,162 1618 111 1,851,576 1349 110		percent.	Macedonia	LZ9W	12,691,960 10331 165 655 Croatia
501A 502J			88 311 74 295	IR9Y		4752 166 65		1,664,671 1348 101 12,985,334 6316 153	360 616	Z37M	6,011,353 6750 147 550 Netherlands	9A1P	14,807,474 11156 166 648
GSPZ	England 5.962,920	4249 1	52 588	IU9T IF9A	5,463,150 1,425,383	4206 147 57 2387 92 36	WASEKL	12,985,334 6316 153 1,352,592 1149 109 336,636 504 84	387	PI4DX PI4COM	6,010,121 5447 153 56 3,806,080 3456 128 51	ULTH	Czech Republic 11,839,940 8931 160 645
M4A G6MC	4,139,710	3493 1	52 588 45 549 22 470	IT9DFI IT9HBT IT9JQY	580,017 524,524 235,478	993 87 31 1195 83 28 774 66 21	Net Will	4,511,188 3006 135	494	PI4W PD2EDR	1,014,519 1997 87 34 21,390 235 18 7		Dodecanese 5,613,975 6224 144 531
G5D G38			10 397 98 391	113041	Slovakia	777 00 21	NSDX	5,257,616 3441 144	500	CRST	Portugal 1,762,697 2410 95 34	BL6YXX	European Russia 745.184 1100 94 370
M48 GSFZ	1,098,531 327,360		80 291 45 141	OMBA OM7M	9,768,200 9,656,000	5064 179 70 6004 170 68	0 weren	240,093 540 83 1,824,950 1400 133			Romania	BLUTAK	Germany
MBC G3YNN	164,206 102,446		54 205 43 138	OM3RRC OM3KWZ	225,882 23,856	634 65 21 153 33 7	1 SASETY V	1,616,800 1466 118		YPZY	165,426 571 52 18 Scotland	DR1A DF8HQ	20,693,196 12799 183 749 17,542,980 11676 183 762
RU1A	European Russ 7,979,527		72 685	\$53\$	Slovenia 4,219,638	3428 138 55	NK7U N7AT	2,516,480 2309 137 1,571,152 1556 127		GM6NX	1,097,260 2013 87 32	GJ2A	Jersey 6,212,895 7129 128 505
RL3A RT6A	7,717,864 6,502,176	5851 1 5067 1	70 677 67 677	SSOL SS1A	4,165,800 3,925,818	3698 133 50 3441 151 59	3	487,360 650 83	237	OMBA	Slovakia 1,758,240 2571 108 42	0	Liechtenstein
RK3DZB UA3R RC3W	5,403,244 3,626,368 3,280,672	4027 1	50 592 33 523 36 517	S56P S54K	2,494,492 981,245	2566 127 51 1634 93 35	KIBH	1,025,758 1115 100 523,845 646 79	301 236	SSZZW	Slovenia 7,398,978 5686 156 59	HBB/HB9	AON 7,001,928 7349 119 513 Lithuania
RK4PWX RK3GYM	2,626,815 2,400,968	2870 1	32 423 30 502	S59DEM	59,295 Spain	297 43 13	1 100000	Bermuda	4,474	AM3SS8	Spain 6,351,800 5718 147 58	LY7A	7,774,830 7712 151 584
RX3K RZ4CWW	2,309,720 2,085,555		23 461 16 425	EDST EC1KV	8,134,152	5437 155 59 4552 144 53	g AA4V/VP		310	EDSR AM1W	5,852,502 5676 137 55 2,028,024 2356 98 39		Netherlands 753,949 2223 55 204 225,680 726 51 209
RK4WWF RK30ZH RK10WZ	765,320 642,584 663,720	1311	90 334 86 290 83 304	EE2K EA3HCY	3,685,647 1,528,200	3682 128 47 2339 78 28	VP2V/KN	British Virgin Islands 5H 2,171,228 3825 83	215	AMSA AM1T	690,930 1662 87 31 333,603 920 62 24	1	Norway
RX3VWA RZ4HZW	555,255 484,704	914	88 317 77 247	AQ2W EA1GA	1,305,590 1,279,538	2787 87 32 2264 71 30	6 urner	Canada 776,078 912 67	279	нвян	Switzerland 4.233,777 4516 144 53	LN2T LATTPK	782,635 1924 70 309 91,680 478 37 154
RZ3TZZ RK4HYT	271,584 247,355	664 624	65 211 65 240	AM2T AM1A EH5T	942,732 842,996 514,775	2131 84 29 1639 77 31 1349 65 23	4 venny	The state of the s	237	HBSEE	1,188,250 2222 96 39		Portugal 336,740 941 62 236
RK3FWI	14,601 Finland	129	21 72	EA1HOE EA4SG	393,783 212,232	922 67 23 569 59 18	VE3MIS	2,208,681 2222 101	356	-	OCEANIA Australia	CHAR	Scotland
OH5Z OH2BAH	7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7		50 580 99 261	EA4BHK EA3MM	190,156 117,786	498 63 21 423 40 16	2 week	432,072 1244 63 2,329,054 3015 106	141	VK4KW VK4ZD	4,161,195 3458 134 31 624,510 868 92 17		6,977,275 6396 140 563 2,442,830 3306 109 450
ОНБК	471,420	757	93 312	A02A EA4RCT EA4URA	20,687 8,723 5,025	200 34 10 134 16 4 90 19 5	VEBAD	2,023,875 3456 89		AHEXX	Hawaii 3,722,838 3270 133 27	8 YT9X	Serbia 13,336,324 10613 166 655
TM6M		6463 1	69 669	EMHUNA	Svalbard	30 13 0	VE/SZ	4,770,308 5289 125		YEZR	Indonesia 2,254,593 2398 102 26	EE2W	Spain 12,231,180 9340 160 620
TM2S F5KKD F5KIN	4,189,512 960,475 498,480	3229 1 1734 975	42 539 81 292 86 286	JW70IA	512,550	942 58 15	7 VEBEV	593,892 1049 70 United Nations HQ	154	1	forthern Mariana Islands	EB1WW EA38FK	4,789,060 5723 121 459 3,624,594 4026 116 447
F5KAR F6KFA	292,951 128,100		50 221 51 159	SJ2W		2700 127 48	4U1UN	7,778,832 7241 115	381	AHOST	7,402,752 5574 136 35 New Zealand	SK3W	Sweden 4,011,744 3872 136 502
	Germany			SK70A SKØQO SK7A	1,326,682 3,900 1,458		2	AFRICA Canary Islands		ZMZM	3,742,977 3504 124 28		1,141,440 1977 93 371
DLBCS DP9I DL1QW	4,519,931 2,410,715 1,240,797	2711 1	53 614 12 403 19 460	Sitte	Switzerland		AOSA	24,644,952 10660 166	686		SOUTH AMERICA		OCEANIA Guam
DK5EZ DP3E	1,213,866 1,062,147	1246 1	19 412 01 386	HESFR HB9LL	285,264	1028 68 23 864 53 23	0 EE9Z	Ceuta and Melilla 17,374,344 8988 146	553	LS2D	Argentina 3,713,241 3665 126 32	WH2DX	3,157,506 3563 113 220
DJØA DL3G	776,135 718,256	1196 1074	88 309 89 335	HB9EI	129,823 Ukraine	512 44 15	ZS9X	South Africa 6,626,088 4773 126	979	ZY7C	Brazil 10,307,700 5726 148 50		Philippines 201,760 584 64 96
DFØDA DLØUM DKØGYB	586,356 321,062 191,011	1078 753 696	74 299 73 250 49 202	UT7L UTØAZA	The same of the sa	2711 151 57 2581 94 35	4	AGNOTICE .	910	PS2T ZV2K	6,207,908 4235 129 40 573,135 910 84 20	1	SOUTH AMERICA
DKØALK	43,920		25 95	UY4WWA UR3QXX	309,465 178,728	670 70 22 558 51 21	3 040	ASIA China 701,088 1419 87	191	PY18M8	896 34 14 1 Chile	ZZ5Z	Brazil 315,084 619 72 159
SZ1A	Greece 2,590,396	3258 1	38 514	UR6GWZ UR4PWC UT7AXA	97,410 18,666 8,470	410 43 14 174 24 7 94 22 5	0	Cyprus		CE4CT XR6T	6,701,468 4432 138 41 4,844,196 4485 112 31		Chile 6,107,520 4776 127 353
HG6N	Hungary 10,186,302	6261 1	73 684	MITTERNET	OCEANIA	27. 27. 12	C41	13,631,604 6705 151	587	PJ4K	Netherlands Antilles 12,159,964 7303 142 48	6 n.m.	Netherlands Antilles
HASKID	16,065	118	31 74	VK6NC		2129 98 25		Japan 3,251,500 2729 143	357		MULTI-OPERATOR	PJ2T	22,010,913 10586 161 622 CHECK LOGS
4U1ITU	1,969,506		96 345	VK4VN VK4WR	1,315,545	1827 110 25 1509 104 23 850 73 14	1 JAVIED	234 15 6	7	1	MULTI-TRANSMITTER NORTH AMERICA		Z5QQ, BASD, A3SA, A6SBB, AB1FY, AI4SX, C2TOM, DG1CMZ, DG9VH, DJ3RA, DLØP,
EI9E	Ireland 3,052,532	3697 1	17 457	VK4SN Fedi	460,530 erated States of N		JU1DX	Mongolia 596,700 1385 74	181	K3LR	United States 19,419,972 9033 172 68	DL1AXJ, DL2DTL,	DL1BZA, DL1EKO, DL1VTL, DL2BWO, DL2GBB, DL2KUF, DL2OE, DL4SVA,
List	Italy		11.401	V6B	458	14 9 1	0	EUROPE		KC1XX W3LPL	16,350,372 8117 155 63 15,060,265 7544 160 64	DLBUGF,	DL9NO, DM5DX, DM5JL, EA1AW, EA1AY, A1CJH, EA1GFY, EA1PO, EA2RY, EA2WD, EA3EXP, EA3NE, EA3NP, EA3RKR, EA4OA,
IR4M IR2C	9,194,328 8,698,140		66 662	AHZR	Guam 6,016,592	4149 146 37	7 0E5T	Austria 2,900,190 3166 124	430	K1TTT NQ4I NR5M	9,847,370 5718 143 57 7,758,720 4859 152 56 7,160,074 4834 158 56	EASFID.	EA7GV, EA7LL, EA8AGF, EB1TR, ED2R, 51, E18FH, EW7LE, F1VNR, F4EMU, F6BEE.
1050 1R3Z 1Q3RK	7,991,880 3,092,589 2,173,212	4913 1 2573 1 2434 1	61 619 45 552 25 511	кнемв	Hawaii 3,888,959	3943 132 23	1 9A7A	Croatia 11,873,622 8009 167	671	K3NA/1 NE3F	7,160,074 4834 158 56 7,082,600 3844 141 55 3,525,375 2499 129 46	G8MIA.	6KPO, FK8GM, G3RWL, G3VQO, G7NKS, GMØF, HA1SN, HA5FQ, HA8EV, IØKHP,
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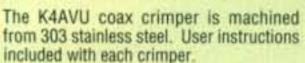
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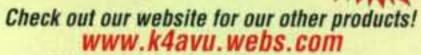






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our readers say

MREs and More

The following letters were directed to "Ham Notebook" editor Wayne Yoshida, KH6WZ.

Dear Wayne,

My wife and I have a need for emergency rations, so I read your article "Are You Ready?" (May CQ) with interest.

MREs have a day's worth of sodium, a day's worth of fat, and a day's worth of calories in each meal, sometimes more. They're made for soldiers in combat who burn up lots of calories and may not get more than a meal a day. Louise and I have found several substitutes that have more nearly normal supplies of calories and other contents. The brand we use most is Heater Meals, but we have a list of quick meals and alternatives at http://www.cieux.com/bm/quickMeals.html.

We list self-heating meals, along with emergency rations that don't have to be cooked and some meals that require boiling water. Note that some of the quick meals are kosher, vegan, gluten-free, and so on, since some people have dietary restrictions of various kinds (I can't digest milk, and I'm allergic casein, which is often used as a thickener).

On canned goods, if you're camping without refrigeration, opening a can means you have to eat the whole thing at one sitting. It would be the same after a hurricane or earthquake with no power. Therefore, we buy single-serving cans for less waste.

It was a great article, and I got a lot of new ideas from it. Many thanks.

Phil Stripling, The Civilized Explorer: http://www.cieux.com

KH6WZ replies: Thank you for your nice comments on my recent article. I took a quick look at the link you supplied and the info in there is excellent. I agree the single-serving cans are the best for emergencies because of the "no waste factor."

Dear Wayne,

Thanks for the informative article! I have been working on gathering the necessary items for a solar system that I can use mobile. I now have two solar panels, 15 watts, but I have been searching for any information on how to connect the two (up to three to match my controller) panels but have not been able to find any. Should they be connected in parallel or serial? Can you suggest any information source that provides that level of detail? Will there be a future article in CQ that provides that level of detail? Thanks again for the great article.

Jimmy Dominguez, KE5PEQ

KH6WZ replies: If you go to an RV, camping, or marine equipment store (check West Marine, for example), you can get small panels that have built-in charge controllers. The charge controllers prevent possible over-charging, but maybe more important is what happens when it gets dark: The solar panels then take power away from the system! A simple diode can do this, but it is lots easier to use the built-in controller that comes with the panel.

The units come with instructions, but basically, you mount your panel in a sunny location, the panel has a controller built-in, and so you connect the panel positive wire to the battery positive post, and the negative from the panel to the negative post on the battery—parallel.

With multiple solar panels, those would go in parallel, but check with the solar panel instructions to see what or how much voltage and current they supply to the battery. Also check the battery you are using (small gel-cell or big car battery?) to see how much charge voltage and current it needs to take for charging. Best thing is to go to a store where you can talk to someone who can guide you in buying what you need and can afford.

A follow-up article on solar power is a great idea. I will do that in an upcoming CQ!

"Get Your Hands into That!"

The following letter is in response to W2VU's June editorial on ham radio as one of the last bastions of personal electronic experimentation.

Editor, CQ:

Your editorial makes some good points, but I would like to remind you that there is an area of experimentation in the software world, and that is Linux. It is an operating system that one *owns*, not licenses, and is open source—that is, one can get the source code for one's OS, and play with it as much as one likes, if one is literate in the language it is written in, "C" as far as I know. I do wish your article writers were more aware of it and of the plethora of "packages" (as Linux programs are called) written for ham radio operators. There is a version of Linux called "Ubuntu" that is very clean and a pleasure to use, and as always, *free*—that is, no cost. I think that we should encourage its use in the ham community as much as possible.

Bob Irwin, K6YV

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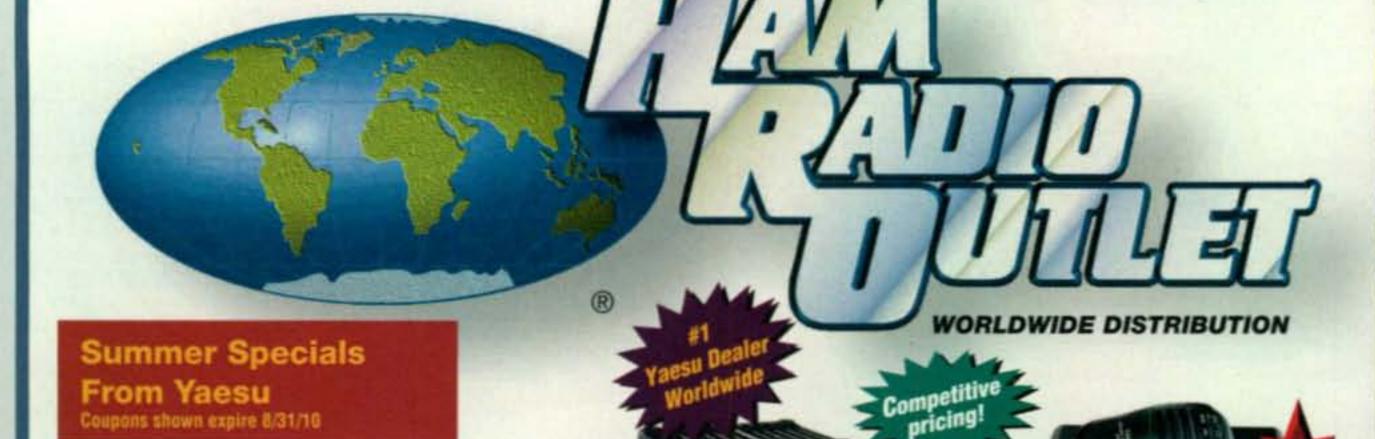
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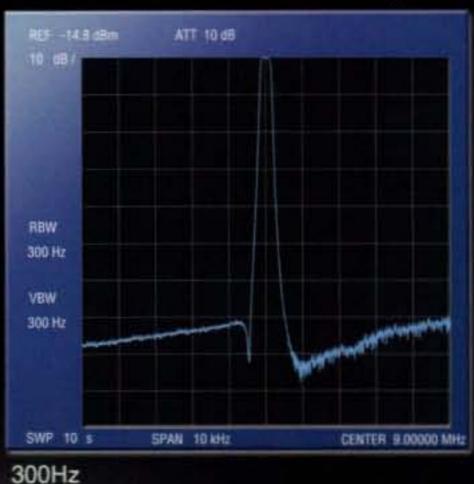
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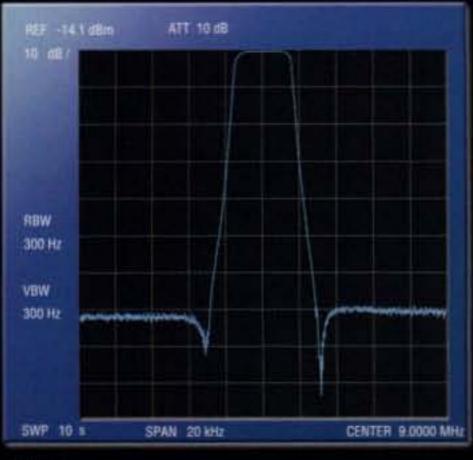


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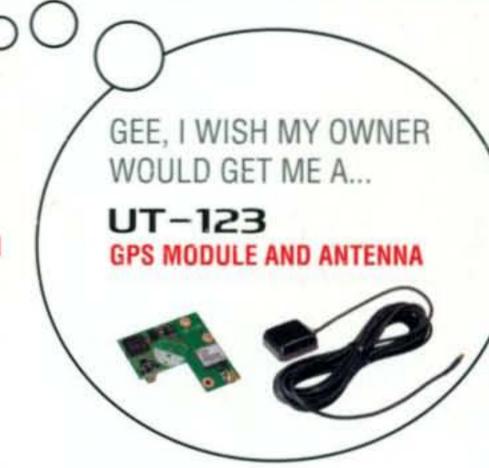




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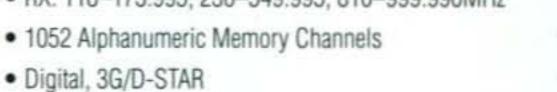


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