The Challenge of Working Antarctica, p. 80

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COMMUNICATIONS & TECHNOLOGY

SEPTEMBER 2022

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- In Search of the Real Wouff Hong, p. 23
- Protect Your NanoVNA, p. 33

On the Cover: DV1IIW's excellent contest station in the Philippines. Elvin and his friends took third place in Oceania in the multi-single low-power category of the 2022 CQ WPX SSB Contest. (Results on page 8; more about DV1IIW on page 60)

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announcements

SEPTEMBER

SHELBY, NORTH CAROLINA — The Shelby Amateur Radio Club will hold the Shelby 2022 Hamfest and the 2022 ARRL North Carolina Section Convention from 9 a.m. to 5 p.m., Friday, September 2, 8 a.m. to 5 p.m., and 8 a.m. to 1 p.m., Sunday, September 3 at the Cleveland County Fairgrounds, 1751 E. Marion Street. Phone: (980) 295-5151. Email: <chairman@shelbyhamfest.org>. Website: <www.shelbyhamfest.com>. Talk-in 146.880-. VE exams.

LOCKPORT, NEW YORK — The Lancaster Amateur Radio Club will hold the Lancaster Hamfest beginning 7 a.m., Saturday, September 10 at the Transit Drive In, 6655 S. Transit Road. Website: <www.w2so.org>. Talk-in 147.255 (PL 107.2).

SHEPERDSVILLE, KENTUCKY — The Greater Louisville Hamfest Association will hold the Greater Louisville Hamfest 2022 from 8 a.m. to 2 p.m., Saturday, September 10 at the Paroquet Springs Conference Centre, 395 Paroquet Springs Drive. Website: <www.louisvillehamfest.com>. Talk-in 146.700 (PL 79.7). VE exams, card checking.

WYOMING, MICHIGAN — The Grand Rapids Amateur Radio Association will hold the GRAHamfest 2022 from 8 a.m. to 1 p.m., Saturday, September 10 at The Home School Building, 5625 Burlingame, SW. Email: <rmoe424242@gmail.com>. Website: <www.w8dc.org>. Talk-in 147.26+ (PL 94.8). VE exams, card checking.

BALLSTON SPA, NEW YORK — The Saratoga County Amateur Radio Association will hold its Hamfest 2022 beginning 7 a.m., Sunday, September 11 at the Saratoga County Fair Grounds 162 Prospect Street. Contact: Jim Polewczak, KG2H, (518) 703-9558. Email: <kg2h@arrl.net>. Website: <http://k2dll.org>. Talk-in 147.000 (PL 91.5), 147.240 (PL 91.5), or 147.03 (PL 91.5). VE exams, fox hunt.

BUTLER, PENNSYLVANIA — The Butler County Amateur Radio Association will hold its Swapfest 2022 from 8 a.m. to 3 p.m., Sunday, September 11 at the Unionville Fire Department, 102 Mahood Road. Website: <http://w3udx.org>. Talk-in 147.360+ (PL 131.8). VE exams.

DANBURY, CONNECTICUT — The Candlewood Amateur Radio Association will hold the Western CT. Hamfest beginning 8 a.m., Sunday, September 11 at the Police Athletic League, 35 Hayestown Road. Contact: John Morelli, W1JGM, <hamfest@cararadioclub.org>. Website: <http://hamfest.cararadioclub.org>. VE exams.

FINDLAY, OHIO — The Findlay Radio Club will hold its 80th Annual Hamfest from 8 a.m. to 2 p.m., Sunday, September 11 at the Hancock County Fairgrounds, 1017 East Sandusky Street. Email: <hamfest@FindlayRadioClub.org>. Website <www.FindlayRadioClub.org/hamfest>. Talk-in: 147.150+ (PL 88.5).

MULLICA HILLS, NEW JERSEY — The Gloucester County Amateur Radio Club will hold its 44th Annual Hamfest and 2022 ARRL Southern New Jersey Section Convention beginning 8 a.m., Sunday, September 11 at the Gloucester County 4-H Fairgrounds, 235 Bridgeton Pike (Route 77). Website: <www.w2mmd.org>. Talk-in 147.180+ (PL 131.8). VE exams.

EAST PEORIA, ILLINOIS — The Peoria Area Amateur Radio Club will hold the Midwest Superfest from 8 a.m. to 4 p.m., Saturday, September 17 and from 8 a.m. to 1 p.m., Sunday, September 18 at the East Peoria Event Center, 4200 Washington Street. Email: <w9uvi@arrl.net>. Website: <www.w9uvi.org>. Ta;lk-in 147.075+ (PL 156.7). VE exams, DXCC card checking, satellite demo.

NAPERVILLE, ILLINOIS — The 2022 W9DXCC Convention will be held from 7:30 a.m. to 4 p.m., Friday, September 16 and from 8 a.m. to 7 p.m., Saturday, September 17 at the Chicago Marriott Naperville, 1801 North Naper Boulevard. Website: <http://w9dxcc.com>.

ADRIAN, MICHIGAN — The Adrian Amateur Radio Club will hold its 47th Annual Hamfest and Computer Show beginning 8 a.m., Sunday, September 18 at the Lenawee County Airport, 2651 W. Cadmus Road. Contact: Mark Hinkleman, NU8Z, (517) 423-5906. Email: <cqnu8z@comcast.net>. Website: <www.w8tqe.com>. VE exams.

EAST STROUDSBURG, PENNSYLVANIA — The Eastern Pennsylvania Amateur Radio Association will hold its Hamfest 2022 from 8 a.m. to 1 p.m., Sunday, September 18 at the Moose Lodge 1336, 705 Stokes Mill Road. Phone: (570) 350-1185. Email: <3w3fnz@gmail.com>. Talk-in 147.045+ (PL 131.8). VE exams.

HORSEHEADS, NEW YORK — The Amateur Radio Association of the Southern Tier will hold the ARAST Hamfest & Computerfest from 6 a.m. to 2 p.m., Saturday, September 24 at the Chemung County Fairgrounds, 170 Fairview Road. Website: <http://arast.info>. Talk-in 147.360+ or 146.700-. VE exams and bunny hunt.

LEXINGTON, NORTH CAROLINA — The Healing Springs Mountain VHF Society will hold its inaugural Lexington Hamfest from 8 a.m. to noon, Saturday, September 24 at 366 Livestock Market Road. Email: <allenjs12000@gmail.com>. Website: <http://w4par.org>. Talk-in 146.910- (PL 107.2). VE exams.

PLYMOUTH, MINNESOTA — The Twin City FM Club will hold the Last Chance Tailgate Swap Fest beginning at 8 a.m., Saturday, September 24 at the West Medicine Lake Community Club, 1705 Forestview Lane North. Email: AJ <nopvc@outlook.com> or Mike <president@tcfmc.org>. Website: <www.tcfmc.org>. Talk-in 146.76 (PL 114.8).

TINTON FALLS, NEW JERSEY — The Garden State Amateur Radio Association will hold its Hamfest from 8 a.m. to noon, Saturday, September 24 at the MOESC Parking Lot, 100 Tornillo Way. Email: <gsara@arrl.net>. Website: <www.gsara.club>. Talk-in 147.045+ (PL 67). VE exams and card checking.

WEST FARGO, NORTH DAKOTA — The Red River Radio Association will hold the RRRA Hamfest and 2022 ARRL Dakota Division Convention from 8 a.m. to 2 p.m., Saturday, September 24 at the RRV Fairgrounds Hartl Building, 1805 Main Avenue W. Website: <http://rrra.org>. VE exams, Wouff Hong ceremony.

BEREA OHIO — The Hamfest Association of Cleveland will hold the 48th Annual Cleveland Hamfest and Computer Show form 8 a.m. to noon, Sunday, September 25 at the Berea Fairgrounds, 160 Eastland Road. Website: <www.hac.org>. Talk-in 145.41 (PL 110.9) or 442.225 (PL 131.8). VE exams, DXCC / WAS / VUCC / WAC card checking.

JOPLIN MISSOURI — The Joplin Amateur Radio Club will hold the Joplin Hamfest 2022 from 10 a.m. to 7 p.m., Friday, September 30 and from 8 a.m. to 2 p.m., Saturday, October 1 at the ETG Event Center, 1107 N. Prosperity Avenue. Email: <chairman@joplinhamfest.org>. Website: <www.joplinhamfest.org>. Talk-in 147.210 (PL 91.5). VE exams.

OCTOBER

NEW HOLLAND, PENNSYLVANIA — The Red Rose Repeater Association will hold its Hamfest beginning 8 a.m., Saturday, October 1 at the Garden Spot Fire and Rescue, 331 East Main Street. Website: <http://w3rrr.org>. Talk-in 147.015. VE exams.

WEST FRIENDSHIP, MARYLAND — The Columbia Amateur Radio Association will hold CARAfest 2022 from 7 a.m. to 3 p.m., Sunday, October 2 at the Howard County Fairgrounds 2210 Fairgrounds Road. Email: <cara@columbia-ara.org>. Website: <www.carafest.org>. VE exams.

SLIDELL, LOUISIANA — The Ozone Amateur Radio Club will hold the Slidell EOC 2022 Hamfest and 2022 ARRL Louisiana State Convention from 2-5 p.m., Friday, October 7 and from 8 a.m. to 2:30 p.m., Saturday, October 8 at the Slidell City Auditorium, 2056 2nd Street. Email: <hamfest@w5sla.net>. Website: <www.w5sla.net>. Talk-in 147.27+ (PL 114.8). VE exams.

LEXINGTON, KENTUCKY — The Bluegrass Amateur Radio Society will hold the Central Kentucky Hamfest beginning 7 a.m., Saturday, October 8 at 2032 Parallel Road. Contact: David Richardson, W9KHZ, (859) 983-1380. Email: <centralkyhamfest@gmail.com>. Website: <www.bluegrassars.org>. VE exams.

MELBOURNE, FLORIDA — The Platinum Coast Amateur Radio Society will hold the PCARS 57th Annual Melbourne Hamfest and 2022 ARRL Florida State Convention from 1 to 7 p.m., Friday, October 7 and from 9 a.m. to 3 p.m., Saturday, October 8 at the Melbourne Auditorium, 625 E. Hibiscus Boulevard. Email: <hamfest@pcars.org>. Website: <www.pcars.org>. VE exams, special event station, DXCC card checking.

MITCHELL, INDIANA — The Hoosier Hills Ham Club will hold the 61st Annual Hoosier Hills Hamfest from 8 a.m. to noon, Saturday, October 8 at the Lawrence County 4-H Fairground, 11265 U.S. Highway 50 West. Contact: Tim Wray, KB9SNL, (812) 675-6733. Email: <president@w9qyq.org>. Website: <www.w9qyq.org>. Talk-in 146.73- (PL 107.2). VE exams.

(Continued on page 110)

ham radio news

Hams Help Red Cross in Kentucky Flood Response

Amateur radio operators from Kentucky ARES® (Amateur Radio Emergency Service) helped Red Cross disaster teams in the aftermath of historic flooding in eastern Kentucky in late July. The *ARRL Letter* reports that ARES members provided communication support for Red Cross damage assessment teams that made their way through flooded areas, noting that communication needs were complicated by the rural region's mountainous terrain. ARES groups in Ohio and Virginia were placed on standby in case additional help was needed.

NOAA: Above-Average Hurricane Season Still Expected

The National Oceanic and Atmospheric Administration (NOAA) provided an updated forecast for the 2022 Atlantic hurricane season in early August, sticking with its initial prediction of an above-normal number of storms, but scaling it back slightly. According to the agency, forecasters now suggest a 60% chance of an above-normal season (vs. 65% in its initial outlook), along with a 30% chance of an average season and only a 10% chance of a below-average season. The updated forecast predicts 14-20 named storms, of which 6-10 are expected to become hurricanes, including 3-5 major hurricanes.

While there had been only three named storms (and no hurricanes) in the Atlantic as of August 15th, NOAA Administrator Rick Spinrad noted in the August 1st update that, "we're just getting into the peak months of August through October for hurricane development, and we anticipate that more storms are on the way." The official hurricane season runs through November 30th, although recent years have seen several "out of season" tropical storms and hurricanes.

Hams on SOTA Activation Help Spot Forest Fire

Members of South Dakota's Black Hills Amateur Radio Club are credited with bringing a quick response to a small forest fire that officials were then able to keep from spreading. According to the *ARRL Letter,* a dozen club members were taking part in a Summits on the Air (SOTA) activation when two members of the group spotted smoke from their perch atop Cicero Peak in the Black Hills. They asked a local ham on a VHF simplex frequency if there had been any fires reported to the Forest Service, who then relayed the request on a local repeater. An off-duty forest ranger was monitoring the repeater and called in the alert, prompting a response by a fire crew and helicopter. They were able to quickly contain the fire and keep it from spreading.

Several New Ham Satellites Now in Orbit

Two satellites carrying amateur radio digipeaters were launched into a medium-Earth orbit (3,665 miles) in mid-July aboard the inaugural launch of the ArianeSpace Vega-C rocket. The AMSAT News Service reports that the digipeaters aboard the AstroBio and Greencube satellites may be useful for long-distance digital QSOs.

In addition, 10 Russian "Radioskaf" cubesats were released into orbit from the International Space Station during a spacewalk on July 21st. According to the Radioskaf website, the new satellites, all of which operate on the 70-centimeter band, are intended to form a peer-to-peer information network, study Earth's magnetic field, measure radio noise in outer space, and transmit both slow-scan TV images and voice messages to amateurs on the ground. The voice messages will be transmitted in eight different languages.

Active Sun Serving Up Surprises

As Sunspot Cycle 25 continues to ramp up, the sun is getting more and more active in ways that affect radio propagation here on Earth. According to Spaceweather.com, the sun on August 14th sent a plume of "dark plasma" into space after a huge explosion around sunspot AR3076. That resulted in a coronal mass ejection (CME) that will at least partially impact Earth and could touch off minor to moderate geomagnetic storms. On July 23rd, Spaceweather reported on a CME that touched off auroras that were visible as far south as Virginia, as well as the poorly understood (but entertainingly named) ribbon of light known as "STEVE."

QSO Today Virtual Ham Expo Returns This Month

Despite the resurgence of in-person hamfests as we all start to adjust to Covid as part of our everyday lives, the online QSO Today Virtual Ham Expo is once again on the calendar, this time on the weekend of September 17-18th. A new feature for this edition will be a "Project Gallery" that will include a product showcase for vendors as well as papers / projects submitted by individual amateurs. Those whose projects are accepted will have the $10 admission fee waived. For more information, visit <www.qsotodayhamexpo.com>.

Study of Arecibo Telescope Collapse Focuses on Cables and Sockets

A forensic analysis of the collapse of the Arecibo radiotelescope in 2021 has concluded that problems in both the suspension cables and the sockets that held them led to the failures that precipitated the collapse. The detailed study, by the engineering firm of Thornton Tomasetti, reported that a combination of five major factors was responsible: "(1) the manual and inconsistent splay of the wires during cable socketing, (2) the design of the cable system with relatively low safety factors, (3) the occurrence of extreme environmental events such as hurricanes and earthquakes, (4) the non-replacement, repair or bypass of the sockets where large cable slips were observed, and (5) the addition of auxiliary cables as isolated cables."

The report concluded that, while further study is needed to determine the service life of cable-socket assemblies, "the risk of socket failure can be mitigated by … (1) controlling the number and geometry of splayed-out wires during cable socketing, (2 and 3) designing cable systems with larger safety factors under gravity and transient loads, (4) monitoring the cable slip and slip rate after cable installation, and (5) designing cable systems with multiple adjacent cables on each span." (*Tnx WP3R*)

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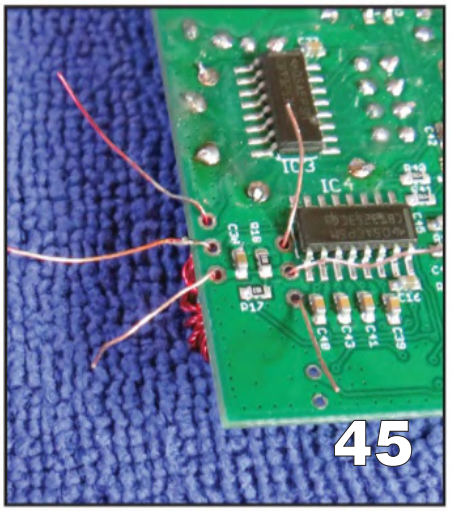
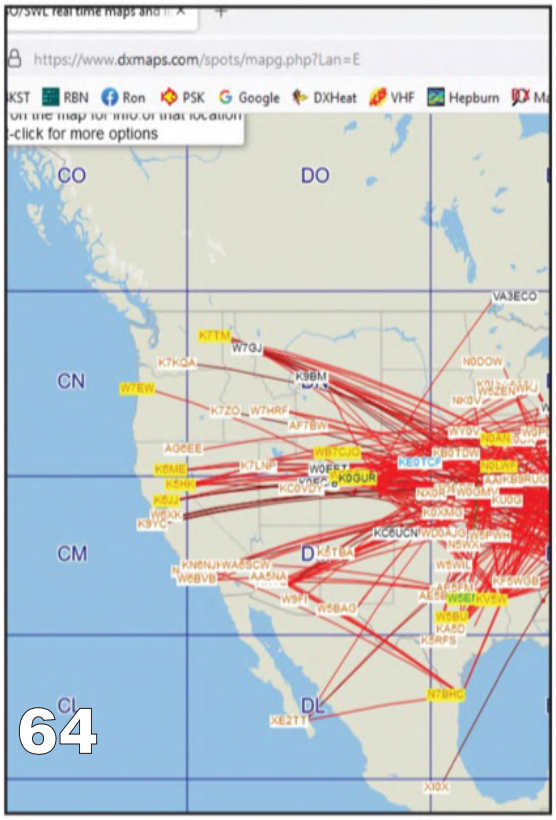


features

FOCUS ON: Summer is coming to a close and propagation will begin heating up as we approach the Autumnal Equinox as explained on page 92. Why not take advantage of the great opportunities by exploring new bands on pages 64 and 68? How about some antenna projects on pages 36 and 49? Plus with the CQWW RTTY DX Contest running this month, read all about a legendary South American RTTY contester on page 18.

columns

departments



miscellaneous

zero bias: a cq editorial

BY RICH MOSESON,* W2VU

CQ Contests and the War in Ukraine Revisited

Plus, New CQ Award Policy Takes Effect

The SSB results of the 2022 CQ World Wide WPX Contest are published in this issue and, not surprisingly, the number of logs submitted is down from last year. There are two main reasons for this: 1) the "pandemic bump" of 2020 and 2021 is receding, as more people return to "normal" activities, and 2) CQ's policy restricting the participation of stations in Russia and Belarus due to Russia's invasion of Ukraine (as well as the total lack of entries from Ukraine, where ham radio is shut down due to the war).

Because of this drop in submitted logs, CQ management has been getting quite a bit of pressure from some top contesters and major contesting clubs to reverse our policy adopted in response to the invasion, particularly with the approach of the CQWW DX Contest this fall. After much discussion and consultation with some of our *contesting cognoscenti*, we have decided to keep the policy in place.

I'll explain our reasoning in a moment, but first a little background. Here's the crux of the policy we adopted in the spring: All stations from any country in which amateur radio operation is permitted are welcome to participate in CQ contests, make as many contacts as they can and submit their logs if they wish. *However*, stations in Russia, Belarus and the secessionist Donbas region of Ukraine (unofficial D1 prefix) may not compete for awards or plaques; their logs are accepted only as checklogs and their scores are not listed in the results. *In addition*, contacts with those stations by other participants have zero point value and do not count as multipliers.

Why did we take this action when ham radio traditionally stays out of political matters? As we explained in this column in April, "While we strongly respect amateur radio's tradition of staying above political frays, we feel that this situation is not about politics and debating which person or proposal is the best choice for dealing with a particular situation. Rather, this is about an unprovoked invasion of one sovereign country by another, compounded by Russia's deliberate targeting of civilians, as seen in repeated missile strikes on residential areas, hospitals, and shelters. This is not politics; it is, as the U.S. State Department says, war crimes."

This decision was based on events very early in the war. Subsequent revelations of Russian atrocities and continued targeting of civilian populations only serve to strengthen our resolve that standing up and saying "NO" is the only moral position we can take.

Some contesters complain that nothing that we do in our little corner of the world will have an impact on what the Russian government does in Ukraine, and that the only effect of our action is to punish "innocent" Russian hams. Here's how we see it: In taking this action, we are part of a much larger group of international sport federations and private businesses telling the Russian government and the Russian people (3/4 of whom support the war, according to a recent poll[1]) that it is *not* OK, it is *not* business as usual, and the rest of the world will not stand by silently and pretend that it is. In addition, of course, most western nations have imposed significant economic sanctions on Russia, affecting "innocent Russians" far more severely than anything we may do regarding a ham radio contest.

Nothing has changed in the six months since the invasion began to suggest that easing or lifting of any sanctions imposed on Russia is appropriate at this time.

Looking Ahead

With the WPX contests in the rear-view mirror, it is clear that our policy had a negative impact on participation. Maintaining this policy will very likely have a negative impact on participation in this fall's CQWW contests, beginning with the RTTY weekend later this month. As N3QE points out in his contesting column this month, several European contests have been canceled completely because of the war. Do we want to see shrinkage in our contest participation? Of course not. Any contest sponsor wants to see steady growth in participation from one year to the next, not shrinkage. But let's be real here.

With all due respect to some of our strongest and most loyal supporters, and to some of our own contest committee members, ham radio at its core is a hobby. Contesting is a part of that hobby. While contesting certainly helps build technical and operating skills, and helps promote the development of new technology, we do it mostly because it is *fun*, and because competition with our fellow hams around the world is *fun*. There's nothing wrong with that. But…

What we now have is one group of people who are complaining loudly because they believe our policy will put a damper on their fun. If they're in their basements for 48 hours, it's because that's where their radios are. On the other hand, many Ukrainians are spending hours in their basements trying to stay alive in the face of continuing Russian shelling of residential neighborhoods. No one will be killed or tortured because they didn't get as many multipliers as they would have liked in the CQWW, or even if they learn that their entry will be accepted only as a checklog. It's time we all got our priorities straight. There are more important things in life than ham radio contests. Standing up for what is right, and to oppose what is wrong, is one of them. That was our position in March. It continues to be our position now.

New Policy on CQ Award Certificates Now in Effect

Finally, a reminder that as of September 1st, the "standard" certificate for the CQ WAZ and WPX awards is now a high-definition digital PDF file suitable for printing and framing. The traditional hand-lettered certificate on special paper is still available, but as an added-cost option ($19 U.S. for the first certificate, $5 U.S. for each additional certificate mailed in the same envelope; payable through the award managers). Certificates "in the pipeline" as of September 1st are not subject to the new fee. (For more details, see July 2022 CQ, p.79.) The new policy will extend to other CQ awards as the logistics are put into place. Watch for notifications here and online.

This fall promises great propagation and great DXing on the HF bands. Get on the air and make the most of it!

– 73, Rich, W2VU

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

Note:
1. <https://tinyurl.com/26d9ymca>

news bytes

W2NAF Gets NSF Grant to Study Grayline and Solar Eclipses

National Science Foundation
WHERE DISCOVERIES BEGIN

HamSCI founder and University of Scranton professor Nathaniel Frissell, W2NAF, has been awarded a nearly $400,000 grant from the National Science Foundation to study changes in the ionosphere at dawn and dusk (a period we hams know as "grayline") and during solar eclipses. According to the university, Frissell will work with students there and at Case Western Reserve University, as well as amateurs around the country, to gather data using so-called "Grape" receivers designed using another NSF grant for the HamSCI Personal Space Weather Station project.

Frissell says there will be an annular solar eclipse visible in the continental U.S. next year, as well as a total eclipse in 2024, noting that these will be the last solar eclipses to traverse the country until 2044. The grant will fund an additional 30 Grape receivers that will be provided to HamSCI volunteers across North America. The stations will run continuously at least through 2025, the end of the project period, monitoring WWV and CHU to collect data daily at sunrise and sunset as well as during the two solar eclipses.

In a post to the HamSCI email group, Frissell says the project will have five main areas of study:

1. How do dawn and dusk ionospheric variability as observed by HF Doppler shift measurements vary with local time, season, latitude, longitude, frequency, distance, and direction from the transmitter?
2. Is eclipse ionospheric response symmetric with regard to onset and recovery timing?
3. How similar is the eclipse to daily dawn and dusk terminator passage?
4. Do we observe multipath HF mode-splitting in the post-eclipse interval that is similar to dawn events?
5. How is the response different for the southward annular eclipse in 2023 compared to the northward total eclipse of 2024?

According to Frissell, the grant will also provide support for a Ph.D. student at Case Western and a masters candidate at Scranton.

Results of the 2022 CQ World Wide WPX SSB Contest

BY BUD TRENCH,* AA3B

"Well, this was my breakout contest of the new cycle! … Cycle 25, here we go!" – W6QU

"What an absolute joy 15 meters was. There were stations I'd never heard before. Great time, and great contest." – WI7J

"WPX has become one of my favorites. If it talks, you can work it!" – N7DX

"This was the most on-air fun I had in the past eleven years, and I've been operating since 1957. What a hoot" – W2STM

If the 2022 running of the CQWW WPX SSB contest is any sign, then we are in for a wild propagation ride during Cycle 25. Nearly one-third of all contacts were logged on 15 meters, and 10-meter QSOs were up over 400% compared to last year. A summary of the action is provided in *Figure 1*.

While the peak Solar Flux Index in 2022 was up by 175% from 2021, the number of logs received and QSOs verified were down by 17% and 9% respectively, undoubtedly influenced by the Russian invasion of Ukraine. The 2021 results included 548 logs from Russian DXCC entities, Belarus, and Ukraine; this accounts for about half the 2022

* director@cqwpx.com

ED8W (EA1BP) finished first in the Low Power, Tribander / Single Element (TB-Wires) overlay.

	Continent							
Metric	AF	AS	EU	NA	OC	SA	All	2021
Logs	43	697	2,479	2,011	556	427	6,213	7,276
Operators	57	816	2,970	2,181	680	495	7,199	8,217
DXCC	13	26	54	24	13	15	145	142
Prefixes	22	212	684	541	119	126	1,704	1,962
Reported QSOs By Band (Post Log Checking)								
160M	1	127	10,816	1,922	31	7	12,904	34,758
80M	784	1,765	90,919	39,251	288	1,501	134,508	248,167
40M	3,223	20,302	193,609	137,492	37,028	11,220	402,874	591,199
20M	6,836	28,823	286,952	206,287	20,985	28,758	578,641	899,305
15M	15,478	82,441	217,986	219,716	37,955	47,819	621,395	343,266
10M	12,632	17,627	33,576	70,218	16,390	85,757	236,200	53,004
All	38,954	151,085	833,858	674,886	112,677	175,062	1,986,522	2,169,699
Average Productivty								
QSOs/Log	906	217	336	336	203	410	320	298
QSOs/Opr	683	185	281	309	166	354	276	264

Figure 1. 2022 activity level summary by continent.

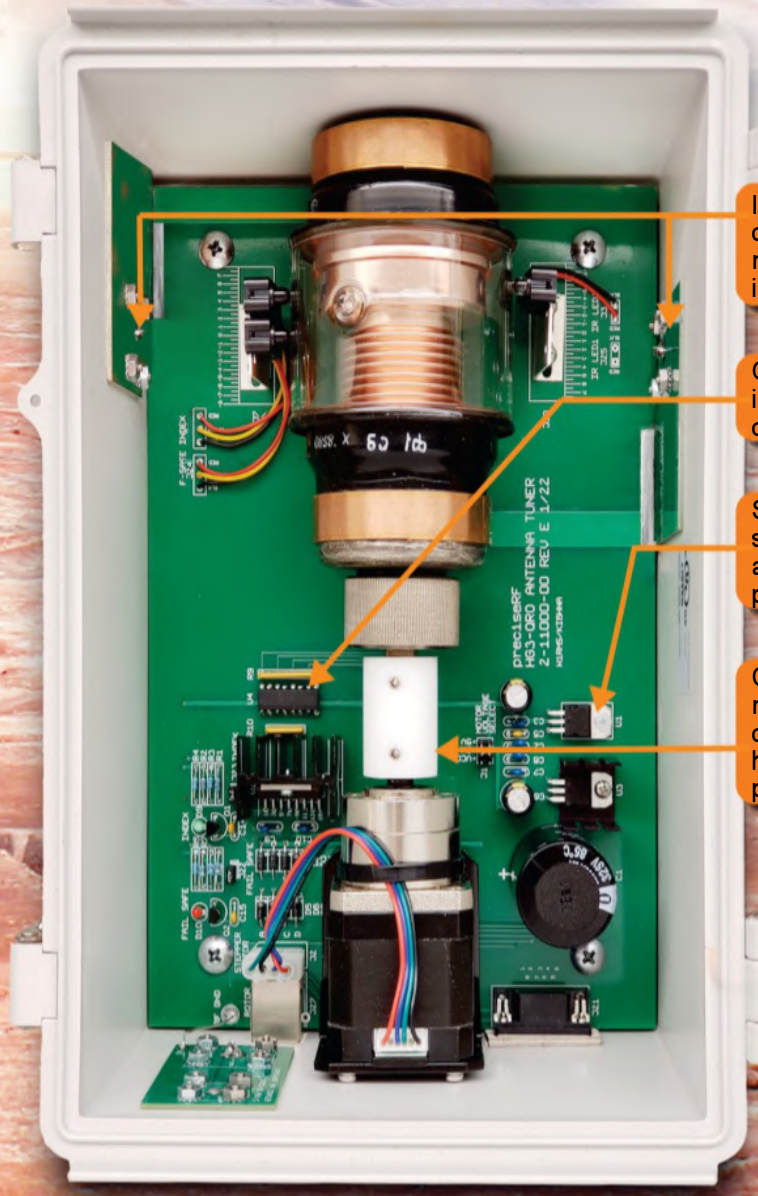
COMPROMISE WAS NOT AN OPTION FOR THE NEW HG3 QRO-A!

No Compromises Mag Loop

The new HG3 QRO-A raised the bar again for Magnetic Loop Antennas (MLA). MLAs are well known for their superior performance. The remotely tuned HG3 QRO-A MLA covers 80*-10 meters with stepper motor precision and resolution. The high Q vacuum capacitor allows for 1.5 KW PEP*. The 45,000-step resolution delivers an unprecedented 511 Hz resolution bandwidth allowing you to set your band preferences spot on. Rapid-Tune automatically scans each band for the lowest SWR and works with most HF radios.

It Pays to Pay Attention

How do you make a great product even better? You listen to your customers.The heart of an MLA is the tuner. We made so many improvements to it that we now call it the HG3 QRO-A. The HG3 Plus Controller also received new firmware and an improved SWR function. *Some limitations may apply or are optional.



HG3 QRO-A Improvements:

- Integrated capacitor to radiator connections with six times more copper surface area for improved efficiency
- Optical isolated driver interface allows for a longer control cable and RFI rejection
- Separate logic circuit and stepper motor power supplies allow for smoother and more precise tuning
- Custom high voltage Delrin motor to capacitor shaft coupler provides for greater high power and high voltage protection

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Category	Continent							Average per Entry	
	AF	AS	EU	NA	OC	SA	All	Op Time (Hours)	Score Reduction
Single Op High Power Entries									
All Band	15	157	499	674	82	49	1,476	13	9%
Single Band	5	69	221	100	57	59	511	13	10%
Single Op Low Power Entries									
All Band	11	211	941	882	158	96	2,299	11	10%
Single Band	4	162	377	183	204	172	1,102	8	13%
QRP Entries									
All Band	0	13	56	22	9	5	105	9	11%
Single Band	0	27	72	19	18	15	151	7	15%

Figure 2. Single-Op participants by continent

2022 CQWW WPX SSB TOP SCORES

WORLD

Single Op All Band High Power
PJ4K (N6KT).....27,353,511
KP2M (NN3W).....20,439,244
V31XX (K4XS).....19,794,390
KC1XX (NN1C).....15,170,455
H25A (LZ2HM).....14,874,840

Single Op 28 MHz High Power
PX2A (PY2LED).....6,859,382
LW1F (LU5FC).....6,487,221
LO5D (LU9ESD).....4,976,580

Single Op 21 MHz High Power
ZX5J (PP5JR).....11,783,086
CR3DX (OM3RM).....11,205,482
TM6M (F4DXW).....7,631,405

Single Op 14 MHz High Power
PP4T (PY4BZ).....6,973,018
S55OO.....5,340,657
S57DX.....4,528,907

Single Op 7 MHz High Power
SN3A (SP3GEM).....6,569,632
S51YI.....5,134,640
OT2A.....3,830,015

Single Op 3.7 MHz High Power
ED5R (EA5Z).....1,770,003
9A8M (9A7DM).....1,639,208
OK8NM (OM6NM).....1,421,280

Single Op 1.8 MHz High Power
S53O.....196,238
YL3FT.....170,586
S54ZZ.....165,808

Single Op All Band Low Power
P4ØL (W6LD).....13,745,550
CF2Z (VA2CZ).....5,405,823
WP3C (N2TTA).....4,590,718
VE4VT.....4,110,073
KP2B (EB7DX).....3,923,920

Single Op 28 MHz Low Power
PQ5B (PP5BZ).....2,553,600
PU5FJR.....2,021,012
CE7VP.....1,545,360

Single Op 21 MHz Low Power
KP4PUA.....2,172,707
PY5QW.....1,828,108
ZV2C (PY2CX).....1,750,536

Single Op 14 MHz Low Power
IF9A (IT9WDC).....1,473,435
YV4EK.....906,984
YU5M.....858,900

Single Op 7 MHz Low Power
ED7R (EA7GX).....1,633,203
G8X (G4FJK).....1,112,146
SX8V (SV1JG).....581,196

Single Op 3.7 MHz Low Power
OK6T (OK1WCF).....695,409
SN9B (SQ9OB).....497,168
E7AA (E73AA).....298,304

Single Op 1.8 MHz Low Power
OK6Y (OK2PTZ).....119,548
SQ8MFM.....69,870
OK2BRQ.....14,940

Single Op All Band QRP
LY9A.....852,885
K3WW.....616,610
NDØC.....399,832
LZ1DM.....387,247
DK8R (DL8LR).....241,640

Single Op 28 MHz QRP
TIØRC (TI2YO).....98,230
PU9YCZ.....27,750
PY6GOE.....25,365

Single Op 21 MHz QRP
YBØSSF.....387,840
EF3O (EA3O).....193,224
YC1LJT.....169,081

Single Op 14 MHz QRP
MI1M (MIØLLG).....59,475
W2VRK.....47,064
JH7VHZ.....44,247

Single Op 7 MHz QRP
JA6GCE.....108,251
OE3MDB.....48,477
SO55K.....45,756

Single Op 3.7 MHz QRP
LY2OU.....17,017

Single Op 1.8 MHz QRP
DL1AOB.....10,658
HA1TI.....8,127
YO8WW.....2,016

Multi-Single High Power
V47T.....24,741,080
FY5KE.....23,705,507
E7DX.....22,404,187
9A5Y.....17,455,788
SP8R.....16,181,287

Multi-Single Low Power
HK3RD.....4,342,170
Z32ID.....3,315,956
IO3F.....2,887,995
ZB2BU.....2,190,474
9A1CRT.....2,116,296

Multi-Two
EI1ØØC.....28,841,316
II2S.....23,839,776
IR6T.....23,041,216
ED1R.....21,560,058
ND7K.....16,915,608

Multi-Multi
D4Z.....75,189,590
PJ2T.....31,830,218
YT5A.....30,417,686
NH7T.....28,254,024
LZ9W.....28,043,532

Multi-Distributed
IQ4FA.....14,669,700
PR1T.....5,430,900
PT1K.....5,184,930
4A7A.....3,790,044
ED4W.....3,009,150

Rookie
High Power
IUØOVB.....3,288,267
AA3R.....1,692,449
VE3GJP.....700,740
DD5VL.....385,170
EF5T (EA5JDN).....216,495

Rookie
Low Power
VA3IDD.....1,227,533
PP5KW.....1,036,836
IU1NKS.....713,680
D44PM.....623,076
MØKYB.....315,543

Classic
High Power
PJ4R (KK9A).....9,967,888
CR6T (CT1ESV).....9,111,732
WK5T (N2IC).....6,871,590
WH7T (WH7W).....6,837,244
VA2EW.....6,834,304

Classic
Low Power
KR5X (K1BX).....2,700,894
PY2NY.....813,232
G9X (M1LCR).....737,380
MØPLX/M.....734,855
N8II.....665,112

Tribander / Wires
High Power
CQ9T (CT3KN).....8,033,674
ZW2N (PY2MNL).....8,030,328
IO6A (IK6QON).....5,014,710
WT1A.....4,034,277
MM9I.....3,887,952

Tribander / Wires
Low Power
ED8W (EA1BP).....3,680,849
ZF5T (LU8EOT).....3,147,300
HZ1TL.....2,146,500
PA9M.....1,725,456
EE7E.....1,645,666

Youth
High Power
KC1XX (NN1C).....15,170,455
NTØX (KC1KUG).....6,496,256
YTØC.....4,098,870
LY5AX.....1,942,752
SA6NIA.....639,004

Youth
Low Power
KM4SII.....1,122,498
9A2ZI.....834,815
YC1LJT.....169,081
DJ4MX.....160,686
VE3OMV.....144,396

UNITED STATES

Single Op All Band High Power
KC1XX (NN1C).....15,170,455
KQ2M.....12,918,824
AC1U (N1UR).....11,394,975
K1LZ.....10,307,440
KT5J (K5TR).....9,954,624

Single Op 28 MHz High Power
KZ5MM (W5PR).....354,295
W4DD.....287,375
AA1K.....186,590

Single Op 21 MHz High Power
KU2M.....4,795,371
KR4Z (N4OX).....3,498,312
K2SSS.....2,827,368

Single Op 14 MHz High Power
WIØWA (WØEWD).....2,711,648
KN2M.....1,913,994
KJ4QHL.....1,855,146

Single Op 7 MHz High Power
N9LR.....302,588
W9JOE.....111,699
WZ8P.....98,150

Single Op 3.7 MHz High Power
ND8DX.....898,012
W3BGN.....496,740
K9ZO.....250,772

Single Op 1.8 MHz High Power
N7GP.....7,728

Single Op All Band Low Power
KR5X (K1BX).....2,700,894
WW2R (N2CEI).....2,181,630
KQ1F (K1XM).....1,690,654
N2SQW.....1,498,128
N3AAA.....1,393,536

Single Op 28 MHz Low Power
NA4W (K4WI).....70,775
N3UA.....44,880
N3GB.....40,071

Single Op 21 MHz Low Power
N8II.....665,112
N9TGR.....261,744
N3ZA.....159,828

Single Op 14 MHz Low Power
NG1R (W1QK).....446,490
NY2A.....194,580
W3NO.....104,922

Single Op 7 MHz Low Power
NS3T.....246,456
KO3T.....96,707
AB1J.....17,052

Single Op 3.7 MHz Low Power
K4FTO.....4,361
WZ6ZZ.....3,200

Single Op All Band QRP
K3WW.....616,610
NDØC.....399,832
K2YG.....199,617
W6QU (W8QZA).....156,524
KA8SMA.....107,830

Single Op 28 MHz QRP
NK4O.....3,861

Single Op 21 MHz QRP
KG1E.....56,994

Single Op 14 MHz QRP
W2VRK.....47,064
N4CW.....27,400
N7SVI.....6,600

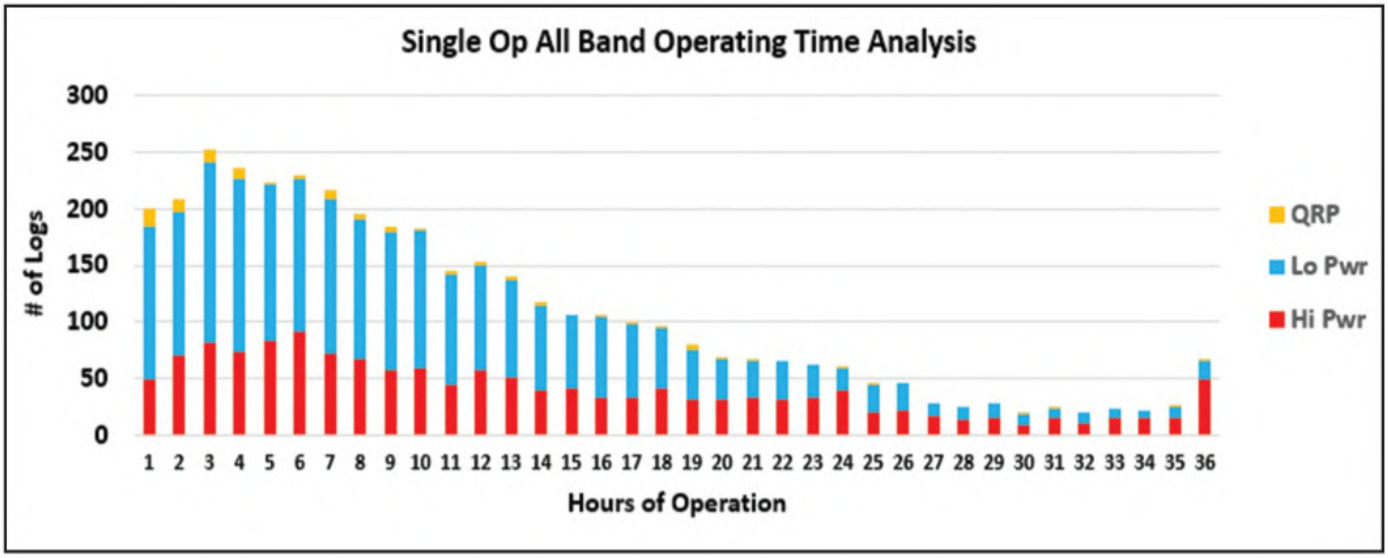


Figure 3. Single-Op All Band operating time histogram

Single Op 7 MHz QRP
NØZIB....2,448

Multi-Single High Power
KU1CW....8,521,194
KA1ZD....5,614,080
NG3R....4,897,896
ND3D....4,345,407
AG3I....3,582,023

Multi-Single Low Power
WA1F....713,592
NJ1F....63,910
KX4AV....37,128
W8AJT....21,854
W7SU....5,490

Multi-Two
ND7K....16,915,608
K9CT....14,385,538
WW2Y....10,763,665
N7DX....8,347,731
WC6H....8,206,957

Multi-Multi
WX3B....20,422,761
NE1C....17,299,692
NR6O....13,314,612
NE3F....3,724,877
K5LRW....45,904

Rookie
High Power
AA3R....1,692,449
W3FR....170,568
KE8SIQ....146,952
N3AML....58,496
KØGYQ....34,545

Rookie
Low Power
KI2D....115,290
N3BAS....112,761
WØADL....82,899
WX7V....78,490
K1MWH....70,858

Classic
High Power
WK5T (N2IC)....6,871,590
WS7X....3,971,880
KD2RD....3,080,528
NJ6G
(N7MH @W6YX)....2,332,998
WU2X (N2QV)....2,058,110

Classic
Low Power
KR5X (K1BX)....2,700,894
N8II....665,112
WA3LXD....495,600
WA5JMZ....451,605
K5FUV....403,048

Tribander / Wires
High Power
WT1A....4,034,277
N3QE....3,171,867
AD5XD....3,132,550
WR2G....3,007,917
K3DNE....2,562,564

Tribander / Wires
Low Power
N2SQW....1,498,128
N3AAA....1,393,536
NGØC....1,154,044
K8ZM....662,634
AA8CA....642,114

Youth
High Power
KC1XX (NN1C)....15,170,455
NTØK (KC1KUG)....6,496,256
W7AOF....13,826
WWØCJ....12,998

Youth
Low Power
KM4SII....1,122,498
W9ADN....68,760
N8AJM....2,992
KO4SGC....1,113

EUROPE

Single Op All Band High Power
CR6K (CT1CJJ)....13,798,050
LZ5R (LZ5DB)....12,730,676
OMØR (OM3GI)....11,958,947
HG3R....11,073,412
IR4M (IK4MGP)....10,922,415

Single Op 28 MHz High Power
IR9W....576,312
E77A....521,612
LZ4TX....387,801

Single Op 21 MHz High Power
TM6M (F4DXW)....7,631,405
DL2ARD....6,732,660
IB9T (IT9BLB)....4,502,181

Single Op 14 MHz High Power
S55OO....5,340,657
S57DX....4,528,907
HA1AH....3,343,506

Single Op 7 MHz High Power
SN3A (SP3GEM)....6,569,632
S51YI....5,134,640
OT2A....3,830,015

Single Op 3.7 MHz High Power
ED5R (EA5Z)....1,770,003
9A8M (9A7DM)....1,639,208
OK8NM (OM6NM)....1,421,280

Single Op 1.8 MHz High Power
S53O....196,238
YL3FT....170,586
S54ZZ....165,808

Single Op All Band Low Power
TM3Z (F4DSK)....3,891,456
LY4L....3,670,144
HGØR (HAØNAR)....2,174,238
PA9M....1,725,456
EE7E....1,645,666

Single Op 28 MHz Low Power
EA2LMI....218,020
EA7CVF....167,160
9A9R....74,304

Single Op 21 MHz Low Power
LZ6V....1,000,252
E73ESP (E77FA)....402,896
SP9XCN....357,599

Single Op 14 MHz Low Power
IF9A (IT9WDC)....1,473,435
YU5M....858,900
OL9R (OK6RA)....801,060

Single Op 7 MHz Low Power
ED7R (EA7GX)....1,633,203
G8X (G4FJK)....1,112,146
SX8V (SV1JG)....581,196

Single Op 3.7 MHz Low Power
OK6T (OK1WCF)....695,409
SN9B (SQ9OB)....497,168
E7AA (E73AA)....298,304

Single Op 1.8 MHz Low Power
OK6Y (OK2PTZ)....119,548
SQ8MFM....69,870
OK2BRQ....14,940

Single Op All Band QRP
LY9A....852,885
LZ1DM....387,247
DK8R (DL8LR)....241,640
IZ4AIF....219,934
SO2U (SP2UUU)....207,473

Single Op 28 MHz QRP
YU7ZZ....13,760
IZ8IEV....8,976
EF7W (EC7KW)....7,038

Single Op 21 MHz QRP
EF3O (EA3O)....193,224
ES2MC....154,100
SP7M....120,344

Single Op 14 MHz QRP
MI1M (MIØLLG)....59,475
HF5WIM....36,792
F1AKK....33,428

Single Op 7 MHz QRP
OE3MDB....48,477
SO55K....45,756
G4Y (M6OXO)....24,120

Single Op 3.7 MHz QRP
LY2OU....17,017

Single Op 1.8 MHz QRP
DL1AOB....10,658
HA1TI....8,127
YO8WW....2,016

Multi-Single High Power
E7DX....22,404,187
9A5Y....17,455,788
SP8R....16,181,287
SJ2W....14,613,312
EC5AN....11,984,022

Multi-Single Low Power
Z32ID....3,315,956
IO3F....2,887,995
ZB2BU....2,190,474
9A1CRT....2,116,296
DM5B....1,797,818

Multi-Two
EI1ØØC....28,841,316
II2S....23,839,776
IR6T....23,041,216
ED1R....21,560,058
HG7T....16,006,000

Multi-Multi
YT5A....30,417,686
LZ9W....28,043,532
OT5A....18,369,735
DP7D....17,895,600
LN8W....12,204,242

Multi-Distributed
IQ4FA....14,669,700
ED4W....3,009,150
IB2C....2,982,150
OO4O....2,753,610
ED2R....1,523,657

Rookie
High Power
IUØOVB....3,288,267
DD5VL....385,170
EF5T (EA5JDN)....216,495
MØNVK....176,847
HA5MIG....171,094

Rookie
Low Power
IU1NKS....713,680
MØKYB....315,543
TK4TH....293,235
SN3J (SP3DAT)....249,050
OH8RX....239,425

Classic
High Power
CR6T (CT1ESV)....9,111,732
ES6RW....5,318,693
EA4KD....3,473,331
OH1F (OH1NOA)....3,441,942
HG1S (HA1DAE)....3,400,544

Classic
Low Power
G9X (M1LCR)....737,380
MØPLX/M (MØPLX/M)....734,855
DL6MRM....657,248
F4FVA....340,000
OM4IK....279,174

Tribander / Wires
High Power
IO6A (IK6QON)....5,014,710
MM9I....3,887,952
EA3CI....3,165,304
IK3UNA....3,040,112
HG1A (HA1ZN)....2,748,955

Tribander / Wires
Low Power
PA9M....1,725,456
EE7E....1,645,666
PC3T....1,597,200
G4PVM....1,054,702
DO4OD....918,048

Youth
High Power
YTØC....4,098,870
LY5AX....1,942,752
SA6NIA....639,004
LY1LB....348,492

Youth
Low Power
9A2ZI....834,815
DJ4MX....160,686
DO2YX....79,868
SY8DQX....31,824
SP3GTP....16,728

	Continent							Average per Entry	
Category	AF	AS	EU	NA	OC	SA	All	Op Time (Hours)	Score Reduction
High Power Overlay Entries									
TB-Wires	4	22	101	82	17	12	238	15	8%
Classic	1	21	60	53	16	11	162	14	9%
Rookie	0	2	13	13	1	0	29	11	10%
Youth	0	1	4	4	0	0	9	22	13%
Low Power Overlay Entries (Includes QRP)									
TB-Wires	2	37	144	103	18	24	328	12	8%
Classic	2	65	205	134	44	27	477	9	12%
Rookie	1	21	95	62	29	12	220	10	14%
Youth	0	14	19	7	6	1	47	8	10%

Figure 4. Single-Op overlay participation summary

shortfall. Verified QSOs from Europe and Asia were down nearly 40% as compared to 2021, while all other continents saw increases. We are all hoping that this tragic situation is resolved as quickly as possible.

Single-Operator Highlights

N6KT returned to the revitalized PJ4K station and added Bonaire to the list of locations from which he has won the world in the Single-Op High Power (SO HP) category, achieving a score of 27.3 million (M) points and a new South American record. Second place went to KP2M operated remotely by NN3W with 20.4M points. The inaugural entry in the SO HP category by NN1C using callsign KC1XX generated the top score USA score of 15.2M points, and perennial contender KQ2M was second in the USA with 12.9M points.

P4ØL (W6LD) was one of several contest expeditioners able to return to a DX location after a two-year COVID-19 induced hiatus. John battled local noise to score 13.7M points and win the Single-Op Low Power (SO LP) category. Thanks to CF2Z (VA2CZ) for activating another rare prefix from Quebec and congratulations on his second place SO LP finish. KR5X (K1BX) returned to WPX SSB for the first time since 2010 and secured the top USA SO LP score at 2.7M points.

LY9A achieved his second consecutive win of the Single-Op QRP category. The QRP bug has bitten K3WW who was second overall and first in the USA.

The SO HP Single-Band categories were dominated by Brazilians as PP4T (PY4BZ), ZX5J (PP5JR), and PX2A (PY2LED) were the 20M, 15M, and 10M winners, respectively. SN3A (SP3GEM) notched a third 40M HP win. First time entrant KP4PUA had the highest 15M LP score.

Figure 2 shows the breakdown of Single-Op power levels by continent as well as all band (AB) vs. single band (SB) log counts. LP was the choice of 60% of the SO entrants. SB entries were

2022 CQWW WPX SSB PLAQUE WINNERS AND DONORS

SINGLE OPERATOR ALL BAND

WORLD - High Power: Tom Georgens, W2SC Plaque. Won by: PJ4K operated by Rich Smith, N6KT
WORLD - Low Power: Caribbean Contesting Consortium Plaque. Won by: P4ØL operated by John Fore, W6LD
WORLD - QRP: Phil Krichbaum, NØKE Plaque. Won by: Gediminas Lucinskas, LY9A

USA - High Power: Alabama Contest Group Plaque. Won by: KC1XX operated by Marty Sullaway, NN1C
USA - Low Power: Terry Zivney, N4TZ Plaque. Won by: KR5X operated by Art Hambleton, K1BX
USA - QRP: Doug Zwiebel, KR2Q Plaque. Won by: Charles D. Fulp Jr., K3WW
USA Zone 3 - High Power: Adrian Ciuperca, KO8SCA Plaque. Won by: KK6P operated by Paul F Merrill, W7IV
USA Zone 3 - Low Power: Buz Reeves, K2GL Memorial by Willamette Valley DX Club Plaque. Won by: NG6O operated by Don Taylor, K6GHA
USA Zone 4 - High Power: Jerry Rosalius, WB9Z and Val Hotzfeld, NV9L Plaque. Won by: KT5J operated by George Fremin III, K5TR
USA Zone 4 - Low Power: Jerry Rosalius, WB9Z and Val Hotzfeld, NV9L Plaque. Won by: M. Charlie Anderson, NGØC
USA Zone 5 - High Power: Charles Wooten, NF4A Plaque. Won by: Robert L Shohet, KQ2M**

EUROPE - High Power: Dave Siddall, K3ZJ Plaque. Won by: CR6K operated by Jose Manuel Farto Lopes, CT1CJJ
EUROPE - Low Power: Richard DiDonna, NN3W Plaque. Won by: TM3Z operated by Dimitri Cosson, F4DSK
EUROPE - QRP: Walter Skudlarek, DJ6QT Memorial by Rhein-Ruhr DX Association Plaque. Won by: Plamen Ivanov, LZ1DM**

AFRICA: Atilano Oms, PY5EG Plaque. Won by: CQ9T operated by Ricardo Martins, CT3KN
ASIA: Chris Terkla, N1XS Memorial by Yankee Clipper Contest Club Plaque. Won by: H25A operated by Andrey Sachkov, LZ2HM
NORTH AMERICA* - High Power: Martin Huml, OL5Y Plaque. Won by: KP2M operated by Richard F DiDonna, NN3W
NORTH AMERICA* - Low Power: Tim Shoppa, N3QE Plaque. Won by: WP3C operated by Yuri Rakushchynets, N2TTA
NORTH AMERICA* - QRP: Phil Krichbaum, NØKE Plaque. Won by: Howard Rosen, VP2V/VA2AE
SOUTH AMERICA: Andrew Faber, AE6Y Plaque. Won by: PJ4R operated by John Bayne, KK9A**
SOUTHERN CONE (CE CX LU) - Low Power: LU Contest Group Plaque. Won by: LS5H operated by Diego Andres Dimunzio, LW5HR
OCEANIA - High Power: Sid Caesar, NH7C Plaque. Won by: WH7T operated by Mark Gerber, WH7W
CANADA - High Power: Saskatchewan Contest Club Plaque. Won by: CJ3A operated by Ron Vander Kraats, VE3AT
CANADA - Low Power: Paul Cassel, VE3SY Memorial by Contest Club Ontario Plaque. Won by: CF2Z operated by Pierre Loranger, VA2CZ
JAPAN: Hamad Alnusif, 9K2HN Plaque. Won by: Masa Okano, JH4UYB
ASEAN (3W 9M 9V DU HS V85 XU XW XZ YB) - High Power: Agus Wibisono, YB2TX Plaque. Won by: E2A operated by Champ C. Muangamphun, E21EIC
INDONESIA - Any Single-Operator: Anda Yudas, YB6HAI Plaque. Won by: Santosa Sunny Ruslie, YBØAGW

SINGLE OPERATOR, SINGLE BAND

WORLD - 28 MHz: Mamuka Kordzakhia, 4L2M Plaque. Won by: PX2A operated by Fernando Cordoba, PY2LED
WORLD - 21 MHz: Stuart Santelmann, KC1F Memorial by W3UA/RA3AA Plaque. Won by: ZX5J operated by Sergio Almeida, PP5JR
WORLD - 14 MHz: Lynn Schriner, W5FO Memorial by N5RZ Plaque. Won by: PP4T operated by Fernando Laguardia, PY4BZ
WORLD - 7 MHz: Vince Weal, K4JC Plaque. Won by: SN3A operated by Jerzy Smoczyk, SP3GEM
USA - 28 MHz: Maurice Schietecatte, N4LZ Plaque. Won by: KZ5MM operated by Chuck Dietz, W5PR
USA - 21 MHz: Maurice Schietecatte, N4LZ Plaque. Won by: Peter Bizlewicz, KU2M
USA - 14 MHz: Charles Wooten, NF4A Plaque. Won by: WIØWA operated by Mike Kelly, WØEWD
USA - 7 MHz: Yankee Clipper Contest Club Plaque. Won by: Miroslav Kisacanin, N9LR
USA - 3.5 MHz: Bernie Welch, W8IMZ Memorial by W3ASW Plaque. Won by: Karl Brandt, ND8DX

favored by participants from South America and Oceania, while AB entries were strongly preferred in North America and Europe.

A study of *Figure 3*, showing operating times by power levels for the SO AB categories, reveals that about 60% of the operators exited after 12 hours and 90% by 24 hours. This profile is nearly identical to that seen in 2021. There were 66 AB entrants who lasted the full 36 hours along with eight SB entrants.

Figure 5. Noteworthy accomplishments by Youth overlay operators

Youngest Op to Achieve:	Call	Age
>10 Hours of Op Time	BG8INK	8
>100 QSOs	PU5JDA	12
>100,000 Points	VE3OMV	12
>1 Meg Points	NT0K (KC1KUG)	16
>10 Meg Points	KC1XX (NN1C)	20
Perfect log (294 QSOs)	DJ4MX	19

Contests within the Contest – Overlays

The Single Operator Tribander – Wires (TB-Wires) overlay is intended to allow participants using a triband antenna and single-element antennas for 160 / 80 / 40 meters to compete on a near-level playing field. This overlay was the most popular among SO HP participants and had the smallest average score reduction of any data set analyzed as shown in *Figure 4*. There was a razor thin difference between winner CQ9T (CT3KN) and runner-up ZW2N (PY2MNL) in the TB-Wires HP overlay; their scores differed by only 0.04%. WT1A put in his longest ever WPX SSB effort to win the HP TB-Wire overlay in the USA, followed by N3QE who had won the previous three years. ED8W (EA1BP) and N2SQW were the World and USA LP TB-Wire overlay winners, respectively.

The Classic Overlay is for Single-Ops using one radio, without QSO finding assistance, and their score is based on the first 24 hours of their on-times. This was the LP overlay of choice. PJ4R (KK9A) secured his second consecutive Classic overlay win, on his birthday, by edging out CR6T (CT1ESV). WK5T (N2IC) returned to CQWW WPX SSB for the first time in 11 years and delivered the #1 Classic overlay score in the USA. Similarly, KR5X (K1BX) was back after 12 years and was the LP Classic overlay world champion; PY2NY was second.

The Rookie overlay is intended to attract new contesters licensed under three years. The top scorers using the Rookie overlay were both in their second year of eligibility. IUØOVB doubled his 2021 score for a win in 2022. Second place overall and first place in the USA went to AA3R. The winner of the LP Rookie overlay was VA3IDD who also set a new Canadian record.

Applause goes out to the Youth On the Air (YOTA) leadership for their rec-

EUROPE - 28 MHz: Chuck Dietz, W5PR Plaque. Won by: G. Tommaso, IR9W
EUROPE - 14 MHz: SJ2W Contest Team Plaque. Won by: Goran Andric, S55OO
EUROPE - 3.5 MHz: Ranko Boca, 4O3A Plaque. Won by: 9A8M operated by Igor Ovcin, 9A7DM**

OVERLAY CATEGORIES

WORLD - Tribander/Single-Element: Nate Moreschi, N4YDU Plaque. Won by: CQ9T operated by Ricardo Martins, CT3KN
USA - Tribander/Single-Element: Tom Francis, W1TEF Memorial by Swamp Fox Contest Group Plaque. Won by: Timothy Bubier, WT1A
USA - Tribander/Single-Element Low Power: Alex M Jozsa, KG1E Plaque. Won by: Ken Goetz, N2SQW
EUROPE - Tribander/Single-Element: Angel Turpin, EA5Z Plaque. Won by: IO6A operated by Francesco Giancola, IK6QON
WORLD - Rookie: Val Edwards, W8KIC Memorial by K3LR Plaque. Won by: Roberto Ursino, IUØOVB
USA - Rookie: Bud Trench, AA3B Plaque. Won by: Fred Tollin, AA3R
EUROPE - Rookie: GØCKV, OH1VR, OH2BH, OH2KI Plaque. Won by: Renato Baiunco, IU1NKS**
EUROPE - Youth: GØCKV, OH1VR, OH2BH, OH2KI Plaque. Won by: Janko Mihailovic, YTØC
WORLD - Youth: Ukrainian Contest Club Plaque. Won by: KC1XX operated by Marty Sullaway, NN1C

MULTI-OPERATOR, SINGLE-TRANSMITTER

WORLD: Latvian Contest Club Plaque. Won by: V47T operated by K3NM, K5ZD, N2NT
WORLD - Low Power: Mike Goode, N9NS Memorial by Hoosier DX and Contest Club Plaque. Won by: HK3RD operated by HK3JJB, HK3PMC, HK3EA, HK3TU, HK3LCU
USA: Steve Bolia, N8BJQ Plaque. Won by: KU1CW operated by K2PO, KU1CW
USA - Low Power: Matt Tatro, NM1C Plaque. Won by: WA1F operated by WA1F, WA1S
EUROPE: Tonno Vahk, ES5TV Plaque. Won by: E7DX operated by E7ØT, E74A, E76C, E77DX, E77EA
NORTH AMERICA*: Jerry Rosalius, WB9Z and Val Hotzfeld, NV9L Plaque. Won by: TO3Z operated by FG/F6HMQ, FG/F6GWV**
ASEAN (3W 9M 9V DU HS V85 XU XW XZ YB): Champ C. Muangamphun E21EIC Plaque. Won by: 7D1C operated by 9A3JH, YBØAR, YDØRGI, YB1EME, YB1FAV, YB1IUQ, YB1NWP, YC1FCC, YD1DSV, YD1EBP, YD1EBQ, YD1IUZ, YD1JSX, YD1KDA, YD1NKL, YE1AA, YF1AJW

MULTI-OPERATOR, TWO-TRANSMITTER

WORLD: Ken Adams, K5KA Memorial Plaque. Won by: EI1ØØC operated by EI3JE, EI3JZ, EI3KD, EI4BZ, EI4HQ, EI5GSB, EI5LA, EI6LA, EI7IG, EI8IR, ON4EI
USA: Florida Contest Group Plaque. Won by: ND7K operated by N6WIN, N6MJ, KL9A, W9KKN, W4IX, K7ZO @N6WIN
EUROPE: Rich Strand, KL7RA Memorial Plaque. Won by: II2S operated by IZ2FOS, IK2QEI, IZ2KXC, IK2TDM, IU2IBU, IK2SGC, IK2UJS, IZ2DLV, IZ1ZHG**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Sid Caesar, NH7C Plaque. Won by: D4Z operated by G4BVY, G4CLA, GD4XUM, IK2NCJ, IZ4DPV, SQ9D
USA: Dale Hoppe, K6UA Memorial Plaque. Won by: WX3B operated by WX3B, WR3R, WA3AER, N3FZ, W3IDT, NH7C, N8IVN, NY3A, KC3EMA, AK3Z

MULTI-OPERATOR, DISTRIBUTED

WORLD: Atilano Oms, PY5EG Plaque. Won by: IQ4FA operated by IU4AZC, IK3AES, IU4FBU, IK4LZH, IU4ICT, IZ4ORO, IZ4COW, IZ4AKO, IZ4VUS, IU4NIZ, IU4NDY, IZ4UEZ

CONTEST EXPEDITION

WORLD - Contest Expedition: Gail M. Sheehan, K2RED Plaque. Won by: PJ4T operated by WØCG, K4UEE, K4WK, W4ATL, W5MJ, N7VWH, KG5U, W5GAI, WX4W, W5XU**

** Applies only to North American stations outside the USA and Canada*
***Denotes awarded to runner-up in category*

The GTØSP Multi-Single High Power operating team at the Scarlett Point Tower on the Isle of Man.

PV2K (PY2KNK) finished third overall in Brazil in the Single-Op High Power category.

Devanir, PY2SGL, operated 31 hours and finished fourth from Brazil in the Single Op, All Band, Low Power category.

CE1RT finished second in Chile using the 15-meter band in the Single-Op Low Power category.

DV1IIW Multi-Single Low Power station layout, piloted by DV1IIW, 4G1LD, 4G1LDE, DV1VTZ, and DV1TCP to third place in Oceania.

Sebastian, CE4JW, is a proud member of Radio Club Eternautas, operating outdoors!

Oscar, EA7CVF finished second in Europe in the 10-meter Low Power category.

Category	Continent							Average per Entry	
	AF	AS	EU	NA	OC	SA	All	Op Time (Hours)	Score Reduction
Multi Single HP	1	8	55	27	6	10	107	30	11%
Multi Single LP	0	12	38	6	9	6	71	20	14%
Multi Two	1	7	14	20	3	0	45	33	11%
Multi Multi	1	3	13	6	2	4	29	31	10%
Multi Distributed	1	3	9	1	0	2	16	29	13%

Figure 6. Multi-Op participation summary

ommendation to add the Youth Overlay to WPX. This overlay attracted 56 entries, ranging in age from 8 to 25. In addition to achieving the top SO HP score in the USA, contest prodigy NN1C - using the call KC1XX - dominated the Youth overlay. KC1KUG borrowed callsign NTØK and K1RX's station to place second overall. Two entries in the Youth Overlay were QRV for 36 hours — LY5AX and KC1XX (NN1C). Additional noteworthy accomplishments by Youth overlay operators are celebrated in *Figure 5*.

Multi-Operator Masters

St. Kitts had been absent from WPX since 2003, but that all changed this year thanks to K3NM, N2NT, and K5ZD. Their V47T efforts resulted in the top Multi-Single HP score of 24.8M and a new North American record. FY5KE was second, and KU1CW was the winner in the USA. The top score in the Multi-Single LP category belongs to HK3RD.

EI1ØØC, commemorating the 100th anniversary of the Irish Free State Constitution Act of 1922, was the top gun in the Multi-Two transmitter class. The crew at ND7K secured their second consecutive victory in the USA at the N6WIN superstation.

D4Z dominated the Multi-Multi category with a score of over 75M points. Second place went to PJ2T at 32M points, achieved by a new crew of operators with widely varying levels of contesting experience. The USA winner and runner up both returned to Multi-Multi operations after a hiatus of several years — WX3B at 20.4M and NE1C at 17.3M.

The 12-member team at IQ4FA leveraged the Multi-Distributed category to win the world, moving up from third in 2021. The members of the PR1T team characterized their effort as small setup among friends that had fun on their way to second place.

Figure 6 shows the breakdown of Multi-Op participation by continent. Half of all Multi-Op stations were from Europe.

No Reduction		>1000 QSOs		
Call	QSOs	Call	QSOs	Reduction
F4FTA	397	PA9M	1,088	1.7%
W6QU	315	HB9DQL	1,065	1.7%
DJ4MX	294	PX2V (PY2KJ)	2,262	1.9%
LY3CY	260	V55Y (V51WH)	1,638	1.9%
AE5LQ	224	IK3UNA	1,671	2.1%
DL8UV	224	AL2F	1,464	2.3%
IU2JWF	214	KE2D	1,188	2.3%
G4G (G4FZN)	201	TM3Z (F4DSK)	1,759	2.5%
W3AVP	200	WB2ZAB	1,400	2.5%
AC9BJ	186	KR5X (K1BX)	1,575	2.6%

Figure 7. Single-op exemplary accuracy achievements

High Power		Low Power		QRP	
Call	Rate	Call	Rate	Call	Rate
KP2M (NN3W)	288	P40L	209	JT1BV	106
PJ4K (N6KT)	283	WP4SD	184	HZ1LG	94
WP2Z (K9VV)	264	HI8RD	169	DV9IGT	79
KT5J (K5TR)	264	VE4VT	161	K3WW	77
TI7W (N3KS)	263	8P1W	155	EA2AFV	76

Figure 8. Single-Op peak 60-minute rates

Pushing the Performance Envelope

Accuracy is a competitive discriminator that can determine the final rankings. *Figure 7* recognizes exemplary accuracy performances. The left two columns provide the Top 10 participants sorted by total QSOs that had ZERO point reductions after log checking. The right three columns show the Top 10 lowest score reductions achieved by ops working a minimum of 1,000 contacts.

One of the greatest thrills in radiosport is a sustained high-rate run. A review of *Figure 8* suggests that CQ Zones 7, 8, and 9 are the places to be if you want to peg the rate meter. Further, a special shout out to the amazing SSB QRP operators who achieved sustained high rates despite the crowded bands.

There were no new world records set in 2022; however 10 new regional

PJ4K (N6KT) on his way to a Single-Op High Power win and new South American record.

records were achieved as shown in *Figure 9*. Note that several of these records stood for more than 20 years. Please go to <www.cqwpx.com/records.htm> to see all record scores by category in each DXCC entity as well as call districts in the USA, Japan, Russia, and Canada.

CQWW WPX SSB 2022 Reflections

The CQWW WPX Committee continues to benefit from synergies with other CQ sponsored contests, particularly CQWW DX and CQWW WPX RTTY, as well as the infrastructure provided by World Wide Radio Operators Foundation. It is apparent that these synergies and shared infrastructure have been widely leveraged by CQ WPX participants, as the quality of logs and the timeliness of their submittal continues to improve.

The major hurdles that were experienced during the log checking process were twofold. The first area was regarding the Classic Overlay. The use of QSO alerting systems (Assistance) is prohibited for the Classic Overlay; 95 logs were determined to be ineligible for the Classic Overlay because of this concern. The second challenge was out of

		New Record		Previous Record		
Category	Region	Call	Score	Call	Score	Year
Single Op High Power	South America	PJ4K (N6KT)	27,353,511	HC8A (N6KT)	25,180,199	2001
Multi-Single High Power	North America	V47T	24,741,080	VP2EC	24,409,580	1992
Multi-Distributed	Europe	IQ4FA	14,669,700	IQ4FA	12,589,255	2021
40M Low Power	Africa	EA8CZK	357,298	CT3HY	224,961	2018
40M QRP	Asia	JA6GCE	108,251	JA6UBK	99,160	1995
Classic High Power	South America	PJ4R (KK9A)	9,967,888	LU5FC	5,387,382	2021
Classic High Power	Oceania	WH7T (WH7W)	6,837,244	WH7T	2,224,285	2021
Classic Low Power	USA	KR5X (K1BX)	2,700,894	KU1CW	2,116,828	2020
Classic Low Power	Africa	CT3IQ	514,080	EE8K (EA8AV)	422,988	2020
Classic Low Power	Oceania	YC5AKH	383,019	YB8RW	274,200	2021

Figure 9. New regional records

band operation which spawned multiple committee actions including revised logs, warnings, and disqualification.

Finally, stations competing for World, Continent, and USA awards are reminded that they must provide accurate frequencies for all contacts in their logs.

Looking Forward to 2023

This was the third consecutive year in which external events heavily influenced CQWW WPX SSB. COVID-19 stimulated activity in 2020 and 2021 as social distancing and travel restrictions meant that there was not much else to do other than getting on for the contest from home. The response to the Russian invasion of Ukraine by several contest sponsors, including CQ, was unprecedented; this coupled with the situation in Ukraine suppressed 2022 CQWW WPX SSB participation. It is my sincerest wish that the tragedy in Europe is resolved as soon as possible and that the only external influence that will need to be addressed in 2023 is the progress of Cycle 25.

It is with the deepest appreciation that I would like to acknowledge all those who contributed to the 2022 CQWW WPX SSB contest, including 3V8SS, CT1BOH, DL6RAI, EA4KD, ES5TV, F6BEE, I2WIJ, IK2QEI, JK3GAD, K1AR, K1DG, K1EA, K5TM, K5ZD, KM3T, KR2Q, LA6VQ, N8BJQ, OH6LI, OK2FD, PA3AAV, PY2WS, S5ØA, S5ØXX, SV1DPI, VE3TM, WØYK, WA7BNM, and YO3JR. It was an honor to work with such an esteemed group of volunteers who are unrelenting in their efforts to serve the radiosport community.

Thanks to all who participated this year, and I look forward to the next running of CQ WPX SSB on March 25th and 26th, 2023.

(Scores on page 96)

Ham radio's big umbrella covers a wide variety of specialties and sub-hobbies. Contesting is one of the more popular of these, and radioteletype (RTTY) contesting is a specialty area within a specialty area. In this interview with South American RTTY contester Julio Tarraço, PY2XV, Contributing Editor-at-Large PT2ZDX/LU9EFO explores not only Julio's dedication to the sport but a brief history of RTTY and tips on successful RTTY contesting.

CQ Interviews:
RTTY Contester Julio Tarraço, PY2XV

BY MARTIN BUTERA,* PT2ZDX/LU9EFO

RTTY is the transmission, via radio, of TTY, or teletype. This mode of transmission can be considered as one of the oldest applications of binary technology in telecommunications, right after Morse Code. It was invented in the 19th century, and was first used in radio by the U.S. Army in the 1920s, and commercially starting in 1932.

It consisted of printing machines that output audio signals, consisting of 5 bits of information that were transmitted by radio to other machines, which printed the received text. These signals allow text to be transmitted much faster than through Morse code, and were therefore preferred when large amounts of information needed to be sent in a short time.

Within amateur radio, the use of RTTY began shortly after the end of World War II, on VHF. In 1946, the first amateur radio RTTY contact took place on the 2-meter band. Throughout the history of our hobby, many other digital modes have been created, such as: FT4, FT8, PSK-31, JT65, Packet, APRS, SSTV, etc. The popularity of these modes has its highs and lows, but traditional RTTY has established itself as the preferred and most respected digital mode to operate contests around the world.

Today I interview Julio Tarraço, PY2XV (*Photo A*), a Brazilian radio amateur from the state of São Paulo, an authority on RTTY issues at a national and global level, recognized for always being in the top positions worldwide in contests.

His most recent achievement was the first place in the world in this year's CQ WPX RTTY Contest, in the Single Operator High Power 28 MHz category, where he accumulated 1,722,595 points, operating from the Alto da Serra DX & Contest Station PX2A in São Paulo *(Photo B)*. Let 's start!

CQ: How did you get started in the world of RTTY?

Julio Tarraço, PY2XV: I got started with RTTY in the most obvious way, like any curious radio amateur. Between mistakes and successes, understanding through software and hardware were essential.

In competitions, I really started after having attended a conference at LABRE-SP (Liga de Amadores Brasileiros de Radio Emissão — São Paulo), which was led by my colleague Cesar, PY2YP, who explained in a very technical way the concepts of one of the leading software products, MMTTY. After this understanding, other important factors made the difference. Other colleagues who are great at RTTY, Luciano, PY2SHF, and Carlos, PY2VM, helped me a lot to understand the tricks of the mode and I improved the techniques little by little in the contests.

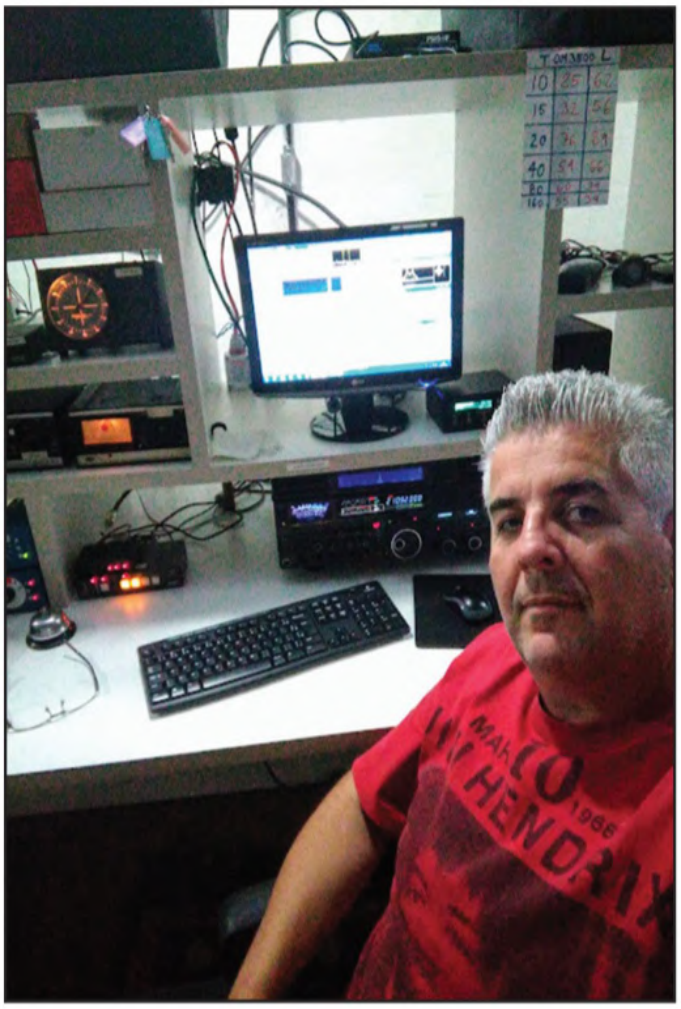


Photo A. Julio Tarraço, PY2XV, at the PX2A contest station. (PT2ZDX/LU9EFO photo)

* *Contributing Editor-at-Large*
Email: <martin_butera@yahoo.com.ar>

Photo B. Julio took the #1/World prize in the 10-meter single-operator high-power category in the 2022 CQ World Wide RTTY WPX Contest, operating from club station PX2A.

Photo C. MicroHam MKIII RTTY interface, in FSK mode. (PY2XV photo)

CQ: What interface or controller do you work with in RTTY?

PY2XV: I currently work with a microKEYER III from microHAM (*Photo C*), which in addition to RTTY provides the use of several other functions in the SSB and CW suite.

CQ: What RTTY software do you use for contests?

PY2XV: I use a set of software that is used to decode the signals, with N1MM being the main one, but also using MMTTY as the first decoder, 2Tone as the second decoder and Gritty as the third decoder.

CQ: Why do you use so many programs at the same time?

PY2XV: Sometimes the signals arrive in different ways through the decoders and the three options can help a lot in the exact decoding of a doubtful signal. These techniques are very well explained on a dedicated RTTY contest website <www.rttycontesting.com>.

CQ: One of the most typical debates in RTTY is to choose between signal formation by audio displacement or signal formation by frequency displacement, that is, AFSK vs. FSK. Which do you prefer to use?

PY2XV: Before having a dedicated interface, I used AFSK, but after buying the MKIII, I always use FSK. The difference is marked in the operation and the features that can be used directly from the radio.

CQ: What is it like to be part of the digital modes team at the Alto da Serra DX & Contest Station, PX2A?

PY2XV: A great joy. Since the first time I was invited to enter a contest at PX2A, I learned many things that I never dreamed existed in the field of ham radio competition. It is very different from the conditions we have in our urban stations in terms of QRM/QRN, equipment, resources, and strategies. Everything is very well designed by the PX2A team and most importantly, learning is constant.

Total concentration on signals and keyboard shortcuts to maximize the exchange of QSOs per minute.

CQ: I can imagine that when you work from PX2A, you must generate interesting pileups. What technique do you use to work those pileups?

PY2XV: Total concentration on signals and keyboard shortcuts to maximize the exchange of QSOs per minute. Sometimes you can do six to seven QSOs per minute; it's crazy.

CQ: In addition to the RTTY contests sponsored by CQ magazine, do you participate in others, and if so, what are they?

PY2XV: Yes, ARRL Roundup, CVA DX, WPX SSB, but what I like the most is WAE RTTY and SSB. WAE (*Photo D*) is a very technical competition that will kill anyone, QTC traffic really separates the men from the boys (laughs) ...

CQ: According to calculations and surveys at the end of each global RTTY contest, 10% of new licenses are found. Why do you think that RTTY is still growing and maintaining itself, unlike other digital modes that are disappearing?

PY2XV: Despite being a digital mode that is not practiced on a daily basis, it arouses the curiosity of newer colleagues. It is a mode that can be worked with a lower degree of difficulty than SSB, for example. Another point is that there are many operators who do not like to do SSB and CW and prefer the more focused modalities to use a PC and software to make a QSO or participate in a contest.

CQ: However, this growth is not reflected in new operators at the national level. What do you think is missing for the increase of RTTY operators in Brazil?

PY2XV: I think three main things are missing, which are dissemination, motivation, and action. What I have seen in some situations is that the ham doing FT8 thinks that RTTY is the same thing simply because it is a "digital mode." RTTY is technically and operationally different from other digital modes. When some colleagues realize that it

Photo D. PY2XV participating in the 2017 WAE RTTY Contest from PX2A along with Luciano Berloffa, PY2SHF, and Ricardo Lucin, PY2EL. They finished as bi-continental champions. (PY2XV photo)

requires a lot more attention, they get discouraged and don't continue.

CQ: For those who haven't started yet, what do you think is necessary to get started in RTTY contests?

PY2XV: Like everything in life, a goal. If you want to learn, look for information, be curious, don't be afraid or ashamed to ask. But don't wait until the start of the contest to ask me questions and call me so I can help you set up the software (laughs) ...

CQ: There's one thing I can't help but ask you: What do you think of other digital modes? But let me ask you this way first. We know that the advancement of technology cannot be stopped, everything is a matter of perception and of course, automation began with RTTY, I can imagine that it was surely very criticized at the time. That's why I want to ask you what you think about why RTTY enjoys so much prestige and more current digital modes like FT8 are so criticized?

PY2XV: Everything new is scary. In the old days, RTTY was done by big noisy machines, today a simple notebook (computer) does the job. It is simply "evolution and innovation." FT8 is great for those who are limited in power and space for antennas. I sometimes do FT8, but I don't like it so much because of the automation and robots that do the work of the human being. But we must put prejudices aside, so let's have fun and occupy the bands. Take advantage to understand the propagation behavior, get to know the bands better to understand your best time to catch a new DX country, and always improve your operating technique.

CQ: What do you think it takes to get started in RTTY contests and not fail and end up quitting?

PY2XV: Find a good guru (laughs) ... A person who motivates you to make this a sport, a person who inspires you, teaches you to be the best of this. A teacher looks for the best diploma in his class (laughs) ...

CQ: Lastly, if you can tell us, what is your preparation for a contest on RTTY? And what strategies or tips can you give us to improve our positions in a global contest?

PY2XV: Unfortunately, I am a daytime operator. I am not one to be up at dawn, spending 36 or 48 hours on the air, never. Maybe that hinders me a bit in contests. I recommend not working on all bands. Of the times I tried to do Single Operator ALL Band, I messed up and the result was not positive. Once I heard a renowned Brazilian colleague, Sergio, PP5JR, who has an important contest station located in the south of Brazil, in a small city called Rancho Queimado, say a phrase that was fundamental to its success: "Use the best you have and you will surely make a difference."

Find a good guru (laughs) ... A person who motivates you to make this a sport, a person who inspires you, teaches you to be the best of this

This made me think about choosing better working conditions given my limitations and I achieved it in 2018. I finished second worldwide from my QTH in the CQ WPX RTTY 2018 – SO LP 21 MHz, that means we can also compete from home and you can be in the top positions with colleagues who are operating in better conditions, such as in a contest station for example.

CQ: Congratulations again on your world title in the CQ WPX RTTY 2022 – SO HP 28 MHz, not only for winning, but also for sharing your knowledge and being a great reference and motivator for RTTY within Brazil and around the world.

PY2XV: Thanks to you. It was a great honor for me to have participated in this interview, I hope it motivates more radio amateurs to approach RTTY.

Julio ended the interview by recommending an old article, written almost 20 years ago by another great RTTY enthusiast, Don Hill, AA5AU. For all those who want to get started in this digital mode, you can find it at the following link: <https://tinyurl.com/5358m4yr>.

When I checked and read Don's article titled "Getting Started on RTTY," I came across a fascinating short story. Don recounts that the deceased, N5JR (this call has since been reassigned to Joel Rubenstein, who is an active RTTY operator as well), was a paraplegic and obtained RTTY DXCC before he died. He operated RTTY with a rod in his mouth. This should be an inspiration to all of us and shows that even those with disabilities can enjoy this very fun and exciting operating mode.

In my view, there really is no justification for not trying to experiment with RTTY. Whether you want to operate RTTY for DX, contests, or just for fun, you have to start somewhere. After reading this article, I knew why Julio was recommending it to all of us. There really are no excuses not to give RTTY a chance.

CQ CLASSIC:
The Ham Spirit in Action

We recently received an email from the son of this article's author, asking about getting a copy of it. When we found and read the article, we realized that — even though it was short — it so embodied the ham spirit that it would make a great CQ Classic. So, without further ado, from the February 1984 issue of *CQ*, here is "A DXpedition to Juan Fernandez Island" by Joseph Pena, WB6WOD … about so much more than a DXpedition. – *W2VU*

It's a lot of fun to finally meet a DX buddy after a few years of regular skeds. It's even more fun If you can tie in a DXpedition with the visit WB6W0D accomplished both.

A DXpedition to Juan Fernandez Island

(Robinson Crusoe's Island)

BY JOSEPH E. PENA, WB6WOD

As a low-profile amateur who is mostly involved in rag chewing with minimal DXing, I never imagined I would ever be involved in a DXpedition to an exotic island. One QSO on an evening in April 1982 changed all of that.

It started when CEØZAD broke into my QSO with a South American station. The operator, Juan Carlos, and I have had many QSO's since that night, and I became his friend and QSL Manager. Eventually he invited me to visit him and his family on Juan Fernandez Island, the island on which Robinson Crusoe was marooned.

The invitation was tempting, but I kept thinking of the many obstacles: XYL, family, my lack of experience in handling pileups, getting a CEØZ license. I was encouraged by many of my friends, such as Bob, WB6QPG, who also became a good friend of Juan Carlos, and Frank, KC2DI, of the "Family Hour" net, who promised to help from stateside. I started to gain confidence, and soon my XYL gave her approval (in exchange for my being an exemplary husband and father the rest of my life!).

Obtaining the CE0Z license was facilitated with the help of Edwardo, CE3BOC, and Patricio, CE3GN. Their efforts enabled me to get the license within three weeks. The license fee in CE land is $30.

Travel arangements were made. I would leave San Francisco on October 21, 1982, arrive in Santiago, Chile, the next day, and onto Juan Fernandez Island on October 23rd.

Two days prior to my departure, I answered an emergency medical call. A station in Chile was calling for assistance. A seven-year-old girl suffering from a brain tumor needed a special medicine not yet available in Chile. My plans for the DXpedition lost their importance at that moment. My only concern was to try to locate the medicine needed by that little girl. After several phone calls, the medication was located and arrangements were made for me to carry it down to Santiago. (This was really what amateur radio is all about!)

Joe, WB6W0D, at the microphone and Juan Carlos, CEØZAD, checking the log.

My carry-on luggage consisted of my rig, power supply, v.f.o., and keyer. Coax, wires, antenna tuner, etc., were packed in a box and put in the freight compartment. The medication for the little girl was packed in a plastic bag.

Twenty-eight hours after leaving home, I landed at Santiago airport. I was greeted by an immigration official and the little girl's father, who was waiting for the medicine. (I'm sure that's one guy who will never complain about TVI.) Also there to greet me was Carlos, CE3DNP, who took me to the headquarters of the Radio Club de Chile.

My visit with the members of the club was a memorable one for me. Even though I was a stranger, I felt the camaraderie and comfortable feeling of belonging to the same fraternity—amateur radio. In addition, I was elated when the members presented me with a banner and their club pin.

WB6WOD/CEØZ seems to be checking out dinner.

Early the next morning, after much anxiety, my big day had come. While waiting at the airport for the plane to Juan Fernandez, I met Rudy, CEØEVG/ØZ, who was headed back to the island. He is a coworker of Juan Carlos who operates the government weather station.

The plane was a ten-passenger Cessna. Since the main activity on Juan Fernandez is lobster fishing, the plane had no seats, as it was used to carry lobsters. Thanks to Rudy, I got to ride in the copilot's seat while he sat on a crate. The flight to the island took 2 hours and 15 minutes. However, for the last hour of the flight I was able to speak to CEØZAD over the plane's radio.

Due to low-hanging clouds we could not see the island until we descended in preparation for landing. Once below the clouds, I saw the rugged beauty of the island with its steep mountains and beaches. It was breathtaking.

The pilot gave me an aerial tour of the island while Rudy pointed out items of interest. When he indicated Juan Carlos's house, I saw him standing at his entrance waving up at me with a white sheet. He was ensuring that we wouldn't miss him.

Because of the mountainous terrain, the dirt landing strip is on the opposite side of the Island from the village. The landing was smooth. But it was not the end of my trip.

Because of the terrain there are no roads to the village, and we had to board a small boat to reach the village from the sea. However, the boat could only be reached by a five hour hike from the airstrip! Five hours of walking over very difficult terrain! I soon discovered that my physical endurance left a lot to be desired. But with the help of Rudy and Ernesto, the pilot, I made it to the boat.

The 2-hour boat trip in the 12-foot outboard to the other end of the island gave me a breather. I also got to see the caves where Alexander Silkirk, on whom the story of Robinson Crusoe was based, supposedly lived. It mattered not if the story was real or otherwise; it was exciting. Seeing the abundance of wild goats on the verdant mountainsides, the steep mountains plunging into the sea, the playful seals surrounding our boat made me wish that my little son Pepe were with me. How he would have loved the adventure.

There were people awaiting our arrival at the dock. Rudy pointed out Juan Carlos, who was in the crowd. We waved to each other, and on landing embraced like long-lost relatives. I'm sure Juan Carlos was as excited as I was as he introduced me to his family and friends.

We walked to Juan Carlos's house, where his lovely wife Margaritta and their two children who called me "Tio Jose," made me feel at home. She was very understanding when after brief formalities we had to curtail our pleasant chat so as to set up my equipment. We had set a schedule with Frank, KC2DI, on the Family Hour net for 2330Z.

Once the antenna was inspected, the elements readjusted, and the radio tuned up, we spun up and down the 15 meter band. Stateside was coming in 59, but the butterflies in my stomach were acting up. I tuned up to 21.345, and there I heard Frank chatting with Irv, W6OMR, and alerting the net that I was expected any moment.

At 2330Z came "Willie Baker 6 Willie Oscar Delta, this is KC2DI. Are you there, Joe?" I'm sure we all remember the emotions of our first contact or our first DX contact. Well, I had that feeling again. The moment of truth had arrived. I wondered what kind of signal I would have. I knew many stations were waiting for me, and I didn't want to disappoint their hopes for a contact with a new country. I gave KC2DI a comeback, and when he gave me a "Beautiful Joe, 5 and 5," Juan Carlos and I were greatly relieved.

I had planned my first contact with Frank, and now I would QSY off frequency so that my friend Bob, WB6QPG, could patch me into my family while KC2DI took a list on the net.

That night I worked 100 stations on the Family Hour net from 0000Z to 0145Z. At 0200Z I had a schedule with Al, KE6JU, on the IDX net on 20 meters. Propagation was great; I made about 175 contacts.

Once I had kept my schedules with the nets I decided it was time to find out how the rest of the world was coming into Juan Fernandez Island. I felt like a little boy in a toy store. Almost every time I called CQ I had someone coming back to me. My first big pile-up was with JA stations. They are such courteous and patient operators that I had little difficulty with their pile-ups. During the first 4 days, I worked an average of 16 hours a day and made over 2,000 contacts with 110 countries.

Besides the FHO and IDX nets I tried to drop in as many nets as possible, and all of them seemed happy to have me. The African Safari net was one of my favorites. When the net was on, propagation was great into the States and Europe, so I was able to work the eastern and western hemispheres at the same time.

Often after working a pile-up on s.s.b. I would go on c.w. to give my throat a rest. Unfortunately, I am not the best at c.w., but it was fun. Remembering my Novice days, I did go on the Novice portions several times, and believe it or not, I never made a contact on those parts of the bands!

I had planned to stay on the island 14 days, but I had to lop off 3 days in order to make plane connections. Leaving all my new friends was the only sad part of my DXpedition, and I wished I could have stayed longer. However, it was not goodbye, but "hasta la vista" with a hope to return soon. I scheduled my return trip through Argentina and was hosted by LU2MAI and LU2MEF. They made my short stay a pleasant one.

While on Juan Fernandez I met the only doctor who tends the needs of the 50 inhabitants. He informed me of the great need for a dentist. Once home, I informed my good friend and neighbor, Joe Zamboni, D.D.S., of their situation. He immediately volunteered to help. He is planning to go there for a month's stay with his family this year and give the inhabitants free dental care.

To all who have helped me with this endeavor I wish to say "many thanks" with special acknowledgement to my XYL; my daughter Carla; WB6QPG who helped send out QSL's; KC2DI, KB2HK, and W6OMR of the Family Hour net; KE6UJ and KA3DSA of the IDX net; and Juan Carlos, CEØZAD, and all the people on Juan Fernandez Island

Are you familiar with the Wouff Hong? Do you know a fellow ham who has been subjected to its fearsome punishment? One who should be? AC7ZL applies 21st-century computer technology to try to pinpoint the true source of this ham radio legend.

In Search of the Real Wouff Hong

BY H.P. FRIEDRICHS,* AC7ZL

Among the fibers from which the fabric of any culture is woven are the legends surrounding its cultural icons. Stories about them serve to remind a community of its identity and help to propagate its ideals and values to future generations. Examples of this from American history might be the tale of George Washington and the cherry tree, the midnight ride of Paul Revere, or the story of Benjamin Franklin and his famous kite.

Similarly, the amateur radio community has its own history, cultural icons, and stories. That includes legends like the Wouff Hong. If you're a licensed amateur radio operator and don't know what a Wouff Hong is, you most certainly should.

A Bit of History

The story of the Wouff Hong begins in 1917. Radio pioneer Hiram Percy Maxim (*Photo A*), writing under the pseudonym "The Old Man," penned a series of letters to *QST* magazine collectively entitled "Rotten Radio." These articles were humorous in nature — the purpose of which was to highlight and poke fun at sloppy and poor radio operating practice. By modern standards, The Old Man's style might now seem biting or even mean-spirited. However, it's been said that even those who could recognize themselves among the subjects of The Old Man's wrath would nonetheless find themselves chuckling.

Beyond mere entertainment, the articles served the greater purpose of encouraging professional behavior and the development and practice of technical excellence on the air. As W1UJR says in his 2017 article "The Rotten Radio Series," The Old Man was "... justifiably concerned with government intervention [in] early amateur privileges, and felt that poor or sloppy operation and procedure only gave weight to the early critics of amateur radio."

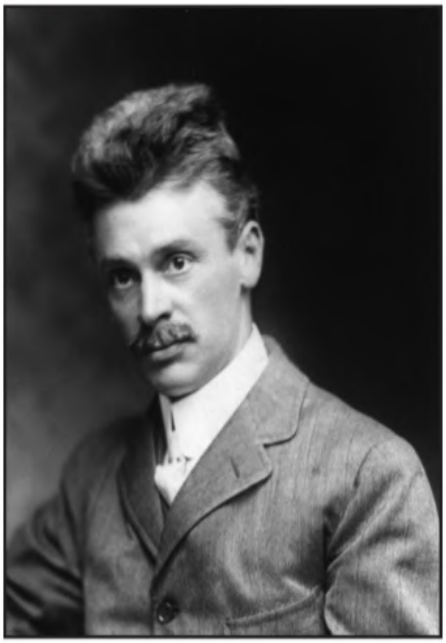


Photo A. "The Old Man," ARRL co-founder Hiram Percy Maxim (Library of Congress photo)

In an installment titled "Rotten QRM" (QRM meaning "man-made interference"), The Old Man railed about indecipherable gibberish he claimed to have received on the air — such phrases as "bliftsfy monkey motor" and "Hnneg se." It was from this letter that the phrase "wouff hong" first emerged when the author wrote, "I do not think I know just exactly what a wouff hong is." Whatever the intent of the original radio message, the "wouff hong" interpretation was funny, and shortly became part of ham radio vernacular, synonymous with bad station practice.

Despite World War I — which resulted in the temporary suspension of all ham radio activities in the United States — "wouff hong" remained an earworm and wouldn't go away. Two years later, with the end of the war and pending restoration of radio privileges, The Old Man reappeared and upped his game. In a letter sent to *QST* he wrote: "I am sending you a specimen of a real live Wouff-Hong which came to light when we started to get our junk out of cold storage. Keep it in the editorial sanctum where you can lay your hands on it quickly in an emergency. We will soon be allowed to transmit, and then you will need it."

The letter was accompanied by a strange, medieval-looking contraption fashioned of wood and metal (*Photo B*) — an implied torture device — presumably intended to inflict suffering on those whose on-air behavior might tarnish the good name of amateur radio. In a few short years a garbled radio message had become a joke, and the joke had transformed into a genuine, physical object — and a cultural icon.

Ham radio's answer to the Liberty Bell, hundreds of replicas have been fashioned in its likeness. The original,

W	O	U	F	F	H	O	N	G
.--	---	..-	..-.	..-.	....	---	-.	--.

Figure 1. "Wouff Hong" in Morse code characters

.--.---..-.-...-.....----.--.

Figure 2. Wouff hong with no spaces

*Website: <www.hpfriedrichs.com>

mounted in a frame, still hangs on a wall at the American Radio Relay League's headquarters in Connecticut.

In Search of the Real Wouff Hong

Recently I was reminded of the Wouff Hong legend while reading a vintage issue of *QST*. In a moment of fevered imagination, I began thinking about the original radio message — the *intended* but garbled message — that was decoded by The Old Man as "wouff hong." Who sent it? What might that message have been? Was there any way I could somehow reconstruct some part of the original message?

Morse code is a communicated through a sequence of symbols — dots and dashes — but also spaces. There are specific timing relationships between these symbols. The duration of a dot symbol, which is established by the rate at which the message is transmitted, is considered to be one time unit in length and becomes the standard by which all other timing is established. In a perfect world, a dash, for example, is three times the length of a dot. Spaces — the intervals of silence between the symbols — are also timed with respect to the length of a dot. The space between dots and dashes are one dot-time in length, while the space between letters is three dot-times. The space between words is 7 dot-times.

Human beings being what we are, it's not hard to imagine that Morse code, sent from a hand-operated key, might deviate from these ideal timing relationships. The more skilled the sender, the better the transmitted code will conform to the timing rules. However, the more experienced the receiver, the better his or her ability to "roll with" changes in speed and timing and successfully recognize characters by context.

Figure 1 represents the phrase "wouff hong" in Morse code. Note that there are 29 (dot or dash) symbols and, between those symbols, 28 spaces. If we assume, as a starting point, that the sender was so bad that any received dot might actually have been intended to be a dash or vice versa, and that the intended spaces might actually be any of the three varieties, the number of possible source messages can be calculated. With that as I guide, I reasoned, I should be able to write a "brute force" computer program to generate a catalog of those possibilities, and then work backward to a likely original, intended, message.

Unfortunately, a bit of mathematics quickly showed my plan to be hopeless. Consider first that there are two symbol types (a dot and a dash) and 29 instances of symbols. The number of possibilities connected with symbol variation is therefore 2 to the 29th power. There are three space types (symbol space, letter space, and word space) and 28 instances of spaces. The number of possibilities connected with space variation is 3 to the 28th power. The total number of possibilities is the product of those two values:

$$\text{Total Possibilities} = (\#\text{ of symbol types})^{(\#\text{ of symbols in msg})} \times (\#\text{ of space types})^{(\#\text{ of spaces in msg})}$$
$$= (2)^{29} \times (3)^{28}$$
$$= 1.23 \times 10^{22}$$

The result is 1.23×10^{22} or 12,000, million, million, million possibilities. Wow. This is an impossibly large number of patterns to generate. Even if I had a computer that could generate a trillion patterns per second, the pattern generation task alone would still take some 390 years to complete. Mind you, that doesn't give you the answer — that's just the list of *possibilities*. You must then parse and review all possibilities looking for that one message that represents the best guess of what the original message might have been.

Photo B. The fearsome Wouff Hong (source uncertain)

Aside from practical computational concerns, a fair criticism of the "all-possibilities" approach is that it ends up casting an unreasonably and unmanageably wide net. If there is no requirement that our computer "guesses" correlate to the "wouff hong" pattern in any way, then we might well stumble across words or phrases that *seem* meaningful, but in fact appear through nothing more than empty and irrelevant coincidence. No, brute force computation was not going to work here.

I was considering abandoning my "wouff hong" analysis entirely when I stumbled across an October 1949 article in *QST* by A.F. Scotten, W6ZMZ, entitled "The Hum Bug." In this article, Scotten proposes the construction of an electronic Morse keying device embodying a novel concept, based upon assertions that I found non-intuitive but compelling.

First, Scotten argues that the human ear does not measure isolated intervals very well, but on the other hand, it

The Royal Order of the Wouff Hong

The Wouff Hong is more than a physical object intended to inflict severe punishment on hams afflicted by poor operating practices. It is also the centerpiece of a secret society made up of amateurs who have pledged to uphold the highest standards of on-air operating. Sponsored by the ARRL, the Royal Order of the Wouff Hong accepts new members through a very secret (and some would say very silly!) induction ceremony held only at ARRL conventions … and only at midnight (often midnight UTC, so the very young and very old among us don't have to stay up past their bedtimes).

Inductees are issued a certificate suitable for framing. Your editor's — illustrated here — indicates that he was inducted too many years ago to count, and several callsigns ago as well, at an ARRL national convention in Virginia. (He could tell you more, but since it's a secret society, doing so would subject him to the horrors of the Wouff Hong itself!)


The Royal Order of the Wouff Hong

RO WH

To All Who Shall See These Presents:

Greeting!

The Royal Order of the Wouff Hong, in solemn conclave assembled, makes known by this Certificate that its esteemed brother,

Radio Amateur RICHARD S. MOSESON WA2QQN

is a member of the Order in good standing, and is entitled to all the rights and privileges of membership, and the high regard of his fellow amateurs.

Conferred at the Midnight Conclave of the Order,
ARRL NATIONAL Convention, American Radio Relay League,
Held at RESTON, VA. 14 SEPT 1975

"The Old Man."

W4ZM

excels in *comparative* measurement. This means that as long as a dot symbol is somewhat shorter in duration than a dash, the exact difference between the two doesn't really affect intelligibility.

According to the article, what *does* affect intelligibility greatly — and this is the counterintuitive part — is not the symbols themselves, but the care with which *inter-symbol spaces* are treated. Scotten says, "... these and only these, make the code intelligible. The long and short fragments of mark [dots and dashes] merely serve the secondary purpose of correctly placing the *spaces* in relation to one another and preventing them from running together."

I immediately saw relevance to the "wouff hong" problem. If Scotten is correct, we can assume, with a high degree of certainty, that Maxim would have accurately distinguished dots from dashes (he was an accomplished radio telegrapher, after all). This implies that the corruption of the original message — whatever it was — would have been caused by bad symbol *spacing*.

Why does that matter? Two reasons: If we can assume that the dots and dashes that comprise "wouff hong" are correct, the scope of the search problem, even with "brute force" methods, drops nine orders of magnitude. Not only that, if a search *does* reveal embedded intelligence, one can make a reasonable argument for legitimacy based upon the fact that we're actually using the dot and dash pattern Maxim reported.

As it turns out, once we accept the premise that the dots and dashes inherently correct, a "brute force" approach to pattern generation is not needed at all. A more practical (and as it turns out, more effective) method is a kind of test-and-try. Let me explain.

Figure 2 shows a condensed version of the dot and dash stream from *Figure 1*. While we trust the dots and dashes, the potential for corruption in the spaces makes them all suspect, so I've removed them.

Now, let's consider this string of symbols and make an educated guess as to the identity of the first letter. The first letter could be just one symbol long, a single dot, which translates to the letter E. If the first letter is two symbols long, it would be an A. Three symbols? It would be a W. Grouping the first four symbols yields a J. Five symbols gives us the number 1. This means that the first letter of the original message — the one that was ultimately corrupted into "wouff hong" — could in fact have started with the characters E, A, W, J or 1.

Now, for each starting-letter case, we look for the next possible letters.

If we assume the first letter was E for example, then next symbol, a dash, might mean that the letter that follows was a T. It could also be an M (two dashes), an O (three dashes) or a zero (five dashes). This yields the possible sequences ET, EM, EO, or EØ.

If we repeat this analysis on each of the starting characters, E, A, W, J, and 1, we start to see a tree-branch-like structure appear (*Figure 3*).

The process is iterative and continues, building branches upon branches. *Figure 4* shows an expansion of the branches from the starting letter E.

More Computing Power Needed

Naively, I began this "tree-branch" analysis manually, that is, with a pen and a piece of paper. After all, there were only 29 symbols to account for, right? When one page of branches turned to two, I tried continuing with the benefit of a spreadsheet program. However, the geometric nature of the process quickly convinced me that further automation would be necessary. To accomplish this, I wrote a C program on one of my Linux machines to automatically process the symbol string into branches, in the manner I have just described.

After one-and-a-half hours of computation, and the creation of a letter-sequence tree with branches some 30 levels deep, the computer finally generated a list of 82 *million* Morse character patterns that, through sloppy sending, could conceivably have been mis-received as "wouff hong." The question then became which of those candidates was the one, true, original source?

Analyzing the Possibilities

With results in hand, it was obvious that 82 million possibilities are simply too much to scan through with the naked eye. So, back to the computer I went … along with some ideas as to how to filter and sift the wheat from the chaff.

First, I wrote a program to search the possibilities list looking for matches to common ham radio abbreviations: "CQ" (call to station), "DE" (this is), "73" (best wishes), "GE" (good evening), "XYL" (wife), and so forth. Conceptually, this was a great idea, but in practice, it proved worthless. The result of this search was thousands upon thousands of matches, usually buried in a sequence of letters that was, otherwise, gibberish. In retrospect, I should have expected this. These abbreviations are so short that they show up in large numbers, simply through random chance. So even after computer analysis, I was still left with too many guesses to read through and contemplate manually.

Next, I began thinking about Q codes. Q codes are a kind of Morse "shorthand." They are three-letter sequences, each starting with the letter "Q", that represent some kind of standard question or statement. If someone tells you their "QTH," for example, they are describing their location. If one is asked "QRL?"

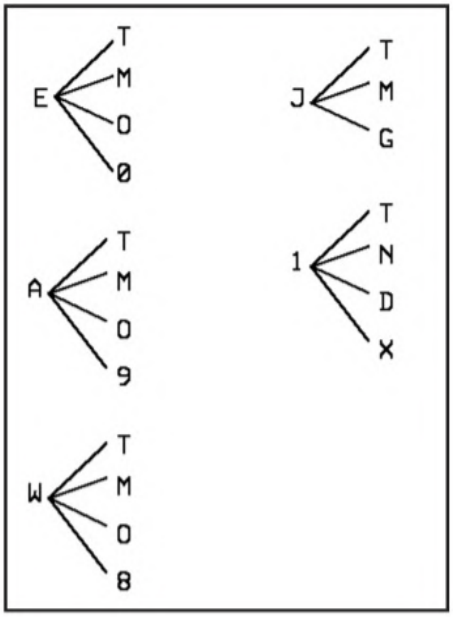


Figure 3. Developing branches from each of the possible starting characters

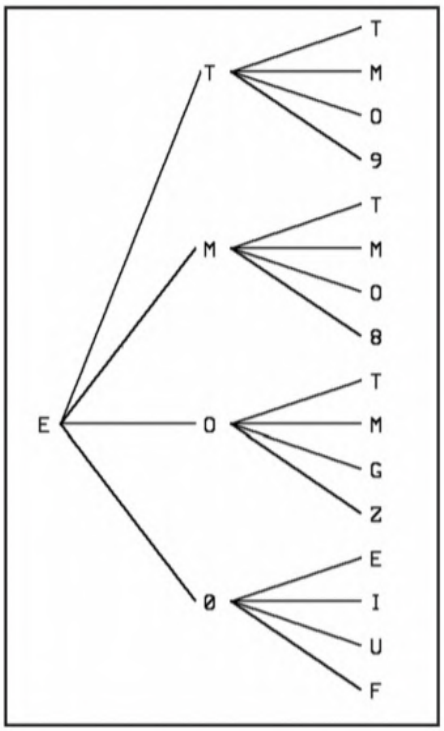


Figure 4. An example of more branches growing from starting letter E

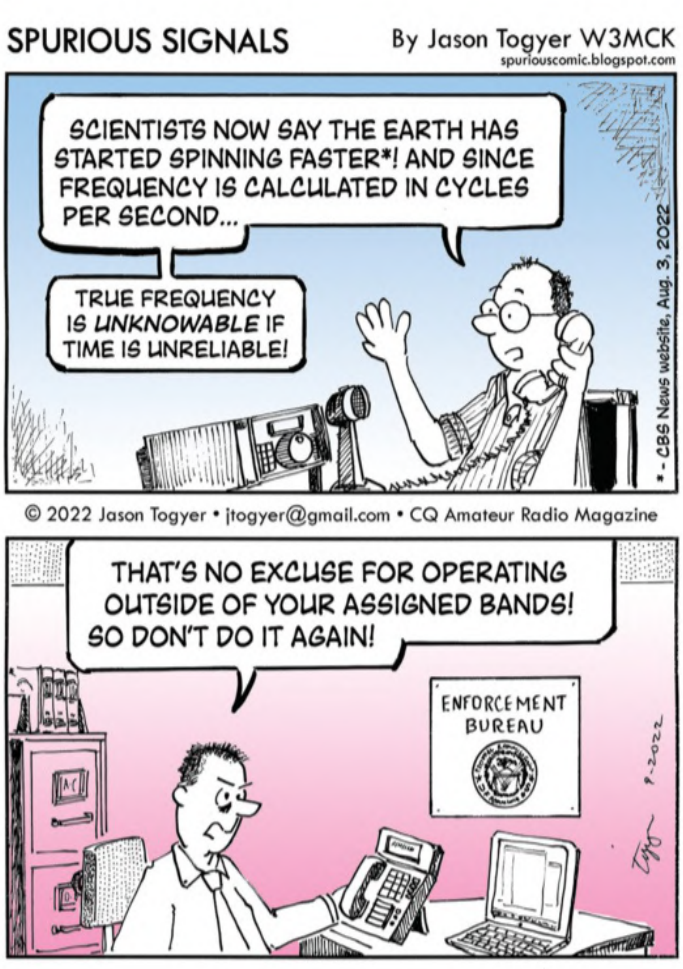
you are being interrogated as to whether you are busy. A report of "QSB" indicates that your signal is fading.

I thought Q codes might be an ideal attack vector for my search problem for several reasons. "Q" is a less common letter in English, three-letter Q codes (as opposed to two-letter abbreviations) would be less likely to appear through random chance, and finally, I knew that some form of Q codes were in use as early as 1909. Yet, after running a new search program, which bounced a list of several dozen Q-code variants against the letter patterns in the possibilities list, I was surprised to find zero matches. Not one!

These disappointments caused me to completely rethink my search algorithm. Real intelligence, I reasoned, would not simply contain a word, it should contain evidence of *multiple words*, and those multiple words should bear syntactically meaningful relationships to one another.

My final program compared each of the 82-million letter-sequence guesses against a 20,000-word English dictionary. If a word was found in the guess-letter-sequence, it was extracted, and the remaining characters were compared to the dictionary again, in search of another word. This recursive action was repeated again and again until there were no characters left to analyze. When all the found words were recorded the computer would clear its slate and grab the next of the 82 million letter-sequence guesses. The analytic process would then repeat.

I should add that this version of my program also contained some logic to effect an acceptance threshold. So, while "I" is a legitimate English word, a sequence containing multiple "I"s in a row was understood to be gibberish and would be discarded. I also added some code that would throw away any message guesses that failed to contain at least two English dictionary words.



I compiled the code, instructed the computer to execute it, and away it went … on and on and on. The CPU fan spun up as the computer strained under the load. Early evening turned to late evening, but still the computer scanned, shuffled, and compared. I eventually gave up waiting for it and went to bed. The following day, some 12 hours later, the computer had reduced the 82 million possibilities to a list of just over 4 million.

Some of the word matches found were fascinating. The computer identified letter-sequence guesses containing three, four, five, and even six-letter words in some cases. The problem was all the "left-over" letters that could not be resolved to a dictionary entry. Thus, many of the 4 million possibilities consisted of interesting but syntactically unrelated words resting in a salad of leftover letters.

My program was able to measure percentage-utilization by dividing the number of letters in the identified words by the total letters in the particular guess-letter-sequence. The higher the percentage, the better the utilization of letters. When I raised the acceptance criterion to 100% — meaning that all the letters in a given guess *must be* accounted for by findings in the dictionary, the 4 million possibilities evaporated, leaving just 18 guesses.

Through a half-dozen programs and hours of computer runtime, I was able to condense 82 million letter sequences — possible messages that might conceivably have been misread to say "wouff hong" — into just 18 guesses whose characters mapped fully into a 20,000-word English dictionary.

In 16 of the 18 final results, the words were indeed all valid, but appeared syntactically unrelated and did not, in my opinion, convey any probable fragment of intelligence. *But two of them ... arguably could*. Either one of those two might have been part of a message, received by Maxim more than a century ago, that would go on to become the basis for the Wouff Hong legend.

And the Answer Is?

In the end, I found *two* possible message fragments that meet all the criteria touched upon, above.

One reads, "*Eton aided stop*," meaning, a fellow by the name of Eton somehow assisted in physically stopping something (halting a train or boat?), or he somehow assisted in putting an end to an undesirable practice, process, or event.

The second possible message fragment reads, "*Eton aided Stowe.*" Here, the same helpful Eton is now providing assistance of some type to a character whose last name is "Stowe."

There is, of course, a third possibility. When I was young, the Washington, Revere, and Franklin stories I alluded to earlier were taught in school as virtual Gospel. Yet, in the years that have since passed, most historians have come to agreement that, in fact, these events *never actually happened.*

I think this makes them *more* interesting, not less. Why? Because the values they convey were apparently important enough to our culture that if happenstance and reality couldn't provide a suitable tale, why, we'd simply have to create it ourselves!

So … did there once exist an ever-helpful gentleman by the name of Eton? Did a fumbling Morse key operator, describing Eton's actions, accidentally release to the aether the comical phrase "wouff hong?" Computer analysis suggests the answer might be "yes."

Or ... did Hiram Percy Maxim simply fabricate the whole thing — employing humor to sweeten the medicine he felt necessary to assure amateur radio's continued survival?

I'll let you be the judge.

Commercial telegraphers often carried their own keys from assignment to assignment. Often, they were Vibroplex "bugs." N1EA shares some key tales — including his own — as well as a look at the history of popular telegraph keys in commercial service.

The Vibroplex and Other Keys on Ships, Aircraft, and at Coastal Radio Stations

BY DAVID J. RING, JR.*, N1EA

American radiotelegraphers were the first to popularize using a Vibroplex® in commercial applications. The UK General Post Office, which ran the coast stations of Ireland and the United Kingdom, actually prohibited all "speed keys," but around the 1970s, these regulations were relaxed and I'd hear keyers and semi-automatic keys on from the UK commercial stations. However, the UK operators took deserved pride in their use of the straight key, and they mostly used "pump handle keys," that is the ones with contacts at the back of the key after the pivoting fulcrum. The PS-213A was the classic UK coast station key. Germany used its excellent Junker keys at its coastal radiotelegraph stations, such as Norddeich Radio/DAN and Kiel Radio, DAO.

I found that the countries that used Marconi equipment — which were mainly UK Empire (now "Commonwealth") stations used the long-lever keys. The U.S., Germany, and nearby countries used low-profile American keys. New Zealand, Australia, and Singapore used the pump handle keys, as did many stations in Japan. Canada was the odd duck country because half of its stations were outfitted by American suppliers who used the E.F. Johnson (later Nye Viking) type keys, and the other half by Marconi, which used the 365 model keys from the 1940s. The 365B was the best key, but when supplies were expended, Marconi started making the 365EZ (with contact filter) and 365FZ (no filter).

FCC and ITU regulations required that radiotelegraphy stations on land, sea, and air be "full break in," that is, being able to hear between dots. For ships, this meant using relays and shunts for spark and arc, and relays for continuous wave (CW) transmitters. Coast stations often had separate transmit and receive locations, sometimes as much as 30 miles apart, and those didn't need to have relays to be able to "hear between dots" because that was taken care of simply by distance. But if the transmit and receive stations were in one location, they'd have the same noisy relays — often running on 130 volts.

After vacuum-tube transmitters became common, telegraphers on U.S. ships started taking Vibroplex keys to sea. I took my Vibroplex Original to sea; later, I took a Curtis EK-430 keyer that I modified with a CP CLARE relay HGJM series rated 50VA at 200 volts.

The U.S. Coast Guard (USCG) and U.S. Navy required a "speed key certificate" — merchant ships just had to be able to use the key. Some of us were as good as the USCG and Navy operators with a speed key, but they were excellent.

Ship Radio Configurations

There were two basic types of shipboard radio station installations. One

Photo A. NS Savannah Radio Room (Courtesy Maritime Park Association; <https://tinyurl.com/2j9tbwjh>)

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had the radio equipment in front of the operator, with a two-level desktop, two high parts on the right and left of center, and in the center a depression in which a typewriter was provided, so that the keys were at the right height for use by an operator sitting at the operating desk facing the equipment.

Such an arrangement is seen on NV Savannah/KSAV — the only U.S. nuclear-powered merchant ship (*Photo A*). This type of station was generally mounted fore and aft ships so that the typewriter carriage would be thwart ships and would only act up when the ship pitched (bow / stern movement). A Vibroplex positioned on the right (or left) would have to be angled 45° in weather during which the ship rolled. A pencil on the surface would move from side to side (and into the typing well) when the ship rolled.

Photo B. The author in the radio room of the Training Ship TS Empire State IV / WHMW at Massachusetts Maritime College, Buzzards Bay, Massachusetts, in 1982. (Source: N1EA personal collection; photo by David J. Ring, Sr., WA1DRR)

Photo C. Italian Radio Officer Antonio Iaccarino was a radioman in the Italian Navy and merchant marine, from 1951 until his retirement in 1992. He served on multiple ships and at coast station IAR. Iaccarino was called "Captain Jack" by the operators of Roma Radio/IAR. He died in early 2022.

Photo B shows your author aboard Training Ship TS Empire State IV / WHMW (State of New York Maritime School vessel used by Massachusetts Maritime after a fire on their ship). In this 1982 photo, you can see an example of a ship radio station that is mounted thwart-ships and a typewriter "L" furnished so that the typewriter is thwart-ships and the typewriter carriage is in line with the keel of the ship to minimize problems with the typewriter carriage moving when the ship rolled sideways. In the photo is radio officer David J. Ring, Jr., at 31 years of age (40 years ago). In my right hand is my Vibroplex Original Deluxe which I carried to sea in my luggage until I retired. Behind me is the ship's *mill* — probably a Remington manual machine. A ITT/Mackay 3020 receiver which covers 10 kHz to 29,999.9 kHz synthesized in 100-Hz steps by thumbswitch selection is in front of me to my left, the ship's MW (medium wave) 410-to 512-kHz main transmitter is above the Vibroplex, approximately 300 watts of A1 unmodulated CW output and 300 watts of keyed A2 modulated CW output (1,200 watts Peak Envelope Power double sideband signal modulated with a 800-Hz tone making the bandwidth about 1,600 Hz). Ships were required to keep a 24-hour watch either with an operator on duty or a watch receiver on 600 meters / 500 kHz. One of the other transmitters is above the ITT/Mackay 3020 receiver. I can't see clearly which, but it was either the HF CW or the battery emergency transmitter for 500-kHz medium-wave band (it would run on either A.C. mains or lead-acid cell battery.) Since all U.S. ships were required to have full break-in, these transmitters all used keying relays which switched the antenna from receiver to transmitter then keyed the transmitter when the key was closed, noisy but effective even at 45 WPM.

Of course at coastal stations, there was no rolling or pitching to contend with, and *Photo C* shows Radio Officer Antonio Iaccarino at Rome (Roma) Radio / IAR sending on his personal Vibroplex. Next to it are Roma Radio's excellent station keys, which were PS-213 type keys often manufactured by Italian machinists. This long-levered key is probably the finest straight key ever made and is highly prized by those who own one.

The author maintains a collection of ship Morse recordings and related videos and documents and software at <http://tiny.cc/n1ea> on the Internet Archive and some videos at <http://youtube.com/djringjr>.

Oops… 2022 CQWW 160-Meter Contest Errata

Due to a production error, the incorrect Top Scores, Plaque Winners, and Club Score boxes were published with the results in the August issue. The correct boxes are published here. We apologize for the error. NOTE: This material further corrects and updates the correction that was previously posted online.

2022 CQWW 160M CONTEST TOP SCORES

CW

USA

AA1K 622,908
K3ZM 529,405
NA8V 516,150
AB3CX 492,804
N1UR 460,358
N4XD 417,942
WF2W 416,738
N2MF 386,950
K5ZD 363,630
W9RE 308,460

VE

VY2ZM 1,586,304
VE3AT 746,646
VE3DZ 738,475
VE3JM 458,422
VE3MGY 427,248
VA3AR 294,160
VE3YT 249,444
VE6BBP 223,924
VE3KP 202,242
VA3SB 172,560

QRP

4U1A 299,475
LY4ZZ 224,856
DK7HA 205,436
E77Y 193,927
S57M 190,458
OL4W 183,855
YL2QN 170,912
OK1FKD 157,040
DM7AA 144,354
RD9D 119,901

DX

CR3W 1,331,508
ZF5T 1,220,480
OK6W 816,934
MU5E 810,216
NP2J 791,544
UP4L 772,480
4L9M 732,862
G4A 722,267
R7NW 667,552
EF5Y 667,104

Zone 3

AA6AA 185,990
K6NA 136,689
WJ9B 127,908
N6JV 97,920
N7GP 97,016
W6PH 88,920
N7IR 82,971
W7YAQ 71,110
N6RK 60,844
W6JTI 52,780

Zone 4

VE3AT 746,646
VE3DZ 738,475
NA8V 516,150
VE3JM 458,422
VE3MGY 427,248
W9RE 308,460
VA3AR 294,160
W5ZN 259,168
VE3YT 249,444
VE6BBP 223,924

Zone 14

MU5E 810,216
G4A 722,267
EF5Y 667,104
DL1AUZ 522,832
EA6SX 437,448
G4BUO 295,372
SM2U 285,476
MØNDZ 220,765
G2X 219,177
DLØMCM 211,426

Zone 15

OK6W 816,934
S53A 658,920
OM2XW 540,708
S57K 525,046
OK1Z 507,870
OM7RU 451,212
LY4L 386,124
YL2SW 385,800
E79D 344,784
LY4T 341,968

Zone 16

R7NW 667,552
UX2X 541,861
US6EX 388,157
UA3EDQ 315,192
R3ZZ 293,058
UT5NR 287,615
RD4F 213,960
UT3QU 195,690
UW1WA 141,015
RA3UAG 139,893

LOW POWER
World

VE3JM 458,422
3V8SF 445,745
EA6SX 437,448
VE3MGY 427,248
LY4L 386,124
E79D 344,784
OM5NL 331,296
UT5NR 287,615
OM2XA 283,410
KD4D 267,498

LOW POWER W/VE

VE3JM 458,422
VE3MGY 427,248
KD4D 267,498
VA3SB 172,560
WB8JUI 165,645
KØTT 134,904
WØUO 129,646
WD5COV 120,474
WD8DSB 119,275
VA2CZ 103,152

MULTI-OPERATOR WORLD

PJ2T 1,458,816
UA2FW 1,318,484
EW5A 1,246,616
OK7K 1,206,360
S5ØC 1,189,704
E7DX 1,095,248
4X2M 1,078,056
HBØ/DL3DXX 1,039,682
K1LZ 1,026,066
UA7K 1,009,368

MULTI-OPERATOR W/VE

K1LZ 1,026,066
N2AA 739,660
K3LR 653,520
VE3FU 536,283
KØDI 456,320
K9RS 420,860
VE2OJ 403,920
K3AJ 391,164
N4SS 323,532
NA7TB 283,440

ASSISTED WORLD

+P4ØAA 1,206,768
+OM4MW 1,038,960
+MW5B 1,038,294
+9A5Y 1,009,231
+9A5X 932,694
+VE3EJ 864,981
+VA2WA 842,985
+IQ2CJ 819,192
+NP2X 806,019
+G5W 784,686

ASSISTED W/VE

+VE3EJ 864,981
+VA2WA 842,985
+VE3VN 532,689
+N1LN 492,793
+W1UE 489,954
+VE3RZ 486,517
+VO1HP 483,276
+VE3ZI 473,244
+AA3B 444,666
+K2KW 437,875

ASSISTED LOW POWER

*+P3AA 543,504
*+LY5E 533,882
*+HGØR 514,712
*+OE8TED 432,783
*+OK6Y 417,920
*+YT4T 403,940
*+S57DX 393,075
*+EA3CX 383,945
*+YT7KM 376,808
*+DAØBCC 366,336

ASSISTED LOW W/VE

*+VE3NZ 180,029
*+N3HEE 159,732
*+KG9X 152,366
*+NJ3K 145,550
*+WO1N 136,728
*+W1WBB 126,360
*+VA3WB 114,898
*+VE3VY 100,224
*+KX9RT 99,792

SSB

USA

K3ZM 250,454
ND8DX 166,592
WF2W 144,450
K3ZO 101,689
W3BGN 89,110
N4XD 81,770
AF1T 77,286
NG4C 75,225
N1DPM 73,254
W3TS 63,305

VE

VY2ZM 524,232
VE3MGY 168,948
VA3AR 132,664
VE3CKO 67,100
VE3UZ 38,532
VA3AC 33,048
VE3WG 30,414
VE3BR 27,936
VE6DDD 18,768
VE3KP 15,488

QRP

E77Y 46,404
WB4MSG 29,655
DK8R 24,684
N4SS 18,291
WW2G 15,873
YO8WW 13,857
DK2LO 13,286
HA1TI 11,293
IK4RQJ 10,854
IKØXBX 10,649

DX

I5JVA 418,035
HB9NE 174,306
NP2J 149,325
SP5C 135,309
ED8W 126,840
SQ2PHG 97,740
OZ4MD 92,512
OK4U 91,977
OK1LRD 82,603
SN9B 73,710

Zone 3

NJ6P 43,968
N7RK 20,130
K7RAT 16,356
KD7UO 11,628
KG6AO 7,104
WB6HYH 5,184
AI6LY 3,146
N6RO 3,025
KE6QR 2,926
VA7EU 2,669

Zone 4

VE3MGY 168,948
ND8DX 166,592
VA3AR 132,664
VE3CKO 67,100
KW8N 60,264
N0PB 58,680
KE8BKP 43,806
K0SIX 42,804
K0TT 40,014
N8OL 39,167

Zone 14

HB9NE 174,306
OZ4MD 92,512
DK5NJ 63,588
DK3BK 62,640
EI4KU 59,360
EF3O 48,898
SB6A 48,320
DL6MI 47,027
DLØNG 43,524
EB1A 40,890

Zone 15

I5JVA 418,035
SP5C 135,309
SQ2PHG 97,740
OK4U 91,977
OK1LRD 82,603
SN9B 73,710
SQ8MFM 73,100
OM2XW 73,040
OM7RU 67,855
SP6LUV 63,664

Zone 16

EU3A 25,164
RK3E 16,327
UA3BL 11,100
RC5Z 9,240
R8WF 7,848
R7NP 7,752
UA1CUR 4,410
RU4CK 4,194
RL2Y 3,114
RZ9WU 2,964

LOW POWER
World

VE3MGY 168,948
OK1LRD 82,603
SN9B 73,710
SQ8MFM 73,100
SP6LUV 63,664
N1UR 61,161
EI4KU 59,360
NØPB 58,680
KB4OLM 50,055
EF3O 48,898

LOW POWER W/VE

VE3MGY 168,948
N1UR 61,161
NØPB 58,680
KB4OLM 50,055
KE8BKP 43,806
KC9LA 35,144
VA3AC 33,048
VE3WG 30,414
WD8DSB 29,050
KS3D 26,362

MULTI-OPERATOR WORLD

OK7K 479,560
HG8DX 365,232
PJ4G 318,072
K1LZ 280,194
EW5A 264,732
C4I 260,028
E7CW 252,750
9A5Y 247,800
SP8R 238,915
HBØDX 228,840

MULTI-OPERATOR W/VE

K1LZ 280,194
N2CEI 220,970
WG3J 143,480
N2QV 137,376
N2CW 133,749
N7T 108,697
KB3VQC 84,932
K9RS 84,594
NE3F 78,385
NA5NN 76,300

ASSISTED WORLD

+S53O 233,306
+HGØR 211,773
+OK6RP 208,906
+S56B 180,096
+VA2WA 168,140
+DK6WL 162,981
+LZ5R 162,006
+K3CT 150,080
+DL4VK 149,562
+HB9CXZ 147,280

ASSISTED W/VE

+VA2WA 168,140
+K3CT 150,080
+K4ISV 117,789
+NO9E 110,325
+K3ZU 101,470
+W4NF 100,590
+W2DAN 99,562
+NN3W 96,255
+N2HMM 66,670
*+VE3PJ 64,630

ASSISTED LOW POWER

*+S54ZZ 135,795
*+S57DX 102,856
*+OK6Y 90,066
*+OK6AA 89,350
*+SE0X 69,564
*+HG5A 65,562
*+VE3PJ 64,630
*+HF7A 62,000
*+W4/KP4KE 59,995
*+9A/IZ3NVR 44,040

ASSISTED LOW W/VE

*+VE3PJ 64,630
*+W4/KP4KE 59,995
*+N3AAA 37,975
*+VE3VY 31,136
*+KD9PLD 29,798
*+NS3T 28,204
*+AA2EQ 21,060
*+VE3EJ 20,794
*+N2BEG 19,614
*+KB9RDS 17,464

**Low Power*
+Assisted

PLAQUE WINNERS AND DONORS

World Single Operator Combined SSB/CW
Jeffrey T. Briggs
VY2ZM
Donor: Ed Parish, K1EP

World Multioperator Combined SSB/CW
Station OK7K
(OK1BN OK1GK OK1NP OK1NS OK1VAO OK3RM)
Donor: Juan Carlos Munoz, TG9AJR

CW

SINGLE OPERATOR

World
Jeffrey T. Briggs
VY2ZM
Donor: DJ8WL Memorial by Bill Tippett, W4ZV

U.S.A
Jon Zaimes
AA1K
Donor: Milt Jensen, N5IA, Memorial by Arizona Outlaws Contest Club

Canada
Ron Vander Kraats
VE3AT
Donor: VE2XAA Memorial by Thor Stefansson, TF4M

U.S.A. — Zone 3
Steve Orland
AA6AA
Donor: Bruce Butler – W6OSP Memorial

U.S.A. - Zone 4
Greg Chapoton
NA8V
Donor: Steve Schmidt, K4WA

U.S.A. — Zone 5
Peter Briggs
K3ZM
Donor: W3YOZ Memorial by Jim Monahan, K1PX

Africa
Andre Shoch (DL4UNY)
Station CR3W
Donor: James “Skip” Riba, WS9V

Asia
Valeriy Zhilyayev
UP4L
Donor: Missouri DX/Contest Club, K4SX

Europe
Pavel Prihoda
OK6W
Donor: Emir-Braco Memic, E77DX

South America
Marcelo Fernando Egües Martorell
CX2DK
Donor: John Rodgers, WE3C

Oceania
Akito Nagi (JA5DQH)
KH7A
Donor: Steve “Sid” Caesar, NH7C

European Russia
Serge Kiblitsky
R7NW
Donor: CQ 160 Contest Committee

Asiatic Russia
Dmitry Makarov
RA9MA
Donor: Steve “Sid” Caesar - NH7C

Japan
Masaki Okano
JH4UYB
Donor: Alabama Contest Group

North America
Stan Stockton (ZF9CW)
ZF5T
Donor: N4IN Memorial CQ Magazine

Southern Hemisphere
Holger Hannemann (ZL3IO)
ZM4T
Donor: Robert Kile, W7RH

World Assisted
Mathias Kolpe DL4MM
P4ØAA
Donor: Andy Chesnokov, UA3AB

Asia Assisted
Sergey Moskaev
R8TT
Donor: Jon Zaimes, AA1K

Europe Assisted
Jozef Reck
OM4MW
Donor: Bill Salyers, AJ8B

U.S.A. Assisted
Bruce Meier
N1LN
Donor: Akito Nagi, JA5DQH

U.S.A. Assisted — Zone 3
Riki Kline
K7NJ
Donor: Larry Pace, N7DD

U.S.A. Assisted — Zone 4
Victor A. Kean, Jr.
K1LT
Donor: Pete Michaelis, N8TR

U.S.A. Assisted — Zone 5
Dennis Egan
W1UE
Donor: Potomac Valley Radio Club

World Low Power
Vlad Milutinovic
VE3JM
Donor: Akito Nagi, JA5DQH

U.S.A. Low Power
Mark Bailey
KD4D
Donor: Rich Kennedy, N4ESS

Asia — Low Power
Yuri Zinchuk
4Z5PN
Donor: Robert Kile, W7RH

Europe Low Power
Miguel Garcia Castaner
EA6SX
Donor: DL1RK Memorial Petr Ourednik, OK1RP

Canada Low Power
Brian Campbell
VE3MGY
Donor: Contest Club Ontario

World QRP
ARCDXC Club
4U1A
Donor: CQ 160 Contest Committee

U.S.A. QRP
Toni Radebaugh
NØNI
Donor: Bob Raymond, WA1Z

Europe QRP
Algirdas Sadaunikas
LY4ZZ
Donor: Peter Voelpel, DJ7WW

MULTI-OPERATOR

World
Station PJ2T
(W8WTS, K8ND ops)
Donor: Paul Newberry, N4PN Memorial (by N4RJ)

U.S.A.
Station K1LZ
(K1LZ, NN1C, W1ADI, K3JO ops)
Donor: WØCD Memorial (by K8GG and W8UVZ)

U.S.A. Zone 3
Station NA7TB
(AA7A, KY7M, NA2U, N7NR, K9DR ops)
Donor: Tom Whitted, N7GP

Europe
Station UA2FW
(RN1B, RV1AW, RA2FA, UA2FZ, UA4FER, RW4WR, RG6G, R7LV ops)
Donor: Bob Evans, K5WA

ASIA
Station 4X2M
(4X1MM, 4X6HX, 4Z4AK, 4Z5IW, 4Z5ML, 4Z5LY, ops)
Donor: Nodir Tursoon-Zadeh, EY8MM

ZONE 16
Station EW5A
(EW1NY, EW2M, EU4A, EU4CK, EW6W ops)
Donor: John Crovelli, W2GD

SSB

SINGLE OPERATOR

World
Jeffrey T. Briggs
VY2ZM
Donor: Nodir Tursoon-Zadeh, EY8MM

U.S.A.
Peter H. Briggs
K3ZM
Donor: Dr. Scott Wright, KØMD

Canada
Brian Campbell
VE3MGY
Donor: Tom Haavisto, VE3CX

U.S.A. — Zone 3
Leon Madziarski
NJ6P
Donor: Nate Moreschi, N4YDU

U.S.A. — Zone 4
Karl Brandt
ND8DX
Donor: Alabama Contest Group

U.S.A. — Zone 5
John Slusser
WF2W
Donor: Brent Scott, WR5O

Asia
Mamuka Kordzakhia
4L2M
Donor: Ron Lowrance, K4SX

Europe
Carlo Bavecchi
I5JVA
Donor: James “Skip” Riba, WS9V

Africa
Manuel Angel Martin Brito (EA8DO)
ED8W
Donor: John Rodgers, WE3C

Asiatic Russia
Vladimir Falshunov
R8WF
Donor: Steven “Sid” Caesar, NH7C

North America
Daniel Flaig
NP2J
Donor: CQ magazine — K2EEK Memorial

South America
Mario Andraca
LU8DPM
Donor: John Rodgers, WE3C

Oceania
Moh Asrori
YB3BGM
Donor: Steve “Sid” Caesar - NH7C

Southern Hemisphere
H. Soekardi Wibisono
YB9KA
Donor: John Rodgers, WE3C

World Assisted
Ljubo Pintar
S53O
Donor: K9HMB Memorial by Ray Sokola, K9RS

Asia Assisted
Sergey Moskaev
R8TT
Donor: Chuck Dietz, W5PR

Europe Assisted
Dr. Laszlo Radocz (HAØNAR)
HGØR
Donor: Curtis Rose, N2ZX

U.S.A. Assisted
John Bednar
K3CT
Donor: Pete Michaelis, N8TR

U.S.A. Assisted — Zone 4
Bud Foster
K4ISV
Donor: Pete Michaelis, N8TR

World Low Power
Brian Campbell
VE3MGY
Donor: Steve Molo, KI4KWR

U.S.A. Low Power
Edward Sawyer
N1UR
Donor: Tim Duffy, K3LR

Europe Low Power
Vaclav Urban
OK1LRD
Donor: Contest Club Ontario

Assisted Europe Low Power
Simon Kopmajer
S54ZZ
Donor: John Rodgers, WE3C

Canada Low Power
Greg Foster
VE3PJ
Donor: Rudy Bakalov, N2WQ

World QRP
Maksim Kesic
E77Y
Donor: John Rodgers, WE3C

MULTI-OPERATOR

World
Station OK7K
(OK1BN, OK1GK, OK1NP, OK1NS, OK1VAO, OK3RM ops)
Donor: CQ 160 Contest Committee

U.S.A.
Station K1LZ
(K1LZ, W1ADI, K3JO ops)
Donor: Jerry Rosalius, WB9Z, and Val Hotzfeld, NV9L

Europe
Station HG8DX
(HA8DU, HA8DZ, HA8FM, HA8KW, HA8RT ops)
Donor: South Jersey DX Assocation, N2CW

USA Zone 3
Station N7T (@NA7TB)
(N7NR, K9DR, KY7M ops)
Donor: Paulo, PV8DX

Zone 16
Station EW5A
(EW1NY, EU4A, EW6W, EU4CK, EW8Y ops)
Donor: Valery Zhitkovic, EW6W

Skyhooks: Simple vertical of HBØ/DL3DXX (top) and huge tower of K1LZ.

2022 CQWW 160M CONTEST CLUB SCORES

(Minimum of 3 three entries required for listing)

SCORE	#ENTRIES	CLUB
28,533,583	221	BAVARIAN CONTEST CLUB
11,573,440	157	POTOMAC VALLEY RADIO CLUB
9,794,421	119	FRANKFORD RADIO CLUB
8,505,311	54	CONTEST CLUB ONTARIO
8,176,611	61	UKRAINIAN CONTEST CLUB
8,041,215	40	RUSSIAN CONTEST CLUB
7,988,752	76	YANKEE CLIPPER CONTEST CLUB
7,537,034	53	RHEIN RUHR DX ASSOCIATION
6,098,479	51	ITALIAN CONTEST CLUB
5,625,142	22	CROATIAN CONTEST CLUB
4,715,302	19	BALTIC CONTEST CLUB
4,419,100	11	BELOKRANJEC CONTEST CLUB
4,213,332	34	SP DX CLUB
4,210,243	30	KAUNAS U. OF TECHNOLOGY RADIO CLUB
4,204,164	20	SLOVENIA CONTEST CLUB
3,678,265	86	SOCIETY OF MIDWEST CONTESTERS
3,539,367	18	EA CONTEST CLUB
3,403,464	18	MAD RIVER RADIO CLUB
3,259,107	22	BELARUS CONTEST CLUB
2,898,979	14	LATVIAN CONTEST CLUB
2,599,498	4	THREE A'S CONTEST GROUP
2,362,158	12	CONTEST CLUB SERBIA
2,176,011	13	CZECH CONTEST CLUB
2,122,131	6	CHILTERN DX CLUB
1,966,266	32	ARIZONA OUTLAWS CONTEST CLUB
1,902,400	9	HA-DX-CLUB
1,874,278	17	CONTEST CLUB FINLAND
1,747,282	31	FLORIDA CONTEST GROUP
1,673,042	56	DEUTSCH AMATEUR RADIO CLUB
1,626,115	24	SOUTH EAST CONTEST CLUB
1,568,506	16	NORTH COAST CONTESTERS
1,446,024	5	UA2 CONTEST CLUB
1,431,887	44	MINNESOTA WIRELESS ASSN
1,290,802	5	SOUTH URAL CONTEST CLUB
1,216,090	10	CONTEST GROUP DU QUEBEC
1,207,863	5	MILARA CONTEST CLUB
1,167,924	24	TENNESSEE CONTEST GROUP
1,148,992	9	DANISH DX GROUP
994,878	24	HUDSON VALLEY CONTESTERS AND DXERS
976,425	5	GIPANIS CONTEST GROUP
968,702	6	BOSNIA AND HERZEGOVINA CONTEST CLUB
906,049	5	GM DX GROUP
896,896	3	CENTRAL SIBERIA DX CLUB
869,500	7	MARITIME CONTEST CLUB
841,118	4	RSGB CONTEST CLUB
827,514	6	URAL CONTEST GROUP
817,888	20	SOUTHERN CALIFORNIA CONTEST CLUB
808,443	8	NIAGARA FRONTIER RADIOSPORT
780,306	5	ALRS ST PETERSBURG
770,476	9	ALABAMA CONTEST GROUP
763,644	3	LA-DX-GROUP
755,920	24	NORTHERN CALIFORNIA CONTEST CLUB
747,548	3	TALL TREES CONTEST GROUP
738,726	13	CENTRAL TEXAS DX AND CONTEST CLUB
734,057	14	KENTUCKY CONTEST GROUP
659,994	3	FAZENDA ACTIVITY CONTEST GROUP
653,848	14	GRAND MESA CONTESTERS OF COLORADO
621,882	12	RUSSIAN CW CLUB
607,492	12	VERON
543,166	5	VRHNIKA CONTESTERS
497,166	3	CONTEST CLUB BELGIUM
493,139	3	CATALONIA CONTEST CLUB
437,356	3	WORLD WIDE YOUNG CONTESTERS
425,790	9	WILLAMETTE VALLEY DX CLUB
393,623	3	RTTY CONTESTERS OF JAPAN
391,589	3	OK QRP CLUB
388,210	19	DFW CONTEST GROUP
382,591	8	SWAMP FOX CONTEST GROUP
361,273	6	INTEREST GROUP RTTY
351,966	8	CAROLINA DX ASSOCIATION
347,659	5	LKK LVIV SHORTWAVE CLUB
345,009	7	BRISTOL (TN/VA) ARC
339,991	10	KANSAS CITY CONTEST CLUB
339,055	8	THRACIAN ROSE CLUB
322,039	11	ORCA DX AND CONTEST CLUB
319,153	7	ORDER OF BOILED OWLS OF NEW YORK
317,611	4	RIIHIMAEN KOLMOSET
313,590	3	RC THREE VICTORIA
307,586	4	BAY AREA DXERS
288,952	4	BIG SKY CONTESTERS
234,096	4	RRC
225,647	4	NORTH CAROLINA DX AND CONTEST CLUB
224,500	3	WYTHALL AMATEUR RADIO CLUB
218,421	3	VYTAUTAS MAGNUS UNIVERSITY RADIO CLUB
217,655	5	SK5AA VASTERAS RADIOKLUBB
214,293	3	IVANOVO DX CLUB
184,230	3	TURKISH RADIO AMATEUR CLUB
174,184	3	RADIO AMATEURS OF NORTHERN VERMONT
169,068	3	DONBASS CONTEST CLUB
165,862	3	SKYVIEW RADIO SOCIETY
163,676	5	SOUTHERN OSAKA CONTEST CLUB
156,450	3	SK6QA HISINGENS RADIOKLUBB
154,596	5	SHENANDOAH VALLEY WIRELESS
151,051	3	599 DX ASSOCIATION
146,718	10	WESTERN WASHINGTON DX CLUB
142,662	3	CS PETROLUL PLOIESTI
137,880	4	CTRI CONTEST GROUP
137,578	4	SOUTH JERSEY DX ASSOCIATION
135,565	5	OKAYAMA DX CLUB
133,592	3	DEEP DIXIE CONTEST CLUB
132,140	4	IOWA DX AND CONTEST CLUB
122,938	7	ROCHESTER DX ASSOCIATION
116,464	4	5NNDXCC
115,446	3	GERMAN DX FOUNDATION
112,857	4	NORTH TEXAS CONTEST CLUB
111,548	3	BINGHAMTON AMATEUR RADIO ASSOCIATION
77,731	7	RU-QRP
76,989	3	MOTHER LODE DX/CONTEST CLUB
75,328	4	HEARTLAND DX ASSOCIATION
73,650	7	NE MARYLAND AMATEUR RADIO CONTEST SOCIETY
72,538	7	SPOKANE DX ASSOCIATION
58,170	3	SHARKS DX TEAM
57,466	4	PROVIDENCE RADIO ASSOCIATION
52,137	3	ECHELFORD ARS
46,579	3	TEXAS DX SOCIETY
46,110	3	RUSSIAN DIGITAL RADIO CLUB
43,027	7	ARCK
41,517	3	CLIPPERTON DX CLUB
41,390	10	KEYMEN'S CLUB OF JAPAN
34,822	4	VLADIMIR CONTEST CLUB
33,215	6	METRO DX CLUB
32,352	3	KOREA DX GROUP
32,233	3	SASKATCHEWAN CONTEST CLUB
22,591	3	URE BAIX CAMP
22,403	3	FORT WAYNE RADIO CLUB
22,370	4	PACIFIC NORTHWEST VHF SOCEITY
18,534	3	HILLTOP TRANSMITTING ASSOCIATION
17,485	7	ARAUCARIA DX GROUP
16,800	3	ALBERTA CLIPPERS
16,039	3	SHARP HAM CLUB
8,483	4	HAMPDEN COUNTY RADIO ASSOCIATION
7,609	3	CLUB DE RADIO EXPERIMENTADORES DE OCCIDENTE
7,473	3	NEW PROVIDENCE ARC
1,130	3	BT CW CLUB
382	7	7ADXCC
294	3	ORARI LOKAL BLITAR
253	6	ORARI DAERAH NTB
212	4	YB-LAND DXING PASSION IS
184	4	ORARI LOKAL BOGOR
172	5	ORARI LOKAL KEDIRI
124	4	CABREUVADX
50	4	CIMAHI CONTEST CLUB

The very capable and inexpensive NanoVNA vector network analyzer has become very popular among hams. But it's very delicate as delivered and it comes without instructions. WA9PYH solves both of these problems.

Protect Your NanoVNA

Plus, a "Cheat Sheet" for Making Common Measurements

BY JIM KOCSIS,* WA9PYH

Like many amateurs, I purchased a NanoVNA[1] after reading an article about these tiny network analyzers. I purchased the most inexpensive unit I could find ($65 on Amazon) and later purchased an enclosure for it (a unit made on a 3-D printer for $11 on Amazon). I experimented with it for a while and was very impressed when measuring the SWR on several antennas. It produced results equal to those of my Rig Expert AA-170. Then, after watching some YouTube videos by Alan Wolke, W2AEW, I saw the true power of this little unit. You can measure way more than just SWR.

However, after a short time, I also noticed how delicate the unit is, especially the two SMA connectors. I could see myself pulling on the attached cables and pulling the connectors off or breaking the internal connections. If an adapter is used to mate it to a heavy coaxial cable, the weight of the cable could do some significant damage. Three hands would be required — one to hold the VNA, another to operate the stylus, and a third hand to hold the heavy cables. During calibration the supplied SMA connectors (load, short, open) take considerable time to attach and detach. The supplied dual male-to-male connector used during calibration seems determined to roll away. If you've spent time with your unit, then you are familiar with these issues. A better "home" for the unit is definitely in order!

The NanoVNA Protective Setup

Photo A shows what came with my unit. *Photo B* shows the additional parts required to build a safe and efficient setup. *Photo C* shows my finished unit. Your unit may vary from this. The parts list is shown in *Table 1*. I rigidly mounted two BNC connectors to interface to the rest of the world instead of SMAs which would require an adapter anyway. The BNCs are noted for good response to UHF and are "quick on / off" with a quarter turn.

Figures 1 and *2* show the details of the clamps used to hold the BNC-to-SMA connectors and how to attach the NanoVNA case to the base. My case has a tiny compartment opposite the connectors. I drilled two holes to attach the case to the base. Heat-shrink tubing is

Table 1. Parts List

1 BNC 50-ohm terminator (Amazon 5 for $8)
1 BNC shorted shell to center pin
1 heat-shrink tubing 1/2-inch diameter, 1-inch long
2 clamps to hold BNCs
1 clamp to hold stylus
2 SMA-female to BNC-female adapters (my unit came with these)
2 SMA-male to SMA-male cable 11-inches long (my unit came with these)
1 copperclad board, cut to size needed (mine measures 4-1/2- x 6-inches
Assorted 6-32 hardware, star washers, flat washers

Photo A. The author's NanoVNA as received from Amazon.

** 53180 Flicker Lane*
South Bend, IN 46637
Email: <WA9PYH@ARRL.NET>

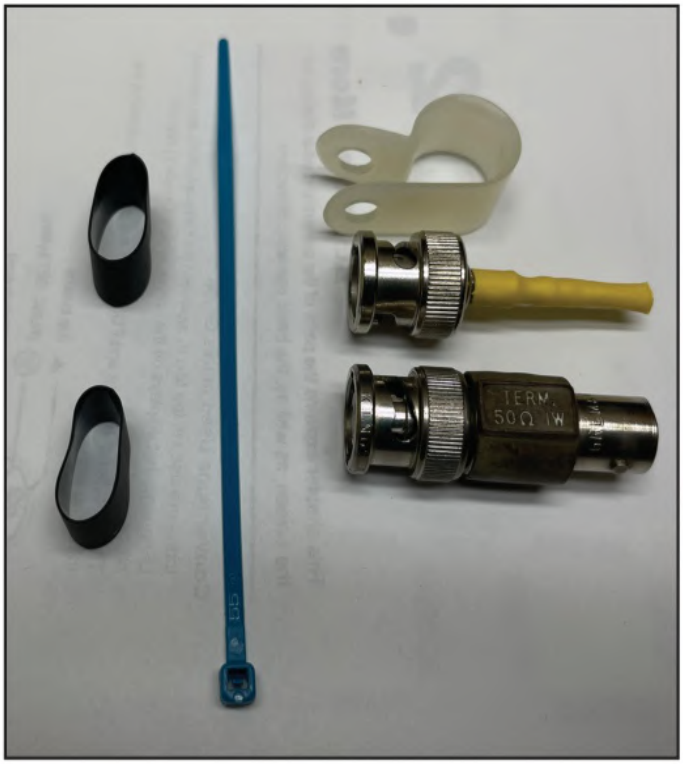

Photo B. New parts added to create a safe and secure case for the NanoVNA; see text for details.

Photo C. The author's NanoVNA installed on its protective platform.

used to increase the diameter of the BNCs so the clamp can securely hold the connector. The screws that attach the clamp to the base should be VERY tight or else it will turn as you attach and detach the BNC cable. Note the parts and their order during assembly. Star washers are used between surfaces to keep the clamps from turning.

Photo B also shows the new calibration connectors — one is a 50-ohm terminator, the other is a shorted BNC. For the open part of calibration, I just leave the BNC open. When using SMAs, you are supposed to cover the connector with an SMA that has no center pin. I read that at very high frequencies, leaving this open can cause inaccurate readings. At my highest test frequency (450 MHz) I found no difference in SWR readings between using SMAs or my setup using BNCs. I don't expect to go much higher than 450 MHz so this is not an issue for me. If you intend to go much higher, you may need to use a BNC without the center pin.

The most expensive part is a 50-ohm terminator. I happened to have one in my junk box but a 5-pack is available on Amazon for $8. In *Photo C*, note that I store the stylus in a small clamp so that it doesn't get lost.

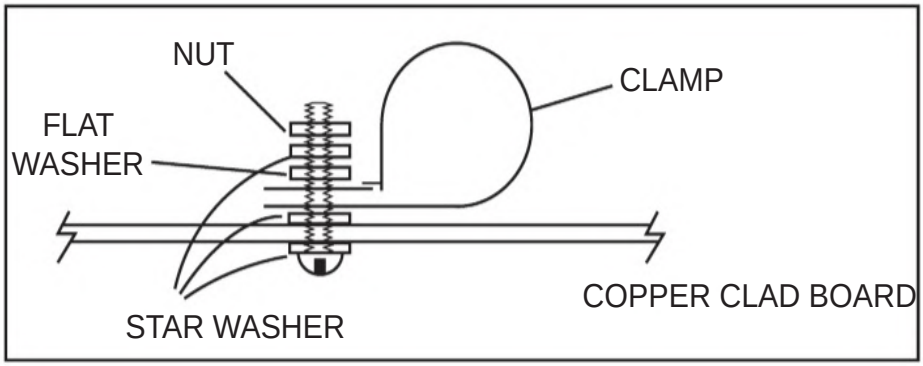

Figure 1. Detail of the clamps used to hold the BNC-to-SMA connectors. (Illustrations by Emily Leary)

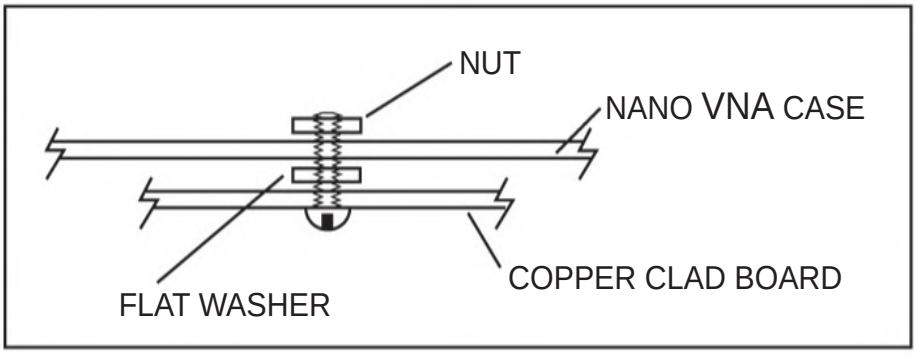

Figure 2. How to attach the NanoVNA case to the base.

Conclusions

I'm happy now that my delicate NanoVNA is safely held and protected from damage. Calibration is much faster with the BNCs because I no longer have to thread and unthread the SMA connectors.

My unit came without any instructions (not even a thank-you note!) so I composed my own from the W2AEW YouTube videos. I found that I cannot

remember how to set it up for SWR, velocity factor measurement, phase shift measurement, etc., as there are many steps. I composed a set of instructions that lists the steps for each kind of test I anticipate running. I had it laminated at Kinkos and keep it with the NanoVNA. Even if you don't own a NanoVNA, check out Alan's videos as he explains RF measurement techniques very clearly.[2]

My Rig Expert unit is getting a little lonely after being replaced by the NanoVNA. The Rig Expert is built very well and has a fixed 50-ohm reference, so damage is much less likely and no calibration is required. I'll keep it as a backup unit. When using the NanoVNA to measure SWR, the curve is updated automatically about once per second so you see the effects of any adjustment (length, etc.) right away — VERY NICE!

The sidebar contains the instruction sheets I've developed for taking various measurements using the NanoVNA.

Notes:
1. <https://nanovna.com>
2. <https://tinyurl.com/bdcnvbzf>

Procedures for Various Measurements with the NanoVNA

The steps that follow for various common procedures probably won't make much sense if you don't have a NanoVNA. However, they should be very helpful if you do. These instructions are based on YouTube videos by Alan Wolke, W2AEW.

SWR

1 - Power on
2 - calibrate, calibrate
3 - short, open, load
4 - done
5 - back, back
6 - display, trace, 1, 2, 3 off
7 - back, back
8 - display
9 - format
10 - SWR
11 - back, back
12 - stimulus
13 - start
14 - 7
15 - M (MHz)
16 - stop
17 - 7.3
18 - M (MHz)
19 - back
20 - connect load
21 - move cursor to dip, read frequency
22 - read SWR @ upper right

MEASURE IMPEDANCE OF COAX

1 - calibrate (same as in SWR)
2 - Smith chart only, display, trace 0, 1, 3 off
3 - stimulus start =50 kHz, stop=300 MHz
4 - reduce stop until curve crosses x-axis only once
5 - use rocker switch (or stylus) to go around curve until it's at x-axis, then fine adjust until it goes back & forth between XC and XL (above x-axis is inductive, below is capacitive)
6 - read resistive component at top: "CH 0 Smith *NNN* ohms X μHy or X pF"
7 - compute Z of coax using Z = SQR (*NNN* x 50 ohms)

MEASURE PHASE vs FREQUENCY

1 - calibrate (same as in SWR)
2 - connect network between CH 0 and CH 1
3 - display
4 - trace, turn off 1, 2, 3
5 - back
6 - format
7 - phase
8 - move cursor to mid declining slope on two successive waves (A & B), note frequencies of each
9 - back, back
10 - stimulus
11 - start A
12 - stop B
13 - move cursor to find phase shifts and frequencies at ±180°

MEASURE LENGTH OF COAX – VELOCITY FACTOR KNOWN

1 - calibrate (same as in SWR)
2 - display
3 - trace, 1, 2, 3 off
4 - back, back
5 - display
6 - format
7 - more
8 - linear
9 - back, back
10 - transform
11 - low pass impulse
12 - transform on
13 - velocity factor (e.g., RG-58A/U is 0.66)
14 - enter 66 x 1 (no decimal point)
15 - attach cable to CH 0 (far end is open)
16 - move cursor to peak: M1: XXX.X ms (N.NNN)....value inside ( ) is length in meters; e.g., physical measurement is 11' 0", calculated is 3.435 meters or 11' 4"; error = 3%

MEASURE VELOCITY FACTOR - LENGTH (X_p) IS KNOWN

1 - calibrate (same as in SWR)
2 - display, trace, 0, 1, 2 off
3 - back, back
4 - connect cable to CH 0 and CH 1
5 - stimulus, start 50 kHz, stop 200 MHz
6 - keep changing stop frequency higher or lower so you see 2 complete cycles
7 - use cursor to find the frequencies of 2 adjacent points — either peak (+180°) or valley (-180°)
8 - use rocker switch to find the exact frequency at each point
9 - Freq 1 – Freq 2 = delta F
10 - X_e is the electrical length = 300/delta F
11 - X_p is the physical length in meters
12 - Velocity Factor = X_p / X_e e.g. delta F is 57.34 MHz, length is 3.435 meters; therefore: velocity factor is 3.435 / 5.232 = 0.656

MEASURE FILTER RESPONSE (LOW PASS, HIGH PASS, BAND PASS)

Calibrate as follows (*Note: it is different from the others*)
1 - calibrate, calibrate
2 - short, open, load
3 - connect load to channel 1
4 - isolation
5 - connect channel 0 to channel 1 using a short cable
6 - thru
7 - done
8 - display, traces 0, 2, 3 off
9 - back, back, adjust stimulus for desired frequency range

math's notes

BY IRWIN MATH,* WA2NDM

An Active Antenna Project

Recently, I uncovered an old shortwave receiver I had loaned to my granddaughter many years ago when she exhibited an interest in amateur radio (which unfortunately she did not pursue). This was an old Hallicrafters S-38 that was one of my very first shortwave receivers that I kept for "old times sake." A quick check indicated that the radio still seemed to work but a short length of hookup wire connected to the antenna terminals left much to be desired in terms of what could be received on the shortwave bands. Obviously, it needed a decent antenna but the task of stringing a longwire at my present home was not practical as I did not plan to really use it regularly. I was curious, however, about what an "old timer" could actually do. A solution that came to mind was to try an "active antenna" which might not only solve the longwire antenna support problem but might possibly give good results and be an interesting project as well. When I finished thinking about this, I thought I would pass on the results of my endeavor for the benefit of others who might wish to duplicate it.

To begin with, it is a fact that any short antenna significantly less than a quarter-wave in length has a high impedance and, when connected to the typical low impedance antenna input of a shortwave radio (which is usually from around 50 ohms to several hundred ohms), will perform poorly due to the losses of this mismatch. Therefore, the trick to using short antennas effectively is to provide a way to transform the high impedance of such antennas down to something much lower without losing signal. This can be done with a so-called "active antenna." Not wanting to disturb or modify my actual radio, I decided to accomplish my efforts externally.

Since I wanted to do everything outside the receiver, I decided to build my active antenna and power supply in a couple of small aluminum mini-boxes I had on hand. Operating power could then be provided by either a simple 9-volt battery (in the same housing as the "front end") or from a separate external power supply driven from the AC line. This would also allow the front end of the active antenna to be located at some convenient distance away from the receiver. Then the same coax conveying the antenna signals could also be used to provide operating power to the active antenna circuit as well. *Figures 1* and *2* are schematics of the final results, which wound up to be somewhat more elaborate than I expected.

Beginning with *Figure 1*, Q1 is a low-cost common JFET transistor such as the popular MPF-102 or the lower noise J310. The gate of this device presents an impedance that is so high that for all practical purposes the actual input circuit impedance (between the gate and ground) is solely determined by the value of the 1-megohm resistor. As a result, the signal from the antenna is not significantly loaded and appears at the source (of the FET) at a lower impedance. This circuit configuration is commonly known as a source follower. The two diodes across the input, by the way, are used to block any high voltages that might occur at the antenna from damaging the gate of the FET. The resulting FET source signal is then applied to Q2, a common NPN transistor con-

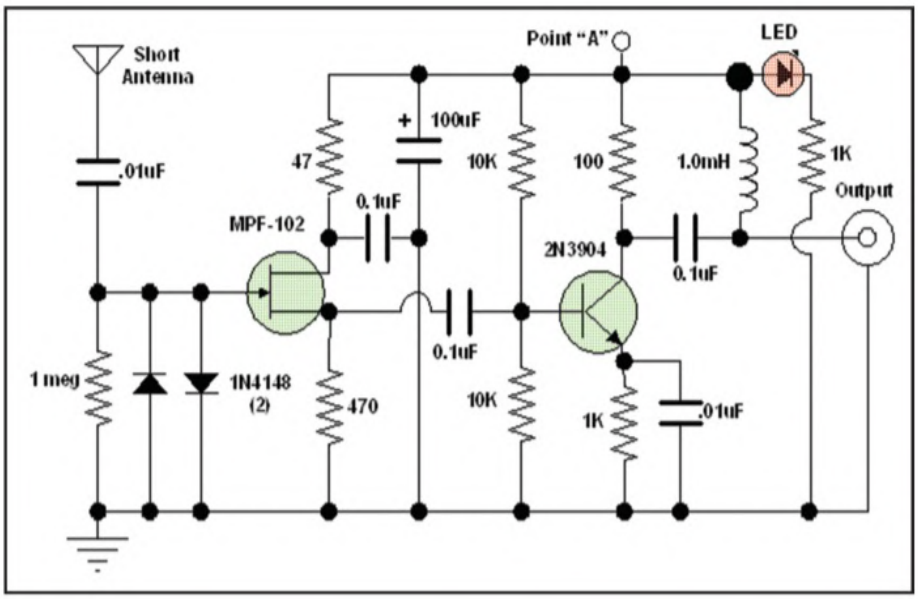

Figure 1. Active antenna "front end" schematic

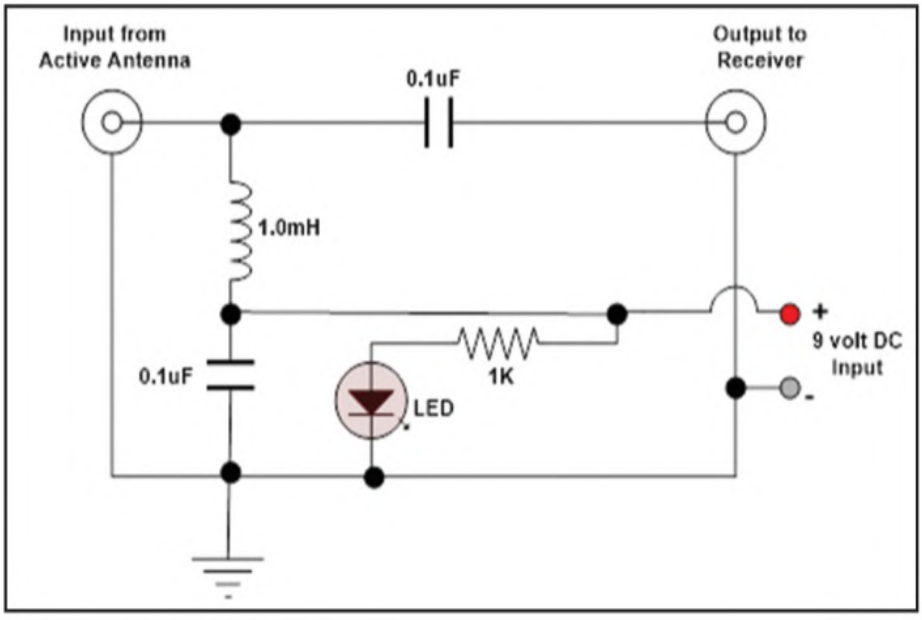

Figure 2. Power supply for active antenna

*c/o CQ magazine

nected as a simple common emitter amplifier stage. This provides an output (with a gain of about 10) that can easily drive the receiver's antenna input. You will also note that I have included an indicator LED to show when power is present. This is optional but handy if you plan to locate the active antenna portion away from the receiver.

Figure 2 is a schematic of the remote power supply portion which is built in a second mini-box. When you compare both schematics, you will note that the RF from the active antenna circuit is passed straight through the power supply portion directly to the receiver's input. Connected at both ends of the RF path, however, are also RF chokes. DC power applied to the choke at the power supply side passes right through it and onto the coax but RF present on the coax (from the active antenna) is not affected by the power supply. In the active antenna circuit, DC power from the coax again passes through the RF choke to power the circuit but RF is also blocked at this point and "stays" in the coax. A capacitor is also included in the power supply side to prevent any DC from inadvertently passing to the receiver's antenna circuit. An indicator LED is also provided in this section to show the presence of operating power. Finally, the whole assembly is powered by a common low cost 9-volt DC wallwart. Since the operating current the circuit requires is only 20 to 30 mA, almost any wallwart you may have in your junk box should suffice. Not that there is no regulator so be sure to keep the input to around 9 volts.

For those who wish to use a 9-volt battery alone, all you must do is to eliminate the RF choke in *Figure 1*, connect the positive lead of the 9-volt battery to point "A" on the schematic and the negative lead of the battery to ground and then eliminate all of *Figure 2*. Then simply connect the output of *Figure 1* directly to the receiver's input. It would also be a good idea to include a power switch in series with the battery.

Antenna Options

For the choice of the actual antenna, you could use a length of rigid wire anywhere from 3 feet to 6 feet in length. Too long an antenna may pick up "everything," so try to keep the length to something that gives good results with the signals you are trying to receive without overloading the receiver. A good idea is to use a telescoping antenna such as the ones sold for receiver replacement purposes or even a length of straightened coat-hanger wire. You can easily adjust these for best results.

As I mentioned, I mounted the active antenna circuit and power supply in separate small aluminum mini-boxes. I then used BNC connectors for the RF / power connections and 30 feet of RG-58 with matching BNC connectors for the run from the active antenna to the power supply. The power supply was driven by a wallwart that was salvaged from a defunct cordless telephone.

The active antenna assembly was initially tested indoors and then located outside the window of our shack. The antenna that I used initially was just a 3-foot length of straightened coat-hanger wire. Later I experimented with other lengths and finally settled on a 48-inch telescoping "whip" which could be adjusted for best results with the signal I was trying to receive.

The final results were quite impressive (to say the least). The receiver finally "sprang to life" and the major shortwave bands were filled with signals. Not having a longwire for comparison, I can only say that the active antenna beat the "hank of wire" approach by magnitudes. If you repeat all of this you too will be surprised. *– 73, Irwin, WA2NDM*

the listening post

BY GERRY DEXTER

Brazil Renews Activity on 60 Meters

Plus, the Wandering Frequency of Voz Missionaria

~ It seems there is renewed activity on 60 meters from Brazil lately, which is certainly good news. Radio Educadora on 4824 kHz, broadcasting from Tefe; and Radio Aprecieda, broadcasting from Aprecieda on 4925 kHz, have both been reactivated. Odd that both have re-emerged at about the same time and both just slightly off their assigned channels. Let's hope for more.

~ On the not-so-positive side, Voz Missionaria broadcasting from Camboriu has been unstable on and off lately, continues its wayward ways and has approached 9670 kHz, a good 5 kHz off its assigned spot on 9665 kHz.

~ After an absence of several years, WMLK has returned from a former gas station outside Bethel, Pennsylvania with a much-advertised higher power on 9275 kHz and a strong but not-so-high-quality signal.

~ It must be fun living within easy reception range of Radio Vanuatu, aside from enjoying the beaches! What with the coming / going of their third harmonic, which gives them a sort of an unofficial "international service" on 11835 kHz. The second harmonic on 7890 kHz is not quite so widely heard. Let's enjoy it while we can.

Reader Logs

Your shortwave broadcast station logs are always welcome. But please ensure to double or triple space between the items, list each log according to the station's home country and include your last name and state abbreviation after each. Also needed are spare QSLs, station schedules, brochures, pennants, station photos, and anything else you think would be of interest. The same holds for amateur radio operators who also listen to shortwave broadcasts ... I know you're out there! You, too, are also most welcome to contribute.

Here are this month's logs. All times are in UTC. If no language is mentioned, English is assumed.

ALASKA—KNLS via Anchor Point on 9580 at 1402 with a program lineup and then into a song. (Sellers, BC)

AUSTRALIA—Reach Beyond on 9610 via Kununurra at 1256 in English with IS and station ID with a woman opening in Tamil at 1300; on 11875 at 1222 in Nga La with a woman giving postal and internet addresses, short piano, man giving website, station ID and off at 1231; on 12010 at 1154 in Dzonga with man then woman over music, flute, postal address, English address in India, off at 1158. (Taylor, WI) On 9720 with devotional at 1342. (Sellers, BC) On 11875 at 1357 in Bhopuri. (Brossell, WI)

BOTSWANA—Voice of America (VOA) Relay on 15580 via Mopeng Hill at 1927

A few antenna "sticks" at Reach Beyond (Australia's) Kununura site.

More towers, these at Hope Radio on Palau Island.

**c/o CQ magazine*

Feedlines at Vatican Radio's SM Galeria site.

KNLS, The New Life station at Anchor Point, Alaska.

with update on the Russian invasion. (Brossell, WI) At 2106 with program of African music. (Sellers, BC)

BRAZIL—(*All in Portuguese –GLD*)

Voz Missionaria via Camboriu on 9669.4 at 2225 with man and woman reading an announcement, into hymn, frequency drifts and is nearly up to 9670 now. (Taylor, WI)

Radio Brazil Central via Goiania on 11815 at 0031 with nice station ID, several man and woman in a discussion followed by music program at 0100. (D'Angelo, PA) Heard at 2306. (Brossell, WI)

CANADA—Bible Voice, on 11590 via Uzbekistan at 1321 in Korean with man talking and music. (Taylor, WI)

CHINA—China Radio International on 9550 via Beijing at in Vietnamese at 1337; on 11955 via Kunming in Malay at 1320; on 17880 via the Mali relay in Arabic at 1653. (Brossell, WI) On 11640 via Beijing with a strong signal at 1430 with traditional music in Tagalog; on 15160 via Jinhua at 0100 with woman speaking in Mandarin. (Barton, AZ) On 11640 via Mali at 2103 with news in English. (D'Angelo, PA)

Nei Menggu PBS on 9520 via Hohhot in Mandarin at 1209 with a very long talk. (Brossell, WI)

CUBA—Radio Havana Cuba on 13700 via Batua in Spanish at 1300, vocal bit, news, spurs noted on 13632 and 13767. (Taylor, WI)

EGYPT—Radio Cairo on 9900 via Abis in Arabic at 2123 but completely distorted / unreadable. (Brossell, WI)

ENGLAND—BBC on 12065 via Woolferton at 2129-2200* with special transmission to Antarctica, "Greetings from family, friends to those stationed there." (D'Angelo, PA)

ESWATINI (Swaziland)—Trans World Radio on 15105 via Mpangela Ranch in Lingala at 1905. (Brossell, WI)

FRANCE—RFI on 11995 via Issioudun in French at 1726. (Brossell, WI)

GUAM—Trans World Radio on 7510 via Agana in Korean at 1541 with closing announcements and off at 1543. (Sellers, BC) On 9000 via Agana in Kazakh at 1440. (Brossell, WI) At 1228 with IS and woman opening in the Karen language. (Barton, AZ)

Adventist World Radio on 12070 via Agat at 1452 with closing announcements mentioning Guam and AWR. (Sellers, BC)

HAWAII—WWVH on 10000 via Kokole Point with a woman giving the full station ID at 0859; WWV not noted. (Taylor, WI)

INDIA—All India Radio on 15030 via Bengaluru in the Dari language at 1347. (Brossell, WI)

Trans World Radio India on 12075 via Armenia in Hindi at 1354. (Brossell, WI)

IRAN— VOIR on 6060 via Zahedan in Arabic at 0142 with possible Friday sermon. (Taylor, WI)

JAPAN—Radio Japan on 11625 in Japanese at 2043 with two men talking. (Sellers, BC) On 11815 via Yamata with English newscast at 1400 on U.S.

The big guns pumping out Hope Radio from Palau.

President Joe Biden's Asian visit; into Burmese at the half hour. (Barton, AZ) Heard at 1401. (Sellers, BC)

Radio Nikkei One on 6055 via Nagara at 1330 with Japanese pop music. (Barton, AZ)

MALI—RTV Mali via Bamako on 5995 in French at 2341 with man talking and music program. (D'Angelo, PA)

MALAYSIA—Wai FM on 11665 via Kajang at 1325 in Malay with local contemporary ballads. (Taylor, WI)

MADAGASCAR—Madagascar World Voice / World Christian Voice on 9765 in Portuguese at 2121. (Brossell, WI)

MWV/Radio Feda on 13710 in Arabic at 2006. (Brossell, WI)

NEW ZEALAND—RNZ Pacific on 15720 via Rangitaiki with news at 2103. (Sellers, BC)

NORTH KOREA—Voice of Korea on 9435 in English at 1311 and 1511 with news in English; on 9650 at 0830 with soprano singing, woman speaking in Japanese, reopened in Japanese again after IS at 0900. (Barton, AZ) On 13760 via Kujang at 2100, with IS, station ID, and anthem at 2101. (Sellers, BC)

KCBS on 15180 in Korean at 1223 with man talking, DPRK opera. (Taylor, WI)

OPPOSITION—Dimtse Woyane (via France to Eritrea) on 11570 with man speaking in Tigrinya and several remote reports, long discussion, then instrumental, the carrier cut at 0456. (D'Angelo, PA)

Echo of Hope/Voice of Hope (South Korea to North) on 9095 in Korean at 1110, //3985, 4880 under jammer, 6245 and 6350 both also jammed, (Barton, AZ)

Nippon No Kaze (via Taiwan to North Korea) on 7295 in Korean at 1332. (Brossell, WI)

Radionyi Diree Shaggar (via France to Somalia) on 15330 in Somali at 1618. (Brossell, WI)

Radio Tamazuj (via Vatican to South Sudan) in the Sudanese Arabic. (Brossell, WI)

Denge Welat (via Moldova to Turkey) on 11530 in Kurdish at 1419. (Brossell, WI)

PALAU ISLAND—Hope Radio on 9965 via Medorn at 0843 with woman ending an evangelical message, internet address, station ID, postal address in Morgantown, off at 0853. (Taylor, WI)

PHILIPPINES—Radio Pilipinas on 15190 at 1915 in Tagalog, man and woman talking then man with "Voice of the Philippines" station ID at half hour, into female vocals and cut in mid-song. (Barton, AZ)

Far East Broadcasting on 12120 via Bocaue at 1250 in the Naga language, after 1300 in the Liau language with female vocals. (Barton, AZ)

PIRATES—Wasteland Radio on 6955 upper sideband (u) at 0207 with dense electronic stuff, some unintelligible words, station ID, Slow-Scan TV (SSTV), mentions of Outhouse, more electronics. KRAP on 6925u at 0152 with instrumental music, station ID, progressive rock. Cool Jazz (via Mix Radio) on 6860u at 0037wth mellow jazz and lots of light jazz. (Taylor, WI)

Goat Herder Radio on 6925u at 0011 with piano, guy saying he can't play one, reading posts from HF Underground. Good Time Radio on 6940 at 0016 with jazz / rock and dog barks. (Hassig, IL)

PREVIOUSLY REPORTED PIRATES—Wolverine Radio, Corn Desert Outpost, WTF Worldwide, WANK, Captain Morgan, Pee Wee, WHIZ, Ballsmacker, Skippy Radio, Sycko Radio, Wasteland Radio, WDOG, Mix Radio.

ROMANIA—Radio Romania Intl. on 7375 via Galbeni at 0140 in French with the usual IS and close at 0200. (Barton,

AZ) On 11650 via Tiganesti at 2057 with IS opening in Spanish, man reading the station ID, woman reading the news. (D'Angelo, PA) Also heard at 2045 with a discussion on energy. (Sellers, BC)

SAUDI ARABIA—Al-Azim Radio on 11745 via Jeddah with Arabic talks, light instrumental music, ending program at 2359, then another man introducing a vocal. (D'Angelo, PA) Also heard at 1356. (Brossell, WI)

SAO TOME—VOA Relay on 15460 via Pinheira in Shona at 1706. (Brossell, WI)

SINGAPORE—BBC-Far East Relay on 12025 via Kranji at 1512 with an interview. (Sellers, BC)

SOUTH KOREA—KBS World on 15575 via Kimjae signing on in Spanish at 0200. (Barton, AZ) Heard at 1355 with hip hop, closing announcements at 1400 in Korean. (Sellers, BC)

SPAIN—REE on 15520 via Noblejas at 2200 beginning English (Monday, Wednesday, Friday) also good on 17855; Harmonics on 11670 and 11940 were barely audible. (Sellers, BC)

SRI LANKA—SLBC on 11905 via Trincomalee with O/C at 0028, instrumental music, group singing, woman reading a station ID, announcements in the Bangla language, and EZL music. (D'Angelo, PA)

SWEDEN—IBRA / Radio Sama on 11965 in the Tigrinya language at 1730. (Brossell, WI) On 15510 via Woofferton at 1730 with mix of music and talk in the Fulfulde language. (Barton, AZ)

TAIWAN—Radio Taiwan Intl. on 9405 via Danshui signing on at 1600 with English program, station ID, and welcome. (Sellers, BC)

THAILAND—Voice of Thailand on 12045 in Thai at 0030 with children's choir. (Barton, AZ) On 15590 via Udan Thani with English news, ads, promo, and several station IDs. (D'Angelo, PA)

UNITED STATES—Voice of America on 11570 via the Northern Marianas relay at 1443 in Korean; on 11660 via the Philippine Relay in Mandarin at 1414; on 15260 via Woofferton in Swahili at 1647. (Brossell, WI) On 12045 via the Thailand Relay at 1430 in Korean; Harmonic on 12080 a minute out of sync; on 17700 via Vatican in Hausa at 1500, IS at 1511, and an apparent magazine program. (Barton, AZ)

Radio Free Asia, on 12140 via the Northern Marianas relay at 1230 in the Khmer language, English station ID then announcing the next program would be in Burmese. (Barton, AZ) On 13580 via Tajikistan at 1229 in Tibetan and music bridge to man and woman talking alternately, Harmonics on 13640 and13805 were jammed. (Taylor, WI)

WMLK on 9265 via Bethel returning to shortwave with a new transmitter and much higher power. Even so, still with a crappy signal; Elder Meyer giving a religious message at 1930, station ID by man at 2300. (D'Angelo, PA) On 9275 at 2156 with piano, hymn, full station ID including postal address, instrumental hymn, off at 2200, carrier off at 2201. (Taylor, WI)

Adventist World Radio on 11790 via Germany at 2039 with woman speaking in Yorba, station ID at 2040. (Sellers, BC) On 17720 via Germany in the Oroma language at 1730 with interesting vocals at the quarter hour. (Barton, AZ) On 17570 via Madagascar in the Moore language. (Brossell, WI)

VANUATU—Radio Vanuatu via Port Vila on 11835 (third harmonic) at 0834 with man and woman talking and U.S. oldies. (Taylor, WI)

VIETNAM—Voice of Vietnam on 11885 at 1605 with news by woman; on 12020 via Sontay in Indonesian at 1331 with woman reading the news; no harmonic on 9840 which was in an Asian language. (Sellers, BC) At 1430 nearly buried under co-channel RTTY interference. (Barton, AZ).

QSL Quests

Once again, same old same old: Zilch, nada, an empty tank.

As Time Goes By

Radio Eastern Highlands, Garoka, New Guinea Province, Papua New Guinea on 2410 kHz at 1237 UTC in Pidgin English running 2 kilowatts with its domestic service on September 25, 1976.

Quien Sabe

Nothing new here either. There's still that unidentified station periodically noted on 9900 kHz; and I don't mean Radio Cairo!

Just Sayin'

I'm still upset over the coming loss of the World Radio TV Handbook (WRTH). And the lack of any rumors or information about any plans for a replacement. I really thought the WRTH would still be around long after I'm gone.

Thank You!

Many thanks to Mark Taylor, Madison, WI; William Herzog, Mt. Pleasant, IL; Bob Brossell, Pewaukee, WI; Rick Barton, El Mirage, AZ; and Rich D'Angelo, Wyomissing, PA.

emergency communications

BY JOHN FERGUSON,* K3PFW

Is Your Family Ready?

It's September again, and this is the month when we reflect on the lessons learned during the September 11th terrorist attacks and we remember those who lost their lives on that terrible day, both the civilians and the first responders.

September is also National Preparedness Month, and therefore fitting that we take a look at the question, "is your family ready?" We've discussed disasters, we've asked if *you* are ready, and we mentioned that your family had to be provided for before you deploy to an emergency. So, in line with FEMA's publicity push for the month, we will look at getting your family prepared for disaster. Unfortunately, this is more a question of when disaster will strike, rather than if it will. We live just on the edge of having everything we take for granted wiped out in the terrifying aspects of a natural or man-made disaster. Your ability to survive, let alone be comfortable, will depend on how well you and your family have planned for the inevitable. When a disaster strikes your community, the first responders and the relief organizations are not going to get to you immediately. It could be days before the emergency operations and disaster teams can get to you. The ability of your family to survive may solely depend on the planning and preparation you do now. Whether the disaster affects just your family or the whole community, a good plan will help mitigate the personal impact.

The Family Disaster Plan

First, be aware of and discuss with your family what kinds of natural or man-made disasters you can expect. Across the U.S., you can expect the complete range of what an angry Mother Nature and an unsettled earth can deliver. Man-made disasters, fires, explosions, transportation-related incidents and the like can all bring your everyday life and schedule to a screeching halt. Your local emergency management and preparedness organizations can advise you on the most likely disaster types to expect. Naturally, if you and your family have lived in that area for many years, you've probably seen the types to expect, but may not have experienced the possible severity. There is a huge difference in effect between a Category 1 and a Category 4 hurricane, as well as between a 3.0 and 9.0 earthquake. Where floods before were not too bad, decades ago, spreading development will have increased runoff from heavy rains, and flooding can now be more of an issue. Again, pay attention to what is on the national news; disasters of all types are more frequent and more devastating than in former decades.

Evaluate

How will the disasters you are likely to experience affect you and your family? What conditions unique to your situation will complicate your family's ability to react and respond to a disaster? Can you shelter in place, or must you evacuate? If you must evacuate, how will you? Is transportation an issue? Where will you go? Again, watch the national news. As I write this column, thousands of victims are being displaced from their homes and communities by fires in the west and flooding in the middle of the country. Consider their situation and how you would handle it if it happened to you tomorrow.

Think about how family members will communicate if a sudden disaster strikes your community in the middle of a winter work week. Dad is at work on one side of town, mom on the other side, and the kids are in school in another location. How will you all communicate with each other, let alone get reunited? Many families have experienced this situation. According to the Centers for Disease Control and Prevention (CDC), It took nearly six months to reunite 5,290 children with their families after Hurricane Katrina.

Are members of your family group elderly, mobility-impaired, deaf, or blind? How old are the children? Involve them in the discussion if you can. Children view disasters far differently than adults. Their value systems differ from those of adults. For older children and teenagers, be sure to include them in your evaluation and planning activities.

As part of your preliminary planning, talk with your children's school about its emergency plan. Also talk to your employer(s), if you haven't already been informed of the company's emergency plan. For companies over a certain size and type of business, OSHA requires that they have one. Don't be surprised if you're with a smaller company that when asked about its emergency plan, you get the proverbial "deer in the headlights" look. There are many companies that do not have a plan, or even common knowledge of possible disasters. My wife works for a small subsidized housing management company. In 2011 there was a 5.8-magnitude earthquake in Virginia on the western side of Chesapeake Bay. We live on the eastern side of the bay, on the Delmarva Peninsula, approximately 150 miles away from the epicenter. My wife's company's office was an older two-and-a-half-story frame construction building. The tremors were widely felt all over the middle of the eastern seaboard. My wife had spent several

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years in southern California and was no stranger to what an earthquake felt like. When she felt the shaking of the building in her second-floor office, she yelled "earthquake," grabbed her purse, and headed down the steps. Out the door and into the street where she had an interesting discussion with an assistant chief of the local volunteer fire company who had just come out of his office across the street. The president of the company, however, coming out of her office yelled, "we all have to go to the basement." That company still does not have a disaster plan. There was no significant damage from the "quake," neither here or near the epicenter, but a whole lot of panic, and — yes — a few laughs.

Making The Plan

So you've done your research and now it's time to "put pen to paper" and write the plan. You write it so you can share it with family, and have something to direct your activities when time is of essence. Your plan will ultimately consist of several individual plans, like chapters in a book.

Family Communication Plan

I can assume, if you are reading this, you are a communicator. Perhaps the most critical part of your plan will be the Family Communication Plan. It is how you all will be able to locate each other if a disaster hits, as above, with the kids in school and the parents working. Pick a friend or relative who lives outside the area as a primary point of contact. Make contact cards for all the members of the family, listing phone number(s) and email addresses for each family member and the contact person. Laminate them and put one in the children's bookbag. Where possible, list cell phone numbers for texting. Texts will eventually get through, even when it's impossible to make a voice call. As soon as possible after the disaster has struck, have family members notify the contact person of their location and condition. This will be critical information for getting the family back together. Post emergency numbers near any telephone in the house (that is if you still have land-line phones). Add them to the back of the contact cards you will make for your family. Teach your children when and how to call 911. I'm old school; despite my wife and I both having cell phones, we still have wired phones in several rooms of the house. They will continue to work when the rest of the "whiz bang" technology has failed. For a 911-type of emergency at home requiring a quick response, the wired phone is my first choice.

Exit Plan

House fires are probably the most common disaster that families can experience. Make a floor plan of your home, and draw escape routes for all the bedrooms and living areas of the home. Plan some alternates, too. Discuss it with all the residents of the house, then practice it. There's an acronym for this, it's EDITH, Exit Drills In The Home. A critical part of the exit plan is designating a place outside and away from the structure, to meet in case of a fire, like a specific telephone pole or tree. My Deputy ACL, N3ID, has this motto, "that which is not tested will not work." Plans need to be tested, evaluated, and modified if necessary.

Disaster Supply Kit

What will you do if your community is hit with a major paralyzing disaster, like a blizzard or a total and massive power outage? Maybe you are in a small mountain community and get isolated with the loss of a bridge or a landslide. What are you going to do now?

You are going to need water, drinkable water. Bottled water will keep for quite a while, but you would be wise to use and replace it every so often. You also need water for washing and toilet flushing. With lead time you can fill a bathtub with water for general use, but keep small children away from it.

You should already have first aid supplies, but what if a family member or neighbor has been badly injured? An expanded selection of first aid supplies is a "must have" in good disaster preparation. And while you're at it, why not have several family members take a first aid and CPR course? It could save a life, maybe even yours.

You will need food. You may not have electricity, therefore no refrigeration. Do you cook with electricity? If so, now what? If it's winter, you're not going to bring your charcoal grill inside, are you? Not only is it a fire hazard, but a producer of deadly carbon monoxide. Do you see where these issues need to be covered in your planning? Having a stock of non-perishable food items that you rotate so the items don't pass their "use by" dates should be part of your overall preparation. And if you're cooking in a non-traditional way, do you have the appropriate utensils and cookware?

Having a selection of tools and disaster "make-do type" materials will make all the difference in your comfort level while you wait for restoration of services. To be able to temporarily make do and fix small problems is a great asset.

Don't forget sanitary items, prescription medications, and medical appliances. If someone in the family is dependent on life support type devices like oxygen concentrators, do you have an emergency oxygen tank, and are you registered with your electric utility? Do you keep cash on hand? Credit card machines and ATMs may not be working either due to power outage or loss of the internet.

Last, but certainly not least, are the family pets. They ARE part of the family. If their normal routine is abruptly changed, and there is a lot of tension and stress in the home, they too will become stressed. Your disaster plan must include providing for their welfare.

Sheltering In Place

Sometimes the disaster stretches over more than a few days. It's not that long

ago that emergency management recommendations were to plan for three days before some degree of normalcy, in terms of transportation and utilities, would be restored. Well sometimes that just doesn't happen. Here in Sussex County, we've had two major winter weather incidents that were not over in three days; the ice storm of the mid '90s and the double blizzards of 2010. The damage to the power distribution systems from the ice storm — particularly in rural areas — was devastating, leaving some of the more remote areas without power for more than a week. The double blizzard had things shut down for nearly 10 days. I'm sure many of you have similar observations.

Now your needs for food and water can become a major issue. Drinkable water is a high priority. You may be able to use a questionable source of water if you can purify it by boiling, or chemically treating it. Food may have to be rationed. You may want to enhance your disaster planning to accommodate an estimated seven days.

Evacuation

Sometimes staying at your residence is not going to be possible, and your planning should cover the possibility of evacuation to another location. Maybe a relative or friend's house, or when nothing else is available, a disaster shelter. You will have to take with you everything you are going to need for whatever the length of time is that you're unable to return home. Prescription medications for your family members, medically necessary appliances, clothes, money, documentation and identification, and important legal papers. A whole lot of stuff to remember and pack up at a moment's notice, and if your only transportation is the National Guard truck out front, with the driver saying, "get on, we gotta get moving," you grab what you can and get on board.

You will be evacuated to a temporary shelter and provided with shelter, minimal necessities, food, and water. If your plan included a "bug out bag," and you grabbed it on the way out, and it had critically essential stuff, you will thank yourself for having it ready. Mass care shelters are not an upscale bed and breakfast, but they certainly beat the alternatives. Evacuations of large metropolitan or vacation areas can in themselves become a disaster within a disaster. You've probably seen examples in the news. Florida's debacle a few years ago occupied the news for days. When told to evacuate, do so just as soon as you can. Just like Christmas shopping, do it early and avoid the rush.

Disasters at Work or Commuting

OK, so what are you going to do if a sudden disaster hits while you are at work or commuting? Disasters can strike anywhere and anytime, and being prepared definitely gives you an edge. A smaller "bag size" kit for your car, particularly one stocked for cold weather if you live in the northern part of the country, would help during these times. A fast-moving front with snow or freezing rain can turn your commute into a stalled nightmare. Urban areas can and do experience widespread power outages. You're at work in your downtown high rise and suddenly no power, no elevators, no trains, and traffic is in gridlock. You're stuck there.

There is much, much, more information, as well as ideas, hints, and list after list, regarding disaster planning, sheltering, etc. available on the internet. See the sidebar for a few of the many resources out there. Do take the time to look through those listed, and you will find many other resources out there, as well. Knowledge is power, and that knowledge may allow you and your family to make it through any disaster that you unfortunately find yourself in.

Don't Forget the Radio

Ok, so you're a ham, and hams want radios with them, and I haven't yet said anything about "Go Kits" and disasters. Yes, by all means available to you, without putting yourself or your family at risk, be prepared to use your equipment and your skills to provide communications as you can in support of the disaster that you now find yourself in. However, don't be too surprised if your offer of help is met with a bit of skepticism from the hams who may be already working the incident, particularly if you have not been participating with the other hams from the area in local and state communication exercises or had training in disaster communications through any of several regional and national groups. The day of the average ham being an asset, just because he had a radio and can talk to other people that have a radio, is long over. The process of emergency management, the complexity of communications, and the extensive organization that goes into disaster recovery process requires that everybody working the incident has been trained and understands the process.

Next month is *CQ*'s special "Emergency Communication" issue. This column will feature a "Philosophical Approach to Go Kits" as the topic. There are endless lists of what you should have in your "Ultimate Go Kit." You won't find lists here next month. The attempt will be to get you to think through what you need that will fit your style of operating, under the conditions you may encounter, and allow you to be successful. Developing a "Go Kit" is a reflection of you and your operating style, to fit the situations you in which you may find yourself.

– 73, K3PFW

Online Resources for Disaster Preparedness

Children in Disasters
<https://tinyurl.com/ys5asjmh>

Reunification
<https://tinyurl.com/2sh8kf9b>

E D I T H
<https://bkfire.org/exit-drills-in-the-home>

Family and home disaster preparation from Ready.gov
<https://tinyurl.com/bdfdtrs9>

First Aid, AED and CPR
<www.redcross.org>

Pets in Disasters
<https://tinyurl.com/3vzjc7h6>
<https://tinyurl.com/5n76n69p>

Surviving a fire disaster
<https://tinyurl.com/2p953ks2>

Work, School and Community
<https://tinyurl.com/9m95htv7>

Emergency Kit for the Car
<https://tinyurl.com/32b79837>

Bug Out Bag (an interesting study)
<https://tinyurl.com/yckuj9ye>

kit building

BY JOE EISENBERG,* K0NEB

QDX: A Pocket Full of Fun

With the popularity of FT8 and other related digital modes on the rise, there has been an increase in the availability of kits that bring these modes to portable operating. QRP Labs, the brainchild of Hans Summers, GØUPL, is on the right track with the third version of the pocket-sized QDX 4-band digital modes kit. This is not a beginner's kit, but a very rewarding kit once completed.

This "deck of cards"-sized kit is a four-band QRP digital modes transceiver, covering the 80-, 40-, 30-, and 20-meter bands. This kit is about the same size as the ever-popular QCX Mini, but needs no display. There is only one red LED on the front panel, which blinks to indicate what mode the radio is in. The QDX is a software-defined radio (SDR) so there are a lot of surface-mount parts, all of which are already mounted on the board. When you open the parts bag, there are surprisingly few parts for such a sophisticated kit. That does not mean there isn't a challenge to building it. There are just 16 capacitors, six diodes, four transistors, four molded chokes, and one LED, plus the jacks and optional case hardware along with the cores and wire to make the toroids. There are 10 toroids to wind, including a "binocular" style, a round one with 3 taps, and a trifilar toroid.

The good news is the manual is very clearly written and spells out exactly how each is to be wound and how to treat the leads, and in the case of the trifilar toroid, how to properly identify which leads are paired together on opposite sides.

The other challenge is that since there are so many very small surface-mount parts already mounted on both sides of the board, a finer-than-average tip is really needed when soldering this kit. There are many places where the distance from the through-hole pads is very close to an adjacent surface-mount part. In addition, you need to be very careful to not allow any stray solder to fall from your soldering iron tip

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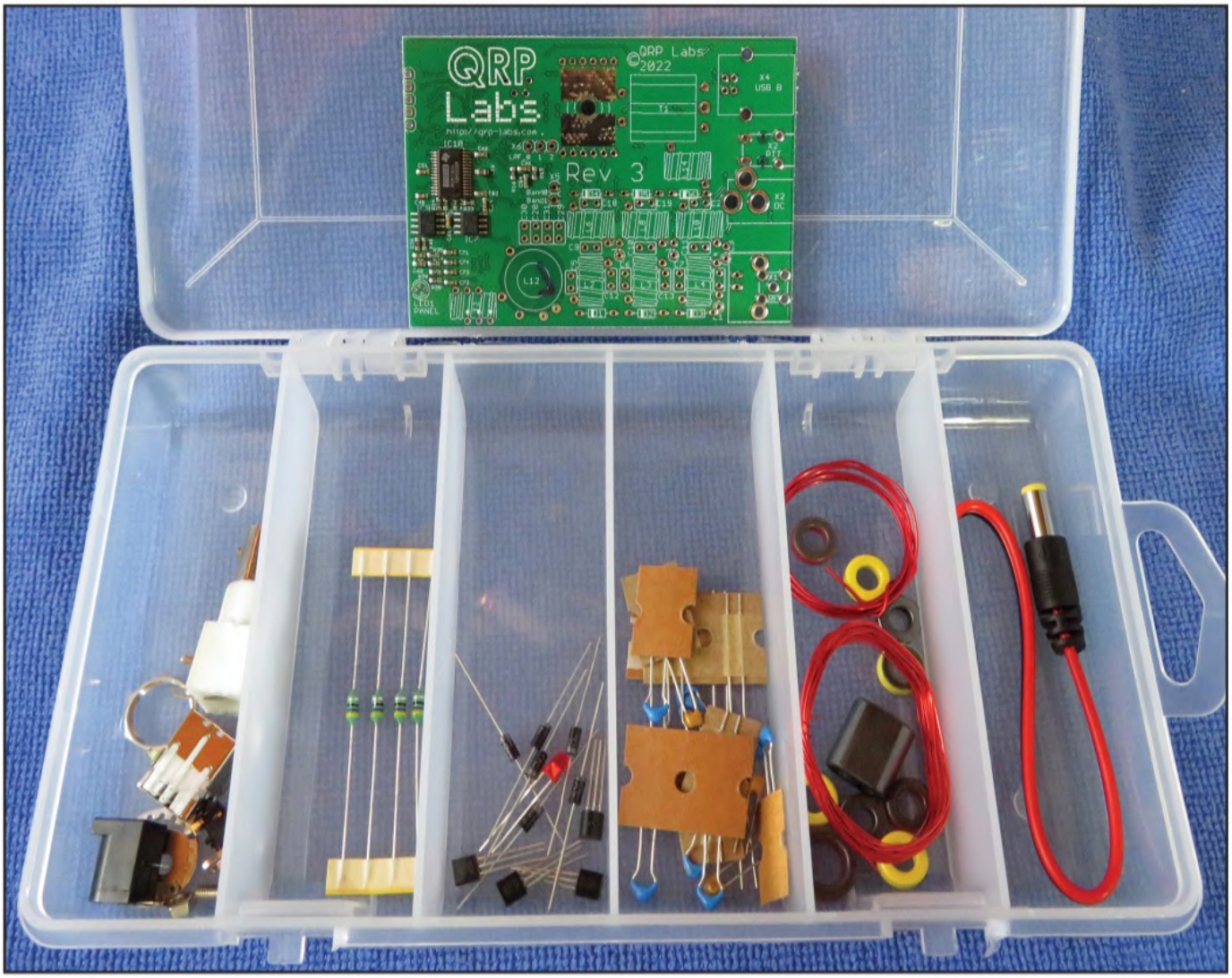
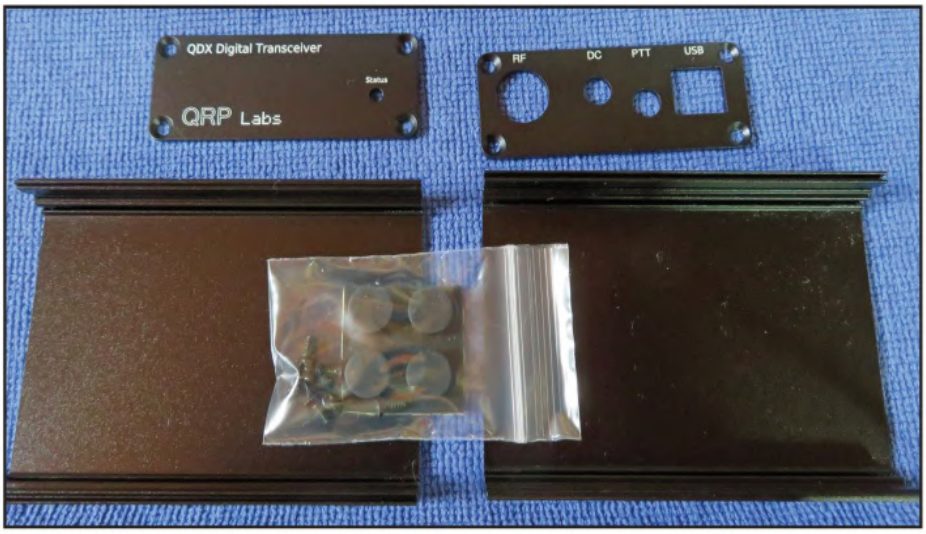
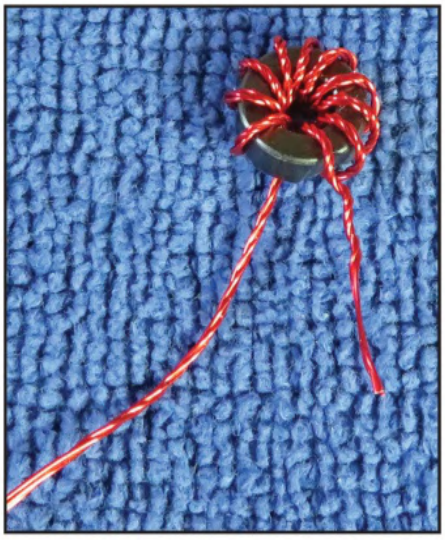
Hamfest Hotline #5855



The QDX 4-band digital transceiver parts ready to assemble. Notice the low parts count, due to all the surface-mount parts already being mounted.



The matching case parts are already drilled and labeled.



The last toroid to be mounted is a trifilar type, which requires three wires to be twisted together. The leads are then separated out, stripped, cleaned, and tested to get three parallel pairs of leads to be mounted. Be sure to do the continuity tests exactly as instructed for this vital toroid to work properly.

The through-hole parts are mounted and one of the toroids, T1 is mounted. I used the 3:2 ratio winding option for lower power output when running up to 12 volts to prevent damage to the output transistors.

onto the areas of the board where these very intricate parts reside.

Building the QDX

Mounting the capacitors comes first. Double-checking the values of each capacitor is a must as some are difficult to read. I used a component tester to check mine before mounting them. An LCR meter would be another way of testing the capacitors to ensure you are mounting them in the correct locations. The diodes, transistors, and molded chokes are all the same value, but care must be taken to ensure they are mounted correctly. Pay attention to the orientation of the diodes as well as the four transistors, which are made to lie flat on the board for use as a heatsink.

There is an option on T1, the binocular toroid, to allow for less output if the kit is powered by up to 12 volts. The QDX can function quite well on 9 volts, so make sure to pay attention to the options on T1 to allow you to use up to 12 volts of input if desired. I did that option of winding T1 at a 3:2 ratio to reduce output power at 12 volts to avoid damaging the output transistors. If you use the kit at 10-volts DC, it will still put out 4 or 5 watts on most bands. The key is to keep the output below 6 watts. Reducing the source voltage to 9 up to 12 volts will not hurt the receive capabilities or stability. It only affects the output power. Note that for the QDX, 12 volts means just that, NOT the normal 13.8 volts we often use for things that run on 12 volts. Many batteries that are marked 12 volts often put out 13 volts or more when freshly charged.

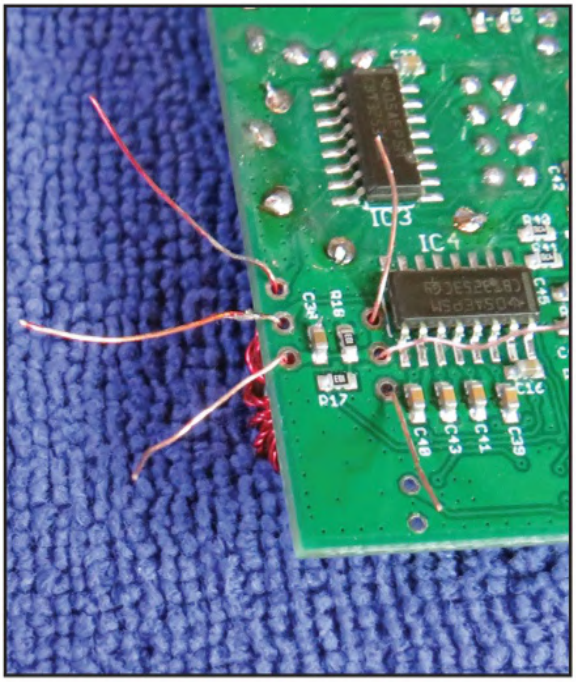
My best advice is to take your time and follow the manual explicitly, as there are very few questions that are not addressed. Each toroid is thoroughly covered and will fit correctly if wound and mounted according to the manual. Be sure to start and end each one the way it is shown. The manual is also very thorough in explaining how this very unique approach to digital modes is accomplished in this kit. Detailed schematics covering all components, not just the ones you install, are described with all the theory behind each stage explained clearly.

The CAT protocol used for interface is the same as for the Kenwood TS-440S, and the operating manual — which is a separate file — has all the details how to configure WSJT-X for use with the QDX transceiver. The interface duties are handled with a single USB cable for both CAT and audio, and the internal sound card interface even shows up as a QDX transceiver in Windows® and other operating systems. FLDigi works with this kit as well if the Kenwood TS-440S interface is chosen. WSJT-X versions for Windows, Mac, and LINUX all work with the QDX.

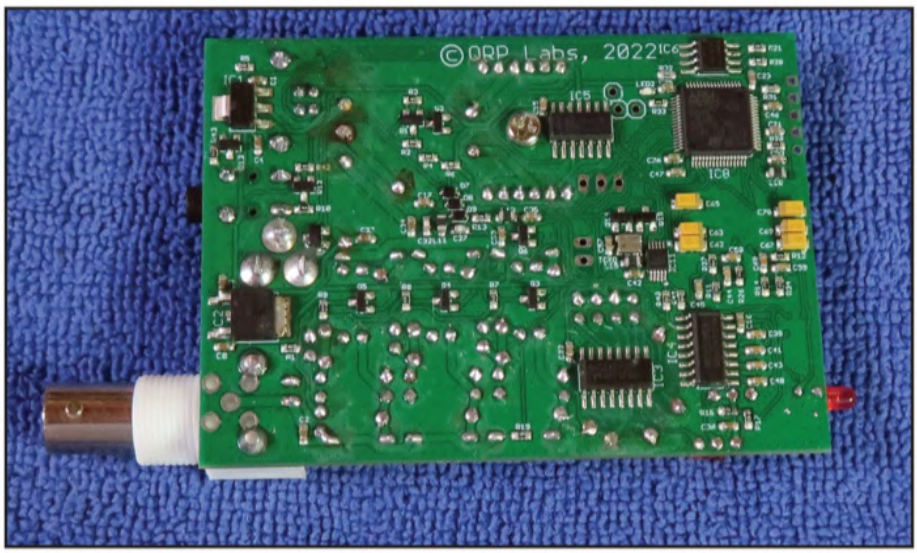
QSY via Software

Because there is no accessible VFO control on the QDX, changing frequen-

The trifilar toroid is then mounted following the manual so that the three parallel windings are placed in the correct holes in proper order. I used a bit higher heat setting on my soldering iron and stayed on the connections a bit longer on this and every toroid to ensure the heat burned off any remaining insulation and the solder had a chance to flow through the hole for the best connection. Note the proximity of adjacent surface-mount parts that need to be avoided to prevent them from being damaged or dislodged by the soldering iron. Use a very sharp soldering tip for this process.



The finished QDX board top side view.



The bottom side of the board reveals more surface-mount components that already are mounted before assembly.

The rear of the finished QDX transceiver.

The front of the finished QDX transceiver case. The finished QDX kit easily fits into a shirt pocket.

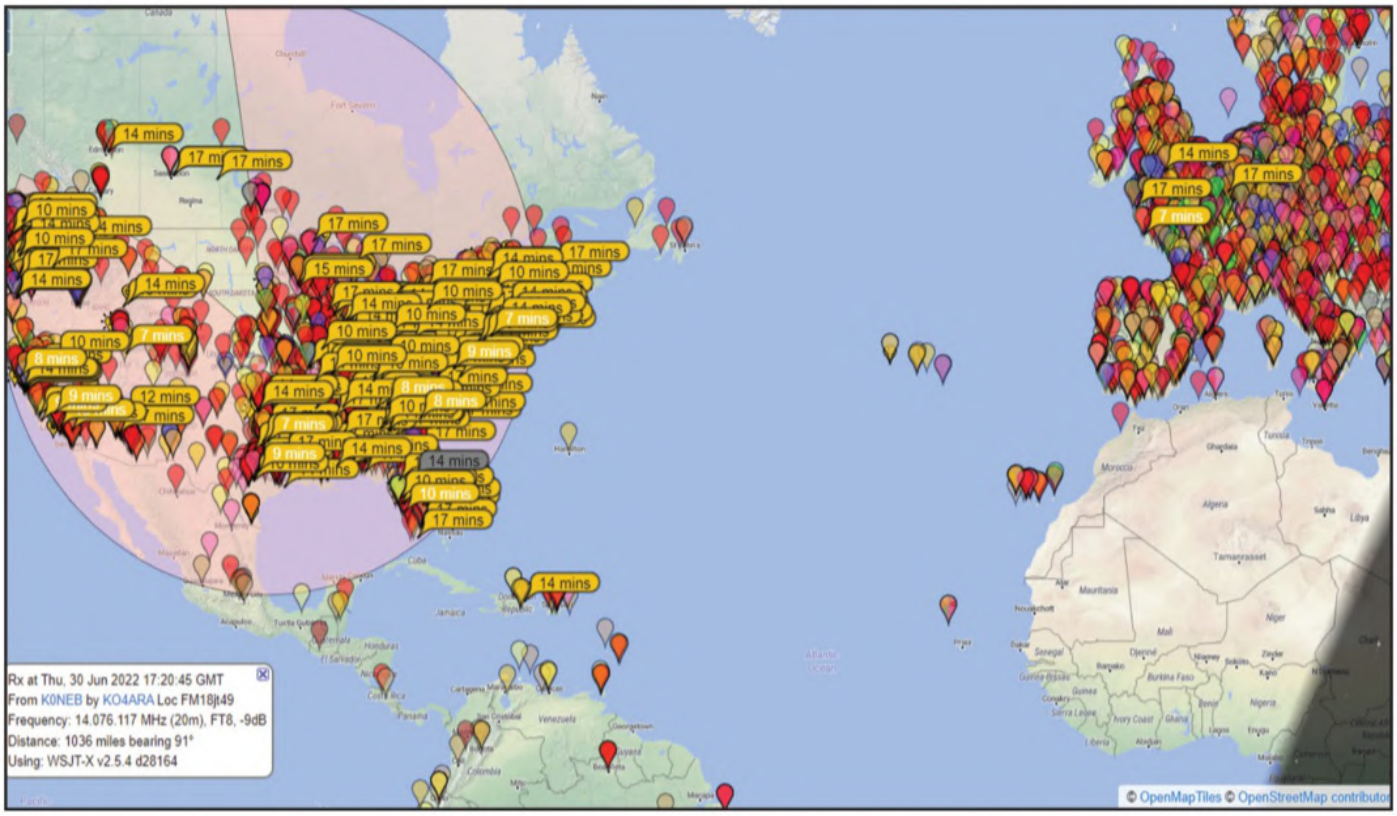
cies and bands is controlled by the digital mode software using CAT commands. WSJT-X, for example, will set the QDX for the proper frequency for each of the digital modes it supports as well as the band if you change bands in the program. There is no alignment required for this SDR, making for a minimum of test equipment to complete the QDX.

The QDX comes with a short power cord with the plug already attached. I simply added to the cord and put Anderson Powerpoles on the end for connection to my sources of 12-volts DC. If desired, you can add a 9- or 10-volt regulator or put diodes, such as a couple of 1N4001s, in series to the power cord to reduce the input voltage if the output RF power is too high. A USB "A" to "B" cord is not supplied, but is a very common cable available in most electronics stores, or you might have one lying around, since it is commonly used to connect to printers, etc. I highly recommend connecting the kit first to a wattmeter connected to a dummy load and once the digital mode software such as WSJT-X is configured, put it in the "tune" mode and see how much RF output is present and be sure to keep it under 6 watts by reducing the input power supply voltage.

The QDX Transceiver is available at <www.qrp-labs.com/qdx.html> for $69 plus the case (HIGHLY recommended) for $20. Be sure to look over the whole lineup of great kits on his website.

Be sure to say hi when you see me at hamfests this fall!

– Until next time, 73 de KØNEB



Using FT8 on 20 meters generated this coverage report on PSK Reporter on my first try. I was using a TH3 beam up about 50 feet at the time. This kit covers 80, 40, 30, and 20 meters.

the ham notebook

TEXT AND PHOTOS BY WAYNE YOSHIDA*, KH6WZ

Making the Right Connections: RF Connector Assembly

For those of you with very long memories, yes, this is a reprise of Wayne's "Ham Notebook" column in the November 2014 issue of CQ. *It's a topic that needs to be revisited at least once each decade as new hams join our ranks and need to learn the best way to attach connectors to antenna feedlines. - W2VU*

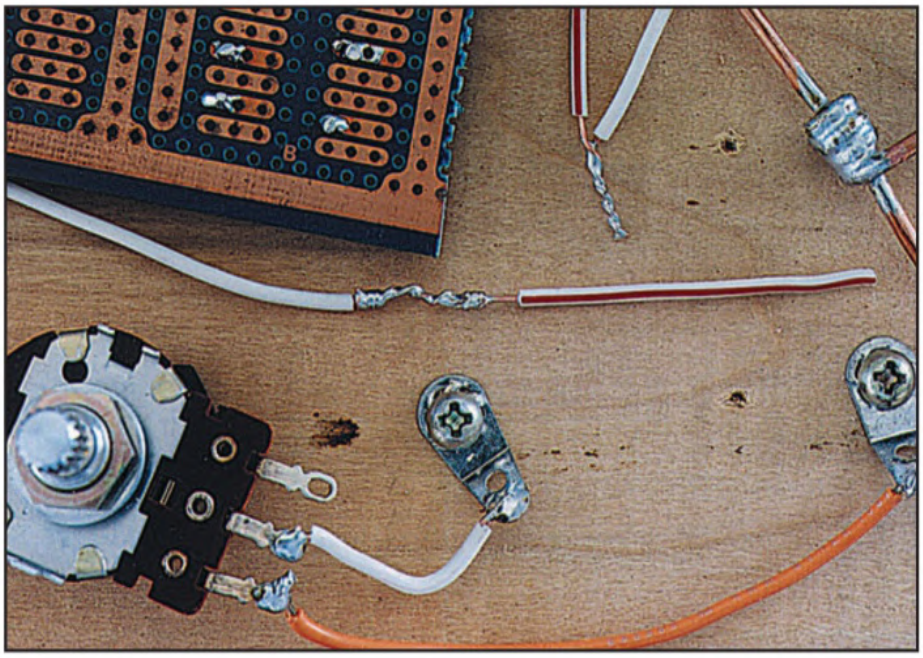


Photo 1. The soldering practice board. Practice making wire splices with both stranded and solid copper wire. These connections are especially useful for wire antennas, including the trusty dipole.

I firmly believe that there are some "hardware" skills all amateur radio operators need to possess, in order to keep their stations operating efficiently. The first and most major skill is soldering. Soldering is what holds all electronic parts together. Knowing how to solder properly will enable you to do-it-yourself, and to save yourself both time and money, two very precious commodities these days.

The skill and art of soldering is not hard to master, and will provide you with a tool to increase your enjoyment for a lifetime. You youngsters out there may even develop a career path from all of this ham radio activity, like a lot of us "old folks" already have.

Very good tutorials on soldering and building electronics projects appear in the building guides provided by companies that produce electronic kits, such as Ramsey Electronics <http://www. ramseyelectronics.com> and Elecraft <http://www.elecraft.com>.

As I write this, I remember my eighth grade electric shop teacher, Mr. Brotherton (I never knew his first name), saying, "you must learn to crawl before you can walk," as he made all of us make wire splices with a torch-heated soldering iron, paste flux, and 50/50 solid solder (we won't do that here). He wanted to emphasize to us that we must possess the basic skills before we could attempt anything else. I guess that's good advice.

The most important part of successful soldering is the proper application of heat to the joint. The phrase often used is "heat the work, not the solder." This means placing the hot iron tip at the intersection of the wire and another wire, or the wireand a printed circuit board (PCB) foil trace, heating the junction (not the solder), and the applying solder to the heated wires and/or PCB foil. In other words, do not attempt to use solder like hot-melt glue, dripping molten solder onto the connection. It won't make a good electrical bond.

In order to learn the skill, you must actually do it, and practice, practice, practice. Get a good soldering iron or soldering station, some 60/40 or 63/37 rosin-core electronics solder and a simple tool kit. (Rosin-core solder is more difficult to find in 2014 than it was in 2003; silver-bearing solder is also good for electronics work. - ed.) Again, the websites mentioned above have g mendations. Practice on scraps of wire you might find around the garage, or perhaps you can get some scraps from a fellow ham. The wire size and the

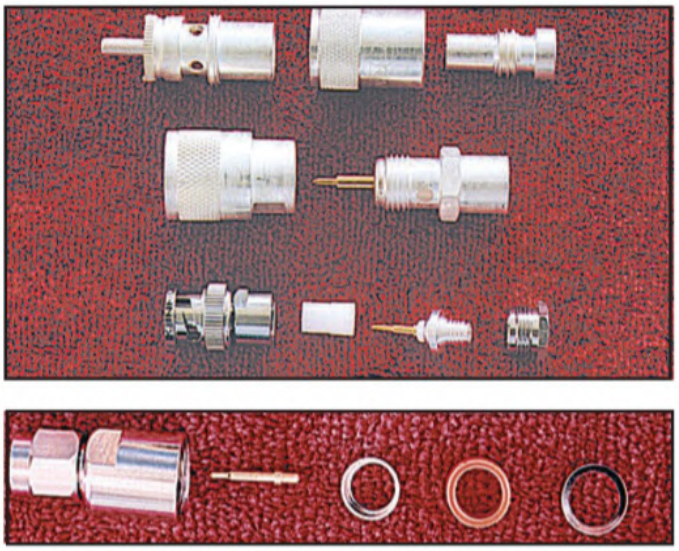


Photo 2. The most popular RF connectors you will use in your shack. Top to bottom: PL-259 and reducer for RG-8X coax, Type N, BNC, and SMA. The Type N is the "new and simplified" connector, available at most ham radio shops. It's highly recommended for UHF and microwave use, or any installation requiring as little feedline loss as possible.

email: <kh6wz@cq-amateur-radio.com>
Linkedin: www.linkedin.com/in/wayneTyoshida

Step-by-Step: Connecting a PL-259

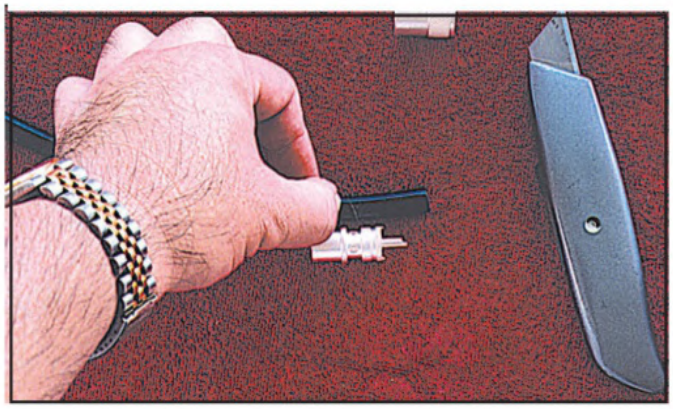


Photo 3. No need to measure. My thumb indicates where the outer jacket needs to be removed. Notice that the length of cable is slightly longer than the connector length, as indicated by the center pin.

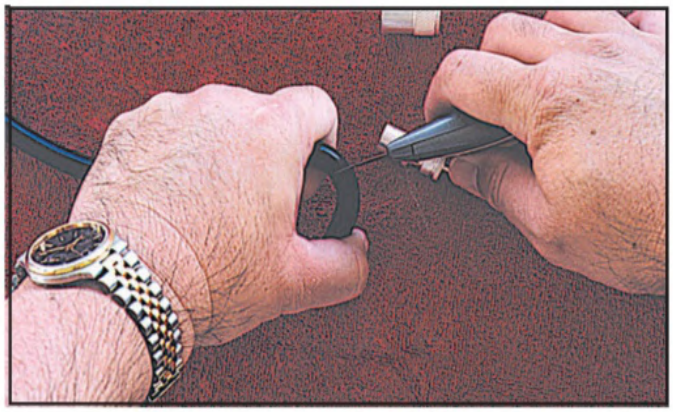
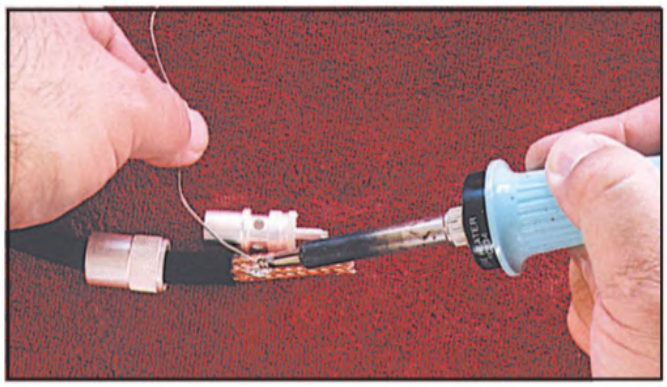


Photo 4. Carefully remove a section of the outer jacket. See text for a neat technique to prevent nicking the braid.



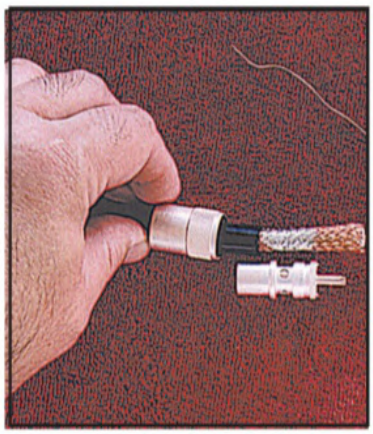


Photo 5. Tin the braid. As the solder melts into the braid, "wipe" the hot tip back and forth and along the braid, depositing a very thin film of solder on the shield. This turns the outer braid into a piece of tubing.

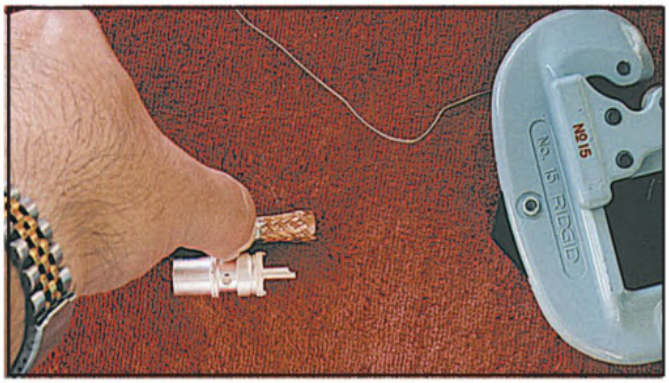


Photo 6. Again, my thumb indicates where to cut. The shield and center insulator will be cut so that the cable will fit into the connector body, and stop where the Teflon insulator joins the connector body.

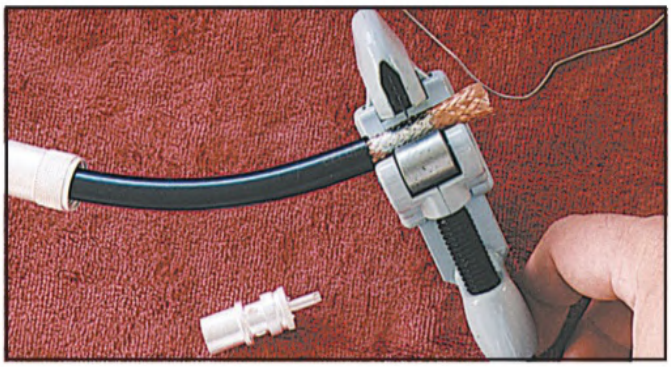


Photo 7. The tubing cutter makes removing the shield and center insulator quick and easy. Do not cut into the center conductor.

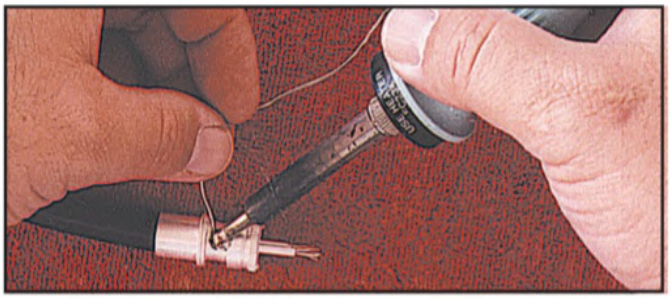


Photo 8. Screw the connector body onto the cable as far as it will go, and solder the shield to the body. When done properly, the molten solder will get sucked into the shield. Solder the center conductor to the center pin, and trim the end. File the end smooth if necessary.

Photo 9. This is how it should look.

insulation color do not matter, and you may want to get both solid and stranded wire for your practice sessions. You may be able to get various terminals, connectors and components from a junked computer or other gadget. Try splicing wires together and wiring connectors and terminals, see Photo 1. (*Ed. Note: Solder makes good electrical joints, but you cannot depend on it for the physical strength of a connection. Make sure you start out with a good mechanical connection before heating the joint and applying the solder.*)

Make Your Own Cables

As hams, we tend to have "wires all over the place." I hear this same phrase from the spouses of fellow hams all over the world, so I think this fascination with wires is a universal trait for us. Making your own cables may even be required, if what your need is not available off-the-shelf. Rather than asking a friend to build a cable for you, or paying someone else to do it, you can do-it-yourself, and gain some independence.

Once you get the hang of soldering, building custom cables becomes an easy task. Here are some of the tips and tricks I use. I learned some of these techniques by reading instruction sheets and books, but the best tips came from watching others, actually doing it, and learning from my mistakes.

Photo 2 shows the most common RF connectors you will see in a ham shack. As I did some research on this month's topic, the Google search engine reported 682 references to "soldering PL-259." I sort of knew that soldering the PL-259 was "controversial," and there are many different ways to properly assemble this ubiquitous connector, but I had no idea how hot this topic is.

I ran into an interesting entry on the ARRL site (unfortunately no longer available - ed.), in which VHF contester (and former CQ magazine VHF Editor) Steve Katz, WB2WIK/6, advises that you should not solder the coax braid to the connector shell.

Steve's advice must be sound, since he treated his connectors to a high potential (hi-pot) test. Hi-pot testing uses high voltages (500 volts and above) to check for dielectric performance. Hi-pot testing can find defects that a conventional continuity test will not find, such as high-resistance shorts.

Tools of the Trade

You'll need some good tools for good soldering. If you don't have these basic tools, this is a great excuse to go to your nearby tool store. A good soldering iron or soldering station is a must. I use the Weller WTCPS soldering station, with an 800-degree chisel tip installed. A sharp utility knife will be needed for cutting insulation. And the most important tool for this job: A good tubing cutter with a sharp blade. I use the Ridgid Number 15 (<http://www.ridgid.com>). I am assembling a length of RG-213 to a PL-259 in the sequence of photo beginning with Photo 3. You may want to consult the instruction sheet for your particular connector for exact dimensions and similar details. These techniques can simplify PL-259 assembly, and can be applied to soldering the "new type" Type N connector.

PL-259 Connector Assembly, Tricks and Hints

1. Remove a section of the outer jacket using a sharp utility knife. Do not nick the braid. Here's a neat trick I learned from John Johnson, WB6LMN. Bend and pinch the cable so that the jacket is under tension. Take a sharp knife, and gently press the blade into the insulation. Continue to gently press the blade into the jacket, going around the circumference of the cable. Do not "saw" or "slice" the jacket.

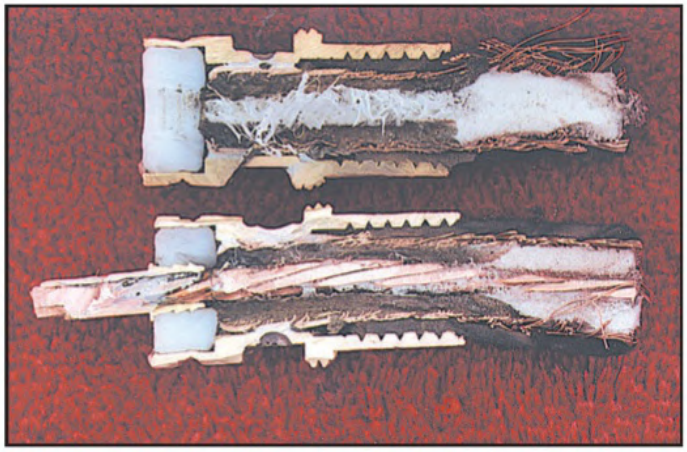


Photo 10. I have always been curious about what my PL-259 connectors looked like on the inside, so I sliced this one in half length-wise. See text for details.

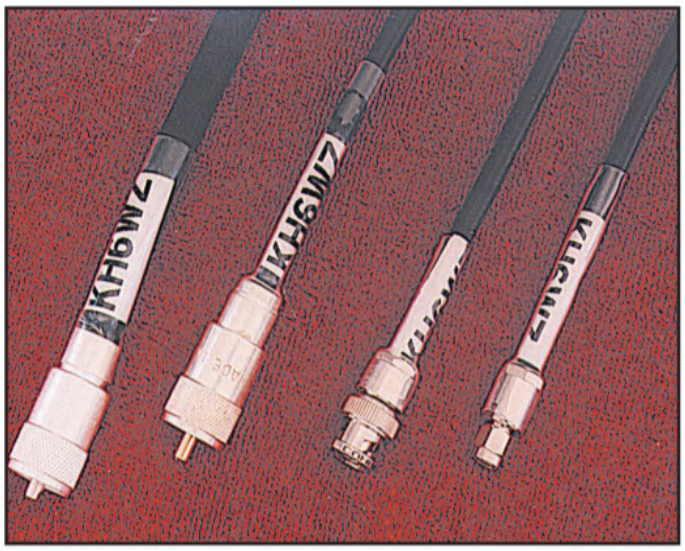


Photo 11. As a final touch, I add a callsign label to the cable, and used heat shrink tubing to add strain relief. Seen here, from left to right, are a PL-259 on RG-213, PL-259 with RG-8X reducer, BNC on RG-8X, and SMA on RG-8X.

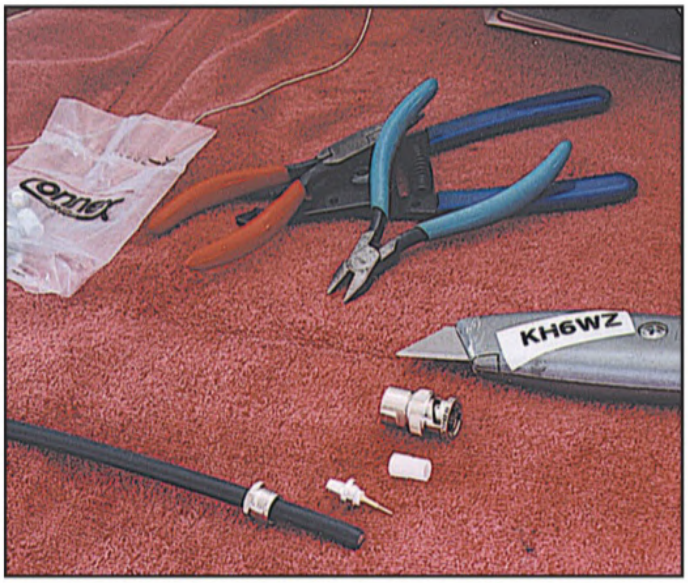


Photo 12. The BNC connector is better than a PL-259 to use at VHF and is actually easier to assemble.

2. Tin the shield. Use 63/37 solder for its lower melting temperature. I learned this trick from contest partner Mike Reagan, NI7T. The tinned section of the shield should end up being under the ring of holes in the connector body. Notice where the outer jacket ends. You want some of the outer jacket to be screwed into the connector body. Oh yes, remember to insert the outer shell onto the cable before the body. Do it now, because if the housing isn't installed, the only remedy is to chop off the connector and start all over. And don't laugh — I've done this too many times for it to be funny.

3. Use a tubing cutter to remove some of the shield and center insulator. Do not cut into the center conductor. If you do, you will have to start all over. If you do not have a tubing cutter, you can use the utility knife, by pressing the blade into the tinned shield, and rolling the cable back and forth. Keep your fingers out of the way, and again, make sure you do not cut into the center conductor. Now, remove the piece of center insulator and shield at the same time by twisting and pulling. This also twists the center conductor, preparing the cable for the next step.

4. Last chance to make sure the outer shell is slipped onto the cable first, and in the right direction (threads facing the end of the cable). Then, insert the cable into the connector body. Screw the connector body onto the cable as far as it will go, and solder the shield to the body. When done properly, molten solder will get sucked into the shield. If the solder "balls up," you do not have enough heat to make a good connection. Get a higher-temperature (higher-wattage) iron. Solder the braid to the connector through all four holes. Solder the center conductor to the center pin, and trim the end. File the end smooth if necessary.

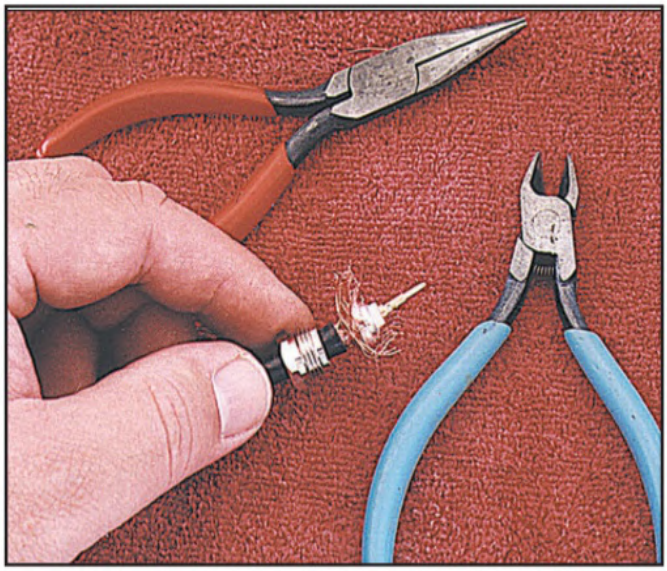


Photo 13. The BNC connector is smaller than the PL-259, so care must be taken to avoid internal shorts.

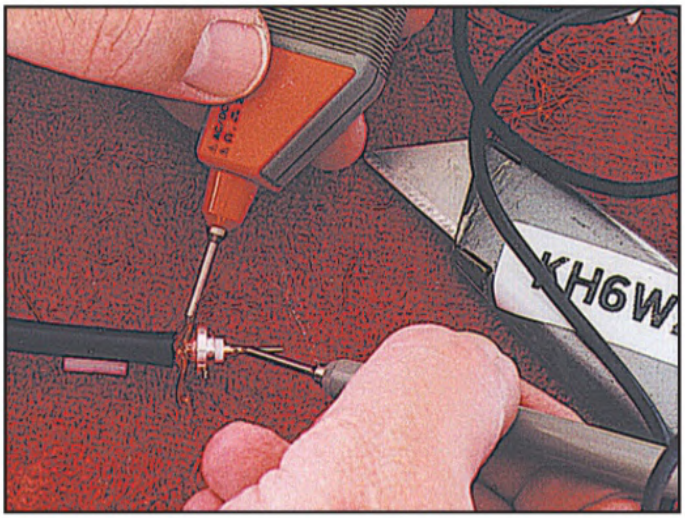


Photo 14. Check for short circuits between the center pin and shield as you assemble any connector.

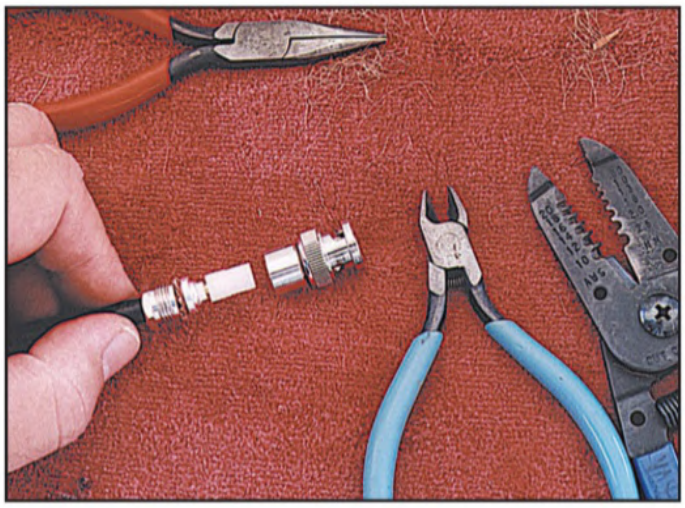


Photo 15. After soldering and checking for shorts, slide the shell onto the assembly. Hold the cable and connector body still with a wrench while you turn the locknut. Try not to twist the connector body, since that may twist

what's new

Amateur Contact Log 7.0.6 is Now Available!

N3FJP has upgraded AC Log to version 7.0.6, which includes direct access to the online QRZ Logbook service. The new QRZ Logbook interface functionality works almost identically to AC Log's interface with eQSL and similarly to the ARRL's Logbook of the World (LoTW).

Users of AC Log who are currently running a version of the software released after January 2022 should be able to detect the new upgrade and offer to retrieve it when you start the software. In Amateur Contact Log 7.0.6, click eLogs > QRZ Logbook to use this new feature, if you have trouble, visit: <www.n3fjp.com/help/qrzmenu.html>.

Users will be able to upload records to QRZ Logbook, which will add a "Q" to the Sent Confirmed By field of each record, so that it is not duplicated on future uploads. Similarly, a "Q" will be added to the Received Confirmed By field for confirmed records downloaded from QRZ. You may also optionally mark the uploaded and downloaded records as QSL Sent and / or Received. Make sure the records you are uploading are in the log date range that you have specified in your online QRZ Logbook settings.

QRZ requires a paid QRZ account, such as the QRZ XML callbook lookup service, to allow other applications such as AC Log to access your online QRZ Logbook data. AC Log 7.0.6 is available now and is a free upgrade for registered users. For more information visit <www.n3fjp.com>.

I have always been curious about what my PL-259 connectors looked like on the inside, after all that work. So, I took my Dremel® Moto-Tool, and sliced this connector in half length-wise (Photo 10). The center conductor has been fused (soldered) into the brass center pin. The center insulator remained in a constant diameter throughout the connector body, and the shield has been fused (soldered) into the connector body, creating an alloy of the copper from the shield, the silver-plated brass from the connector body and the tin-lead solder. This is exactly what should happen inside.

As a final touch, I add a callsign label to the cable, and use heat shrink tubing for added strain relief. You can even add other cable data such as length, frequency band or what antenna is at the other end, like "2M Beam" (see Photo 11).

Other RF Connectors

The BNC connector (Photo 12) is possibly a better connector to use at VHF, and is actually simpler to assemble. Well, usually. As I assembled the connector for this article, I somehow managed to short the cable (Photo 13). As it turns out, the center conductor was not tinned along its entire length, and bent outwards enough to short against the outer (ground) shell. Tinning the center conductor properly and trimming the length just right fixed the problem. I suggest that you check for shorts and open connections with an ohmmeter several times during assembly (see Photo 14). Final assembly of the connector is shown in Photo 15.

The SMA connector seems to scare a lot of people. In fact, when I went to my local ham radio store and asked for "a few SMA connectors so I can make my own cables," the otherwise friendly salesperson looked at me like I was crazy. So, I ordered some SMAs by mail from Universal Radio in Ohio (<http://www.universalradio.com/catalog/parts/bncconn.html>). The SMA is an interesting plug, since it accommodates RG-8X coax, and is assembled exactly like a BNC connector.

A Lifetime Skill

Soldering is a skill that you can easily learn with a bit of practice. Adding the skill of soldering to your amateu radio repertoire will increase your ability to maintain and maybe even build your own station equipment. The PL-259 connector is the most-used antenna connector in amateur radio use, so it is very important to know how to do it right.

Speaking of building stuff, have you built any useful radio or accessory projects recently? Send me a photo of your project with a short description of what it is and what it does, and I'll mention the best ones in this column.

73, Wayne, KH6WZ

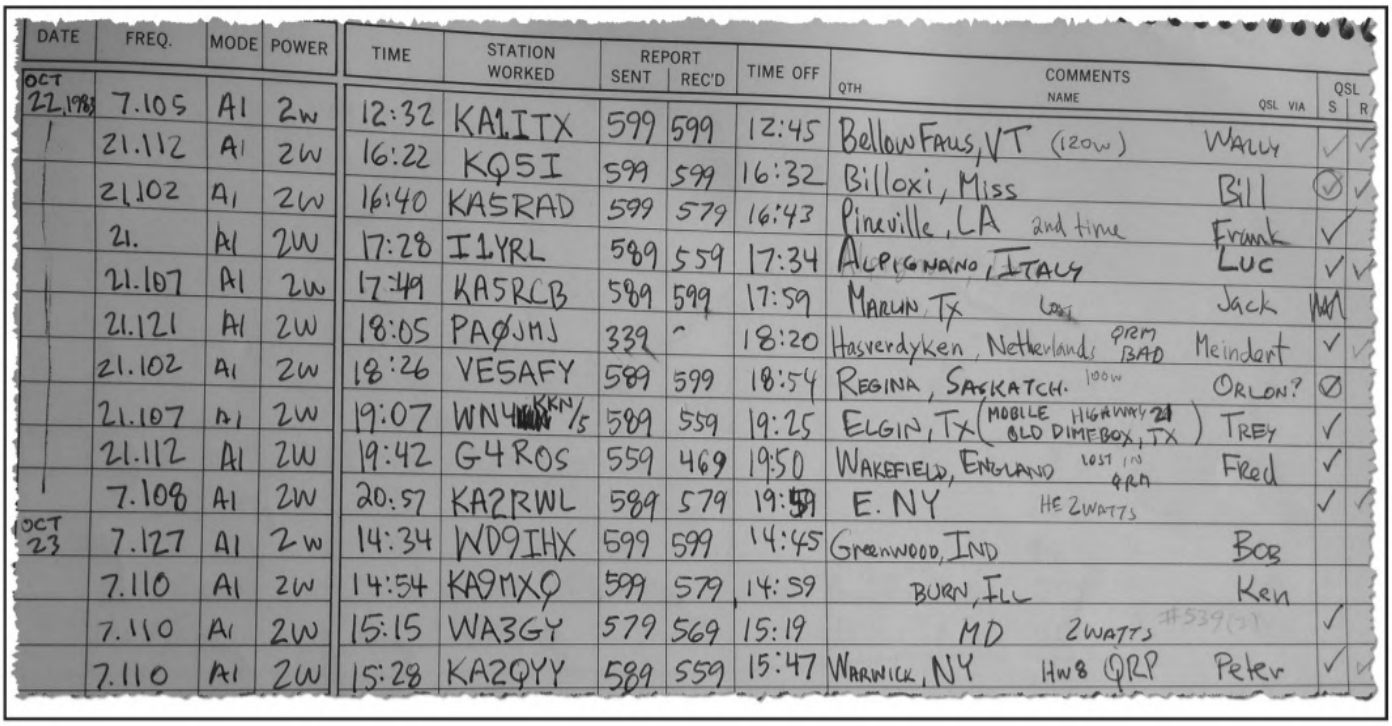
Build It or Buy It?

Even though the goal of this month's column is to help you learn to build your own cables, there are times when buying certain cables makes more sense. An example is the wonderful handful of shielded audio cables I found at alocal electronics surplus shop. This was a great deal — pairs of brand-new, 3-foot, shielded audio cables, with gold-plated RCA connectors on each end for 65 cents each. That is cheaper than the price of a single plug! So in this case, it makes more sense to buy it, rather than make it. Of course, deals like these aren't universally available, so you will still need to make something — or even modify a cable — for a particular need.

ham radio explorer

BY ANTHONY A. LUSCRE*, K8ZT

Keeping Track of Your Contacts with a Log



DATE	FREQ.	MODE	POWER	TIME	STATION WORKED	REPORT SENT	REPORT REC'D	TIME OFF	QTH	COMMENTS NAME	QSL VIA	QSL S	QSL R
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	21.112	A1	2W	16:22	KQ5I	599	599	16:32	Biloxi, Miss		BILL	⊘	✓
	21.102	A1	2W	16:40	KA5RAD	599	579	16:43	Pineville, LA	2nd time	Frank	✓	
	21.	A1	2W	17:28	I1YRL	589	559	17:34	Alpignano, Italy		Luc	✓	✓
	21.107	A1	2W	17:49	KA5RCB	589	599	17:59	Marlin, Tx	Lost	Jack		
	21.121	A1	2W	18:05	PAØJMJ	339	~	18:20	Hasverdyken, Netherlands	QRM BAD	Meindert	✓	✓
	21.102	A1	2W	18:26	VE5AFY	589	599	18:54	Regina, Saskatch.	100W	ORLON?	⊘	
	21.107	A1	2W	19:07	WN4KKN/5	589	559	19:25	Elgin, Tx	(MOBILE HIGHWAY 21 OLD DIMEBOX, TX)	TREY	✓	
	21.112	A1	2W	19:42	G4ROS	559	469	19:50	Wakefield, England	LOST IN QRM	Fred	✓	
	7.108	A1	2W	20:57	KA2RWL	589	579	19:59	E. NY	HE 2WATTS		✓	✓
OCT 23	7.127	A1	2W	14:34	WD9IHX	599	599	14:45	Greenwood, Ind		Bob		
	7.110	A1	2W	14:54	KA9MXQ	599	579	14:59	Burn, Ill		Ken		
	7.110	A1	2W	15:15	WA3GY	579	569	15:19	MD	2WATTS		✓	
	7.110	A1	2W	15:28	KA2QYY	589	559	15:47	Warwick, NY	HW8 QRP	Peter	✓	✓

Photo A. Memories — here is an excerpt from my first logbook in 1983 as KA8NRC. As soon as I opened this page, my mind raced back to my first apartment, my Ten-Tec Argonaut 515, and a very low folded dipole antenna! At the top of the page is my first Vermont QSO and the KA1ITX QSL card is still on my wall.

No matter what your favorite part of amateur radio is, you can keep track of your contacts by keeping a log. Before 1984, the FCC required all amateur radio operators to keep a log of their contacts. Earlier requirements even included logging all on-air activity, including unsuccessful CQing. With logging now optional, you might ask why you should bother. The advantages of keeping a log today include some of the following:

- You will have a record of your operations that will document your radio accomplishments.
- It is easier to facilitate exchanging QSLs (both outgoing and incoming as well as paper or electronic).
- It reinforces the memories and friendships you have established.
- It helps keep track of your station equipment over the years (antennas and radios).

Typically, amateur radio logs contain the date and time of the contact. They also list the band and / or frequency and the mode used. They include the callsign of the other station, signal reports (sent and received), and optional information about the other station — their name, location, comments, etc. In addition to records of QSOs — and fruitless CQ calls — many stations also maintain station information in their logs. These might include information and dates on the installation of new radios, antennas and SWR measurements, feedline installation and measurements, other station equipment, guest operators, and records of QSLing.

For years, the only way to keep a log was on paper. A wide variety of commercial logbooks was available with prelabeled lines and columns to assist in keeping everything neat and orderly. The advent of computerized logging was most likely spurred by contesters looking for a way to increase the speed and accuracy of their contest logs. They also quickly began to add additional features to logging — automatic time and date entry, detection of duplicates (dupes), and the ability to give running totals of contacts. Eventually, features were added to interface the computer with the radio, resulting in the automatic entry of band / frequency and the ability to key the radio from the keyboard and send CW. As computer logging in contests became more popular, many hams began using computerized logging software for their everyday logging functions. Today, a wide variety of general logging and contest logging software programs is available.

Computer Logging

With paper logging, some hams went the DIY route using plain notebook paper instead of commercially printed logbooks. The same idea can be used with electronic logging; DIY using a generic spreadsheet or database software. But just like commercial paper logbooks, software programs designed specifically for amateur radio logging have many more features and are more efficient and effective for logging your contacts. There are paid commercial programs, freeware, and shareware logging software. Most install on

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your computer (PC, Mac, or Linux), but some are online or installed on your phone or tablet as apps.

Categories

Electronic logbooks can be divided into categories (some packages fit multiple categories):

- Comprehensive logbook software
- Contest logging software
- Other ham radio software with built-in logging (i.e., WSJT-X, Fldigi, etc.)
- Station management software (a.k.a. logging suite) – logbook plus other tools (i.e., Ham Radio Deluxe, DXLab, etc.)
- Specialty logging software (designed for a specific activity, phone apps, portable use, individual contest, etc.)

Contest logging software features include:

- Quick & efficient logging of contacts
- Automatic dupe checking
- Keyboard, other shortcuts & "macros" to speed contacts and logging
- Avoid common logging mistakes
- Allow display of your current score
- Radio interfacing to read and / or change frequency
- DX Cluster / Reverse Beacon Network (RBN) spot integration
- CW keying
- Voice memory keying
- Display of current statistics
- Worked/needed multipliers
- QSO rate

- Bandmaps provide a visual frequency display of
- Spotted stations
- Stations worked
- Multiplier status

- You change bands, frequency, or mode of radio from the software

Comprehensive logging software features include:

- Manage all contacts by direct entry or import from contesting software
- QSL management: Printing paper cards / labels, submitting and downloading electronic QSLing, marking sent and received QSLs, etc.
- Radio interfacing
- Integration with DXClusters, RBN, etc. for gathering and displaying spots
- DX prefix lookup and distance & bearing calculation
- Callsign database lookup from online (QRZ.com, Hamcall.net, HamQTH, etc.) or local data sources (CD ROM)
- Award tracking — WAZ, DXCC, grid squares, IOTA, etc.
- Previous contacts (other QSOs)
- Contact sorting, filtering, and reporting

Choosing a Program

Different hams will find different programs suitable for their personal styles, so I suggest you explore multiple programs before finalizing your choice. Choose the best program for what you want to do. You may use more than one software for different scenarios, especially contesting. Most programs have a free or demo version, so trying out multiple programs is a good idea. Many demo programs limit the number of QSOs you can enter. The choice of a logging program is often a balance between the ease of use versus extra features in programs. One good feature, ADIF (Amateur Data Interchange Format), allows you to quickly transfer your log entries to a different program.

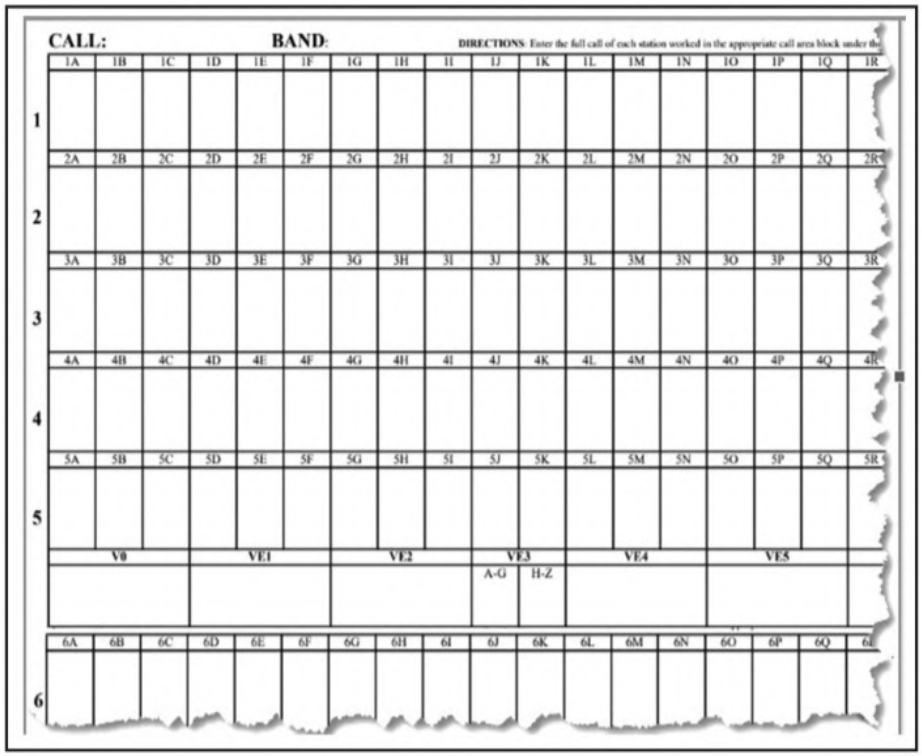


Figure 1. During contests and Field Day, many operators used a "dupe sheet" seen here to make sure they knew who they had already worked. Call district numbers ran down the right column and suffix columns A-Z across the rows. Virtually all contest logging programs do this for you and have made the dupe sheet obsolete.

Amateur Radio Logging Software - view table online tiny.cc/arlog

Platform	Type	Application	URL	~Cost
Win	General	DX4Win	https://dx4win.com/	$90
Win	General	DXLab DXKeeper	www.dxlabsuite.com	Free
Win	General	DXtreme Station Log	www.dxtreme.com/	$90
Win	General	Ham Radio Deluxe	www.hamradiodeluxe.com	$100
Win	General	Log4OM	www.log4om.com	Free
Win	General	Logger32	hwww.logger32.net/	Free
Win	General	LOGic 10 by PDA	www.hosenose.com/radio/	$36
Win	Contest	N1MM+ Contest Logger	http://n1mm.com/	Free
Win	General	N3FJP AC Log	http://n3fjp.com/	$25 (with contests $65)
Win	Contest	N3FJP Contest Logs		
Win	General	Swisslog	www.swisslogforwindows.com	Free
Win	Contest	WriteLog Contesting	https://writelog.com/	$30
Win	General	WA0H	www.wa0h.com/NewWa0h.php	Free & $10 versions
Mac	General	Mac Logger DX	http://dogparksoftware.com	$95
Mac	Contest	SkookumLogger	https://k1gq.net/SkookumLogger/	Free
Linux	General	CQRLOG	www.cqrlog.com	Free

Table 1. Table of common amateur radio logging software. To view the table online and access URLs visit <tiny.cc/arlog>.

Looking Ahead

Here are some of the articles we're working on for upcoming issues of *CQ*:

Emergency Communications Special in October, including...

- A Philosophical Approach to Go Kits
- Developing Your Radio Voice
- EmComm in Poland
- EmComm in the 1950s

Plus...

- MFJ — 50 Years and Counting
- A Mountaintop Contest Station in Brazil
- The Flutenna
- Automatic Battery Discharge Tester

Upcoming Special Issues

December: Technology
February: QRP
June: Take it to the Field

Do you have a hobby radio story to tell? Something for one of our specials? *CQ* covers the entire radio hobby. See our writers' guidelines on the CQ website at <http://bit.ly/2qBFOdU>.

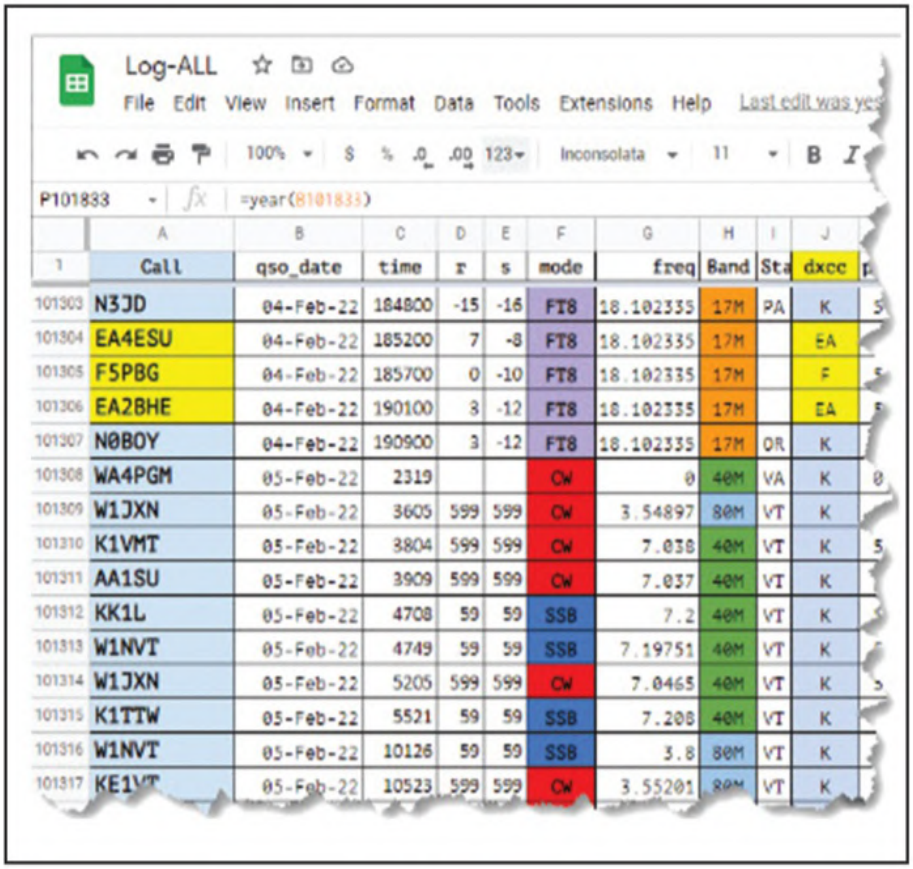


Figure 2. You can create a DIY log using spreadsheet software.

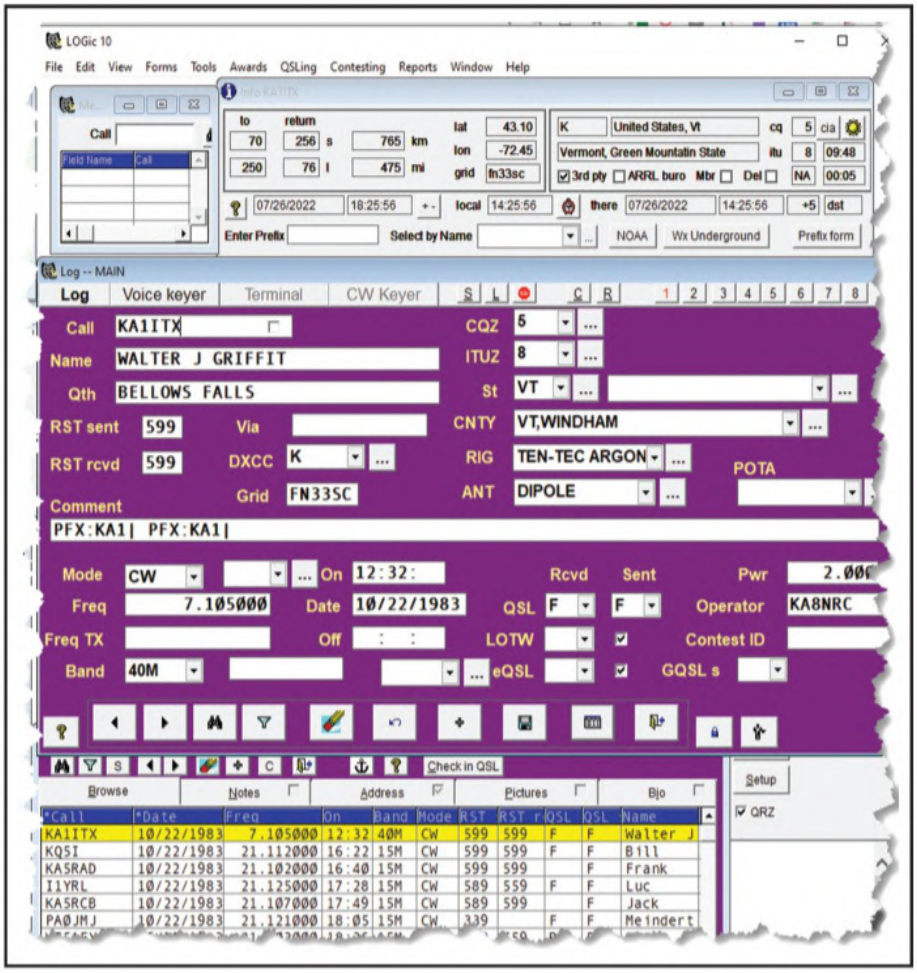


Figure 3. An example of my current logging software, LOGic 10 by PDA Software, displaying the same October 1983 date as the page from my paper logbook.

General Logging	Contest Logging
Detailed Information on Contacts	Minimal needed Information
Manage QSLing Records	Calculate Contest Score
Contains All QSOs over time	Just QSO from single contest
Shows previous contacts with station	Let's you know about Dupes
Configured for all types of QSOs	Configured for specific contest
Keeps track of Award categories WAS, DXCC, VUCC, etc.	Shows potential/worked Mults-Countries, States, Counties, etc.
Import/Export & Interfacing with other software	Produce Cabrillo (.log) files for contest entry and ADIF for export

Figure 4. A comparison of features for general logging vs. contest logging software.

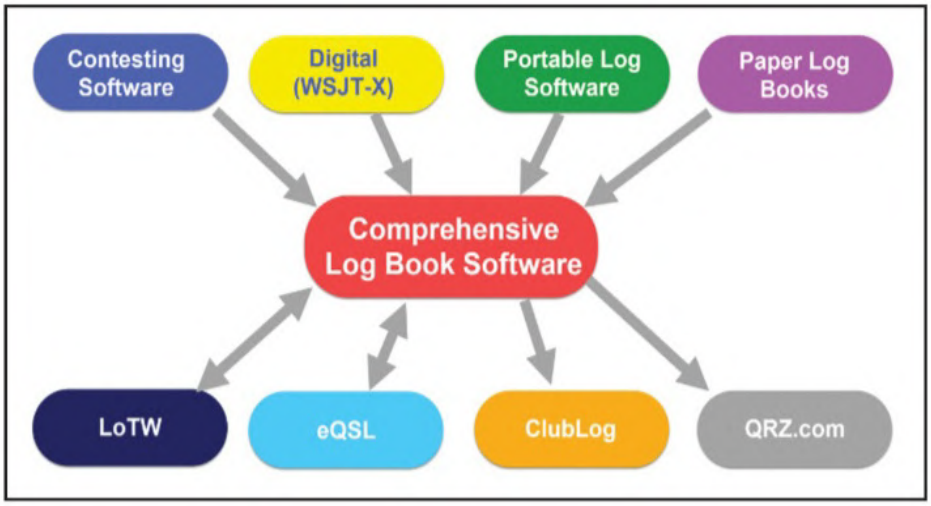


Figure 5. Like that famous ring in the J.R.R. Tolkien classic, I suggest all hams have one comprehensive log to keep all their contacts.

This means that data you entered while trying one program can easily be transferred to another program.

One Log to Rule Them All

I suggest every ham have a comprehensive logging program to pull everything together — contesting, WSJT-X, etc. You can set up the comprehensive program to automatically import contacts from other software, such as FT8 contacts from WSJT-X, or you can manually import from your contesting program or other software via ADIF. You can easily import and export contacts and additional information into and out of this software (of course, you will need to manually enter data from any paper log books).

Moving from Paper to Electronic Logging

If you have many years of paper logs, moving everything to an electronic logbook can be a very daunting task. I do have a few suggestions:

• Start with your most recent paper logs and work your way back through time. One of the main reasons for this is that more recent contacts are much more likely to be confirmed via electronic QSL (we will cover this in a future column).

• Check your program documentation to see if there is a mode designed for easier entry of older contacts (as opposed to the real-time entry of new contacts); this can often save you time.

• If your typing skills are not great or you don't have time, consider hiring a paid or volunteer typist (this might be a grandchild, friend, neighbor, etc.). Hopefully, your handwriting is legible. You will also probably need some time to explain how logging works for the person doing the typing to reduce misunderstandings of your paper log and transcription mistakes.

That's it for this month. I hope to work you on the air and end up in your log! If you are interested in my ham radio presentations to radio clubs via Zoom, visit <tiny.cc/k8zt-p>. Remember, I am looking for information on your new activities, ideas for future columns, and feedback from this column, so please email me at <k8zt@arrl.net>.

mf/lf operating: Life Below the AM Broadcast Band

BY JOHN LANGRIDGE, * KB5NJD

Fun with Ground Waves!

Plus a successful test for the "Lowdown 630" antenna, wildfires in New Mexico impact a community member, and the VK4MSC club station adds a Hustler vertical that works on 2200 meters

Ever since 630 and 2200 meters opened to amateurs in the U.S., one could argue that the primary inclination for a majority of operators was determining the full capabilities of their stations. For some, that meant WSPR beacons and for others, it meant two-way contacts using a variety of modes. Skywave activity was and remains king and talk of point-to-point communications using the so-called ground-wave propagation mode, at least on 630 meters, has been somewhat limited. Truthfully, the obsession with skywaves and DX openings started about 10 years earlier with a growing number of Part 5 experimental stations that began testing the waters on 630 meters and still others that were conducting tests on 2200 meters a few years prior to that. No one really knew the full extent of what was possible for low-power stations as most of the data and modeling were based on military research using very large antennas and megawatt power levels.

In the spring of 2022, Clark Ackison, AA8SH, of Huntington, West Virginia, created a stir by joining the community on 630 meters and adding West Virginia to the roster of states that had active stations. West Virginia was a hot commodity prior to Clark's arrival on the scene as it was one of just three remaining states that had not been activated on the band. Operating with only CW, Clark took an interest in the ground-wave potential of 630 meters and set out to increase local and regional activity outside of the pre-dawn insanity of the so called "Dawn Patrol" group of operators that are active most mornings starting around 0900 UTC. Having spent some time gauging local aeronautical beacons, Clark recognized that these beacons might be useful proxies for amateur signal comparison on ground-wave paths around the region. With posts on the SLACK "kHz" channel and the QRZ.com forum[1], the process began. Clark was seeking HF-capable amateur stations that could listen for his and other signals on Saturday and Sunday mornings a few hours after sunrise and using whatever equipment was already available in their stations. It did not matter if they had a proper 630-meter antenna. A 160-meter dipole might be good enough for receiving local signals.

After a slow start to his experiments, Clark received his first report from Ralph Matheny, K8RYU, of Marietta, Ohio. Ralph is an experienced 630-meter operator but his low-band station was offline at the time so he called Clark's phone to report his signal near the noise level some 99 miles (159 kilometers) away along the Ohio river. The following day's session resulted in a report from Charles Young, N8RR, of Charleston, West Virginia. Charles is located approximately 40 miles (64 kilometers) from Clark and was listening with a 160-meter inverted-L, noting that the signal was about S1. That's a very respectable report considering that the receive antenna in use was neither resonated nor matched for 630 meters.

In the following weeks, Clark completed his first ground wave CW contact with K8RYU, while N8RR reported hearing both stations. More stations began to take notice and altered weekend schedules to be available for these brief

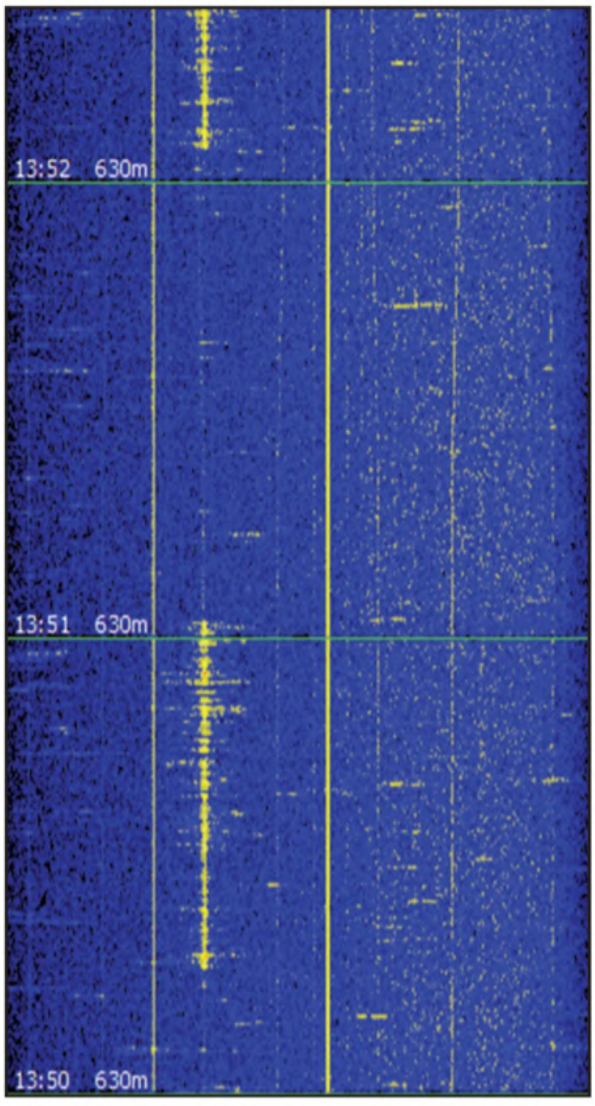


Photo A. AA8SH's ground wave CW signal can be seen on K9KFR's waterfall following the completion of a mid-morning QSO. The distance between the two stations is 250 miles.

*827 Middle Run Ct.
Duncanville, TX 75137
<kb5njd@cq-amateur-radio.com>

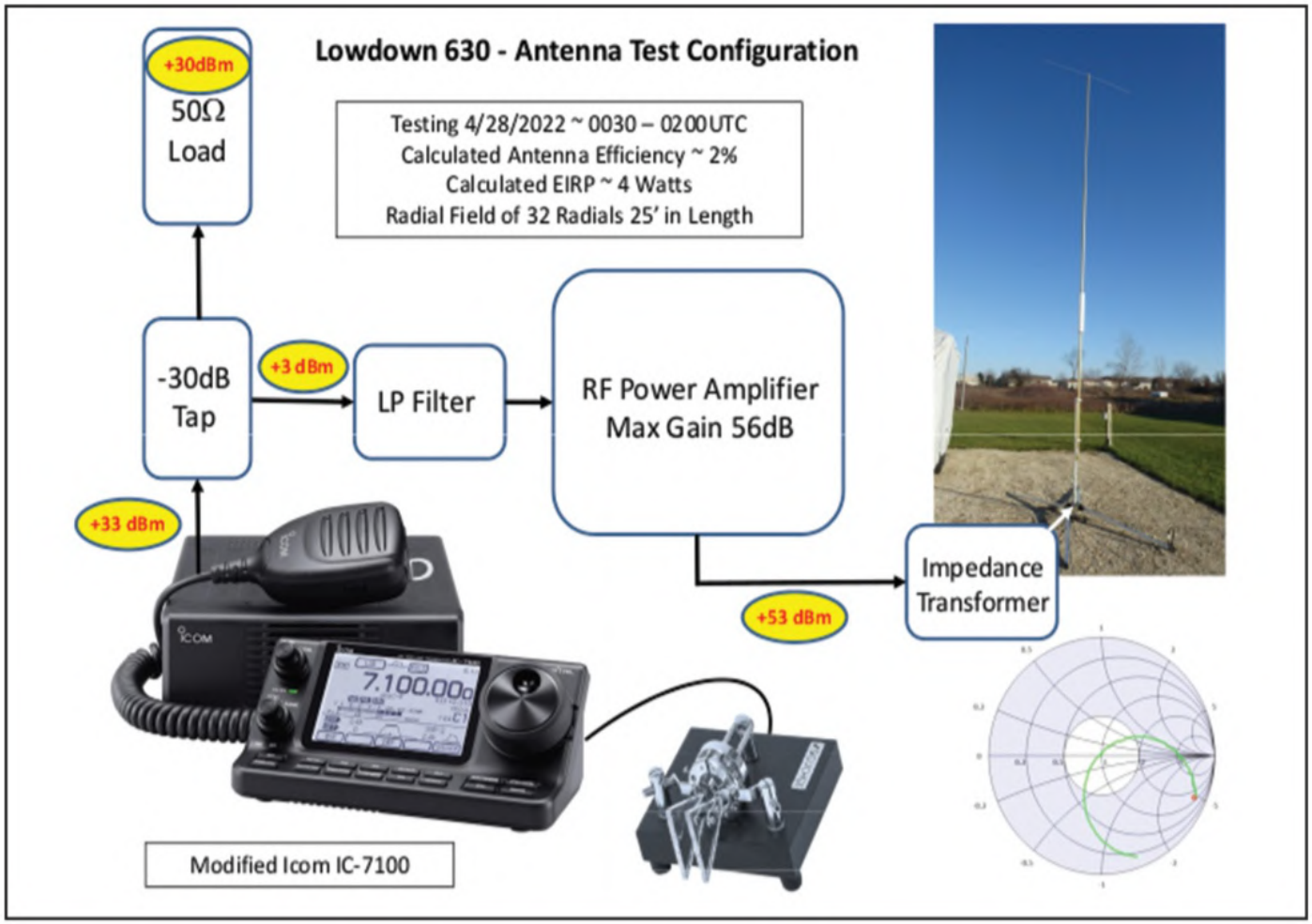


Figure 1. The Information Stations Specialists "Lowdown 630" started as an emergency antenna for AM broadcast band stations that experienced catastrophic antenna failures. Testing shows that this antenna might be a viable solution for the operator who is not interested in building a permanent antenna. The system layout used in the testing can be seen in the image.

half-hour excursions on 630 meters. Clark adopted the name "GWEN," the Ground Wave Evaluation Network, for the project as a variation on the U.S. government's canceled continuity of government communication system also known as "GWEN," the Ground Wave Emergency Network.

A Turning Point

The 28th of May marked a turning point in the experiment. Clark completed a 251-mile (404-kilometer) CW contact with Bob Johnson, K9KFR, of Columbia City, Indiana (*Photo A*). The path was noted to be stable with no variations over the 30-minute span of testing during the session and both stations reported one another at RST 339. Tests with similar results were also conducted at solar noon (when the sun is directly overhead in your location, irrespective of daylight time or your location within your time zone). Contacts were also reported in subsequent sessions between K9KFR and Tom Costa, N9RU, of Marion, Illinois at a distance of 303 miles (488 kilometers) with reports at RST 339 and 329, respectively.

The GWEN activity has expanded discussions on the topic of ground wave and other limited-run data gathering exercises, some of which are only anecdotal. At the end of May 2022, Paul Signorelli, WØRW, of Colorado Springs, Colorado, noted in passing a ground-wave report of his signal by a station 60 miles away. Robert Brown, KR7O, of Madera, California, reported a more extensive study completed with Ben Gelb, N1VF, of Sunnyvale, California, some 155 miles (250 kilometers) away around 2018. Robert indicated extreme stability in signals, which is a hallmark of ground-wave propagation, varying no more than a decibel on the transition from day to night and vice versa. Ground-wave signals were reported to be considerably weaker than the skywave signals associated with darkness but in general, Robert's ground-wave range seems to be at a maximum around 249 miles (400 kilometers).

I mentioned earlier that pioneering Part-5 experimental activity favored skywave communications over ground-wave communications but potential applications were, in fact, examined by some operators from the ARRL's 600-meter research group, led by Dr. Fritz Raab, W1IR, of Boone, Iowa (previously Burlington, Vermont). Ralph Wallio, WØRPK, of Greenville, North Caroline (previously Iowa), indicated that an extensive ground wave data set was developed in 2009 using PSK-31 (approximately 12 dB S/N) and PSK-10 (approximately 15 dB S/N) for the purpose of emergency communications. Wallio's primary area of interest was digital error rates on ground-wave paths. Data collected[2] from four stations ranging from 190 miles (306 kilometers) to 278 miles (447 kilometers) away from WØRPK's Iowa station yielded 100% error free transmissions at 190 miles and over 99% error free transmissions at 270 miles for PSK-10. PSK-31 yielded similar results with over 99% accuracy for 190-mile paths and over 98% accuracy for 270-mile paths. Similarly, in this column dated October 2019, I reported a

On The Cover

Elvin Apostol Jr., DV1IIW, regularly hosts multi-single (multi-operator, single transmitter) contest operations from his station in the Philippine city of Antipolo, a suburb of the capital city of Manila. His main interests are DXing, contesting, and emergency communications.

Using a wire dipole just 6 meters (20 feet) off the ground, he and his teammates — 4G1LD, 4G1LDE, DV1VTZ, and DV1TCP — took third place in all of Oceania in the multi-single low-power category of the single-sideband weekend of the 2022 CQ World Wide WPX Contest (results begin on page 8). For those unfamiliar with contesting categories who might be wondering why there are two radios turned on for a single-transmitter category, the multi-single category allows the use of a second transmitter on a different band from the first, but only to hunt down and contact new multipliers.

Prominent in the photo is a small sign reading "SCAN." This is an organization in which Elvin is an active member, the Society of Communicators and Networkers International <www.scaninternational.org>. According to Elvin, this group — club call DX1EVM — is the largest amateur radio club in the Philippines, providing emergency communications and disaster preparedness training, promoting amateur radio through STEM (science, technology, engineering, and math) education, and broader community service by encouraging members to be active in civic and social organizations. According to the group's website, club members, "regularly promote and perform civic engagement endeavors to benefit the community, such as tree planting, clean-up drive, public and private motorist assistance, and other related activities." An interesting idea for other clubs to consider as well. (*Cover photo courtesy DV1IIW*)

Field Day ground-wave experiment from the same year in which formal CW message traffic was transmitted over a 100-mile path at just 135 milliwatts EIRP with 100% copy. The antenna was very short and exhibited a radiation resistance of 0.1715 ohms and, while the inverse square law and noise conditions dictate that there will be limitations to the maximum achievable distance for 100% accuracy, we suc-cessfully demonstrated the simplicity and elegance of regional information dissemination for the local emergency communications community.

The Math Behind the Waves

I've spent a lot of time talking about what operators are doing or have done with ground waves, but what exactly are they? While it all sounds pretty straightforward, there are complex mathematics involved in describing the behavior of waves in the so called "freespace" and how they interact with ground and other media. For the purpose of this discussion, we will use the simple definition presented by the International Telecommunication Union (ITU) in the 2014 edition of its "Ground Wave Propagation Handbook"[3] and expand on that some. On page 66 of the hand-

Photo B. This is all that remained of KM5SW's 630-meter variometer following a wildfire that swept through his region of New Mexico. Fortunately, his home was spared thanks to the efforts of first responders. In addition to the pile of wire that remained after the bucket melted away, the ferrite matching transformer core can be seen in the lower right side and the stepper motor used to adjust the variometer can be seen in the middle-bottom section. Paul and family are in good spirits, joking that I could use this image as long as I did not include it in the "Hall of Flame" collection.

book, the ground wave is defined as the sum of the direct wave, reflected wave, and the surface wave *in a vertical polarization*. Horizontally polarized waves are heavily attenuated and, in many cases, short the electric field (E-field) with respect to ground in the near field of the antenna.

The direct wave is just as it sounds, moving from point A to point B through space. But there is a bit more to it in order to account for the curvature of the Earth and other terrain on longer paths at lower frequencies and we will deal with that in a moment. The reflected wave is literally the ground reflection of the wave that arrives at the destination some time after the direct wave. In effect, it has similarities to multi-path but rarely has the same impact to signals at medium wave and long wave as is seen at higher frequency signals where distortions can occur, impacting readability of transmissions. The impact is not zero, however, and accounts for the very slightly increased digital error rates that were previously reported with the emergency communications study involving PSK-10 and PSK-31. Finally, surface waves are dependent on the current flowing in the ground and function outside of the ionospheric propagation domain. They are generally not subject to fading over paths but sometime ionospheric reflections can impede or improve signals depending on the phase of the direct and reflected waves on arrival. This behavior can be observed on the AM broadcast band during the grayline period, particularly at the bottom of the band. As waves pass over ground, differences in dielectric constant between air and ground allow the wave to tilt as the edge in contact with ground slows down, following the curvature of the Earth and attenuating in accordance with inverse square law. At true low frequency (LF) and very low frequency (VLF) (below 300 and 30 kHz, respectively), these waves can propagate over the surface of the ground for hundreds or thousands of miles. This is a very common propagation mode on 2200 meters, for example. At 630 meters, which is medium wave, we generally experience ground wave on paths up to about 300 miles but that is not a firm number and can probably vary as much as 100 miles depending on station capabilities and terrain. These values are consistent with those observed in the GWEN exercise.

Signals tend to vary little over solid ground while signals over water can vary with the tidal changes and the height of waves. Additional changes in

flora and fauna along the path as seasons progress can also impact signal levels. In the GWEN experiment, signals have thus far been very consistent from one week to the next between K9KFR and AA8SH. Many of us are very curious about how these levels will be impacted as we transition to fall before daytime skywave enhancements are observed at local noon during the winter. All indications suggest that the signals should increase a bit but weather and ground conditions on the path may have the final say in the matter.

As of this writing, the experiment continues and more operators are needed and encouraged to join the exploration. Check the thread on QRZ.com to determine the current operational status of the experiment. A link will be in the notes section at the end of this column.

More Details on the "Lowdown 630" Antenna

In my June article, I mentioned that the U.S. company, Information Station Specialists, Inc., of Zeeland, Michigan, had the intention of marketing a portable 630-meter vertical antenna[4] that is a modified version of its AM broadcast "stop-gap" antenna intended to be used by commercial radio stations which experienced a catastrophic failure at an antenna site. Following Hamvention 2022, the owner of the company, Bill Baker, let me know that the reception of the product has been positive and currently engineering estimates are being completed to determine what the cost to the consumer may be once the antenna comes to market.

On-air testing (*Figure 1*) conducted on April 27, 2022 by the product's principal creator, Paul Dobosz, K8PD, of Holland Michigan, resulted in reports from 11 stations in the U.S., including three non-amateur SWL stations. Distances of reporting stations ranged from 35 miles to as far away as my station here in North Texas at a distance of 922 miles.

While building antennas can be remarkably rewarding and informative for the radio amateur, it is understood that a homebrew project of this type might not be a trivial exercise for some so it will be nice to finally have an antenna product on the market that enables prospective operators to try out medium wave, potentially leading to long wave in the future. Hopefully other companies will also develop their own products to enhance activity on 630 and 2200 meters.

Photo C. Here is the business-end of the Hustler vertical that was adapted to 2200 meters by Roger Croft, VK4YB. The high-inductance loading coil is secured in the sealed box under the mounting bracket while the antenna is fed against a small radial field and the metal roof of the building.

Disaster in New Mexico

There is little doubt that by now you have heard the reports of massive wildfires in the southwestern U.S. An active member in this community has been impacted but fortunately it was not a worst-case scenario like so many people are experiencing. Paul Johnson, KM5SW, of Jemez Springs, New Mexico, evacuated his family due to a massive fire that threatened his and other people's property in the area. Paul indicated that 45,000 acres were destroyed in this fire but miraculously the approximately 40 homes and cabins in his area were spared, including Paul's home. Paul cited the incredible efforts of first responders in gaining control of this fire. Paul also reported that all but two of his trees were destroyed and those two that remain will have to be used for supporting his antennas as the long process of regrowing the forest commences. As *Photo B* indicates, Paul's bucket variometer was burned to the ground and despite these tragic events, he has been able to retain some sense of

Timestamp	Call	MHz	SNR	Drift	Grid	Pwr	Reporter	RGrid	km	az	Mode	# Spots
2022-03-30 15:00	JA1RWI	0.137520	-44	0	PM95tm	0.5	VK4MSC	QG62lv	7103	167	30	2
2022-03-30 13:50	VK4YB	0.137455	+18	0	QG62ku	1	VK4MSC	QG62lv	9	61	2	13

Figure 2. Not a bad haul for a very short transmit antenna as JA1RWI takes top honors in early receive tests of VK4MSC on 2200 meters using the 30-minute FST4W variant.

Photo D. The 8.2-milliHenry, 2200-meter loading coil for the Hustler vertical atop the VK4MSC Monitor Sensors Amateur Radio Club station.

humor, noting that this was not an on-air meltdown that led to the coil's destruction. Paul has begun the process of recovery which may be a bit less traumatic under the circumstances. He will be replacing thousands of feet of coax and radials and has already installed an E-probe in one of the remaining trees, providing reports to those of us who remain active through the summer months. An inverted-L is planned for the other tree for transmitting. We hope to hear him back on the air this fall.

Hustler Vertical Adapted for 2200 Meters at VK4MSC

In an effort to stimulate some thought about re-purposed antennas for 2200 meters, Roger Crofts, VK4YB, of Moorina, Queensland, Australia, has installed a Hustler 10- to 80-meter vertical on the roof of the Monitor Sensors factory with a custom loading coil for 2200 meters (*Photo C*). Crofts, the trustee of the VK4MSC Monitor Sensors club station, reports that the loading coil uses a 10-inch winding on the 3.5-inch diameter PVC water pipe with over 500 turns of fine enameled wire (*Photo D*). That results in approximately 8.2 milliHenries of inductance which requires 165 picoFarads of capacitance to be resonant on 137 kHz. Because the Hustler vertical provides some of the capacitance required for resonance, a small trimmer capacitor is located at the top of the coil and adjusted for zero reactance at the frequency of interest.

As one might expect, the voltages at the top of this coil when in operation are extremely high and Roger notes that only a few milliwatts of power can be applied as corona and capacitor arc-over have been observed. Even so, results have been promising when using FST4W-30, the 30-minute variant of the WSPR replacement that is optimized for 630 and 2200 meters. As *Figure 2* shows, the 0.5-watt total power output to the antenna was reported at JA1RWI at -44 dB S/N. As Roger has shown, it is possible to load up just about anything and find decent results some of the time with just a bit of creativity.

That's all for this month. If you have comments or questions, you can reach me at <KB5NJD@gmail.com>.

Notes:
1. <https://tinyurl.com/yc298zrw>
2. <https://tinyurl.com/yc4w57p7>
3. <https://tinyurl.com/y9s3yub6>
4. <https://tinyurl.com/9h77dvwb>

learning curve

BY RON OCHU, KOØZ*

Getting Acquainted With 6 Meters

Last month I briefly touched on 6 meters, which is a Very High Frequency (VHF) band, but this band propagates well beyond the usual line-of-sight propagation most hams expect on VHF bands. At times, 6 meters shares some of the same characteristics as the 10-meter band and can occasionally be a band where you can make long-distance contacts (DX). Fondly called the "Magic Band," the 6-meter band's unique propagation characteristics lend themselves to unpredictable band openings that feels like magic. Six meters can appear to be dead when suddenly signals seemingly appear from nowhere to sustain a band opening that may last for only a few moments to hours at your QTH (location).

That's the reason why initial 6-meter contacts exchange callsigns, grid squares, and signal strength. For example, AF4JF may hear me calling CQ on 6 meters and he gives me a call, "KOØZ this is AF4JF." I reply, "AF4JF this is KOØZ, EM48 you're 5x9 over." Herbert, AF4JF, will give me his grid square and my signal report and if we wish, we can continue the QSO chatting about propagation, antennas, etc., if the band continues to remain open. This is a fun band to operate, but propagation isn't always available 24 hours a day, 7 days a week.

Seasonal Propagation

The "magic band" has seasonal propagation. Statistically, spring and early summer are prime operating times, but late summer and early fall can also provide excitement. Trying to predict 6-meter propagation is challenging. There are many theories, all of them interesting, but to the best of my knowledge there is no consensus explaining Sporadic-E (E_s) formation. However, there is consensus that 6-meter signals use ground wave, E_s, tropospheric ducting, trans-equatorial propagation (TEP), and F_2-layer propagation.

Ground Wave

As its name suggests, ground wave is the distance a 6-meter wave will travel along the ground from its antenna

Photo A. I didn't have a photo handy of a 6-meter EME (earth-moon-earth) station, but Sverker Hedberg, SM3PWM's, 2-meter EME station gives a good idea of the resources and coax needed to build a good, EME station. EME is the ultimate satellite QSO. (Courtesy of Wikimedia Commons)

*Email: <ko0z@cq-amateur-radio.com>

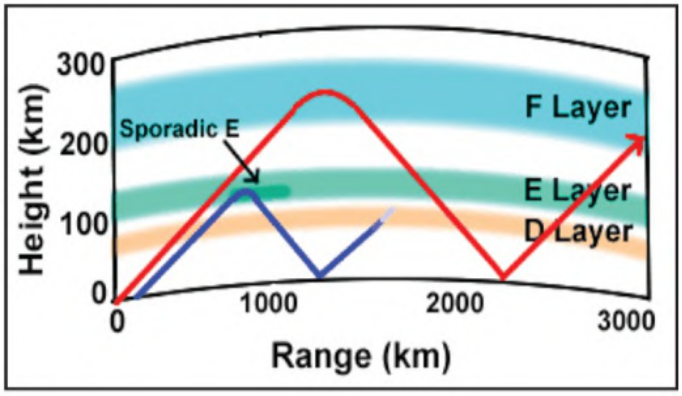


Figure 1. The red curve indicates F_2 propagation. It covers a larger skip zone. The blue line is sporadic-E (E_s) propagation, and its skip zone is shorter. Note the darker blue in the E-layer representing a E_s cloud. E_s clouds are made up of ions that refract 6-meter signals back to Earth. (Courtesy of Wikimedia Commons)

source. Antenna gain, height above ground, effective radiated power, and coax choice all factor into determining 6-meter ground wave distance. Typically, 6 meters extends a little farther than 2-meter ground wave.

Sporadic-E

E_s propagation is the lifeblood of the "magic band!" Our Earth's atmosphere — more specifically, the ionosphere — contains an E layer located at an altitude of 90 to 150 kilometers. Within the E-layer, charged particles form E_s clouds that refract 6-meter signals back to Earth, forming a single-hop skip zone (*Figure 1*). Looking at *Figure 1*, the red curve indicates F-layer propagation. The blue curve is indicative of E-layer propagation, single hop (note the darker blue in the E layer depicting an E_s cloud). An E_s single hop varies, but it can be as far as 1,500 miles. If there are multiple E_s clouds spaced apart, multiple hops are possible. Please note E_s tends to be prominent in the summer months, but it has been worked in other seasons, just not as frequently.

There isn't consensus as to just how E_s clouds form, but there are some intriguing scientific studies. An excellent source is Jim Wilson, K5ND's website: <https://tinyurl.com/4c8x9wpc>. It examines some of the current scientific thoughts regarding E_s cloud formation involving wind shear, micrometeors, and metallic ions. In addition, K5ND offers a free eBook "Capture the MAGIC of Six Meters." Another excellent source would be Dr. Jim Kennedy, K6MIO, who is a frequent contributor to the Central States VHF Conference.

Tropospheric Ducting

Tropospheric ducting, commonly referred to as "tropo" by hams, is another 6-meter propagation phenomenon. When there is a weather temperature inversion, VHF signals can propagate along the inversion created by a warm air mass overlapping a cooler air mass along the ground. Distances of up to 1,000 miles are possible. Tropo ducts are associated with high pressure systems and tend to form in the early morning and early evening hours.

TEP

Another exciting 6-meter propagation is trans-equatorial propagation (TEP), which allows 6-meter signals to cross

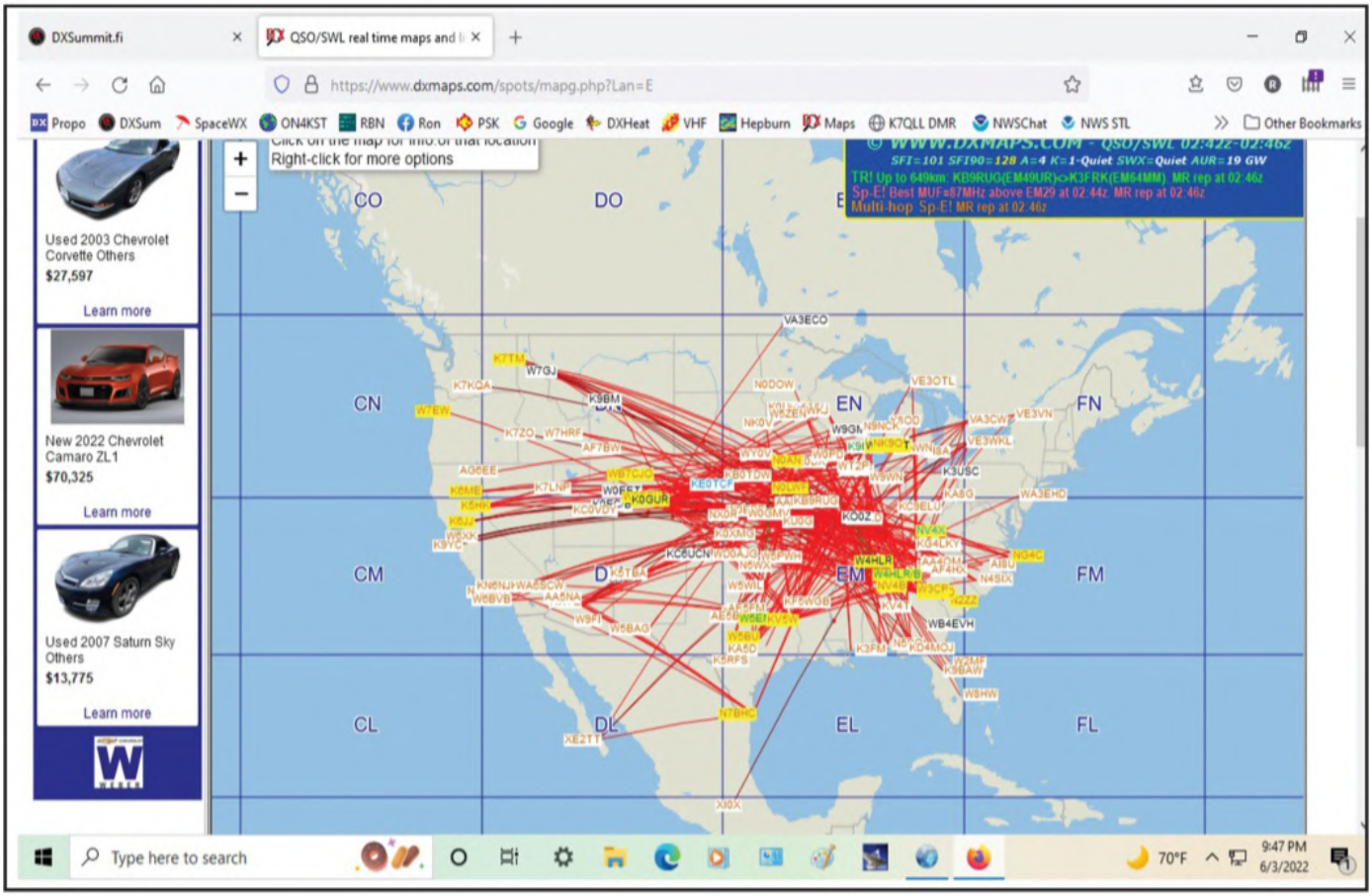


Photo B. DX Maps provides good, nearly real-time maps of 6-meter openings. This June 4, 2022, opening extends from coast to coast and even into Mexico and Canada. Criss-crossing red lines indicate the locations of E_s clouds. (Screenshot from DX Maps.com)

over the Earth's equator for many miles. When I lived in central Illinois, I made many TEP contacts with South American hams with only 100 watts and a 4-element Yagi at a 50-foot elevation.

Earth-Moon-Earth

For the more adventurous and daring who love a challenge, there is Earth-Moon-Earth (EME). Hams using 6-meter Yagi arrays bounce their signals off the lunar surface and make contacts with distant stations. To learn more about this fascinating mode of propagation check out Richard Collister, Jr., W7GJ's, wonderful website <https://tinyurl.com/3ynun9m4>. In addition, the Madison DX Club has a link to David Schmocker, KJ9I's, 6-meter EME presentation on its YouTube channel <https://tinyurl.com/2hsdeamt> that I found to be very interesting. Since I have not had the opportunity to experience EME, these presentations will help anyone get a head start. To get an idea of an EME array, *Photo A* shows Sverker Hedberg, SM3PWM, standing next to his 2-meter EME array that is capable of azimuth and elevation direction. A 6-meter station would have larger Yagi arrays.

Terrestrial 6 Meters

For most of us, we will be content to work the thrill of terrestrial 6-meter propagation such as E_s and tropo. I almost forgot to mention F-layer propagation. You may already be familiar with F-layer propagation on the High Frequency (HF) bands, but at solar cycle maximum, F_2 propagation on 6 meters allows intercontinental QSOs which are quite exciting, considering a VHF band is being used to communicate. I've had QSOs (contacts) with Europe and Japan. I've used CW (Morse code), USB (upper sideband), and FT8. FT8 is a digital mode capable of weak-signal detection. It is a popular communication mode found on 6 meters and many other bands. If you think the 6-meter band is dead, tune up to 50.313 MHz and listen to the digital signals. Better yet, get a computer-to-rig interface, download some free software from WSJT, and listen and see for yourself.

Where and When to Listen?

In the U.S., the 6-meter band starts at 50.0 MHz and goes to 54.0 MHz. Only CW is permitted between 50.0 and 50.1 MHz, 50.100 to 50.125 MHz is the DX calling window, and 50.125 MHz is the calling frequency so you would call CQ using this frequency. When you make a contact on 50.125 MHz, it is polite to move the QSO to another frequency so that others may use the calling frequency. When the band is open, CW QSOs abound between 50.090 and 50.100 MHz and phone Qs can be heard from 50.125 up to 50.200 MHz or higher! FT8 signals can be found at 50.313 MHz. FM (frequency modulation) can also be found on 6 meters, mostly using repeaters at the top end of the band.

When to listen, now that is the question! Leaving your rig tuned to 50.125 MHz and listening is one way to monitor openings. Another method is to periodically check the DX Maps website <https://tinyurl.com/89hbkzda>, which offers a great indicator of nearly real-time 6-meter openings. *Photo B* shows a good 6-meter opening from the Midwest to each coast on June 4, 2022. As you can see, some lucky ops are working Mexico. *Photos C* and *D* show more E_s activity in the central part of the U.S. Note that on June 26, 2022, there

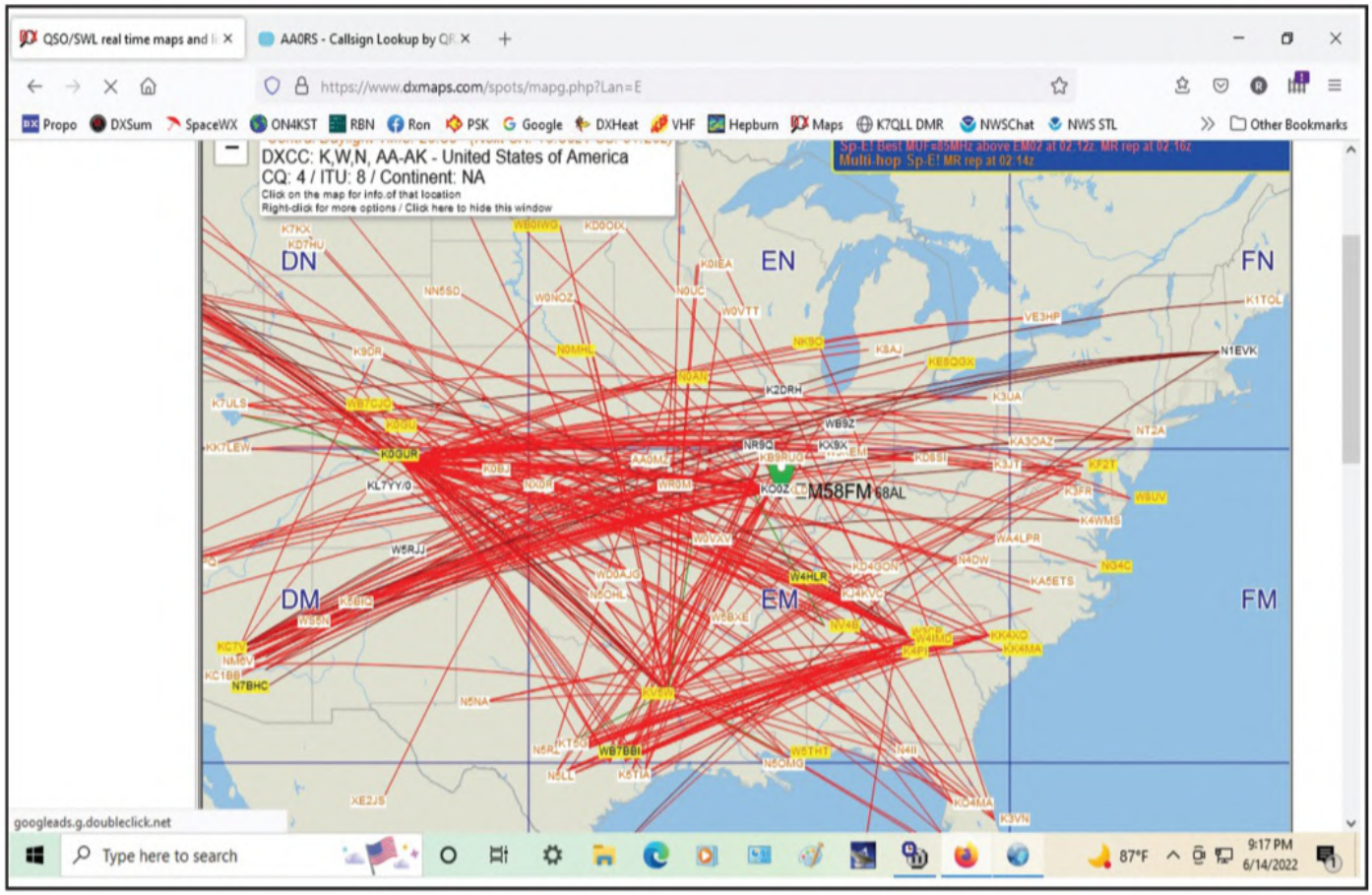


Photo C. This June 15, 2022 opening looks busy, but closer examination reveals open areas that are not experiencing the 6-meter opening. I suggest listening for 6-meter beacons to check the correlation between the map and actual local propagation. (Screenshot from DX Maps.com)

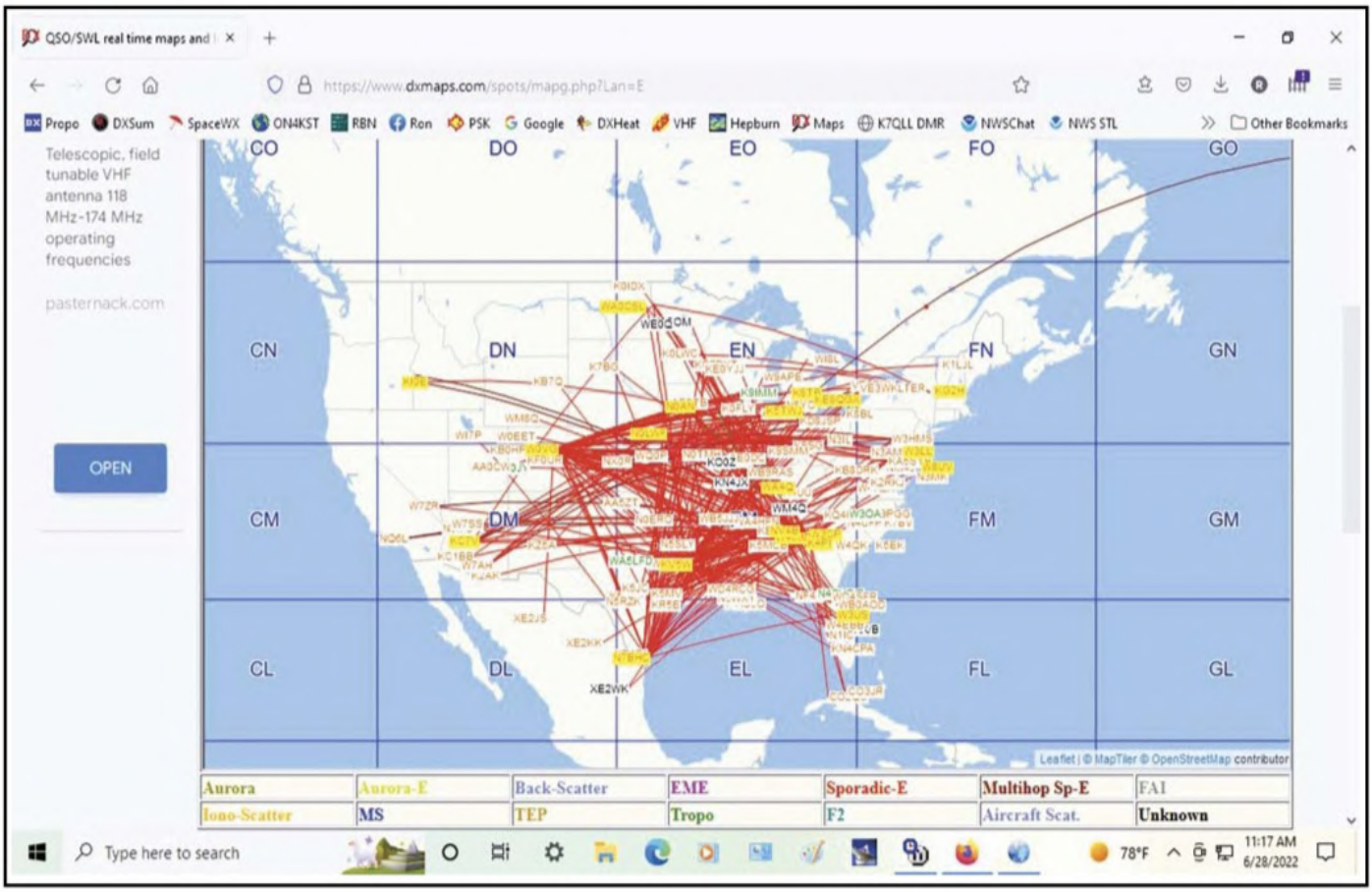


Photo D. The June 26, 2022 opening extends throughout most of the Midwest. Some Midwestern ops are having a great time jumping the "big pond" and contacting European hams. (Screenshot from DX Maps.com)

wasn't much activity to be found on the west coast. However, some Midwestern ops were having a great time contacting European ops on 6-meters, while other parts of the Midwest couldn't hear the European DX. This is a part of the mystique and fun (frustration) of the magic band. Although, I find DX Maps to be extremely useful, sometimes the maps will show an opening but I am unable to hear any 6-meter signal. Drats! The signals being reported are possibly skipping over my QTH.

Then again, there's the possibility there is a band opening to somewhere, but nobody is on the air. Fortunately for us, dedicated hams maintain 6-meter beacons throughout the U.S. and the world. These beacons transmit 24/7 using CW (continuous wave) and Morse Code identifiers. Simply monitor 50.040 to 50.090 MHz and listen for any beacons. Knowing Morse is useful in correctly identifying these beacons and their locations. Monitoring beacons will definitely let you know if there is a 6-meter opening at your QTH.

How About You?

Most commercially available HF transceivers also include 6 meters. Techni-cian class licensees have the same operating privileges as Extra class ops on this band. Not sure if 6 meters is right for you before investing more time and resources? I understand. May I suggest stringing up a simple dipole, connecting some coax, and listening to the band over a few weeks? Especially during the spring and summer months. I'll bet you'll become enchanted with the band and like magic, you'll find yourself getting more and more involved. Thank you for reading *CQ* and I hope to hear you on the air.

– 73, Ron, KOØZ

digital connection

BY DON ROTOLO,* N2IRZ

Packet on 1.25 Meters

QRV on This Wildly Underused Allocation

Way back in the last century, amateur radio lost access to the 220- to 222-MHz portion of the 1.25-meter VHF band in the U.S. We haven't suffered much because of it, but as part of the deal we got secondary access to the 219-to 220-MHz segment, with the Automated Maritime Telecommunications System (AMTS) service being the primary user. But the deal was (and is) that it could only be used for point-to-point digital communications. At the time, the internet wasn't yet a thing, and packet networks were huge. You can read the history of that 1996 FCC decision, but the "why" is not relevant anymore.

*c/o CQ magazine
Email : <N2IRZ@cq-amateur-radio.com>

Using 219-220 MHz is not without significant requirements: First, only data emissions are allowed, and the maximum bandwidth is 100 kHz. [97.307(f)(13)] Second, only fixed point-to-point digital links are allowed; "it is not available for other purposes." [97.303(i)(1)] As a secondary allocation, amateurs must not cause harmful interference to AMTS stations or TV channels 11 and 13, or to stations of other countries. [97.303(i)(2)] Third, anyone planning to use the band must notify — in writing — the ARRL of the station location(s) at least 30 days before transmitting, along with technical details of the link. [97.303(i)(3)] Fourth, transmitter power is limited to 50 watts. [97.313(h)] Lastly, you need to identify all AMTS stations using 217-220 MHz within 640 kilometers of each transmitting location and notify them in writing at least 30 days before transmitting of the station's specific geographic location, and for AMTS stations within 80 kilometers, obtain written approval from the licensee. [97.303(i)(4&5)]

These restrictions, particularly the last one, have scared many hams away from even attempting to operate on the band segment. But, as we'll see, there are very few locations in the U.S. where hams really cannot operate.

ARRL Form 219A (Interim), April 1995

NOTIFICATION FORM
Amateur Radio Service 219-220 MHz
Point-to-Point Fixed Digital Message Forwarding Station
Note: A separate form must be completed for each transmitter. Return to:
American Radio Relay League, 225 Main St., Newington, CT 06111-1494

Licensee information:
Name (last, first, middle initial) (example: Doe, John H.)
Primary amateur station call sign (example: WB4ABC)
Postal address (example: 12345 Main Street)
City, State, ZIP (example: Anytown, NC 24095)
Telephone (day) (example: 407-234-5678)
Telephone (night)
Facsimile (day)
Facsimile (night)
E-mail address (example: jdoe@aol.com)

Transmitter site characteristics:
XSC—Transmitter state (two-letter designator)
XLA—Transmitter antenna latitude (7 characters—deg/min/sec N) (example: 414538N)
XLG—Transmitter antenna longitude (8 characters—deg/min/sec W) (example: 0722625W)
XAD—Height above mean sea level (MSL) (meters)
XCL—Transmitter call sign (to be used at site) (up to 13 characters)
❑ Transmit and receive? ❑ Transmit only? (in 219-220 MHz band)

Figure 1. Part of the four-page ARRL Form 219A, used to notify the ARRL (as administrator) of your intent to operate a fixed digital station in the 219- to 220-MHz band. This band is underused because of the restrictions and paperwork, but it's not as hard as it sounds. Send the completed form to the ARRL at least 30 days before transmitting.

The Speed Question

There is a lingering misconception that only speeds of 56 kilobauds are allowed in this segment, meaning that the entire 100-kHz authorized bandwidth must be used. That's just plain wrong. In Zero Retries 0053 <https://zeroretries.substack.com> Steve Stroh, N8GNJ, discusses the topic and how that misconception may have started. The FCC mentioned in rulemaking documents that "... we find that 100-kHz channels are appropriate ..." and "this allocation is intended primarily for wideband operations...," which implies that only wideband signals are welcome. Indeed, a *QST* editorial from the May 1995 edition states: "Speeds of no less than 56 kilobauds are expected to be used."

But none of that language made it into Part 97. Instead, there is a statement in [97.307(f)(13)] that, "the authorized bandwidth is 100 kHz." Some have argued that, since this does not say "up to 100 kHz" that the full bandwidth must be used, but that is absurd: What incentive, then, would there be to develop narrower-band emission types? In 97.307(f)(5), which relates to the 2-meter band, a similar statement, "the authorized bandwidth is 20 kHz," has never been interpreted as requiring signals to occupy a full 20 kHz. It is a maximum, not a minimum.

To put this to a definitive end, I first contacted Bart Jahnke, W9JJ, at the ARRL who confirmed that there is no minimum bandwidth requirement. I then contacted a former high-ranking FCC official who is a known expert on

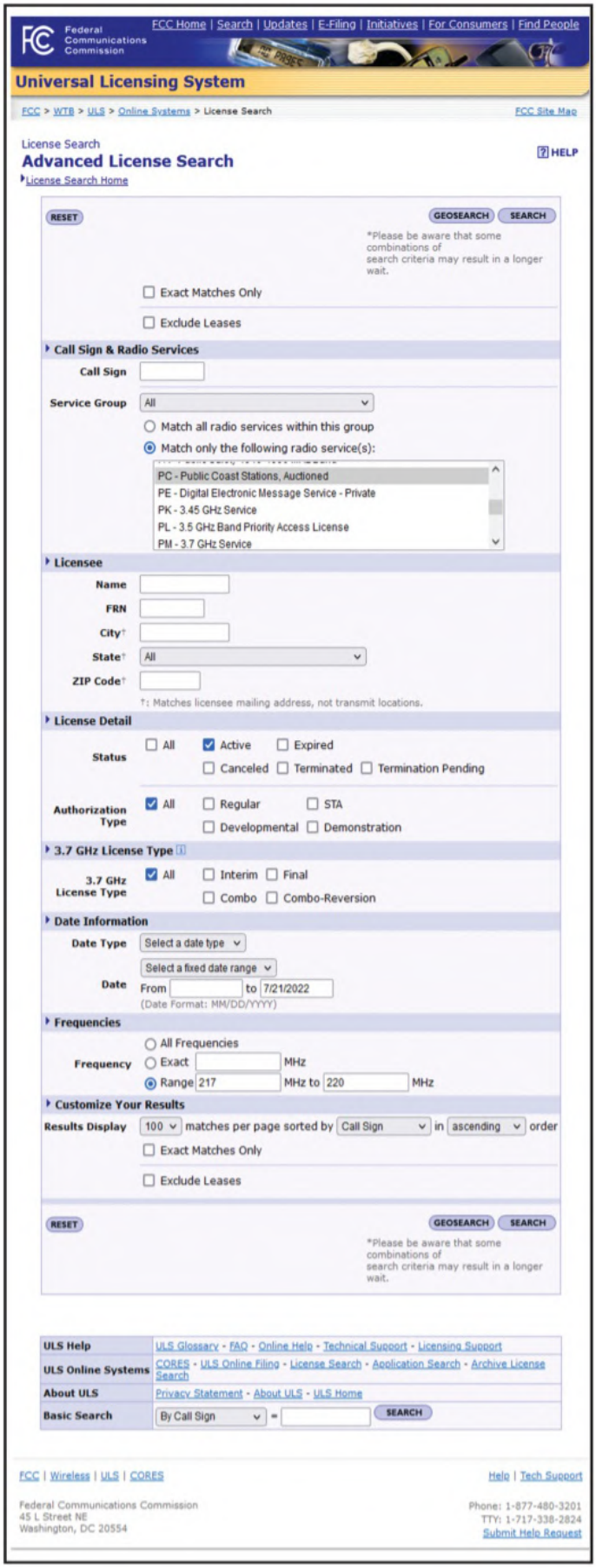


Figure 2. The "Advanced Search" form at the FCC. The search terms shown will show all 151 AMTS licensees. Geosearch can help limit "hits" to a certain radius, but not all of the required 640-kilometer radius circle. Any AMTS licensees inside the circle need to be notified at least 30 days before transmitting.

these matters, and that person confirmed that the statement means "up to 100 kHz" and does not imply a minimum.

The bottom line is that even 300-baud operation is legal, but perhaps not ideal, in the 219- to 220-MHz segment.

Fixed Point-to-Point Links

FCC Part 97 does state very clearly that only "fixed point-to-point" links are allowed. This means that only two stations are allowed on frequency, and these may only "talk" to each other. No user ports, no mobile operations, no three-ways, or zoo channels. While the type of antenna is not specified, good engineering practice dictates that directional antennas would be a superior choice. It is no coincidence that each and every TARPN link generally meets these requirements.

ARRL Notification

Part 97 designates the ARRL as the keeper of the database of stations, and states that you must notify it in writing at least 30 days before transmitting. There is a form (ARRL Form 219A; you'll need to ask for a copy, *Figure 1*) you can fill out that delivers everything needed. You would be wise to mail in two copies, the first by regular first-class mail and the second by certified mail with a return receipt. That way you have evidence in case the FCC comes knocking. Of course, keep a copy for each station.

AMTS Permission and Notifications

St. Jude is the Catholic "patron saint of lost causes," and divine intervention might be needed if you want to operate within 80 kilometers (50 miles) of an AMTS station. It seems to me that getting written permission from such a station to operate is likely impossible. But it certainly couldn't hurt to try. Recognize that the people reading your request might not be radio experts, so be sure to explain, in plain language, how your operations will avoid any possible interference: Perhaps by using low power and highly directional antennas, or there is a mountain ridge blocking you from them, or your intended frequency is far from theirs ... or something. But don't get your hopes up too high.

Notification, on the other hand, is just telling any AMTS station within 640 kilometers (398 miles) what you're up to. They only have a say if you're causing interference. Technically you need only to notify them of your intent to operate and the station's specific geographic location, and while adding more information might seem like a good idea, anything you give them (like operating frequency) gets harder to change if needed. Again, you should consider sending two copies, one regular and one certified with return receipt, at least 30 days before you start transmitting.

Finding AMTS Stations

Using an example of a proposed station in Raleigh, North Carolina, a quick search of the FCC database finds at least one AMTS station, in Trenton, New Jersey, that needs to be notified. And AMTS is not limited to places near the coast: Stations can be almost anywhere. The point is that you almost certainly will have to notify some AMTS stations. But how can you find out how many and which one(s), exactly? Well, the FCC has a database for that. It's a bit tedious to use, but ultimately you will get the answers you need.

Start at the FCC's Universal Licensing System (ULS) search page at <https://tinyurl.com/28vvkwrv>. Click on Advanced License Search, select the radio button "Match only the following radio service(s):" and pick service code "PC" (Public Coast Stations, Auctioned). Check the box "Active"

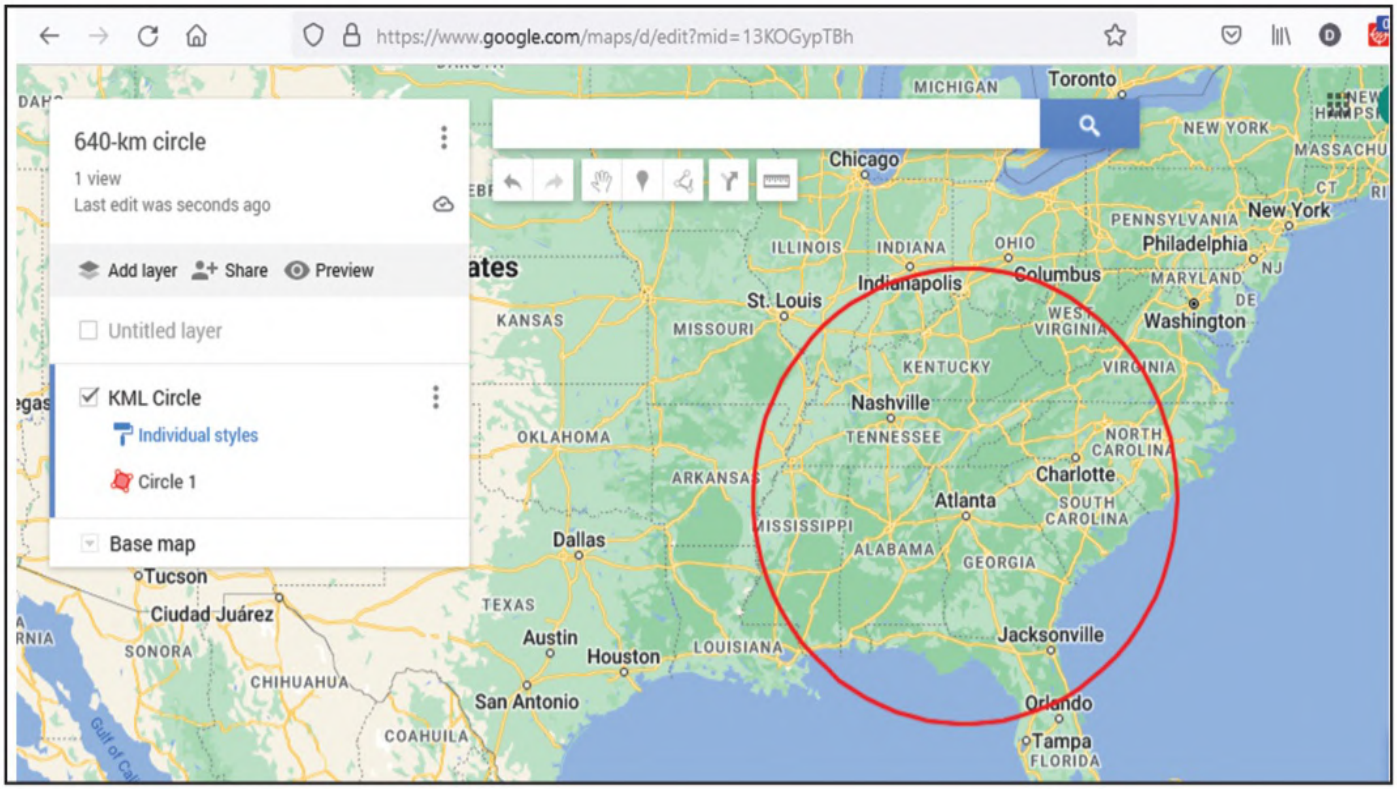
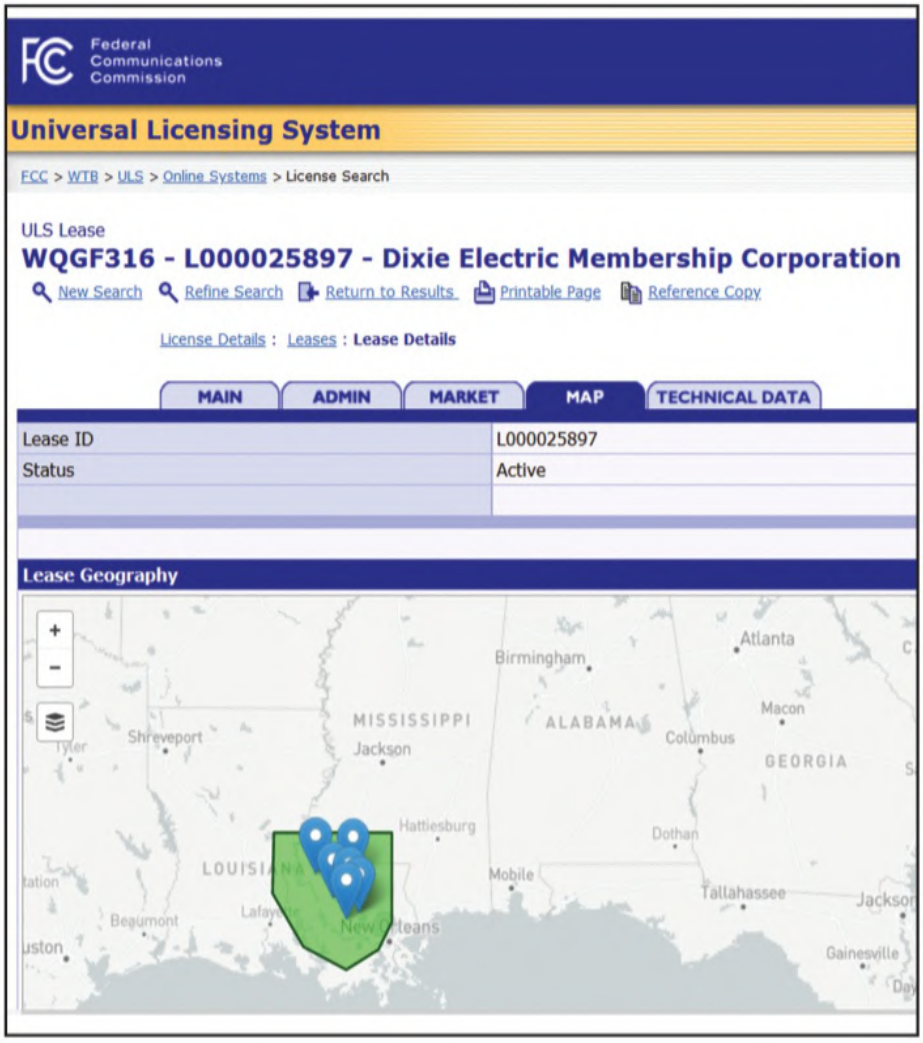


Figure 3. A 640-kilometer circle from my proposed 219-MHz fixed packet network link drawn on a Google map. There are several ways to draw the circle, but you need to use an external application to do it. Adding a map layer (here, a KML circle) requires you to log in to Google. Since the FCC licensee data also includes a map, it makes it easier to determine if a licensee is in or out of the circle.



under Status — you don't care about expired, canceled, or terminated licenses. Finally, select the FCC-specified frequency range of 217-220 MHz, and consider allowing a results display of 100 matches per page (*Figure 2*). Leaving everything else blank and clicking "Search" will, after a long moment, deliver a list of all relevant AMTS stations. Perhaps a bit more than you need, but my search in July 2022 yielded only 151 licensees: That's the absolute maximum anyone might have to look at.

The database also has a "Geosearch" option, unfortunately limited to a 321.9-kilometer radius, but this is a good place to start. Clicking Geosearch instead of Search brings up a second page, allowing you to search within a specified radius of an address or latitude / longitude coordinates. Starting with an 80-kilometer radius from my home on Atlanta, I found no stations, meaning I didn't have to get written permission. I

Figure 4. Some of the 151 "hits" for the search. The blue hyperlink leads to a detail page for each licensee, where you can see their area of operation and contact info. It struck me as odd that many licensees of the Automated Maritime Telecommunications System (AMTS) are inland electric utilities and railroads.

Federal Communications Commission

FCC Home | Search | Updates | E-Filing | Initiatives | For Consumers | Find People

Universal Licensing System

FCC > WTB > ULS > Online Systems > License Search — FCC Site Map

License Search

Search Results

HELP

New Search | Refine Search | Printable Page | Query Download | Map Licenses

Specified Search

Radio Service = **PC**
Status = **Active**
Frequency Upper Band >= **219**
Frequency Assigned <= **220**

Matches **1- 100** (of **119**)

PA = Pending Application(s)
TP = Termination Pending
L = Lease

Page 1 2 — NEXT

	Call Sign/Lease ID	Name	FRN	Radio Service	Status	Expiration Date
1	L000010890	Northwestern Energy	0012478665	PC	Active	04/26/2025
2	L000025897	Dixie Electric Membership Corporation	0001715754	PC	Active	12/29/2026
3	L000025898	Enbridge Energy Company, Inc.	0027639632	PC	Active	12/29/2026
4	L000040769	KCS Spectrum, Inc.	0024414260	PC	Active	12/29/2026
5	L000040874	PTC-220, LLC	0017368184	PC	Active	12/29/2026
6	L000042338	Autauga Northern Railroad, LLC	0020736211	PC	Active	12/29/2026
7	L000042340	Grand Elk Railroad, Inc.	0018491357	PC	Active	12/29/2026
8	L000042430	Missouri & Northern Arkansas Railroad	0005415385	PC	Active	12/29/2026
9	L000042432	Chicago Rail Link, LLC	0006917793	PC	Active	12/29/2026
10	L000042836	Iowa Interstate Railroad, Ltd.	0012131843	PC	Active	12/29/2026

Figure 5. The "Map" tab for licensee Dixie Electric Mobility Corporation, showing the operating area (green) and their six fixed stations. None of the stations are inside the 640-kilometer circle, so even though their area of operations just touches the circle, they don't need to be notified in my interpretation of the rules.

then searched out to the 321.9-kilometer radius, to at least see some of those I'd have to notify, but again got no hits. Good so far!

The Plan B method — manually searching each of the 151 licensees — certainly gets tedious, but not excessively so, and will absolutely yield a list of all the stations I need to contact.

To start, I drew a 640-kilometer radius circle on a Google map (*Figure 3*), using the KML Circle Generator <https://tinyurl.com/yepxmcnn>, downloaded the resulting KML file and added it as a new layer on Google My Maps <https://mymaps.google.com>, which requires a Google login. On the My Maps page, click Create new map, then Add Layer, Import, and select the KML file you downloaded.

Starting with the first licensee, I clicked on the Lease ID hyperlink and got the details on Northwestern Energy (*Figure 4*), located in Butte, Montana. OK, definitely more than 640 kilometers from Atlanta, but just to be sure I clicked the Map tab. The map confirmed their stations were in parts of Montana and Wyoming, so I clicked Back in the browser and went to Line 2, Dixie Electric Membership Corporation.

These folks were in Louisiana, and the map showed locations that might be within 640 kilometers of Atlanta (*Figure 5*). Comparing the FCC map to the Google map, I could see that the nearest of their six stations was close to the 640-kilometer limit, but definitely outside it. Two down.

Number three didn't show any specific stations, but an area of operation (a big green rectangle) in central Louisiana, again outside the 640-kilometer limit. Number four also showed no stations, but an enormous green area covering a third of the country. These folks I'd need to notify.

And so it went. With each map check, I filled in my little spreadsheet with what I'd need to know (particularly the licensee and contact info). Some had multiple licenses, some were close to the 640-kilometer limit, requiring some map zooming and comparison.

I got myself a drink and started the process for the remaining 147 licensees. Sigh. I haven't found a better way, but if you know of one I'd really like to hear from you.

– Until next time, 73 de N2IRZ

vhf plus

BY TRENT FLEMING,* N4DTF

Report From the Central States VHF Conference

LaCrosse, Wisconsin. might seem an out of the way place for a "central states" convention, until you realize it lies along the great Mississippi River, which winds its way south and touches many of the states considered to be in the central part of the United States. Recently, I made my way north from my location in west Tennessee, along the same Mississippi River, to LaCrosse to attend the Central States VHF Conference where I thoroughly enjoyed my time with the CSVHF folks. This is a well-planned conference, with outstanding speakers and outstanding topics. Among the presentations I heard were a treatment of FSK441 vs. MSK144 on 222 MHz, an excellent discussion of software and hardware tools available for the VHF/UHF enthusiast, and a DXpedition that featured Earth-Moon-Earth (EME) work. The Friday evening swap meet was filled with goodies for sale, trade, even for giving away. One ham took some of the free items with the intent of giving it to a ham in his community who he is mentoring. That's the ham spirit. I've included a few pictures (*Photos A*, *B*, and *C*) to give you a sense of the event.

This was my first CSVHF but it will not be my last. In addition to the camaraderie present at many ham events, this was a serious conference focused on learning, experimenting with new modes and bands, and advancing the hobby. Make no mistake, old friendships were rekindled, new acquaintances made, and there was food and drink aplenty. But there's a tremendous focus on the technical side of our hobby, and your inquisitive mind will be sparked by what you see and hear. Another feature of the show is the display of rovers and microwave dish setups. See *Photo C* for an example and visit the Ham Radio Rovers Facebook page for a number of photos provided by Jeff, K9YR.

* <n4dtf@cq-amateur-radio.com>

Photo A. Lots of goodies to peruse in the vendor area of the Central States VHF Conference.

Photo B. Current and former CQ VHF+ columnists. (Photo by Joel, W5ZN)

Remember — everything discussed at this conference is available to those with "only" a Technician Class license. Next year's conference is in North Little Rock, Arkansas. I would encourage you to add this event to your ham calendar if you can. Visit the Central States VHF Society website <www.csvhfs.org> for more information — maybe even grab a copy of the proceedings to review. I guarantee you will learn something!

Operating Reports

On July 11th, Jay, W5JAY, reported that he was working N7PHY in DN76, and right after that QSO he had JL8GFB call him from Japan, and they completed the QSO. The band was pretty dead seeing only N7PHY and looking on DXMaps under the *MUF Sp—E* tab there just wasn't a lot of anything going on, much less towards the northwest and Japan (JA). Jay asks, "so how in the world did the JA's signal get here?" Answering his own questions, Jay then said, "I guess that's why they call it the Magic Band." Thanks Jay, for the report — propagation is a curious thing, and part of what makes our hobby so interesting.

Frequent contributor Steve offered this report from July 10th, regarding potential 2-meter Sporadic-E (E_s): "Trent, it was a pretty poor showing by me. Heard more than I worked. I operated from 2237 UTC till 2309 UTC. I may have gotten in too late. Some stations both farther north, and southwest, worked into that area. But I only worked EL88 and EL97. Heard others in that quadrant and called, but no QSO: EL95, EL96, EL87, and EM90. Doesn't help that to the SE, my 100 watts and 2-meter beam points into my hillside, sadly. I was glad to hear and work the ones I did."

Another regular correspondent, Mario, K2ZD, offered this report from his 6-meter activity: "Last night, June 15th, from 2156 UTC to 2308 UTC I logged 44 JA stations, then at 2224 UTC I logged HL3GOB for 6-meter DXCC #221. Been a great 'E' season for me." Mario, the 221 DXCC countries on 6 meters is impressive! Congratulations and please keep up the reports.

Dave, K1WHS, offers the following report from the July 26th 222-MHz "activity night" effort. Listen for this activity every Tuesday beginning around 7:30 eastern time. As you will see, below, this is not just a Northeast event.

"I live in Maine in grid square FN43mj. I am a 222-MHz operator. I was just back from the Central States VHF conference and was all fired up to make a few contacts on 222 MHz. While at the conference, there was a get-together with all or almost all of the living 220- / 222-MHz WAS holders and current chasers. In addition, there was a presentation about the quest for 222 WAS. Ten VHFers achieved that in the 1980s and about seven more have done it in 2021 and 2022. Anyway, I was pumped up to get on the band after hearing all that.

"I made 15 contacts last night (July 26th) on various modes. A look at the Hepburn map indicated that New England was not the place to be, but western New York and further west were looking a bit better, as was down south. As the night wore on, and the ground cooled and cold air settled, we started to see some enhanced conditions in those areas. Northern New England was still not so good. I try to pay attention to what goes on with the chat page, (ON4KST) and there were plenty of long-haul contacts between New York, Maryland, and Virginia out to the Midwest. For New England, not so much. I found conditions to be flat, as did N1JEZ in northern Vermont. WZ1V on the Connecticut shoreline saw WA3EOQ (see Howard's note below on transverters vs. all-band transceivers) in FM09 having a much better signal strength.

"As we get into the later portion of the summer months, sunset starts moving fast and the sun sets earlier each day. This allows for radiational cooling and some nice localized inversions can set up at decent hours when hams are likely to be on the air. In May, June, and even July, any radiational cooling would set up much later and while hams are asleep. I find that things start getting good about August 1st, and late-night enhancements are quite possible after that. Here in Maine, the typical peak for tropo seems to be in late August, while later periods are less likely to produce good conditions. Of course, there are exceptions, but those average dates are when things happen most likely.

"Stations worked last night (July 26th) on 222 MHz: N1JEZ, WZ1V, K1PXE, N1YCQ, W9KXI, WA3EOQ, W1ZC, W8ZN, N2JMH, W1FKF, W1AIM, N1GJ, K1TEO, WA1PBU at distances of 25 to 500 miles.

"There was a significant amount of activity outside of the Northeast Corridor. (I am at the northeastern end of that corridor). W4ZST EM84, K9MRI EN70, W8RU EN82, W5EME EM35, N1GC EM95, AA9MY, AJ6T near Nashville, and some others are regulars on 222 activity night. Having these folks spread out over large distances can make for interesting possibilities and allow us to uncover band openings on Tuesday night at least!

"I usually work VE3DS, VE3ZV, and others in the Toronto area FN03 and EN92 at distances from 440 to 500 miles. They were absent on the latest Tuesday. It seems that my reliable range is about 500 miles on CW. I am running about 1,300 watts typically, but WA3EOQ runs only 100 watts and he works me almost every week on a 500-mile path. This is a testimony to the effectiveness of 222 MHz. Noise levels are much lower than 144 MHz. Antennas are a bit smaller, but path loss is not all that different from 144. EME results are better than on 144 MHz due to less galactic noise. An EME system on 222 could be two Yagis and 300 watts or so. I am hoping that there is a surge of 222 EME activity. I plan to be around to enjoy it as I have my tropo array also rigged up with an elevation drive."

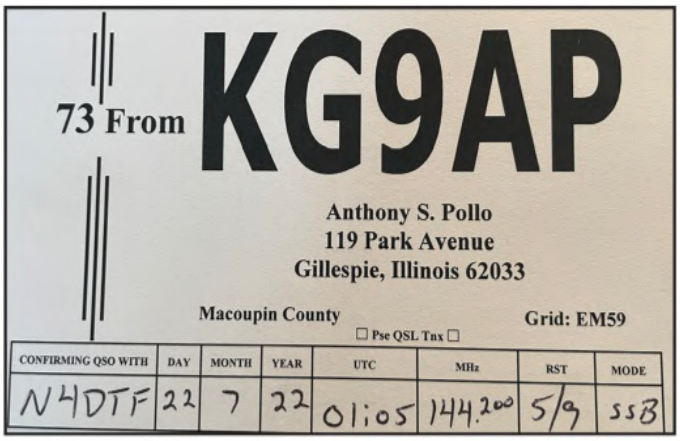
Finally, from your faithful correspondent, a report of a surprise 2-meter SSB contact: "As I was traveling to the Central States conference, I was just south of St. Louis, and as usual I was scanning the FM side of 2 meters to see what activity was there. In listening to a local net, I heard a station report that they were QSY'ng to 2-meter sideband for a local activ-

ity night. I learned that there is such activity each Thursday evening beginning around 7 p.m. local time. Stations are in eastern Missouri and western Illinois. My VHF setup in my Tahoe is an 857D driving a vertical that is quarter wave on 6 meters and 5/8 wave on 2 meters. So, I tuned to 144.200 MHz and listened. Sure enough, there were several stations chatting, and once I cleared the concrete jungle of downtown, I threw out my call. I was close to one station and they kindly answered my call and we chatted. As I crossed into Illinois, other stations could hear me and also called. Several had good signals, and I was able to carry on a conversation, roundtable format, almost to Springfield, Illinois. For reference, these were grids EM48 and EM59. Two of the stations were able to switch between vertical and horizontal antennas to experiment with signal strength and distance, knowing I was only vertical. One even sent me a QSL card. (*Photo D*) As I ran out of string, I bid them goodnight and thanked them for their hospitality. If you are in the area, give a listen on Thursday nights for this SSB net. Remember — enhanced tropo can give even distant stations a chance to work these folks. Call and listen! Stations I worked included Tony, KG9AP, and Mark, WA9SXK.

Open for Discussion

You may remember that in the June issue I started a thread regarding using transverters vs. multi-mode radios for the higher bands. Howard, WA3EOQ, took the time to write and offer some opinions. A quick check of Howard's QRZ page will tell you he knows from which he speaks. I continue to welcome comments and opinions on this topic, so keep those cards and letters coming. Howard writes:

Hello Trent,
We have come full circle. Way back when (1965), I got hooked on 2 meters with a Heathkit Twoer. After graduating


73 From KG9AP

Anthony S. Pollo
119 Park Avenue
Gillespie, Illinois 62033

Macoupin County ☐ Pse QSL Tnx ☐ Grid: EM59

CONFIRMING QSO WITH	DAY	MONTH	YEAR	UTC	MHz	RST	MODE
N4DTF	22	7	22	0105	144.200	5/9	SSB

Photo D. QSL card from mobile 2-meter single sideband (SSB) activity.

Photo C. Bruce, W9FZ's, rover setup. (Photo by Jeff, K9YR)

from college and having a few bucks to spend on ham gear, I really needed to upgrade and transverters were the only game in town. I started with Hallicrafters HA-6 and HA-2 (6 and 2 meters, respectively). Then on to higher bands with Microwave Modules for 220 and 432 MHz (the 220-MHz transverter was actually a modified 2-meter unit by a ham in Canada; forget his call). The 1296 MHz was more Microwave Modules but just a receive converter and a tripler from 432 MHz on transmit. A real bunch of coax switches and pigtails to get this going.*

*[*Actually, before the transverters and still with almost zero budget, I got a Heathkit 2-meter receiving converter which dumped 28 MHz into my National NC-60 HF receiver. That allowed me to have a much better receiver and to be able to use the Twoer's transmitter on both AM and CW.]*

Then around 1985, the Yaesu 736R came out. A group of us VHFers ganged up on a distributor in Dayton and bought five of them. That, coupled with brick amps, got me on 144, 220, 432, and 1296 MHz. The radio could also operate on 6 meters, but only on four bands at a time. Six meters wasn't that important to me at the time, but I eventually got a Ten-Tec transverter to get me on that band (my HF radio, an Icom 751A, did not have 6-meter capability). I was also eventually able to get on 902 MHz with a 144- to 902-MHz transverter. The 736R served me well for probably close to 35 years. However, it was starting to show its age and some critical parts, I was told, were no longer available … anywhere. It was time to modernize. The IC-751A and the FT-736R were replaced with an Elecraft K3s and Icom IC-9700, respectively. The K3s took care of 6 meters; however, the IC-9700 was missing (now) 222 MHz and, of course, 902 MHz. So, it was back to transverters. Q5 Signal (nee DEMI) solved that missing link with a 100-watt 222-MHz transverter and a 50-watt 902-MHz transverter. (Q5 Signal also produces a 5-band (144-, 222-, 432-, 903-, and 1296-MHz transverter with lower power output.)

Observations: There is NOTHING wrong with using transverters. They allow the use of an existing transceiver without having to purchase a completely new radio. Most, even the old Microwave Modules units, had top-of-the-line receiver performance. If you can find one and don't mind vacuum tubes, the Hallicrafters transverters mentioned above put out around 80 watts; but they did require a good solid-state preamp in front of their RF front end (there was plenty of room to do this under the chassis). Most of the older transverters only put out 10 watts or less, but they did get you on the air. Any newcomer to VHF will be surprised what that kind of low power will do on SSB or CW.

The BIG problem with modern weak-signal oriented transceivers is the lack of 222 MHz (and, to a lesser extent, 902). I was really hoping that Yaesu would come out with a replacement for the FT-736R, but that never happened. 222 MHz is the best kept secret in VHF radio; it usually outperforms 2 meters. More and more stations are showing up on 222 MHz. Again, unfortunately, just about the only way to get on 222 MHz is by using a transverter.

That's it for this month — be alert for tropo conditions this fall, and keep those reports, questions, comments, etc. coming!

– 73, Trent, N4DTF, EM55

awards

BY STEVE MOLO,* KI4KWR

Amateur Radio Lighthouse Society Awards

Lighthouse awards chasing is a good way to learn about the geography, history, or culture of lighthouses and lightships and places near and far.

Every August I participate in a great contest supporting the U.S. National Lighthouse-Lightship Weekend where I try to make as many contacts as I can with lighthouses and lightships. With that in mind, I reached out to the group to shed light on its award program and the certificates that are available.

Founded in the year 2000 by K2JXW (SK), the Amateur Radio Lighthouse Society (ARLHS) is devoted to maritime communications, amateur radio, lighthouses, and lightships. Its members travel to lighthouses around the world where they operate amateur radio equipment at or near the light. Collecting lighthouse QSLs is popular for some amateur radio operators. ARLHS is a membership organization with over 2,000 members worldwide.

The ARLHS sponsors many categories of operating achievement awards for the lighthouse / lightship enthusiast in the amateur radio community. Lighthouse awards chasing is a good way to learn about the geography, history, or culture of lighthouses and lightships and places near and far. Awards are administered by a volunteer committee consisting of John Huggins, KX4O, who is the president; and Tim Hijazi, KB3K, the awards manager. They provide applicants with the award rules, application forms, certification of applicant's submission, and issuance of appropriate award or endorsement. All ARLHS awards except the Activator Awards are available to SWLs on a "heard basis." Although the term "lighthouse" is used most frequently throughout, for award purposes, lightships are included in this category. Award certificates were redesigned in 2018 and are primarily issued electronically in the form of a PDF file. Exchange of QSL cards is highly encouraged, and some members and clubs have taken the extra step of printing unique cards with the actual photo(s) of the light beacon they activated.

The ARLHS Awards generally fall into two categories: Activator and Chaser and are available to all ham operators worldwide. Special awards like the Lifetime Achievement Award are reserved for ARLHS members and issued uniquely by the awards committee of the ARLHS to honor longtime active members for their contributions to the mission of the society.

Activator Awards are meant to recognize the efforts and dedication of ham operators who venture out to operate portable or maritime mobile, and bring new or repeat activations of light beacons, as well as promote the light itself and increase awareness of other hams about the mission of the ARLHS.

To clarify common misconceptions about what qualifies as "activating" a light, the society has put in place two primary rules. (A) The activator must be located within 1,000 meters (1,100 yards) of the structure. However, if that is not possible, practical or permissible, then (B) The "visual rule" takes effect and an activator station may be at any distance within visual sight of the physical structure of the light during the day or the "reach" of its light beacon at night. The ARLHS does not impose restrictions for multi-entity activations, in which lighthouse activations are combined with other entities, most commonly islands, parks, and beaches.

The two main Activator awards offered are:

ARLHS Activator Award – is offered in four levels: Bronze, Silver, Gold, and Diamond for activating 25, 50, 75, and 100 lights, respectively.

ARLHS Activator of the Year Award – rewards ham operators for activating the greatest number of ARLHS lights and logging a significant number of QSOs within the previous 1-year period.

Chaser Awards – as the name implies, reward lighthouse

Activator Award certificates from the Amateur Radio Lighthouse Society.

*Email: <KI4KWR@cq-amateur-radio.com>

Falling Leaves... ...Falling Prices

DITS and DAHS

The A B C's of Morse Code Operating

by Ed Tobias, KR3E

This small by solid guide is the perfect read for those interested in learning or improving CQ operating techniques!

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by Lew McCoy, W1ICP

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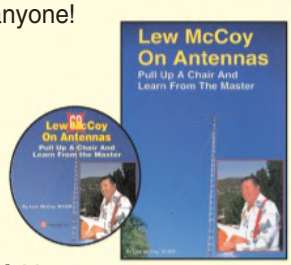

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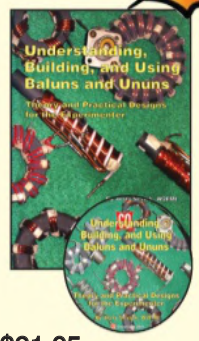
by Jerry Sevick, W2FMI



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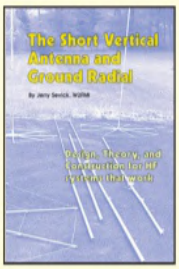
by Jerry Sevick, W2FMI



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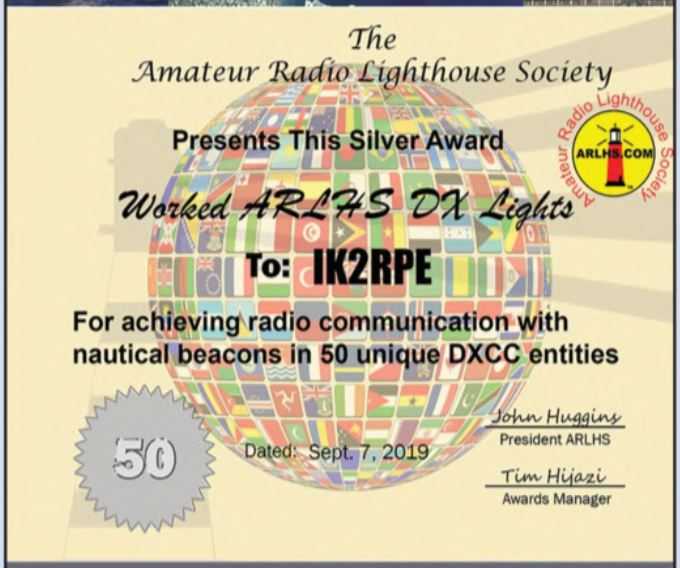
enthusiasts who consistently chase activators at different lights, be they local or DX.

Most Chaser awards are offered at three different levels: Bronze, Silver, and Gold; while some are single level.

1) Chaser Award
2) DX Lighthouse Award
3) Patriot Award
4) Worked All U.S. Call Areas (WACA-LH) Award
5) Worked All Continents Award – Lighthouse WAC
6) Worked All U.S. States Award – Lighthouse WAS
7) Worked All Canadian Provinces Award
8) Chesapeake Bay Lights Award

More awards are in the planning stages and expected to be released later this year. You will find specific details about



the ARLHS awards program as well as general information on the society's main page <www.ARLHS.com>.

The society is also open to the idea of sponsoring major events, like DXpeditions where lighthouses are present.

For the ARLHS official list of lights and their ARLHS numbers database, please visit the World List of Light page at <http://wlol.arlhs.com> Planned activations are regularly advertised on that page as well.

Collecting lighthouse QSLs is popular for some amateur radio operators.

A collage of the different awards offered by the Amateur Radio Lighthouse Society.

behind the bylines...

... a little bit about some of the authors whose articles appear in this issue

H.P. Friedrichs, AC7ZL ("In Search of the Real Wouff Hong," p. 23), is an accomplished author whose most recent book, *Marvelous Magnetic Machines*, was reviewed in *CQ* last year. This is his second article for *CQ*.

David J. Ring, Jr., N1EA ("The Vibroplex and Other Keys on Ships, Aircraft, and at Coastal Radio Stations," p.27), is a former radio officer in the U.S. Merchant Marine and broadcast engineer. He is a vintage key enthusiast and a particular fan of sideswiper, or "cootie," keys.

Jim Kocsis, WA9PYH – ("Protect Your NanoVNA," p. 33), has been licensed since 1964 and enjoys homebrewing and satellite operating. He has written for many amateur radio magazines, including several past articles in *CQ*.

Bob Hines, K4MZU (DX column: "Working a Station in Antarctica is Always a Great Experience," p. 80), is retired from the cellphone industry and has been a ham since the peak of Cycle 19 (1957)! A dedicated DXer (CQ DX and DXCC Honor Rolls), Bob is particularly passionate about working stations in Antarctica, which is the subject of his article. You can see his collection of Antarctic QSL cards at <www.k4mzu.net>.

BY BOB SCHENCK,* N2OO

DXing (Wayy) Down Under

*As I have often related, chasing DX isn't always about the DXCC or CQ DX Awards. Sometimes, the chase is for a more specific goal. In this case, I have passed the keyboard over to Bob Hines, K4MZU (*Photo A*), who will give you a little insight into amateur radio activity in Antarctica over the years and a look at the Worldwide Antarctic Program (WAP) <www.waponline.it>. Working Antarctica stations has always been exciting for me, although I never chased a particular award for doing so. But I always tried to get a QSL card from every station I could work. I hope you enjoy Bob's article this month! – 73 de N2OO*

Working a Station in Antarctica is Always a Great Experience!

BY BOB HINES, K4MZU

Logging stations operating from Antarctica has been the best DX many can wish for. Several hams, particularly the old timers, have progressed far but just a few of them have over 200 Antarctic bases in their logs. This takes years and years of continuous monitoring, setting skeds, following Antarctic expeditions and scientific seasons, all with only one goal; to work a new one. Bases, camps, huts, refuges, and rare scientific sites are the rewards of ample research done by these Antarctic DX hounds.

Currently, there are many different Antarctic DX programs and awards available from Argentina, Australia, France, Italy, Poland, Russia, and Ukraine. Two sought-after Antarctic awards are sponsored by the Worldwide Antarctic Program from Italy, with Gianni, I1HYW (*Photo B*), and Massimo, IK1GPG, at the helm <www.waponline.it>; and the Polar DX Group managed by Mehdi, F5PFP (*Photo C*) <https://tinyurl.com/2s45t2fs>.

Among those meticulous Antarctic hunters (*see Photos D-G*) is yours truly, Bob, K4MZU. I have achieved the popular WAP Top Honor Roll, top of W.A.P. Worldwide Antarctic Program, WADA Award, 202 Antarctic Bases and WACA Award, with 513 Antarctic stations' callsigns. I have also achieved the top Antarctic Challenge 2022 Award with 203 Antarctic / sub-Antarctic bases and refuges (*Photos H & I*). Please visit my

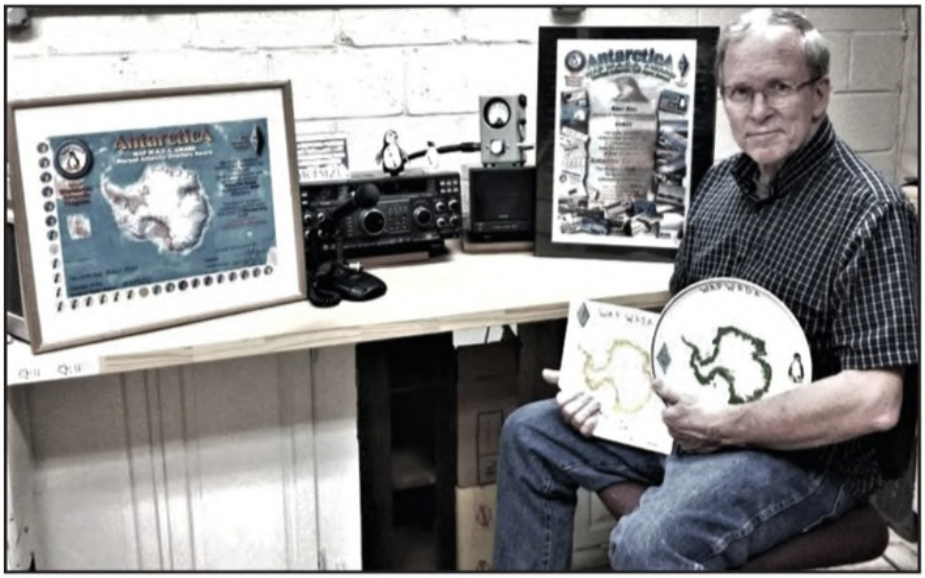


Photo A. K4MZU shows us some of his most cherished Antarctica awards. (All photos courtesy of K4MZU)

Photo B. Gianni, I1HYW, of the Worldwide Antarctic Program (WAP).

*email: <n2oo@comcast.net>

The WAZ Program

SINGLE BAND WAZ

6 Meter

193 .....W2IRT 25 Zones

12 Meter SSB

60 .....I4EWH

15 Meter CW

381 .....OE3SGU

17 Meter SSB

69 .....I4EWH

20 Meter CW

686 .....WE9R
687 .....DL7LX

20 Meter Digital

49 .....JA1AYV
50 .....OE3SGU

20 Meter RTTY

89 .....DK1FW

20 Meter SSB

1274 .....W9HBH

30 Meter CW

169 .....I4EWH

ALL BAND WAZ

CW

1198 .....K4YJ
1199 .....IK8VRP
1200 .....JF3VEC
1201 .....WN7J
1202 .....JA1MJC
1203 .....W1RM

Digital

366 .....NKØS
367 .....K4YJ
368 .....K7PT
369 .....IZ5FSA
370 .....K4GO
371 .....WE3J
372 .....IV3IXN
373 .....NØEUV
374 .....W9HBH

Mixed

10255 .....IZ4DPV
10256 .....K8ARY
10257 .....NKØS
10258 .....N3FWE
10259 .....W3KB
10260 .....WC4H
10261 .....K7PT
10262 .....K2IVS
10263 .....K4GO
10264 .....JA7WND
10265 .....W2NWU
10266 .....WE3J
10267 .....DD8BA
10268 .....I4DOR
10269 .....EI4GXB
10270 .....NØEUV
10271 .....W9HBH
10272 .....JA1MJC

SSB

5540 .....OE3SGU

RTTY

316 .....DK1FW

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, Jose Castillo, N4BAA, 6773 South State Road 103, Straughn, IN 47387. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to John Bergman. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. KC5LK may also be reached via e-mail: <n4baa@cq-amateur-radio.com>.

Photo C. Mehdi, F5PHP, Antarctic DXpeditioner of the Polar DX Group.

The WPX Program

CW

4065 .....K3BLN
4066 .....N9UNX

SSB

4436 .....AD7DB
4437 .....SP7JS
4438 .....YBØFLY
4439 .....W6NWF

Mixed

4460 .....JL1CYL
4461 .....HB9HPL
4462 .....KI5FTY
4463 .....AB9BH
4464 .....K3BLN
4465 .....JA1VNV
4466 .....KDØBQS
4467 .....K9DY
4468 .....AE5FM
4469 .....JR2RSF
4470 .....W7VC
4471 .....PP5ZX
4472 .....W6NWF
4473 .....AB2RA

Digital

1779 .....KIØHA
1780 .....JL1CYL
1781 .....MQØKUH
1782 .....KO4VVQ
1783 .....IZ5FSA
1784 .....HB9HPL
1785 .....PY5LUI
1786 .....KI5FTY
1787 .....AB9BH
1788 .....I6JOW
1789 .....JA1NQB
1790 .....K3BLN
1791 .....KEØNHQ
1792 .....JA1VNV
1793 .....KC1AJT
1794 .....AE5FM
1795 .....VG3CQG
1796 .....KO4WIV
1797 .....WA7AQH
1798 .....PP5ZX
1799 .....VK2ZEN
1800 .....W6NWF
1801 .....VE7DVQ

CW: 350: AC7JM, VE3FAC. **400:** K3BLN. **700:** K4EQ. **900:** IZ5FSA.

SSB: 450: W6WNF. **700:** GØBPK. **850:** AC7JM. **1000:** IZ5FSA. **1200:** W9HBH.

Mixed: 450: HB9HPL, KI5FTY, VE3FAC. **500:** KDØBQS, JP1RLN, PP5ZX. **550:** JA1VNV. **650:** KC5DRI, IW7DVM. **700:** KD2RUY. **750:** KØCFI, YBØFLY. **800:** W6NWF. **900:** WQ9F. **950:** N6DSC, JR2RSF. **1200:** DF2GH. **1250:** KE8FMJ. **1350:** AE5FM. **1400:** N8IK. **1500:** WA6YOU. **1600:** VR2VGM. **1650:** K3BLN, W9HBH, K9DY, JF1LMB. **1850:** AC7JM, AC8TO. **1900:** K6VHF. **1950:** IZ5FSA. **2000:** KO9V. **2050:** EA3EQT. **4050:** K9UQN. **6300:** ON4CAS.

Digital: 350:JA1NQB, JL1CYL, WA7AQH. **400:** KEØNHQ, KO4WIV, PP5ZX, VK2ZEN. **450:** HB9HPL, KI5FTY, VG3CQG. KC5DRI. **500:** JP1RLN. **550:** YBØFLY, W6NWF. **700:** KD2RUY. **750:** KØCFI. **800:** DF2GH, WQ9F. **850:** EA3EQT. **900:** N8IK. **950:** N6DSC, W9HBH. **1000:** K3BLN. **1050:** IZ5FSA. **1250:** KE8FMJ, JF1LMB. **1350:** AE5FM. **1450:** KO9V. **1500:** WA6YOU. **1550:** AC7JM. **1600:** VR2VGM. **1650:** K6VHF. **1700:** AC8TO.
160 Meters: W9HBH
80 Meters: K3BLN, W9HBH
60 Meters: W9HBH
40 Meters: IZ5FSA, KI5FTY, K3BLN, N8IK, W9HBH, AE5FM, VR2VGM, JP1RLN, W6NWF
30 Meters: W9HBH
20 Meters: K3BLN, KØCFI, W9HBH, KDØBQS, K9DY, AE5FM, K4EQ, W6NWF
17 Meters: W9HBH, KD2RUY, WQ9F
15 Meters: JA1KPF, W4DWS, W9HBH
12 Meters: K6VHF, W9HBH, KE8FMJ, VR2VGM
10 Meters: K6VHF, W9HBH, VR2VGM, VK2ZEN
6 Meters: AC7JM, AC8TO, JF1LMB

Africa: W9HBH, K9DY
Asia: JL1CYL, IZ5FSA, JA1KPF, I6JOW, JA1NQB, AB1Q, W9HBH, JL1CYL, K9DY, AE5FM, VG3CQG, JR2RSF, VK2ZEN, W4NWF
Europe: KIØHA, MQØKUH, IZ5FSA, HB9HPL, K3BLN, SP7JS, W9HBH, KDØBQS, K9DY, YBØFLY, AE5FM, VG3CQG, JR2RSF, PP5ZX
Oceania: IZ5FSA, JA1KPF, JA1NQB, AC7JM, W9HBH, K9DY, AE5FM, JR2RSF, VK2ZEN
North America: KO4VVQ, IZ5FSA, KI5FTY, AB9BH, K3BLN, KEØNHQ, N9UNX, W4DWS, VE3FAC, AD7DB, W9HBH, KC1AJT, KDØBQS, K9DY, AE5FM, KO4WIV, JR2RSF, WA7AQH, W6NWF, AB2RA, VE7DVQ
South America: IZ5FSA, KC5DRI, K3BLN, N6DSC, W9HBH, K9DY, AE5FM

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. and the ARRL Logbook of The World (LoTW).

*Please Note: The price of the 160, 30, 17, 12, 6, and Digital bars for the Award of Excellence are $6.50 each.

Antarctic website at <www.k4mzu.net> to see my Antarctic QSL collection (*Photo J*). Here's a look back at my long devotion to chasing stations in Antarctica.

After getting licensed in 1959 (age 16), I immediately started working DX (no problem with a SFI of 270-290). Then, I snagged my first Antarctic contact, VP8EH … and I was hooked.

Working stations like KC4USE/mm (USCGS Eastwind), KC4AAA/mm (USCGS Eltanin), KC4USR/mm (USS Arnet)

Photo D. Dominik (DL5EBE) Antarctic DX Chaser

Photo E. Oleg ZS7ANF (RI1ANF) on the left & Seba VP8/SQ1SGB at Wolf's Fang Runway Camp

5 Band WAZ

As of August 1, 2022
2396 stations have attained at least the 150 Zone level, and 1106 stations have attained the 200 Zone level.

As of August 1, 2022
The top contenders for 5 Band WAZ (Zones needed on 80 or other if indicated):
CHANGES shown in **BOLD**

Callsign	Zones	Zones Needed
AK8A	199	17
DM5EE	199	1
EA5RM	199	1
EA7GF	199	1
H44MS	199	34
HAØHW	199	1
HA5AGS	199	1
I5REA	199	31
IKØXBX	199	19 on 10M
IK1AOD	199	1
IZ3ZNR	199	1
JA1CMD	199	2
JA5IU	199	2
JA7XBG	199	2
JH7CFX	199	2
JI4POR	199	2
JK1AJX	199	2 on 10M
JK1BSM	199	2
JK1EXO	199	2
K1LI	199	24
K1OA	199	28
K4HB	199	26
K5TR	199	22
K7UR	199	34
KZ4V	199	26
N3UN	199	18
N4NX	199	26
N4WW	199	26
N4XR	199	27
N6PF	199	23 on 10M
N8AA	199	23
N8DX	199	23
N8TR	199	23 on 10M
RA6AX	199	6 on 10M
RU3DX	199	6
RWØLT	199	2 on 40M
RX4HZ	199	13
RZ3EC	199	1 on 40M
S58Q	199	31
SM7BIP	199	31
SP9JZU	199	19 on 10M
USØSY	199	1 on 15M
VK3HJ	199	34
VO1FB	199	19
W1FJ	199	24
W1FZ	199	26
W3LL	199	18 on 10M
W3NO	199	26
W4LI	199	26
W6DN	199	17
W6RKC	199	21
W6TMD	199	34
W9OO	199	18 on 10M
W9XY	199	22
9A5I	198	1, 16
EA5BCX	198	27, 39
F5NBU	198	19, 31
F6DAY	198	2 on 10M & 15M
G3KDG	198	1, 12
G3KMQ	198	1, 27
HB9FMN	198	1 on 80M & 10M
I1EIS	198	1 & 19 on 10M
JA1DM	198	2, 40
JA3GN	198	2 on 80M & 40M
JA7MSQ	198	2 on 80M & 10M
JH1EEB	198	2, 33
KØDEQ	198	22, 26
K1BD	198	23, 26
K2EP	198	23, 24
K2TK	198	23, 24
K3JGJ	198	24, 26
K3LR	198	22, 23
K3WA	198	23,26
K3XA	198	23,34
K4JLD	198	18, 24
K9MM	198	22, 26
KI1G	198	24, 23 on 10M
KZ2I	198	24, 26
LA3MHA	198	31 & 32 on 10M
N4GG	198	18, 24
NXØI	198	18, 23
ON4CAS	198	1,19
OZ4VW	198	1, 2
RL3FA	198	2 on 80 & 10M
UA4LY	198	6 & 2 on 10M
UN5J	198	2, 7
US7MM	198	2, 6
W2IRT	198	28, 28
W5CWQ	198	17, 18
W6RW	198	2 & 22 on 10M
W7AH	198	22, 34
W9RN	198	26, 19 on 40M
WC5N	198	22, 26
WL7E	198	34, 37
Z31RQ	198	1, & 2 on 10M
ZL2AL	198	36, 37

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

Callsign	5BWAZ #	Date	# Zones
OE3SGU	2388	07/02/2022	190
DF9LJ	2389	07/02/2022	200
K4YJ	2390	07/03/2022	172
K8DV	2391	07/03/2022	182
WC4H	2392	07/05/2022	187
JA7BAL	2393	7/21/2022	188
DL7LX	2394	7/21/2022	166
W9HBH	2395	07/22/2022	171
W1RM	2396	07/24/2022	200

Updates to the 5BWAZ list of stations:

Callsign	5BWAZ #	Date	# Zones
W2YR	2193	2/14/2020	183
DF2GH	2032	5/28/2018	198
DL6JZ	2321	9/23/2021	195

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

5BWAZ #	Callsign	Date	All 200 #
2389	DF9LJ	7/2/2022	1105
2396	W1RM	7/24/2022	1106

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, Jose Castillo, N4BAA, 6773 South State Road 103, Straughn, IN 47387. 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 Jose Castillo. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N4BAA may also be reached via email: <n4baa@cq-amateur-radio.com>.

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Photoo F. Gita (OM5MF) Antarctic DX Chaser

Photo G. Don (W9DC) Antarctic DX Chaser

Photo H. View of LU3ZY (Old Argentina Corbeta Uruguay Station).

Photo I. WAP WACA Award

Photo J. K4MZU with some samples of his QSL collection.

and KC4USG/mm (USS Glacier), all late night with polar flutter and often the only signals on the band, was a genuine delight.

Later on, from 1970 to 1995 with a much-improved station, I would team up with Larry, K1IED (SK). He would handle phone patches (No satellite phones for personal use then) for KC4USV (McMurdo Station), KC4AAA (South Pole Station), and KC4AAC (Palmer Station). I would do the same for many of the smaller remote sites such as KC4USB (Byrd Surface Camp), KC4USX (Williams Field), KC4AAF (Upstream Bravo Camp), KC4AAG (Terra Nova Bay Camp), and renowned Mr. Henry Perk, VEØHSS/am, who I often claimed would fly from one Antarctic camp to the next in his Twin Otter like I might visit the 7/11 down the street.

All during the period from 1959 until now, I have been fortunate to log numerous Antarctic stations from different countries that are signatories of the Antarctic Treaty. Some were quite rare at the time: LU3ZY (South Sandwich Argentinian

The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

9459 9A2AA	4763 KW9A	3109 NXØI	2400 N7ZO	1870 N5KAE	1480 K4JKB	1217 AB1QB	1032 DG5LAC	757 WB3D
8188 K2VV	4757 I2MQP	3099 N6FX	2394 AE5B	1828 K7LV	1462 AC7JM	1204 VA2IG	1023 N4WQH	750 AB1Q
8143 W1CU	4703 IK2ILH	3077 K1PL	2391 WO7R	1824 WF7T	1462 DL4CW	1201 K9BO	1016 W9QL	736 JA3MAT
7922 9A2NA	4681 JH8BOE	3028 IK2DZN	2391 IZØFUW	1821 PY5FB	1447 K3XA	1167 WA9PIE	1012 NØVVV	711 AG1T
7059 EA2IA	4574 JN3SAC	2987 AG4W	2356 NE6I	1746 K6UXO	1437 KC1UX	1153 N3CAL	1010 VE3RZ	695 W8WDW
6919 KF2O	4462 K1BV	2968 AB1OC	2322 N6PM	1741 N6PEQ	1422 I2VGW	1148 SP8HKT	1007 AA4QE	682 AI8P
6040 KØDEQ	4387 N1RR	2963 N3RC	2225 JH1APK	1711 NS3L	1408 NH6T	1141 4F3BZ	1006 NØRQV	678 WE8L
5859 ON4CAS	4342 WB2YQH	2712 W2YR	2203 KI1U	1707 K4WY	1398 ES4RLH	1137 YO5BRZ	1000 WB6IZG	674 N5JED
5715 S53EO	4298 VE3XN	2697 AK7O	2176 V51YJ	1684 W1FNB	1361 VA3VF	1136 KO9V	999 N3DF	661 AL4Y
5602 ON4APU	4249 WD9DZV	2651 HK3W	2159 VA7CRZ	1672 WU9D	1333 AF4T	1116 YU7FW	995 PU2GTA	633 TI5LUA
5539 N4NO	4241 N6QQ	2642 AA8R	2133 KØKG	1667 AD3Y	1322 AA4FU	1112 N6MM	966 W6WF	621 K4HDW
5500 N8BJQ	4215 W3LL	2616 9A2GA	2113 W2FKF	1643 SV1DPI	1301 KB9OWD	1107 PY2MC	953 JP1KHY	616 AC6BW
5482 VE1YX	4201 YO9HP	2591 IK2RPE	2077 JH1QKG	1639 N7QU	1301 K1DX	1100 WA3GOS	919 ON7MIC	605 IW2FLB
5453 YU1AB	3818 K9UQN	2589 DG7RO	2056 NKØS	1616 TA1L	1301 KM5VI	1109 KE8FMJ	889 WU1U	
5409 N6JV	3793 AB1J	2583 PA2TMS	2046 YO8CRU	1590 JF1LMB	1299 JA6JYM	1088 NJ4Z	866 K2KJ	
5387 W9OP	3538 9A4W	2550 K6ND	2016 N2WK	1570 PY5VC	1295 NIØC	1084 KG4JSZ	857 R1AV	
5215 I5RFD	3459 W9IL	2457 K5UR	1995 JR3UIC	1568 N3AIU	1280 WF1H	1069 IZ4MJP	835 K6RAH	
4970 WA5VGI	3130 SV1EDY	2538 K4HB	1972 K3CWF	1524 NH6T/W4	1260 UR6LEY	1058 N6DBF	801 N2YU	
4934 W9OO	3109 W6XK	2420 WA6KHK	1955 NIØC	1484 FG4NO	1219 K6HRT	1036 DL5KW	758 N4JJS	

SSB

7045 OZ5EV	3174 I3ZSX	2515 W9IL	2093 W2WC	1587 N3XX	1146 SQ7B	1004 WA5UA	758 IV3GOW	637 K5WAF
6334 9A2NA	3172 YO9HP	2483 AG4W	2084 K5UR	1550 IK2RPE	1136 K3CWF	978 EA7HY	724 WF1H	630 W6US
6145 K2VV	3141 DL8AAV	2451 EA3GHZ	2082 WD9DZV	1442 DG7RO	1112 NH6T	957 W9QL	724 W3TZ	624 K6KZM
5404 VE1YX	3139 N8BJQ	2443 JN3SAC	2076 K2XF	1393 N5KAE	1098 K4CN	934 PY5VC	717 KØDAN	606 KJ4BIX
5149 KF2O	3108 I4CSP	2335 KG1E	2048 W4QNW	1389 NKØS	1096 JA7HYS	931 YB1AR	717 N3JON	604 GØBPK
4916 EA2IA	3101 WA5VGI	2327 K1PL	1955 EA3NP	1386 HK3W	1093 N6MM	929 NS3L	714 YB2TJV	
4410 I2MQP	3067 N6QQ	2326 CX6BZ	1935 SV1EOS	1386 IK4HPU	1089 IZ8FFA	919 KA5EYH	713 JH1APK	
4165 KØDEQ	2990 KF7RU	2209 IK2QPR	1884 WA6KHK	1371 VE6BF	1089 IT9ABN	893 W9RPM	710 WA9PIE	
3723 I8KCI	2984 KI7AO	2201 NQ3A	1879 K3IXD	1338 NE6I	1063 W6XK	889 N3AIU	700 N4FNB	
3681 N4NO	2946 PT7ZT	2200 N6FX	1848 AB5C	1334 EA3EQT	1042 IZØBNR	875 K7SAM	700 JA1PLL	
3585 SV3AQR	2903 IN3QCI	2198 AB1OC	1825 KQ8D	1264 N6PEQ	1032 DG5LAC	854 K6HRT	694 KG4HUF	
3535 KW9A	2857 4X6DK	2155 K9UQN	1812 K6ND	1262 K7LV	1031 K4CN	833 DK8MCT	690 W6PN	
3456 W9OO	2650 IK2DZN	2131 N3RC	1646 VE7SMP	1258 N1KC	1031 IK8OZP	808 UR6LEY	684 KO9V	
3416 W3LL	2595 EA1JG	2122 AE5B	1641 AE9DX	1222 YF1AR	1022 NW3H	802 N6OU	675 F1MQJ	
3348 CT1AHU	2582 PA2TMS	2113 W2FKF	1624 W2YR	1187 IZ1JLG	1012 KU4BP	801 K3XA	655 VA3VF	
3274 YU7BCD	2576 AA1VX	2109 NXØI	1622 K5CX	1183 KI1U	1006 NJ4Z	766 I2VGW	647 YB8NT	
3184 N1RR	2568 SM6DHU	2094 I8LEL	1611 W2ME	1150 VE6BMX	1004 K4HB	763 K4JKB	640 UA9YF	

CW

7543 WA2HZR	4162 WA5VGI	3031 EA7AAW	2357 W9HR	1708 NIØC	1421 KN1CBR	992 F5PBL	807 N5KAE	620 AF5DM
7200 K2VV	4076 I7PXV	2948 IK3GER	2291 N3XX	1691 KI1U	1389 IT9ELD	968 K3CWF	783 YB1AR	615 JH6JMM
6024 9A2NA	3974 JN3SAC	2943 N6QQ	2212 AC5K	1620 DG7RO	1342 VE6BMX	962 K7LV	752 K6HRT	608 W9RPM
5392 EA2IA	3804 W9OO	2915 KA7T	2203 NXØI	1619 W2YR	1235 JH1APK	944 AB1OC	743 JA5NSR	600 NY4G
5311 N6JV	3773 KW9A	2811 OZ5UR	2022 AF5CC	1595 PY5FB	1220 AA4FU	908 NH6T	738 NH6T/W4	600 IK2SGV
5261 KF2O	3647 N1RR	2679 W9IL	1998 K5UR	1555 K1PL	1210 DL4CW	897 HK3W	732 SQ7B	
5160 N4NO	3504 YU7BCD	2548 EA2CIN	1973 N3RC	1508 W6XK	1196 N3AIU	891 DK8MCT	727 JF1LMB	
4946 W8IQ	3462 K9UQN	2531 I2MQP	1905 WA6KHK	1505 R3IS	1098 LU5OM	890 NS3L	722 WA9PIE	
4916 IZ3ETU	3279 IØNNY	2497 W3LL	1832 N4YB	1483 VE1YX	1062 K3XA	889 N3AIU	720 K4CN	
4886 I3FIY	3214 SM6DHU	2490 N6FX	1762 K6ND	1480 WO3Z	1036 DL5KW	864 YO5BRZ	652 IK2DZN	
4874 KØDEQ	3159 WD9DZV	2477 VE6BF	1744 NE6I	1458 AG4W	1027 AE5B	848 PY5VC	636 NKØS	
4788 N8BJQ	3041 YO9HP	2424 W2WC	1727 K6UXO	1443 WA2VQV	997 N6PEQ	821 HB9DAX	629 IV3GOW	

DIGITAL

3187 KØDEQ	2139 WA5VGI	1704 IK2DZN	1345 KC1UX	1093 KI1U	992 N3DF	862 JP1KHY	750 NH6T/W4	611 KO9V
3137 KF2O	2217 YO9HP	1638 N1RR	1333 W1FNB	1091 VA3VF	992 K9UQN	855 R1AV	681 PY5VC	600 ADØFL
2996 W3LL	2103 K2YYY	1643 N3RC	1319 W2YR	1089 AC7JM	983 PU2GTA	812 UR6LEY	680 K2KJ	
2978 N8BJQ	2004 N6PM	1501W2/JR1AQN	1308 NKØS	1060 AF4T	966 NS3L	811 WF1H	672 K9AAN	
2827 WD9DZV	1836 AG4W	1500 JH1APK	1227 ES4RLH	1054 KW9A	947 I2VGW	810 N3CAL	670 IV3GOW	
2628 W6XK	1818 W1EQ	1461 WU9D	1189 JF1LMB	1051 KH6SAT	917 K7LV	800 WA3GOS	668 KA5EYH	
2558 NT2A	1811 NXØI	1426 AB1OC	1149 W9IL	1047 RW4WZ	881 NE6I	783 YB1AR	654 JA3MAT	
2251 EA2IA	1790 JN3SAC	1378 K3CWF	1112 AB1QB	1009 GUØSUP	870 WB6IZG	758 N4JJS	640 WA9ONY	
2242 HK3W	1759 N7ZO	1353 K1PL	1108 KE8FMJ	1002 NØRQV	866 SQ7B	750 ON7MIC	636 W9RPM	

REMOTE OPERATION

CW	MIXED	SSB	DIGITAL
7277 K9QVB	4026 N1RR	2953 N1RR	671 N1RR
3292 N1RR			

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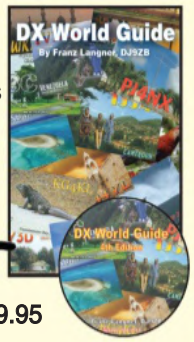

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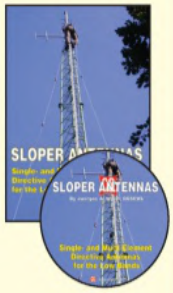

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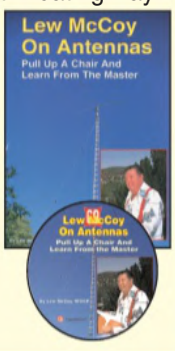

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http://store.cq-amateur-radio.com

Station), ATØA (Dakshin Gangotri Indian Station), VKØVK (Australian Wilkes Station), 3YØC (Norwegian Research Station Bouvet), R1ANH (Russkaya Russian Station), and Astronaut Owen Garriott, KC4/W5LFL (SK) at Multi-National Patriot Hills Station.

Being a passionate Antarctic DX Chaser, one feels compelled to help with QSL responsibilities. Accordingly, over the years I gladly became QSL Manager for LU1ZC (now QSL via LU2CN), VP8AWU, VP8MS, VP8DPC/mm, VP8SIX, C6AMD/mm, R1ANW (op. Henry), KC4/KH6JNF, KC4/KA7DHE, KC4/KC7GJJ, KC4AAF (ops. Sarah, Henry, and Ted), KC4AAG (op. Oriel), KC4/VEØHSS, KC4AAC (op. Janet), (currently KC4AAC, KC4AAA, and KC4USV all are QSL via K7MT), KC4USX (op. Henry), and KC4/KL7RL.

I'm 79 years young now and would love to have operated from the ice. Nevertheless, the reality that I have acquired many friendships with those fortunate enough to travel there, along with my fellow Antarctic DX chasers is, most gratifying.

The CQ DX Field Award Program

Digital Endorsement

JN3SAC.....175

Mixed Endorsement

K1NV.....204

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio. com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. Please make all checks payable to the award manager.

CQ DX Awards Program

New Award CW

N4RF.....1887

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. We recognize 341 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.

Young DXers Return to Curacao

The 2022 Dave Kalter Memorial Youth DX Adventure is now in the history books! The kids were able to make 8,216 QSOs as PJ2Y during their week at the PJ2T station in Curacao. It is extremely awesome to see some young hams running pileups from a DX location! Hopefully, the thrill of being DX and running pileups is addicting! Great job Candace, TJ, and Brennan!

2022 Dave Kalter Memorial Youth DX Adventure participants (L-R) Candace Scott, KE8MMS; TJ Hardin, KO4FFA; and Brennan Long, K6BFL (Photo courtesy of Dave Kalter Memorial Youth DX Adventure)

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604.

Mixed

K2TQC.....288
W1CU.....267
VE7IG.....254
HAØDU.....253
OM3JW.....253
W6OAT.....252
HA5WA.....250
IK1GPG.....245
OK1ADM.....245
K8SIX.....240
HA1RW.....239
VE3XN.....239
I6T.....230
K8OOK.....229
N8PR.....229
HA5AGS.....228
9A5CY.....227
K9YC.....227
VE3ZZ.....226
KØDEQ.....221
WI8A.....219
HA1AG.....218
JN3SAC.....214
HA9PP.....213
WA5VGI.....213
IV3GOW.....211
W4UM.....210
N4MM.....208
OK1AOV.....208
F6HMJ.....206
KF8UN.....205
OM2VL.....205
K1NV.....204
VE7SMP.....204
RW4NH.....203
K1NU.....201
HB9AAA.....200
N5KE.....200
W3LL.....199
NIØC.....196
ON4CAS.....194
HB9DDZ.....193
N4NX.....192
HA1ZH.....190
BA4DW.....188
K2AU.....187
K8YTO.....186
WO7R.....185
N3RC.....184
K2SHZ.....182
KJ6P.....180
W6XK.....180
W5ODD.....177
NØFW.....176
WA9PIE.....176
HB9BOS.....175
NKØS.....175

SSB

W1CU.....249
W4ABW.....202
VE7SMP.....201
KØDEQ.....198
W4UM.....198
JN3SAC.....191
N4MM.....189
WA5VGI.....189
W3LL.....187
NØFW.....176
DL3DXX.....175

CW

W1CU.....253
HA5WA.....234
DL6KVA.....233
KØDEQ.....214
JN3SAC.....211
DL3DXX.....210
DL2DXA.....209
W4UM.....201
OK1AOV.....198
WA5VGI.....197
NIØC.....196
HB9DZZ.....189
N4MM.....186
OK2PO.....184
N4NX.....177
N7WO.....175

Digital

W1CU.....195
HA5WA.....177
JN3SAC.....175
KØDEQ.....175

contesting

BY TIM SHOPPA,* N3QE

Ukraine War Contest Impact

Plus a Close Look at CW Speed in Contests

The Russian invasion of Ukraine has impacted world competition in nearly every sporting event, and radiosport is no exception. At this point, I count 10 contests that have been outright cancelled by their sponsors as a result of the invasion. The first two cancellations, the UBA DX contest in the last weekend of February and the Open Ukraine RTTY contest, were cancelled because all Ukrainian amateur radio activities had been discontinued by their government at the very start of the invasion. The Polish sponsors of the SP DX contest in April cited the responsibilities of Polish citizens as they were taking in 2 million Ukrainian refugees from the war. Similarly close in proximity to the conflict, the Estonian Radio Amateur Union cancelled the ES Open HF contest in April. The Ukrainian-sponsored Digifest usually held in June was necessarily canceled for this year, as was the Ukrainian DX Classic RTTY contest that same month.

The Slovenia Contest Club, sponsor of the EU HF Championship each August, has cancelled the contest for this year. "We do not see the point in competing for the title of European Champion without the presence of our Ukrainian friends and without contest activity from all other EU countries," they write in their announcement.

This fall's Scandinavian Activity Contests have also been cancelled. They write that the SAC contest committee, "consists of four members from four different Nordic countries and the individual countries' organizations have different ideas about how to handle the ongoing war in Ukraine in the context of amateur radio contesting, often referred as radiosport. Each of us had to follow the statements of our respective organizations and we had no other solution than to cancel 2022 contests." This impacts both the CW (September) and SSB (October) SAC events for this year.

Rounding out the list of announced 2022 cancellations, the November 2022 running of the Ukrainian DX Contest is canceled. This lively contest had 1,500-2,000 entrants in the most recent years.

Further removed from the conflict, some sponsors have not cancelled their international events but have ruled out participation by those from the invading countries. This spring, both the RSGB Contesting Committees <https://bit.ly/3BsWasI> and *CQ* Magazine <https://bit.ly/3cM9JZT> announced their contests would not be accepting entries from Russia and Belarus, following the lead of every major world sporting organization. Check both contest and sponsors websites to see details of each policy.

Several other major contest-sponsoring organizations have not yet announced any cancellations or restrictions on participation by Russia and Belarus. Examples include contests sponsored by the American Radio Relay League (ARRL) and the Deutscher Amateur Radio Club (DARC).

The disruption to contesting caused by the invasion likely

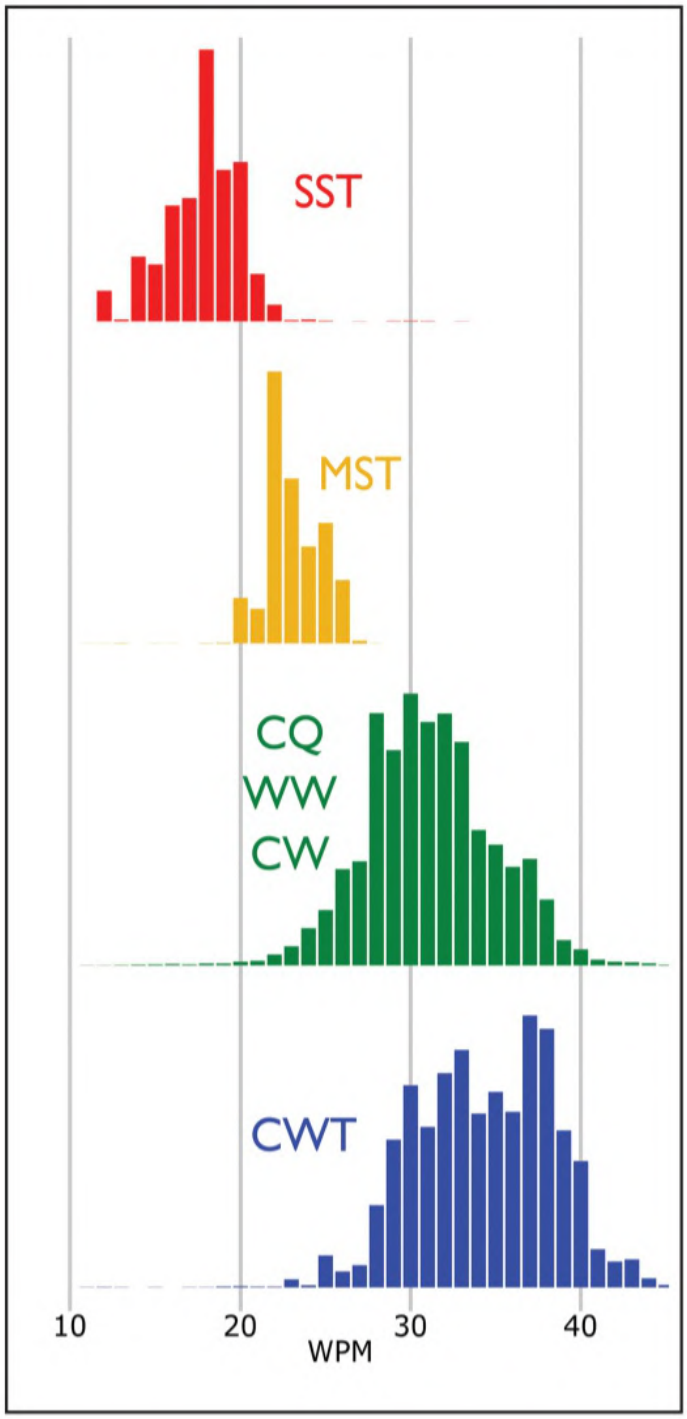

Figure 1. CW Speeds (as measured by Reverse Beacon skimmers) for four different on-the-air contests and contest-like activities. SST data from 2022 July 25th 0000 UTC Slow Speed Test, MST data from 2022 July 25th 1900 UTC Medium Speed Test, CQWW CW data is from all 48 hours of the 2021 contest, and the CWT data is from 2022 July 27th CWT.

email: <n3qe@cq-amateur-radio.com>

extends to contests that had not been cancelled or had their participation restricted, especially when participation across Europe has been a substantial component. The July 2022 IARU HF Championship contest, administered by the ARRL, has had only 3,863 logs submitted. This represents a marked decline — almost 23% — from the 5,024 entries received in the 2021 running of this contest, which has always had heavy European participation.

Build Your Contest CW Skills and Speed

Contester Bill Kollenbaum, K4XS, whom you've likely worked in the past decade as KH7XS, or more recently as V31XX/V3X, told me of the challenges of CW contesting as compared to more leisurely non-contest activities: "For the guys who are still low speed, copying CW speeds over 30 [WPM] is daunting." This prompted me to investigate speeds used in several regular on-air activities and contests. I combined data from contest results, 3830.com scores, and the Reverse Beacon Network to explain the speeds you'll encounter in each of these events.

Calendar of Events

All year	**CQ DX Marathon**	**http://bit.ly/vEKMWD**
Sept. 1-3	G3ZQS Memorial Straight Key Contest	www.fistsna.org/operating.html
Sept. 3	AGCW Straight Key Party	https://bit.ly/3ngQSpB
Sept. 3-4	All Asian DX Phone Contest	https://bit.ly/3HVjkra
Sept. 3-4	Colorado QSO Party	http://ppraa.org/coqp
Sept. 3-4	IARU Region 1 Field Day SSB	http://bit.ly/3cC0HKf
Sept. 3-4	IARU Region 1 145 MHz Contest	bit.ly/3r1kqvT
Sept. 3-4	RSGB SSB Field Day	https://bit.ly/31qpcJl
Sept. 3-4	SARL Field Day	http://bit.ly/H0IqQf
Sept. 3-4	PODXS 070 Club Jay Hudak Memorial 80M Sprint	http://bit.ly/2MkaaNt
Sept. 4	WAB 144 MHz QRO Phone	http://bit.ly/31yE4kT
Sept. 4-5	Tennessee QSO Party	https://tnqp.org/rules
Sept. 5	RSGB Autumn Series SSB	https://bit.ly/31qpcJl
Sept. 5-6	MI QRP Labor Day CW Sprint	www.miqrp.net/contest
Sept. 7	UKEICC 80m Contests SSB	https://ukeicc.com/80m-rules.php
Sept. 7	VHF-UHF FT8 Activity Contest	www.ft8activity.eu/index.php/en
Sept. 10	FOC QSO Party	www.g4foc.org/qsoparty
Sept. 10	OSPOTA Contest	http://ospota.org/
Sept. 10-11	Alabama QSO Party	www.alabamaqsoparty.org
Sept. 10-11	Veron SLP Contest	http://bit.ly/2L9eT1L
Sept. 10-11	Worked All Europe SSB Contest	https://bit.ly/36ubggF
Sept. 10-12	ARRL September VHF QSO Party	www.arrl.org/september-vhf
Sept. 11	North American CW Sprint	http://ncjweb.com/Sprint-Rules.pdf
Sept. 14	VHF-UHF FT8 Activity Contest	www.ft8activity.eu/index.php/en
Sept. 14	RSGB Autumn Series CW	https://bit.ly/31qpcJl
Sept. 15	Bavarian Contest Club QSO Party	https://bit.ly/3IsVqVV
Sept. 16	AGB NEMIGA Contest	https://bit.ly/2AWBbRK
Sept. 17	Feld Hell Sprint	http://bit.ly/2JcbOwW
Sept. 17	QRP Afield	http://bit.ly/2QACxFu
Sept. 17	Wisconsin Parks on the Air	https://tinyurl.com/527vwf8d
Sept. 17-18	ARRL 10 GHz and Up Contest	www.arrl.org/10-ghz-up
Sept. 17-18	ARRL EME Contest (2.3 GHz & Up)	www.arrl.org/eme-contest
Sept. 17-18	Iowa QSO Party	www.w0yl.com/IAQP
Sept. 17-18	New Hampshire QSO Party	www.w1wqm.org/nhqso
Sept. 17-18	New Jersey QSO Party	http://bit.ly/1nDlf8V
Sept. 17-18	SARL VHF/UHF Digital Contest	http://bit.ly/H0IqQf
Sept. 17-18	Scandinavian CW Activity Contest	www.sactest.net/blog
Sept. 17-18	Texas QSO Party	http://txqp.net
Sept. 17-18	Washington State Salmon Run	http://salmonrun.wwdxc.org/rules
Sept. 18	BARTG Sprint PSK63	http://bartg.org.uk/wp/contests
Sept. 18	North American RTTY Sprint	http://ncjweb.com/Sprint-Rules.pdf
Sept. 19	144 MHz Fall Sprint	https://svhfs.org/2022VHFSprintRules.pdf
Sept. 21	VHF-UHF FT8 Activity Contest	www.ft8activity.eu/index.php/en
Sept. 22	RSGB Autumn Series Data	https://bit.ly/31qpcJl
Sept. 24	AGCW UHF/VHF Contest	https://bit.ly/3lw91PK
Sept. 24	Masonic Lodges on the Air	http://cqmorelight.com/rules
Sept. 24-25	**CQWW RTTY DX Contest**	**www.cqwwrtty.com**
Sept. 24-25	AWA Amplitude Modulation QSO Party	bit.ly/3Qkdp4w
Sept. 24-25	Maine QSO Party	www.ws1sm.com/MEQP.html
Sept 25	UBA ON 6M Phone/CW Contest	https://bit.ly/3kKYKzj
Sept. 26	RSGB FT4 Contest Series	https://bit.ly/31qpcJl
Sept. 27	222 MHz Fall Sprint	https://tinyurl.com/257trdtw
Sept. 28	UKEICC 80m Contests CW	https://ukeicc.com/80m-rules.php

The four panels of *Figure 1* show the distribution of CW speeds used by stations calling CQ in four on-air activities and contests. The distribution of speeds in the panel for CQWW CW 2021 is entirely typical for any medium to large sized contest: Almost all CQing stations are using CW speeds between 20 and 40 WPM, with a heavy emphasis on the 28-33 WPM range. I made similar graphs for CQWW WPX, NAQP CW, and WAE CW and they all look almost identical to the CQWW CW speed distribution.

As recently as a few years ago, I frequently recommended the Wednesday CWT (sponsored by the CW Operator's Club) as a way to build skills for mainstream CW contests. You can learn more about the CWT events and CWOps at <https://cwops.org/cwops-tests>. As you can see from the bottom panel of *Figure 1*, recent CWT sessions involve CQ speeds even higher than CQWW CW. In fact, the most common CQ speed in many recent CWT sessions is as high as 38 WPM. So let me replace that recommendation with two relatively new CW events that fill in, especially at lower speeds.

Oct. 1-2	California QSO Party	www.cqp.org/Rules.html
Oct. 1-2	Oceania Phone DX Contest	www.oceaniadxcontest.com
Oct. 1-2	SKCC QSO Party	http://bit.ly/2Xl2vyx
Oct. 1-2	TRC DX Contest	https://trcdx.org/rules-trc-dx
Oct. 1-2	Worked all Provinces of China DX Contest	bit.ly/3AE4d5B
Oct. 2	Peanut Power QRP Sprint	www.nogaqrp.org
Oct. 2	RSGB DX Contest	https://bit.ly/31qpcJl
Oct 2	UBA ON 80M SSB Contest	https://bit.ly/3kKYKzj
Oct. 3	German Telegraphy Contest	https://bit.ly/3xzuPjw
Oct. 3	RSGB Autumn Series CW	https://bit.ly/31qpcJl
Oct. 5	432 MHz Fall Sprint	https://tinyurl.com/257trdtw
Oct. 5	UKEICC 80m Contest SSB	https://ukeicc.com/80m-rules.php
Oct. 5	VHF-UHF FT8 Activity	www.ft8activity.eu/index.php/en
Oct. 6	SARL 80m QSO Party	http://bit.ly/H0IqQf
Oct. 7-9	Nevada QSO Party	http://nvqso.com/contest-rules
Oct. 8	QRP ARCI Fall QSO Party	www.qrparci.org/contests
Oct. 8	Microwave Fall Sprint	https://tinyurl.com/257trdtw
Oct. 8-9	Arizona QSO Party	www.azqp.org
Oct. 8-9	Makrothen RTTY Contest	http://bit.ly/2uZd6oF
Oct. 8-9	Oceania CW DX Contest	www.oceaniadxcontest.com
Oct. 8-9	Pennsylvania QSO Party	http://paqso.org
Oct. 8-9	PODSX 070 Club 160M Great Pumpkin Sprint	http://bit.ly/2RUkcE6
Oct. 8-9	Scandinavian SSB Activity Contest	www.sactest.net/blog
Oct. 8-9	South Dakota QSO Party	https://sdqsoparty.com
Oct. 8-9	Veron SLP Contest	http://bit.ly/2L9eT1L
Oct 9	UBA ON 80M CW Contest	https://bit.ly/3kKYKzj
Oct. 10	10-10 Intl. 10-10 Day Sprint	http://bit.ly/1FrFeBc
Oct. 12	RSGB Autumn Series Data	https://bit.ly/31qpcJl
Oct. 12	VHF-UHF FT8 Activity	www.ft8activity.eu/index.php/en
Oct. 15	Feld Hell Spooky Sprint	https://bit.ly/3g8gpxD
Oct. 15-16	10-10 Intl. Fall CW Contest	http://bit.ly/1FrFeBc
Oct. 15-16	ARRL EME Contest (50-1296 MHz)	www.arrl.org/eme-contest
Oct. 15-16	New York QSO Party	www.nyqp.org
Oct.15-16	JARTS WW RTTY Contest	http://jarts.jp/rules2022.html
Oct. 15-16	Worked All Germany Contest	http://bit.ly/2uDQRSV
Oct. 16	Asia-Pacific CW Sprint	http://jsfc.org/apsprint
Oct. 16	RSGB RoLo CW Contest	https://bit.ly/31qpcJl
Oct 16	UBA ON 2M Phone / CW Contest	https://bit.ly/3kKYKzj
Oct. 16	Illinois QSO Party	https://w9awe.org/ilqp
Oct. 17	RSGB FT4 Contest Series	https://bit.ly/31qpcJl
Oct. 17-21	ARRL School Club Roundup	http://bit.ly/MaLmBs
Oct. 19	AGCW Semi-Automatic Key Evening	http://bit.ly/2WB74qy
Oct. 19	VHF-UHF FT8 Activity	www.ft8activity.eu/index.php/en
Oct. 21-22	Telephone Pioneers QSO Party	http://tpqso.tparca.org
Oct. 22-23	Stew Perry Topband Distance Challenge	www.kkn.net/stew/stew_rules.html
Oct. 22-23	UK/EI DX Contest	www.ukeicc.com/dx-contest-rules.php
Oct. 22-24	YLRL DX/NA YL Anniversary Contest	https://ylrl.net/contests
Oct. 23	North American SSB Sprint Contest	https://ssbsprint.com/rules
Oct.23-24	Fall Classic Exchange CW	www.classicexchange.org
Oct. 25-26	Fall Classic Exchange CW	www.classicexchange.org
Oct. 26	UKEICC 80m Contest CW	https://ukeicc.com/80m-rules.php
Oct. 27	RSGB Autumn Series SSB	https://bit.ly/31qpcJl
Oct. 29-30	Veron SLP Contest	http://bit.ly/2L9eT1L
Oct. 29-30	**CQWW DX SSB Contest**	**www.cqww.com/index.htm**
Nov. 26-27	**CQWW DX CW Contest**	**www.cqww.com/index.htm**

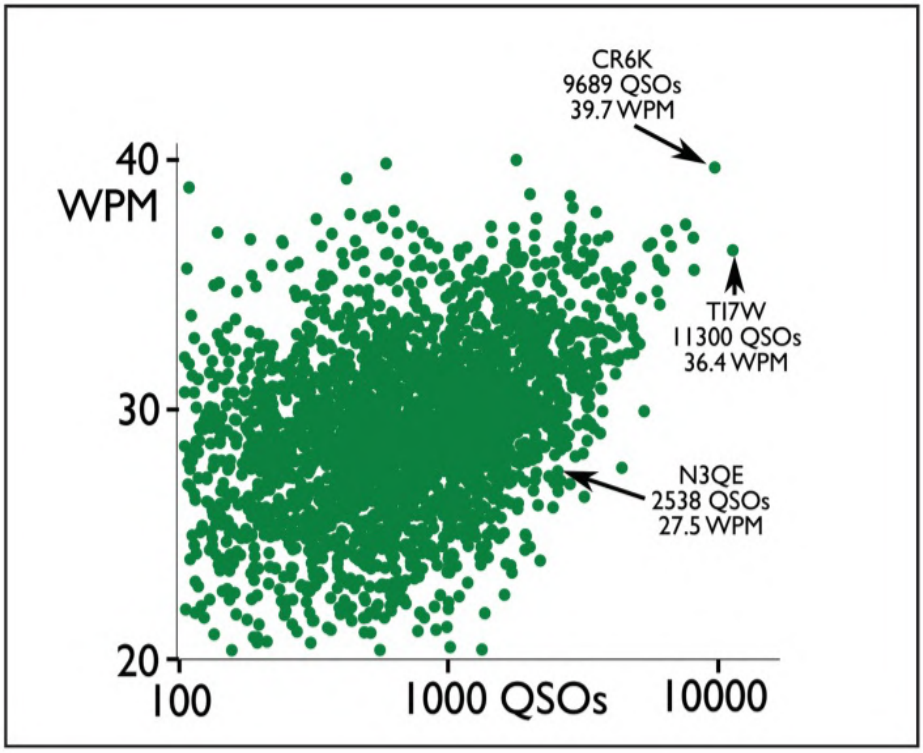

Figure 2. A scatter plot of average CW speed measured by Reverse Beacon skimmers vs. QSO totals for single-operator entrants in CQWW CW 2021.

Let's say you're somewhat comfortable at 13 WPM CW — perhaps you passed the required CW test at that speed decades ago as part of the FCC license requirements. Or you've been teaching yourself CW through online or computer-based trainers, and have a decent grasp of the alphabet and numbers at speeds below 15 WPM, and are looking to build your skill up to 25 WPM where you'd be more comfortable entering the many mainstream CW contests.

The first step up I'd recommend, is getting on the air for either one or two "Slow Speed Tests" each week. The SST, sponsored by the K1USN Radio Club, is a below-20 WPM event that is held in two sessions bookending the traditional contest weekend. There's a Friday 2000 UTC session each week, in the evening in Europe or afternoon in North America. And there's a Monday 0000 UTC session as well, which is early Monday morning in Europe or Sunday evening in North America. Full details on the K1USN SST can be found at <www.k1usn.com/sst.html>.

In the K1USN SST, much like any radio contest, the more experienced operators are often calling CQ and the less experienced operators going search-and-pounce. The most active bands will have 20-30 experienced operators calling "CQ SST" in the lower 15 kHz of the U.S. General CW band (e.g. between 7.028 and 7.040 MHz). The CQing stations will be spaced 400-500 Hz apart from each other, which is a little wider than typical "contest packing," and they'll often be using 600-Hz-wide receive filters so you don't have to exactly zero beat them (but try to be within a few hundred Hz). After you've copied their callsign, toss your call in at whatever speed you are comfortable at sending and receiving. I often am on for the SST calling CQ at 18 WPM or so with a straight key, and if I get a caller who sends his callsign much slower — say 10 WPM — I will immediately adjust my sending to match my caller at a speed he's comfortable with. Assuming good copy, you'll get a reply with your callsign and the exchange.

In the SST, the basic exchange is name and state / province / country — much like the North American QSO parties (NAQPs). The K1USN sponsors encourage "sending brief friendly greetings to the other op, such as GA, GE, and 73," which isn't entirely typical of efficient mainstream contesting but seems like a friendly approach. In the spirit of this instruction, I usually end each QSO with "TU (his / her name) 73".

The range of callers I get in the SSTs is amazing. As many as a quarter of the callers do not appear in the SuperCheck Partial database of active contest calls. Some of these new callers have recently issued US 2 x 3 callsigns starting with K that indicate they were licensed less than a few months before; others have callsigns starting with WA8 or WBØ and are likely hams licensed over half a century ago who are getting back into CW again. Several times a year, I'll get an email or a paper QSL card after a SST QSO, thanking me for helping them through their first CW QSO ever. And often, a new-to-me callsign I first hear in the SST, I will recognize months later as a caller in a NAQP or other contest, or as a CWOps CW Academy participant in a CWT session.

The top panel in *Figure 1* shows that stations calling CQ in the SST are mostly between 15 and 20 WPM. After you've become comfortable at those speeds, there's now a Monday on-air event tuned for the next step up in speed. The MST, or Medium Speed Test, is sponsored by the International CW Council and is held three times each Monday, at 1300, 1900, and 0300 UTC (Monday evening in North America, but Tuesday AM UTC time). It began in May 2022 and is not yet as popular as the SST. More about the MST sessions is available at the ICWC website: <https://bit.ly/3S5sO9w>. Not only is the speed stepped up in the MST, but the exchange is a little more complicated: it's a name and a serial number — and copying serial numbers is an important skill in many real contests, and is not something you can look up in a database because it varies for each and every QSO. The second panel in *Figure 2* shows that much activity in the MST sessions is at the lower end of the recommended 20- to 25-WPM range.

What can we say about the users of the highest speeds — near 40 WPM — in big contests such as CQWW CW? I took the single-operator results of CQWW CW 2021 and plotted the average CQ speed for each call against the number of QSOs the operator made in that weekend. This scatter plot is shown as *Figure 2*.

The two contesters the very upper right corner of *Figure 2* gave me some good feedback about how they adjust their CW speeds for conditions. Dan Craig, N6MJ, was the operator of TI7W in the CQWW CW 2021 contest, and notes that adjusting CQ WPM to conditions is key. He notes that he, "starts out at 48 WPM and gradually the speed drops as the number of callers goes down." Dan also points out that he sends his callsign at 8 WPM slower than the rest of his CQ and exchanges; it's likely that reverse beacon data represents the speed of his callsign, and not the much faster speed of his exchanges.

Dan notes in his 2019 Contest University presentation on advanced

two-band synchronized interleaved techniques (2BSIQ), that higher CW transmission speeds reduce turnaround and wait times on the other radio. He recommends optimal 2BSIQ speeds between 40 and 52 WPM. You can find Dan's full presentation online at <https://bit.ly/3PLjsye>.

Felipe Lopez, CT1ILT, was the operator of CR6K, also called out in my plot. Felipe is widely known as one of the fastest CW signals in the big contests, and he notes that he is, "trying hard to CR6K in the top right corner."

I'm pondering how my on-air speed (a slow 27.5 WPM average in this running of CQWW CW) relates to the number of QSOs I made. I've marked my dot in the scatter plot; you can see that I made many more QSOs than most other hams who were calling CQ at similar speeds. Would a faster CQ result in more QSOs for me, moving me both up and to the right on the scatter plot? An interesting question! This fall I'll try to CQ consistently above 30 WPM and see where I land.

September and October Contest Highlights

The 48-hour **CQ World Wide RTTY DX Contest** is the last weekend in September, Sept. 24-25th. A unique feature of this contest is that it has three kinds of multipliers per band: Zones, Countries, and States / Provinces. As sunspot numbers rise, plan time on the 10-meter band to rack up all the extra multipliers you've been missing in recent years. Find full rules at <https://cqwwrtty.com/index.htm>.

The **California QSO Party** starts at 1600 UTC Saturday, October 1st and runs till 2159 UTC Sunday, October 2nd. Multipliers (the 58 California counties, for those who aren't in California) count once per contest (not per band). Activity is on both CW and SSB; if patterns are like recent years, several counties will be most accessible on SSB. This is the largest of all state QSO parties, and many non-California stations will be calling CQ, looking only for callers from California. Find full rules and operating tips at <www.cqp.org>.

For the first time, a club competition has been added for the 2022 **Worked All Germany** contest. This 24-hour contest is held on October 15th and 16th this year and non-German stations count the first letter of the German DOK (DARC chapters) exchange as multipliers. The lowest German license class (CEPT Novice) has low-power privileges on the 15- and 10-meter bands; with good high-band conditions, these recently minted German hams will be especially likely to call you if you are calling CQ in this contest on the SSB sections of these bands. Find full rules at <https://bit.ly/3cUmz8B>, and a detailed explanation of the DOK multipliers and chapter structure at <https://bit.ly/3PO5z28>.

If you're in North America and want to build your SSB skills with a challenging and fun contest, give the **North American SSB Sprint** a try. This 4-hour event, held the evening of Saturday October 22nd, has a QSY rule which means that every search-and-pounce QSO you make will result in you becoming the new owner of a run frequency for exactly one QSO. Find full details at <https://ssbsprint.com>.

The world's largest amateur radio contest, the **CQ World Wide SSB DX Contest**, is the last weekend in October on the 29-30th. A brief description of operating basics is in last month's issue of *CQ*. Full details are at <www.cqww.com>, and in next month's column I will launch into tips for taking advantage of spectrum scopes in phone contests, as I gain experience on-the-air with my new rig equipped with such a scope.

propagation

BY TOMAS HOOD,* NW7US

A Vast Improvement is On the Horizon

Quick Look at Current Cycle 25 Conditions:
(Data rounded to nearest whole number)

Sunspots:
Observed Monthly, July 2022: **93**
12-month smoothed, January 2022: **60**

10.7-cm Flux:
Observed Monthly, July 2022: **126**
12-month smoothed, January 2022: **105**

One Year Ago:
(Data rounded to nearest whole number)

Sunspots:
Observed Monthly, July 2021: **36**
12-month smoothed, January 2021: **17**

10.7-cm Flux:
Observed Monthly, July 2021: **81**
12-month smoothed, January 2021: **77**

Once again, it's time for some of the best long-range DX openings of the year. With autumn right around the corner, the season for radical improvement in radio propagation conditions is beginning. This is the time to ensure that you finish any antenna projects, double-check your coax, ladder line, and grounding system. The DX "hunting" season is opening this month! Let's get right to the exciting shortwave (high-frequency, or "HF") propagation conditions starting in September.

By late September, the Sun will be directly over the equator. On the Autumnal Equinox (September 23rd at 01:03 UTC), everywhere in the world, the hours of daylight are equal to the hours of darkness.

This results in an ionosphere of almost similar characteristics over large areas of the world. This makes for the best time of the year for long DX openings between the temperate regions of the northern and southern hemispheres on all shortwave bands.

Expect a vast improvement on the higher frequencies (20 through 10 meters) with more frequent short-path openings from mid-September through mid-October between North America and South America, the South Pacific, South Asia, and southern Africa. The strongest openings will occur for a few hours after sunrise and during the sunset hours.

Long-path openings also improve during the equinoctial periods, as a variety of paths open up on 40, 30, and 20 meters. Expect a path from southern Asia around sunset, and daily morning openings from southern Asia and the Middle East, expanding to Africa. Also look for signals from the Indian Ocean region via the long-path over the North Pole. Afternoons will fill with South Pacific long-path, and then extend to Russia and Europe. Look for possible long-path openings on 30, 40, 60, and 75/80 meters for an hour or so before sunrise and just before sunset.

The winter DX season is slowly approaching, making for additional exciting DX conditions. While the weather is still warm and fair, tighten hardware on your antenna system, check coax cables, and fine tune your radio station. Get ready to now to reap the DX in the comfort of home during those cold months ahead.

Autumn is Aurora Season

As we've explored in past editions of this column, the Earth has a magnetic field with a north and a south pole that is enclosed within a region called the "magnetosphere." As the Earth rotates, its hot core generates strong electric currents that produce the magnetic field, which reaches 36,000 miles into space.

The magnetosphere prevents most of the particles from the sun, carried on the solar wind, from impacting the Earth.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for September 2022

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 1-3, 6-7, 9-10, 13, 18, 21-23, 28-30	A	A	B	C
High Normal: 8, 11, 15, 17, 19-20, 24-27	A	B	C	C-D
Low Normal: 5, 16	B	C-B	C-D	D-E
Below Normal: 4, 12, 14	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 S9
B--Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C--Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D--Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E--No opening expected.

HOW TO USE THIS FORECAST

1. Using the **Propagation Charts** appearing in "The CQ Shortwave Propagation Handbook, 4th Edition," by Carl Luetzelschwab, George Jacobs, Theodore J. Cohen, and R. B. Rose.

a. Find the *Propagation Index* associated with the particular path opening from the **Propagation Charts**.

b. With the *Propagation Index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the **Propagation Charts** with a *Propagation Index* of **3** will be excellent on September 1st through September 3rd, poor to fair on September 4th, fair to good on September 5th, and so forth.

2. Alternatively, you may use the *Last-Minute Forecast* as a general guide to space weather and geomagnetic conditions throughout 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 geomagnetic conditions. In general, when conditions are *High Normal* to *Above Normal*, signals will be more reliable on a given path, when the ionosphere supports the path that is in consideration. This chart is updated daily at <https://SunSpotWatch.com> provided by NW7US.at <https://SunSpotWatch.com> provided by NW7US.

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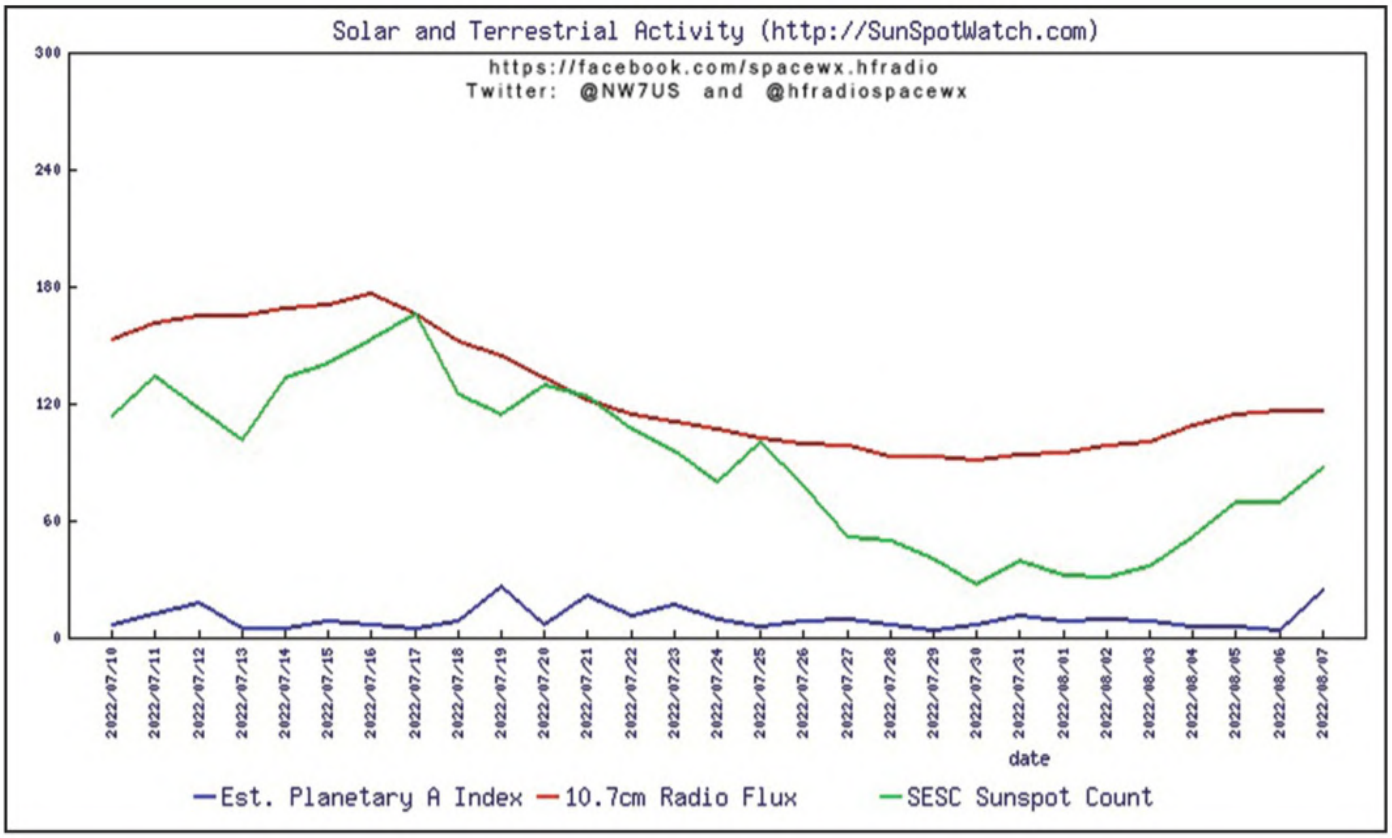

Figure 1. Overall activity (daily sunspot count, daily 10.7-cm Radio Flux) waned a bit during July 2022, but was picking back up by press time. (Image by Tomas Hood, NW7US)

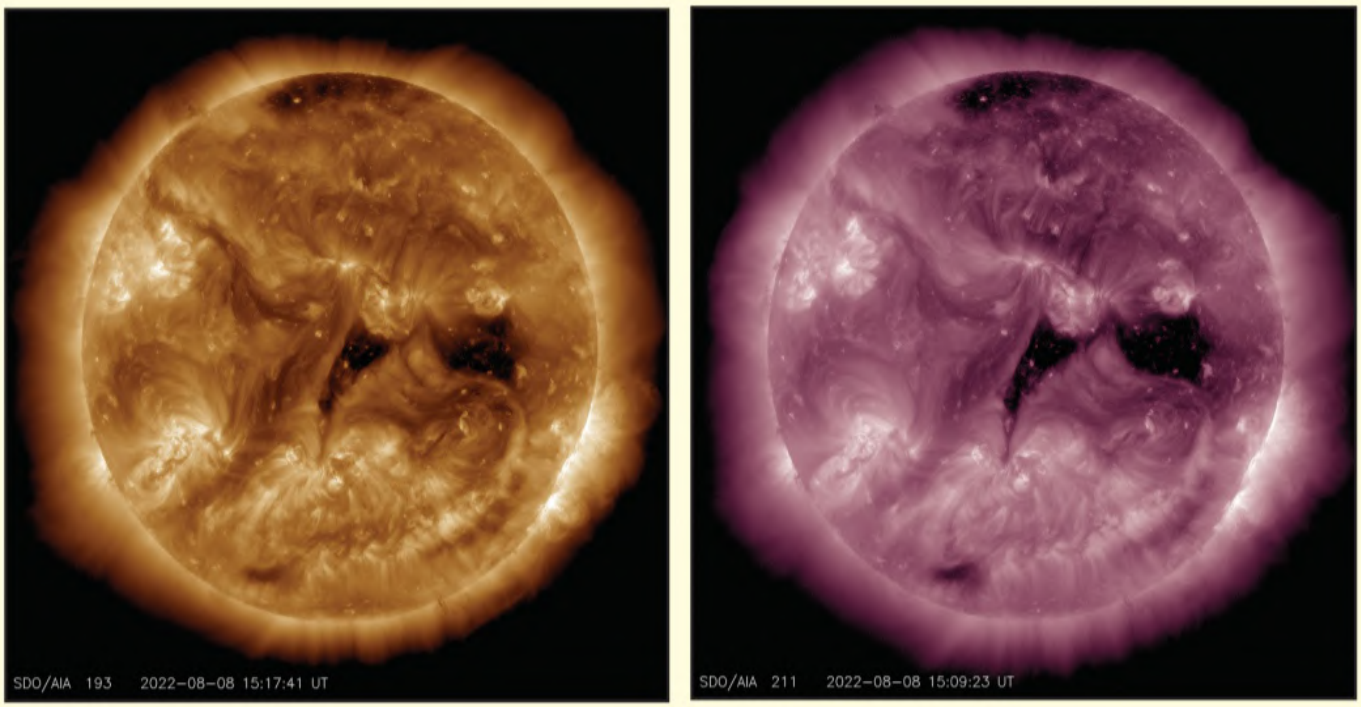

Figure 2. Two different views of the Sun on August 8, 2022, illustrating the Earth-directed coronal holes that gave rise to moderate geomagnetic storm activity on August 8th. These images are false-colored images captured by the Solar Dynamics Observatory spacecraft's Atmospheric Imaging Assembly, or AIA. The images are colored this way because we cannot see extreme ultraviolet, but the AIA images that are captured are rendered with standardized colors that represent the Angstrom wavelength of the image. The bronze image reveals Corona and Flare Plasma, and is helpful in identifying coronal holes. This light is emitted by iron-12 (Fe XII) at around 1.8 million° F and iron 24 (Fe XXIV) at around 36 million° F. The former represents a slightly hotter region of the corona, and the latter represents the much hotter material of a solar flare. This wavelength is typically colorized in bronze. The purple image is at 211 Angstroms, which reveals solar active regions. The light is emitted by iron-14 (Fe XIV) at temperatures of 3.6 million° F. These images show hotter, magnetically active regions in the Sun's corona. (Courtesy of SDO/AIA)

The solar wind distorts the shape of the magnetosphere by compressing it at the front and causing a long tail to form on the side away from the Sun. This long tail is called the magnetotail.

The speed of the solar wind fluctuates. During this year, we're seeing a range of solar wind speed of between 300 and 600 kilometers per second (km/s) on average. When the solar wind picks up speed, and when the magnetic field lines that are stretched out on the solar wind pass the Earth, geomagnetic storms may be triggered. For radio signals, this could be a good thing or a bad thing, depending on the frequency and radio path. In simple terms, for shortwave radio signals, geomagnetic storms cause the ionosphere to lose its ability to "reflect" radio signals. However, during these storms, aurora could occur, which can become an exciting opportunity for VHF weak-signal propagation off of the highly energized E-region of the ionosphere.

While aurora events are generally only visible close to the poles, severe magnetic storms impacting the Earth's magnetic field can shift them towards the equator (*as occurred in early August – ed.*). Auroras happen when ions in the solar wind collide with atoms of oxygen and nitrogen in the upper atmosphere. The atoms are excited by these collisions, and they typically emit light as they return to their original energy levels.

The light creates the aurora that we see. The most observed color of aurora is green, caused by light emitted by excited oxygen atoms at wavelengths centered at 0.558 micrometers, or millionths of a meter. [Visible light is reflected from healthy (green) plant leaves at approximately the same wavelength.] Red aurora is generated by light emitted at a longer wavelength (0.630 micrometers), and other colors such as blue and purple are also sometimes observed.

Low sunspot counts combined with coronal hole activity or coronal mass ejections often contribute to days of very poor propagation on the high frequencies (30 MHz and below). When the solar wind speed is high (over 650 km/s), when there's a release of solar plasma on that wind stream, and when the orientation of that wind stream is aligned to combine with the magnetosphere, the geomagnetic field will "open" to the incoming plasma, and aurora occurs. And that is when VHF comes alive for the exotic Aurora-mode propagation.

During September, we'll see a number of days when Aurora will occur, so be ready for interesting VHF propagation well beyond line-of-sight. When the planetary K-index (K_p) is higher than 5, there is a good chance of aurora.

VHF Conditions

The Sporadic-E (E_s) season we experienced earlier in the year is pretty much

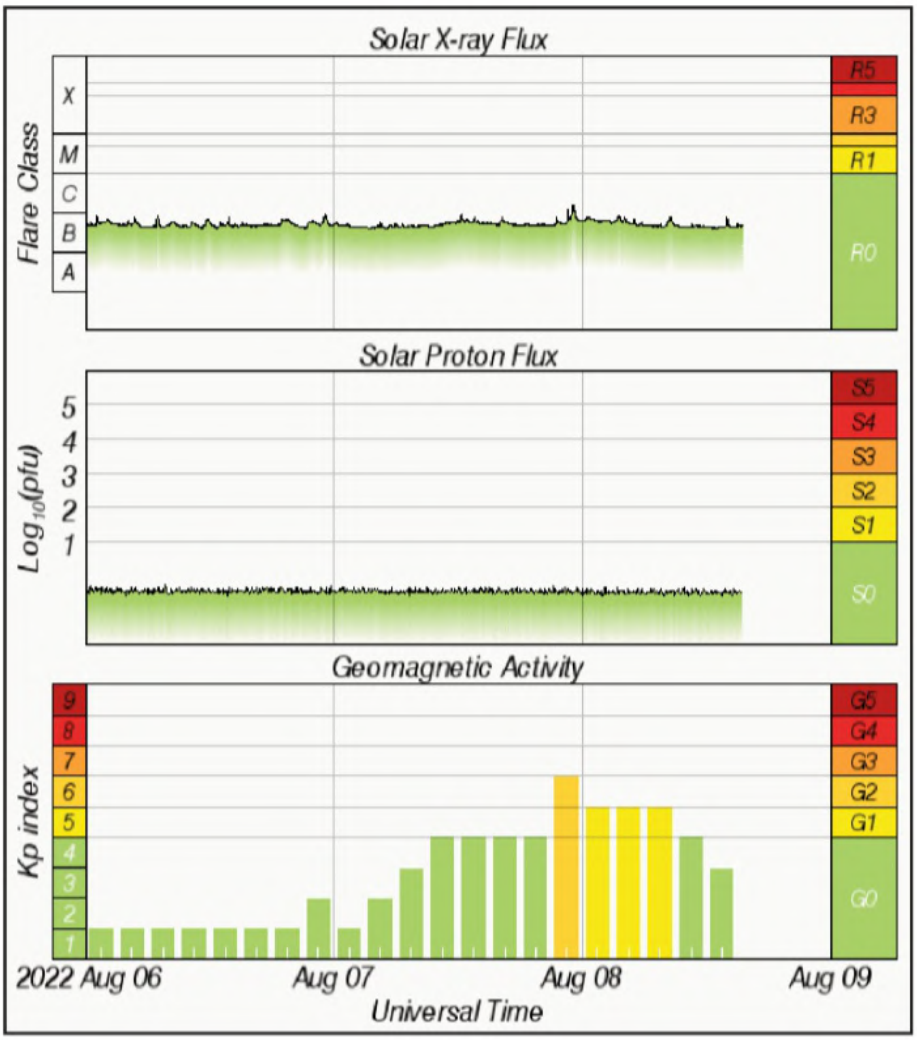

Figure 3. A plot of the Planetary K (K_p) Index which represents the Earth's geomagnetic activity level (bottom plot), as well as the background X-ray flux which represents flare energy as well as sunspot radiation. When the K_p Index is 5 or higher, the geomagnetic field is in a storm condition, which significantly lowers the Maximum Usable Frequency of any give radio propagation path (between two stations, by way of the ionosphere). [Courtesy of NOAA/Space Weather Prediction Center (SWPC)]

over by now. There will be a few openings late this year, but this is not the month typically associated with E_s.

Troposcatter is a possibility, however. Look for signals on paths crossing through stalled high-pressure zones in the Midwest, or along cool, wet air masses.

Additionally, toward the end of September, trans-equatorial (TE) propagation will begin to occur between southern North America and northern South America. Openings will generally occur in the late afternoon to early evening.

F-region propagation activity may occur during the day on the VHF bands, though the 10.7cm-flux levels are not going to support reliable propagation at these higher frequencies. Don't expect any east-west paths to be open.

Tropospheric conditions are generally very good for many of the VHF bands during September with the appearance of different weather fronts. This will be the primary mode for working up to 300 miles. Continue to expect a high number of coronal mass ejections, possibly triggering Aurora during September and October. Look for days when the K_p index is above 5.

There are no major meteor showers in September. For a detailed list of meteor showers, check out <https://tinyurl.com/f9v7fj2u> for a complete calendar for 2022.

If you use Twitter.com, you can follow <@hfradiospacewx> for hourly updates that include the K index numbers. You can also check the numbers at <https://SunSpotWatch.com>, where this columnist provides a wealth of current space weather details as well as links. Please report your observations of any notable propagation conditions, by writing this columnist via Twitter, or via the Space Weather and Radio Propagation Facebook page at <https://fb.me/spacewx.hfradio>.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for July 2022 is 93.03, up from June's 71.53 and May's 92.45. The 12-month running smoothed sunspot number centered on January 2022 is 59.5, up from December's 55.1. A smoothed sunspot count of 68, give or take about 7 points, is expected for September 2022.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 125.62 for July 2022. The 12-month smoothed 10.7-cm flux centered on January 2022 is 105.0. The predicted smoothed 10.7-cm solar flux for September 2022 is 108, give or take 5 points.

Geomagnetic activity level this month is expected to range from quiet to stormy, resulting in occasional degraded propagation. Remember that you can get an up-to-the-day ***Last-Minute Forecast*** at <https://SunSpotWatch.com> on the main page.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may email me, write me a letter, or catch me on the HF amateur bands. If you are on Facebook, check out <https://fb.me/spacewx.hfradio> and <https://fb.me/NW7US> — speaking of Facebook — check out the *CQ Amateur Radio* magazine fan page at <https://fb.me/CQMag>. Also, please check out the new alternative social networking ham radio group at <https://amateurhamradio.locals.com> and please share this with your amateur radio friends and clubs. *– 73, Tomas, NW7US*

Number groups after call letters denote following: Band (A = all; an additional A is All Band Assisted; A after each band is Assisted for that band), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Line scores in *italics* indicate late log received (past the deadline). Certificate winners are listed in **boldface**. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

2022 CQWW WPX SSB RESULTS

SINGLE OPERATOR

NORTH AMERICA

United States

District 1

KC1XX	**A**	**15,186,560**	**4110**	**1220**
			(OP: NN1C)	
KQ2M	"	12,929,183	3889	1151
AC1U	"	11,394,975	3648	1109
			(OP: N1UR)	
K1LZ	"	10,307,440	3200	1144
NTØK	"	6,487,472	2819	976
			(OP: KC1KUG)	
WK1O	"	5,964,822	2363	963
WT1A	"	4,034,277	1884	841
K1AR	"	3,772,616	2002	818
WB1DX	"	3,447,405	1724	747
AK1MD	"	2,534,770	1446	686
NG1M	"	1,801,521	1283	621
K1JB	"	1,663,436	1013	596
W1HS	"	1,474,245	1157	543
KI1P	"	1,148,156	1136	478
ND1X	"	899,100	773	450
K2RB	"	861,056	694	448
KA1IS	"	824,005	673	455
KB1W	"	740,027	706	431
W1ARY	"	668,302	628	389
KE1VT	"	651,840	704	420
W1JQ	"	620,092	581	374
AB1EP	"	590,031	565	351
KV1J	"	574,948	582	358
NB1N	"	567,196	544	329
N1KWG	"	432,140	471	340
W1GD	"	429,048	432	303
KM1W	"	420,913	389	337
KC1GTK	"	341,757	407	299
W3SM	"	305,728	383	272
K1OUH	"	286,764	431	276
K1BZ	"	234,250	352	250
N1ROZ	"	231,472	299	296
W1HNZ	"	230,204	340	247
AI4MD	"	220,806	282	261
WJ1B	"	198,264	344	264
W1KM	"	193,830	276	210
K1SM	"	186,592	299	238
K1VOI	"	138,624	253	192
WX7T	"	113,844	232	179
			(OP: K1RM)	
W1AST	"	97,053	234	187
AB1QP	"	90,036	218	164
N1RR	"	71,426	163	142
N1DFD	"	66,096	196	162
W1TO	"	62,205	158	143
WV1M	"	60,160	193	160
W1GXZ	"	54,606	165	114
N9NC	"	53,712	167	144
K1DVL	"	46,970	149	122
K1BIF	"	43,700	145	115
W1OHM	"	42,362	152	118
W8HMK	"	25,122	115	106
W1PEF	"	19,728	82	72
N1KWF	"	15,633	94	81
N1RPS	"	15,265	81	71
KC1ILH	*"*	*14,490*	*67*	*63*
K1VW	"	2,820	30	30
WC5T	"	960	20	20
			(OP: N1RR)	
WZ1R	"	855	19	19
			(OP: N1RR)	
NC1CC	**21**	**647,770**	**588**	**422**
AB1GS	**14**	**18**	**3**	**3**
***KR5X**	**A**	**2,700,894**	**1575**	**749**
			(OP: K1BX)	
*KQ1F	"	1,692,493	991	613
			(OP: K1XM)	
*N1DID	"	572,601	586	393
*WO1N	"	441,936	494	341
*KR1A	"	314,974	447	278
			(OP: KL7JT)	
*N1ALO	"	213,111	360	243
*W1DYJ	"	186,416	293	244
*AB1XQ	"	171,564	311	204
*N1SFE	"	127,459	288	197
*W1AKI	"	99,554	242	182
*N1SFT	"	89,586	195	158
*W2PMC	"	85,405	201	155
*NE1V	"	79,050	195	155
*KB1ODO	"	75,744	205	144
*AG2K	"	70,184	163	124
*N1IBQ	"	67,624	205	158
*N1DCH	"	55,875	185	149
*N1IBM	"	55,440	139	132
*N1MRI	"	53,019	176	137
*K1MTD	"	50,500	158	125
*W1JIM	"	50,173	170	131
*KC1QEM	"	41,625	146	125
*KB1FX	"	36,654	147	123
*K1LK	"	36,380	130	107
*N1WEN	"	32,724	132	108
*N1CEO	"	32,086	141	122
*W2BUD	"	25,300	118	100
*AE1P	"	25,296	99	93
*N1UMJ	"	24,720	107	80
*N1AM	"	22,113	98	91
*W1VBX	"	21,156	100	86
*K1CSP	"	20,210	98	86
*K1JBD	"	19,503	105	99
*W1ZFG	"	19,404	97	84
*KB1RVU	"	18,990	116	90
*W1NSK	"	18,549	97	81
*WA1SYH	"	18,275	95	85
*K1LHO	"	17,724	99	84
*W1TI	"	16,863	90	77
*KB1FRK	"	14,985	84	81
*AI1G	"	12,744	85	72
AE1EZ	*"*	*9,272*	*73*	*61*
*N1QVE	"	9,180	58	54
*W1QH	"	8,662	64	61
*KA1C	"	3,520	46	40
*AA1SU	"	2,990	53	46
*W1LAG	"	2,546	39	38
*N1YIS	"	1,938	35	34
*WA1N	"	1,320	25	24
*KC2TV	"	648	19	18
*WA3EEC	"	494	19	19
*K1THE	"	378	14	14
***N1RLR**	**28**	**660**	**18**	**15**
*KC1IBR	"	119	7	7
***N1WRK**	**21**	**63,648**	**171**	**144**
*W1NK	"	58,290	155	145
***NG1R**	**14**	**446,490**	**623**	**410**
			(OP: W1QK)	
*KC1RLS	"	20,116	103	94
*KT1TK	"	108	6	6
***AB1J**	**7**	**17,052**	**99**	**87**

District 2

KD2RD	**A**	**3,080,528**	**1722**	**761**
WR2G	"	3,007,917	1633	759
WU2X	"	2,058,110	1016	554
			(OP: N2QV)	
W2GDJ	"	1,917,846	1161	651
KE2D	"	1,877,225	1188	595
WO2X	"	1,624,686	1005	606
NN2NN	"	1,454,390	965	553
WO2T	"	1,210,559	893	511
WS9M	"	1,154,394	941	531
WA2DNI	"	983,964	837	501
KM2O	"	957,899	683	493
K2RET	"	751,248	647	423
AD2P	"	717,882	679	447
			(OP: N2HMM)	
WB2WPM	"	529,842	564	379
AB2E	"	497,377	620	353
WB2NVR	"	383,474	461	301
KF2TI	"	375,081	510	337
W2OIB	"	345,450	446	294
N2NKX	"	300,879	376	303
K2QO	"	266,220	385	270
AD2BO	"	265,000	421	265
K2ANZ	"	246,240	380	228
KF2E	"	245,534	326	293
KE2SD	"	209,100	360	255
KE1IH	"	208,728	325	234
AA2MU	"	198,858	373	253
K3TS	"	188,638	263	257
N2NC	"	187,450	306	230
WA2DHS	"	185,220	327	245
			(OP: W2KA)	
N2YG	*"*	*177,023*	*323*	*209*
WB2WGH	"	169,917	295	209
K2NV	"	169,180	288	220
NS2N	"	141,480	260	216
WA2UBK	"	139,492	248	172
W2KU	"	137,475	249	235
N2AXX	"	97,295	194	145
K2QB	"	83,333	196	167
WA2GOT	"	77,190	196	155
KF2O	"	65,527	164	161
N2RC	"	53,793	148	129
N2KED	"	44,368	129	118
N2LK	"	41,496	146	114
WN2X	"	41,093	132	109
KA2K	"	37,130	96	94
WA2MCR	"	36,252	128	106
KC2NVG	"	34,540	135	110
KC2OSR	"	29,040	113	110
K2XA	"	24,640	92	80
W2ALB	"	14,040	99	90
W7AOF	"	13,826	73	62
KD2UBH	"	9,891	69	63
KC2G	"	8,690	58	55
KD2RPX	"	7,992	62	54
WA2DE	"	5,796	49	46
KC2KZJ	"	4,624	37	34
N2HO	**28**	**189**	**9**	**9**
KU2M	**21**	**4,808,896**	**2069**	**928**
K2SSS	"	2,827,368	1573	734
NU2A	"	333,720	393	324
			(OP: N2GM)	
N2SLO	"	19,096	93	88
KN2M	**14**	**1,913,994**	**1136**	**678**
WO2Y	"	39,195	127	117
K2MFW	"	765	17	17
KX2NY	**3.7**	**73,392**	**210**	**139**
			(OP: W2XL)	
***N2SQW**	**A**	**1,498,128**	**1030**	**552**
*KC2GOW	"	884,700	838	450
*N1NQD	"	767,440	719	424
*W2FDJ	"	525,574	557	346
*WA2JQK	"	519,479	639	361
*KS2G	"	418,817	504	329
*NC1A	"	411,783	499	317
*KC2MBV	"	360,603	541	309
*KV2U	"	348,816	495	312
			(OP: K2AL)	
*N2MTG	"	305,715	444	267
*WA2CNV	"	256,496	477	272
*AB2TC	"	231,119	377	241
*AC2RL	"	213,666	355	239
*WB2KLD	"	205,160	313	230
*AA2EQ	"	183,395	322	215
*AF2V	"	169,000	270	250
*KC2WUF	"	164,280	349	222
*KA2FIR	"	163,976	286	206
*K2WJL	"	140,630	312	205
*KI2D	"	115,290	281	210
*N2LDV	"	107,168	257	197
*KD2JOE	"	98,868	220	154
*WE2DX	"	77,423	196	139
*NG2S	"	71,162	200	161
*N2CU	"	65,794	177	134
*N2OMD	"	65,660	169	134
*KO8SCA	"	64,944	194	164
*W2MJR	"	60,888	174	129
*KD2VSD	"	46,736	161	127
*AC2ZZ	"	44,157	153	123
*AB2NM	"	43,384	160	136
*K2DD	"	41,125	148	125
*WA3AFS	"	38,041	110	109
*KK2B	"	36,816	123	104
*K2PH	"	29,539	123	109
*W2CLA	"	27,755	113	91
*K2SI	"	25,850	123	94
*KS2A	"	21,942	148	106
*AC2XC	"	20,944	131	88
*KB2MN	"	20,086	95	83
*KD2REH	"	19,800	115	90
*KC2PDO	"	19,096	98	88
*WB2UDC	"	17,425	95	85
*KD2SGM	"	17,248	99	88
*KD2KEH	"	17,199	101	91
*W2STM	"	16,400	90	82
*AC2MT	"	13,452	90	76
*KD2TJU	"	12,308	70	68
*W2CHZ	"	11,165	91	77
*KF2FK	"	10,854	67	67
*AI2U	"	9,975	80	75
*K3WHD	"	8,850	61	59
*KA2YRA	"	8,100	57	54
*N2GMU	"	7,830	62	58
*KA2GQQ	"	7,747	63	61
*N2WLY	"	5,830	61	55
*W2MRD	"	5,805	52	45
*KC2VPE	"	5,687	50	47
*KC2JRQ	"	5,412	45	44
*K2MJP	"	4,418	49	47
*N2VM	"	4,365	53	45
*K2HVE	"	4,042	44	43
*N2BZD	"	3,990	37	35
*N3MTB	"	2,296	45	41
*WA2YYL	"	2,142	36	34
N2PTF	*"*	*2,100*	*35*	*30*
*K2IRK	"	1,620	30	27
*KD2CQ	"	546	15	14
KD2YIO	*"*	*456*	*13*	*12*
***NG2D**	**28**	**3,069**	**39**	**33**
***W2CG**	**21**	**6,302**	**48**	**46**
***NY2A**	**14**	**194,580**	**324**	**276**
*W3EH	"	2,952	36	36
***W2FTL**	**7**	**4**	**2**	**2**

District 3

AA3B	**A**	**8,579,860**	**3142**	**1084**
K3RA	"	7,825,440	2803	1020
K3ZO	"	4,609,332	1902	804
KF3P	"	3,939,390	1753	845
			(OP: K3MM)	
N3QE	"	3,171,867	1826	743
KA3GIK	"	3,098,792	1591	761
			(OP: W3FIZ)	
WB2ZAB	"	2,730,048	1400	708
WW3S	"	2,525,800	1405	730
K3TC	"	1,964,319	1226	623
W3LL	"	1,854,200	1222	584
N3FJP	"	1,830,180	1185	660
K3WJV	"	1,780,851	1163	597
W3ICM	"	1,718,096	1214	643
AA3R	"	1,692,449	1155	583
WC3N	"	1,368,730	915	541
W3FOX	"	1,350,744	927	552
AK3B	"	1,112,271	976	499
NW3Y	"	1,047,960	733	492
4U1WB	"	1,011,395	1098	497
			(OP: AJ3M)	
W3FV	"	966,758	765	494
N3FM	"	743,148	672	378
N3AM	"	696,371	651	391
KA3YJM	"	630,292	715	403
N3FCP	"	537,168	654	361
NT3U	"	506,238	484	417
NY3B	"	390,104	497	341
NF3R	"	350,778	490	323
KD3TB	"	312,570	434	302
K3ZU	"	291,606	324	262
NN3RP	"	247,245	387	265
WA3EKL	"	228,750	328	250
K3AU	"	228,735	304	255
			(OP: K2YWE)	
N3DUE	"	211,265	342	235
K2LNS	"	207,669	329	231
KD3H	"	188,742	331	249
K2CD	"	174,714	294	222
W3FR	"	170,568	301	207
N3BD	"	169,680	298	240
KC3NNO	"	168,775	321	215
AC3U	"	163,404	297	204
			(OP: W3UL)	
KG4USN	"	139,216	242	176
N8WXQ	"	131,990	277	197
NY9H	"	112,881	240	197
NX3Z	"	112,240	213	184
N3YPJ	"	81,984	206	168
K3MD	"	65,849	192	161
WY3P	"	62,678	190	154
			(OP: W3RAR)	
N3WR	"	60,160	160	128
N3AML	"	58,496	171	128
KZ3W	"	54,900	190	150
N3WMC	"	52,360	181	140
KB3MMM	"	33,408	114	96
W3OU	"	29,925	124	105
N3ZP	"	28,518	116	98
K3TN	"	25,920	111	90
KB3Z	"	25,480	99	91
WA3AAN	"	23,647	107	107
ND3L	"	23,275	102	95
W3RE	"	15,264	79	72
WF3U	"	15,204	90	84
AA3S	"	13,824	68	64
N3ATE	"	13,206	69	62
KC3JPP	"	11,284	65	62
N3RM	"	8,316	61	54
NO3U	"	6,364	49	43
KU2C	"	1,541	24	23
W2MC	"	407	11	11
AA1K	**28**	**186,590**	**350**	**235**
N3MWQ	**21**	**54,810**	**155**	**145**
W3NRJ	"	3,519	52	51
K3ISH	"	2,523	29	29
WY3A	**14**	**6,048**	**50**	**48**
W3BGN	**3.7**	**496,740**	**618**	**340**
***N3AAA**	**A**	**1,393,536**	**1107**	**573**
*KD3HN	"	638,250	598	370
*AG4Q	"	631,224	716	396
*N3QXC	"	339,264	494	279
*N1EK	"	287,803	424	277
*KA3FZN	"	251,520	364	262
*NU3A	"	237,000	369	237
*KQ3W	"	150,678	296	198
*AB1F	"	123,876	269	186
*N3BAS	"	112,761	211	201
*N3WD	"	112,112	274	196
*N2EM	"	109,335	240	185
*WM3PEN	"	94,482	233	181
			(OP: W3WHK)	
*WA3YDZ	"	93,840	233	170
*AB3SX	"	81,346	217	178
*W3ZGD	"	79,542	194	162
			(OP: K3TEF)	
*W3AVP	"	78,078	200	154
*WI3K	"	74,016	188	144
*K3NO	"	69,576	200	156
*N3GSD	"	66,780	207	159
*AC3MB	"	56,304	173	136
KR3L	*"*	*46,624*	*154*	*124*
*N3GT	"	41,019	127	121
*N3OJU	"	39,444	128	114
*N3KBF	"	29,140	111	94
*KE3ZT	"	27,075	107	95
*N3NQP	"	26,832	125	104
*KS3D	"	25,800	91	86
			(OP: KJ3N)	
*N3YHM	"	25,704	111	102
*KB3RYM	"	25,300	117	100
*WD8RYV	"	19,926	96	81
*KA3KAG	"	19,188	92	82
*NF3K	"	18,432	132	96
*K3BZZ	"	17,680	89	80
*KB3VZE	"	16,720	86	76
*AC3EK	"	16,450	103	94
*AC3EU	"	15,520	94	80
KC3OO	*"*	*14,981*	*90*	*71*
*KD3CR	"	14,514	96	82
*K3KDX	"	13,728	70	66
*KC3RN	"	12,900	90	75
*NW2W	"	12,324	84	78
*W3TAS	"	11,968	74	68
*K3KU	"	11,360	82	71
*KC3NLT	"	8,883	66	63
KC3DLL	*"*	*6,396*	*58*	*52*
*K3YH	"	5,424	51	48
*N3JON	"	5,358	48	47
*K3ZE	"	5,109	46	39
*NX3V	"	4,770	53	45
*AJ3DI	"	4,371	54	47
*KA3KSP	"	2,916	37	36
*KB3GJT	"	2,622	39	38
*WA3TD	"	1,690	29	26
*W3BHL	"	1,505	37	35
*KC3RPO	"	1,500	20	20
*KB3WP	"	1,450	30	29
*W3AZT	"	792	21	18
*N3RUM	"	740	23	20
*KE3O	"	645	16	15
*KC3MSL	"	144	8	8
*NE3R	"	48	5	4
*KB3EEM	"	21	3	3
***KB3NJB**	**28**	**20,713**	**102**	**77**
*N3TKG	"	6,072	55	46
*KA3MZR	"	3,996	45	37
*K3JDF	"	704	18	16
***N3ZA**	**21**	**159,828**	**256**	**228**
*K3HW	"	5,724	53	53
***W3NO**	**14**	**104,922**	**222**	**201**
*W3RFX	"	47,192	147	136
*N3KUN	"	3,268	38	38
*N3GL	"	720	20	20
*W4GMN	"	240	12	12
***NS3T**	**7**	**246,456**	**523**	**252**
*KO3T	"	96,707	228	173

District 4

WZ4F	**A**	**6,064,743**	**2832**	**1033**
			(OP: K4AB)	
AD4TR	"	4,450,712	2559	893
			(OP: N4UU)	
NR3X	"	4,438,564	2370	884
N6AR	"	4,168,593	2041	869
N4RV	"	4,110,957	1969	831
WS7X	"	3,971,880	2107	792
K4PV	"	2,763,180	1905	756
K3DNE	"	2,562,564	1800	716
N1TO	"	1,541,136	1187	582
NU4E	"	1,496,460	1006	588
K3IE	"	1,251,888	851	528
NE4EI	"	1,093,474	1109	493
KM4HI	"	1,040,229	784	531
K4QQG	"	1,039,824	984	522
NF4A	"	995,428	828	511
K5KG	"	895,604	882	508
N5GF	"	868,700	768	425
K5VIP	"	845,340	665	438
KA4RRU	"	815,966	762	466
K4CGY	"	669,900	680	406
KA8Q	"	596,505	621	345
K4BBH	"	593,668	637	386
KS3F	"	578,952	473	473
AB4GG	"	570,555	830	409
AA5JF	"	441,280	480	320
NR4O	"	433,200	547	304
K4VTE	"	401,800	490	328
N1RM	"	393,737	460	323
NO9E	"	392,903	412	287
K4IE	"	392,450	513	334
KG4W	"	357,105	435	285
AI4WW	"	346,500	475	300
KJ4YLR	"	330,020	470	290
K4RO	"	319,680	552	320
W3DQS	"	287,385	399	255
WA4AH	"	274,183	328	299
N4DN	"	245,827	436	293
NS4X	"	229,152	401	264
K4KR	"	217,710	323	246
WN3DX	"	217,008	391	264
KE4KY	"	209,620	347	235
K4NV	"	197,802	323	243
KU8E	"	170,820	411	260
KT4O	"	155,491	301	229
W4FNZ	"	148,224	275	192
KI4GGJ	"	146,331	292	213
K4BAI	"	145,873	322	229
N4CF	"	138,432	262	206
KB9BVL	"	138,208	307	224
WA4JUK	*"*	*125,334*	*315*	*211*
N4JOW	"	117,455	245	169
N4JDB	"	112,387	230	187
WA2EXZ	"	107,579	246	179
KE0L	"	105,281	298	187
KA3MTT	"	100,080	245	180
N4CWZ	"	94,952	217	166
N6DW	"	93,696	183	183
W4KW	"	92,050	239	175
WG4MC	"	86,400	208	150
NV4C	"	81,810	209	162
W4BBT	"	73,450	191	130
KU4FX	"	69,905	201	155
K4XL	"	64,610	157	130
AG4TT	"	61,299	158	139
			(OP: N4GU)	
KC4D	"	55,719	153	123
N1MHV	"	51,324	186	141
W4NF	"	51,100	177	140
KA2NFG	"	49,790	167	130
K4YCR	"	49,392	147	147
KF7RO	"	45,360	126	105
K4TEN	"	44,196	148	127
KO4USA	"	40,252	140	116
WO4O	"	32,012	107	106
WC9D	"	29,391	117	101
AF4T	"	28,975	118	95
N3US	"	27,270	107	101
NK4I	"	24,735	111	97
WB4DKU	"	24,395	96	85
W4NZ	"	23,751	97	87
N4QS	"	20,746	97	82
AC4MC	"	18,601	99	89
KJ4ND	"	17,138	100	82
K4SHW	"	15,960	84	70
N4QWF	"	15,553	112	103
K8YC	"	14,250	75	75
NQ4J	"	14,091	68	61
			(OP: K8LF)	
W4WRS	"	13,825	82	79
W4PF	"	13,735	72	67
KU4YW	"	13,286	76	73
WWØCJ	"	12,998	72	67
AA4WW	"	12,960	98	80
WO4D	"	12,810	78	70
NA4DA	"	12,480	68	65
KE4YOG	"	12,104	74	68
KI4KK	"	10,833	72	69
N8AID	"	9,639	58	51
ND2O	"	7,239	62	57
K4EAK	"	6,533	56	47
K4BGV	"	5,251	69	59
N4NT	"	4,949	54	49
W1IE	"	4,268	45	44
W4RLB	"	4,000	49	40
WE5P	"	3,939	42	39
N2NYR	"	3,534	41	38
NX9T	"	3,264	35	32
N4OI	"	2,204	29	29
N8PEP	"	2,146	31	29
KN4PPD	"	1,702	25	23
W4WWV	*"*	*1,591*	*47*	*43*
K4YYL	"	1,539	27	27
K1ZW	"	972	29	27
N9BPL	"	768	12	12
N3JT	"	555	15	15
N4WPJ	"	400	16	16
AA1RD	"	336	12	12
AJ4A	"	12	3	1
N8KH	"	3	1	1
W4DD	**28**	**287,375**	**483**	**275**
W5MX	"	139,748	274	196
KR4Z	**21**	**3,499,164**	**1818**	**852**
			(OP: N4OX)	
NE8P	"	1,416,456	1116	618
AG4W	"	1,322,658	1054	591
KJ4QHL	**14**	**1,855,146**	**1608**	**699**
AA4GA	"	49,056	146	146
W2IKN	"	12,580	79	74
KO4DJG	"	4,650	51	50
AA4DD	"	363	11	11
***WW2R**	**A**	**2,181,630**	**1300**	**726**
			(OP: N2CEI)	
*KM4SII	"	1,122,498	987	507
*WF9A	"	1,052,779	962	503
			(OP: LZ4AX)	
*WJ4X	"	643,867	666	413
			(OP: N4XL)	
*WA3LXD	"	495,600	544	336
*KK4BZ	"	487,553	503	349
*NN4DX	"	394,295	545	335
*KT3T	"	360,220	577	332
*K4SBZ	"	350,118	426	318
*K4DMR	"	348,076	469	346
*K9OM	"	309,386	348	287
*KV4KY	"	249,290	401	257
*AI4DB	"	227,500	411	250
*KB4CG	"	212,750	326	230
*KN4OQD	"	207,792	372	234
*KG4STL	"	197,120	391	256
*KG4IGC	"	196,425	334	225
*W4EE	"	179,340	306	210
*NC4MI	"	176,472	320	228
*WW4LS	"	172,056	306	214
*K6ES	"	154,830	302	195
*WA4JA	"	153,920	295	208
*WN4AFP	"	139,968	291	216
*K4TMC	"	134,067	262	201
*N4JKO	"	133,200	263	185
*K4DR	"	132,512	284	202
*K3GWK	"	132,430	259	205
*N9TF	"	127,920	299	208
*NJ8J	"	120,582	285	189
*KK4RV	"	116,228	248	196
*WA4IPU	"	112,496	263	178
*KF7CG	"	112,476	239	182
*N4QI	"	111,838	258	199
*KM4IAJ	"	108,900	246	180
*W9TCV	"	101,430	231	161
*KK4R	"	101,360	219	181
*NE4EA	"	99,702	257	174
*N4NTO	"	90,112	249	176
*K1HG	"	85,575	245	175
WA2LMC	*"*	*78,430*	*222*	*155*
*K4JSK	"	76,760	195	152
*WA8YVF	"	75,682	188	158
*KE8PX	"	74,094	205	159
*K1MWH	"	70,858	181	142
*K4FJW	"	70,413	177	147
*KN4UOW	"	63,176	202	149
*W4WCD	"	62,926	184	146
*K5OLV	"	62,752	196	148
*KØFE	"	57,120	189	140
*K8RAR	"	54,864	187	144
*KK4ADQ	"	52,185	180	147
*KV4ZY	"	51,740	130	130
*NE8O/4	"	50,690	173	137
*W4HRL	"	50,646	170	138
*KN4MIV	"	44,748	115	113
*WN8Y	"	43,152	142	124
*AC2N	"	42,408	140	114
*W4JH	"	39,780	150	117
*WD4FMG	"	39,449	127	103
*WV2B	"	38,870	132	115
*AB4PP	"	38,180	134	115
*AI8O	"	37,406	151	118
*K4MVM	"	34,768	116	106
*KY4KP	"	32,912	130	121
*KW4LU	"	32,256	129	112

*W4SDX	"	31,979	143	113
*KN4UND	"	31,524	136	111
*WA4HNL	"	30,000	116	100
*W2TAD	"	29,792	104	98
*KO4VFA	"	29,400	132	105
*K8MR	"	29,392	108	88
*K4RAB	"	28,670	111	94
*KD4ACG	"	27,878	112	106
*AA2KD	"	26,950	115	98
*WX4DAT	"	26,520	134	102
*KB4FUW	"	25,724	119	109
*KØDSL	"	25,578	113	98
*KO4YIN	"	24,722	114	94
*W4TM	"	23,276	104	92
*W3AJL	"	22,792	108	88
*N1QEQ	"	21,902	112	94
*W2WCM	"	21,090	106	95
*KI4RBI	"	20,979	95	81
*KO4EQR	"	20,825	98	85
*WB4MM	"	18,630	97	81
*K1VX	"	17,784	92	78
*WS4Z	"	16,269	95	87
*AD4YQ	"	16,170	94	70
*NØFIR	"	16,072	95	82
*N5VX	"	15,642	98	79
*AC4G	"	14,910	94	71
*KZ1O	"	14,559	76	69
*KK4CS	"	14,364	93	76
*N4MMR	_"_	_14,214_	_80_	_69_
*NA4C	"	13,937	95	77
*KE4QCM	"	13,908	77	61
*KO4QZY	"	13,680	93	76
*W4TWR	"	13,206	76	62
*WD4GZW	"	12,993	76	61
*W4WKU	"	12,931	81	67
*K4CAB	"	12,851	82	71
*N4CN	"	11,760	65	56
*KO4ENU	"	11,400	94	76
*KN8F	"	11,214	69	63
*KD4LEM	"	11,122	73	67
*K2LAT	"	10,584	80	72
*WK2Y	"	9,966	75	66
*N2YF	"	9,660	67	60
*W4LAN	"	9,086	60	59
*W4CMG	"	8,174	64	61
*AF6G	"	7,875	82	75
*NB3A	"	7,791	58	53
*AK4VQ	"	7,007	54	49
*WD4ETU	"	6,912	59	54
*K4LDC	"	6,027	54	49
*W4PGM	"	5,808	46	44
*N4KIN	"	5,650	55	50
*KN4MSE	"	5,520	54	48
*WB4FSU	"	5,330	45	41
*KG3V	"	5,265	49	45
*W4MTM	"	5,264	51	47
*K4WWP	"	5,217	48	47
*WA2MFU	"	5,184	51	48
*KY4MAK	"	4,620	52	44
*KO4EZG	"	4,480	41	40
*K4ELW	"	4,428	44	36
*W4YVA	"	3,978	53	51
*KM4VI	"	3,852	42	36
*KC4S	"	3,724	43	38
*AI4QQ	"	3,450	52	46
*AE2V	"	3,444	42	41
*WØKLV	"	3,360	46	42
*KG4V	"	3,360	37	35
*KF4QFJ	"	2,944	32	32
*KK4TBC	"	2,592	36	32
*WA2OMT	"	2,485	37	35
*KN4JGH	"	1,720	41	40
*K4NMR	"	1,122	18	17
*NA9J	"	1,060	22	20
*K3KZU	_"_	_1,040_	_22_	_20_
*N5ASH	"	779	20	19
*WB2AII	"	777	21	21
*N2OG	"	736	16	16
*N1GFV	"	720	17	15
*KK4QKP	"	714	18	17
*N4JN	"	629	19	17
*KF4FMQ	"	510	17	15
*KC4TEO	"	396	12	12
*N4DTF	"	360	12	12
*W1BKN	"	320	18	16
*KO4JKV	"	220	20	20
*KN4VGY	"	216	8	8
_*NQ3L_	_"_	_144_	_8_	_8_
*KO4IJH	"	112	8	8
*WB4E	"	81	9	9
*NM9X	"	60	5	5
***NA4W**	**28**	**70,775**	**188**	**149**
		(OP: K4WI)		
*N3UA	"	44,880	154	120
*N3GB	"	40,071	144	111
*AA4NP	"	13,065	78	65
*KA1RRX	"	7,332	54	52
*KO4SGC	"	1,113	23	21
*KC4WQ	"	1,040	20	20
*N4HH	"	1,029	21	21
*N3ACK	"	900	21	18
*KO4YJA	"	342	20	19
*N4DAR	"	260	10	10
*KK4YRH	"	81	9	9
*KO4UHE	"	12	4	4
*NØUHF	"	2	1	1
*AE4S	"	2	2	2
***WA1PMA**	**21**	**109,214**	**211**	**203**
*W1AM	"	34,048	127	112
*KNØA	"	19,982	108	97
*K3YDX	"	1,320	24	24
*NX4N	"	1,102	20	19
***W2QU**	**14**	**22,990**	**113**	**110**
*AC3D	"	2,541	33	33
*KB4DW	"	592	16	16
*AD4GN	"	187	11	11
*KJ4LAB	"	153	9	9
*K4RFK	"	30	5	5
*WA2QYA	"	4	2	2
*KO4DFE	"	1	1	1
***AC4AG**	**7**	**126**	**6**	**6**
*N4WAE	"	65	5	5
***K4FTO**	**3.7**	**4,361**	**53**	**49**
*W4GDV	"	3	3	3

District 5

KT5J	**A**	**9,954,624**	**4079**	**1112**
		(OP: K5TR)		
NU5A	"	8,085,320	3460	1048
		(OP: K5GN)		
WK5T	"	6,889,410	2786	990
		(OP: N2IC)		
AD5XD	"	3,127,900	2292	775
NT5V	"	2,804,490	1756	765
WZ5M	"	2,252,030	1706	694
KK5I	"	1,596,012	1445	678
		(OP: W5CW)		
KE5MMT	"	1,250,500	1046	500
WW5L	"	1,160,267	985	521
N5XJ	"	1,093,332	1092	537
WBØTEV	"	842,688	716	448
K5UA	"	417,024	488	288
WQ5L	"	401,280	523	352
N5KWD	"	385,120	531	290
AI5SF	"	322,436	451	298
WF3H	"	270,352	390	277
W5GN	"	232,320	373	264
W2GS	"	193,998	315	217
KJ5Y	"	172,900	438	266
		(OP: KJØD)		
N5GI	"	137,588	232	212
N5WNG	"	125,904	217	183
W5GAD	"	114,912	323	216
		(OP: K5DEU)		
K5LAD	"	104,904	298	188
WDØGTY	"	61,722	200	162
WT4DX	"	61,642	180	119
K5PAR	"	60,970	162	130
KG5GM	"	58,145	198	145
K5TBA	"	31,395	121	91
W5ABA	"	24,568	97	83
K5CKS	"	21,580	96	83
K5NZV	"	20,700	94	90
KA4OTB	"	18,837	108	91
KN5S	"	13,568	76	64
N5JGE	"	13,050	80	75
KG5RXE	"	9,660	65	60
K1JHS	"	9,455	71	61
W5WZ	"	7,552	67	59
N5OT	"	6,174	48	42
N5TJ	"	5,814	52	51
AK5Y	"	2,784	51	48
KC6ZBE	"	2,744	30	28
KI5NHO	"	2,622	50	46
KG5LTL	"	544	16	16
KC7DC	"	180	9	9
KZ5MM	**28**	**354,295**	**527**	**295**
		(OP: W5PR)		
WE6EZ	"	59,904	191	128
KD5J	"	16,498	88	73
KI5LST	"	48	4	4
W5XNA	**21**	**4,080**	**41**	**40**
N5KAE	**14**	**2,958**	**34**	**34**
***N5JR**	**A**	**554,692**	**583**	**404**
*WA5JMZ	"	451,605	656	357
*K5XU	"	429,692	513	356
*K5FUV	"	403,048	520	332
*WB5N	"	224,439	416	237
*KI5MM	"	197,593	326	253
*WB5BHS	"	189,783	459	243
*K5TS	"	158,782	269	197
*KE5LQ	"	141,984	310	204
*WA5LFD	"	132,273	284	207
*AA3C	"	126,072	304	206
*N5JJ	"	96,111	242	177
*WBØRUR	"	90,636	193	182
*WA8ZBT	"	88,872	263	184
*N5DTT	"	83,213	207	173
*WX7V	"	78,490	234	167
*NQ5M	"	78,030	229	170
*AE5LQ	"	75,187	224	161
*NK5K	"	72,542	221	166
*KF5YUB	"	58,968	211	162
*K5LGX	"	55,131	197	141
*W3PWF	"	44,880	156	132
*AB5KM	"	37,572	132	124
*WA5ZKO	"	36,515	136	109
*W5PKK	"	34,692	165	118
*KI5TJW	"	30,956	133	109
*AI5A	"	30,875	170	125
*KJ4EBE	"	27,027	109	91
*AG5XW	"	25,054	137	104
*AA5AH	"	23,400	123	104
*AA5DF	"	21,024	120	96
*W5PUF	"	19,350	99	90
*KA5PMV	"	17,175	99	75
*KG5RJ	"	16,926	95	78
*W5TCB	"	15,957	95	81
*KK5LO	"	15,836	79	74
*KI6HQT	"	15,136	108	86
*KI5LET	"	13,860	91	77
*W5JCC	"	12,765	76	69
*AA5ZT	"	10,790	98	83
*W5RIP	"	10,608	91	78
*NW5Q	"	6,708	56	52
*AB5XZ	"	6,048	62	54
*KA5EB	"	5,512	59	53
*KD5YS	"	4,900	55	49
*KW5H	"	3,528	59	49
*N5PA	"	3,320	47	40
*KI5PED	"	3,042	42	39
*KK5KLK	"	2,925	40	39
*KI5KUI	"	2,485	41	35
*KD5OMC	"	1,680	31	28
*AJ4F	"	1,633	26	23
*KØYA	"	1,520	23	20
*KF5RUW	"	1,152	24	24
*W5RAW	"	720	25	24
*KJ5CF	"	720	18	18
*KF5BCN	"	640	17	16
*KI5MOO	"	459	19	17
*KI5ODW	"	420	16	15
*KG5STP	"	288	18	18
***KD5AFS**	**28**	**882**	**18**	**18**
*KG5YOT	"	176	11	8
*W6FB	"	90	6	6
***WA5WFE**	**21**	**59,760**	**155**	**144**
*AF5CC	"	10,656	75	72
*NT5TM	"	5,512	57	53
*KA5D	"	275	11	11
*NF5Y	"	9	3	3
***W5CSM**	**14**	**72,268**	**260**	**203**
*W2ODH	"	26,703	157	129
*W5XY	"	840	24	24
*KG5ZNJ	"	551	19	19
*K1THO	_"_	_154_	_11_	_11_
*W5HRP	"	104	8	8
*W5BDW	"	24	4	4
*KCØLFQ	"	3	3	3
***K5MAY**	**7**	**48**	**4**	**4**

District 6

KK6P	**A**	**6,944,184**	**3069**	**936**
		(OP: W7IV)		
NF6A	"	3,577,812	1766	669
		(OP: K6XX)		
NT6Q	"	2,599,581	2073	699
		(OP: N5ZO)		
NJ6G	"	2,332,998	1552	666
		(OP: N7MH @W6YX)		
KU6W	"	1,522,600	1394	575
		(OP: K9YC)		
AJ6V	"	786,240	980	480
KE8FT	"	560,790	727	402
WA6KHK	"	433,552	461	343
NN6DX	"	421,056	558	344
		(OP: W1PR)		
K6TQ	"	396,252	499	324
KW6S	"	321,354	475	297
K6RC	"	319,945	497	305
N3RC	"	314,846	469	301
N6RV	"	287,459	387	263
NT6X	"	176,816	402	257
N6TQ	"	146,142	279	207
AK6M	"	137,540	247	230
		(OP: K6MM)		
K6RIM	"	108,560	235	184
AA6PW	"	102,660	223	177
W6PNG	"	92,415	245	183
N6OI	"	76,950	216	171
KJ6JUS	"	62,431	204	149
K6YK	"	50,796	185	153
KG6AO	"	48,984	155	104
NW6P	"	48,321	154	117
K6DW	"	40,959	189	123
WA6MRK	"	36,668	138	103
KB6A	"	32,528	140	107
_K6FA_	_"_	_29,664_	_119_	_103_
KF6I	"	27,876	112	92
NN6C	"	27,492	110	87
K6GFJ	"	25,146	117	99
W6SX	"	23,836	136	101
K6JS	"	22,826	125	101
AI6LY	"	20,440	89	73
W6MOB	"	20,097	94	87
WA6URY	"	18,744	107	88
K8TR	"	18,180	108	90
AI6DR	"	16,892	98	82
K6NR	"	16,728	88	82
AB6A	"	16,146	101	78
N6VOH	"	16,074	108	94
KE6QR	"	15,089	95	79
W6KC	"	11,200	84	70
KM6CW	"	10,020	74	60
W1RH	"	8,533	56	53
AJ6TL	"	7,840	57	49
W6DPM	"	6,200	53	50
NX6D	"	4,598	44	38
KF6NCX	"	2,808	41	39
W6JBR	"	2,449	37	31
N6GWH	"	2,331	41	37
AF6DR	"	2,233	29	29
K6PAD	"	2,210	28	26
N5KO	"	1,740	30	29
KD6NOF	"	1,325	28	25
KN6QNY	"	1,012	23	23
W6XK	"	528	16	16
KA6KEN	_"_	_528_	_17_	_16_
K6ZP	"	518	14	14
WD6T	"	25	6	5
K6KM	**28**	**24,080**	**105**	**86**
		(OP: @W6SRR)		
W6AFA	**21**	**1,140,090**	**1096**	**534**
N6IC	"	22,624	124	112
K6MI	"	65	5	5
WF6C	**14**	**11,620**	**107**	**83**
		(OP: N6XI)		
KN6ETB	"	5,684	61	58
W1SAV	**7**	**1,680**	**20**	**20**
***NG6O**	**A**	**230,538**	**366**	**231**
		(OP: K6GHA)		
*N6OKU	"	230,044	494	289
*N6PGQ	"	149,628	312	222
*KD6RMS	"	66,402	198	153
*AJ6CE	"	54,567	197	141
*K6KTS	"	41,358	158	122
*KE6SHL	"	33,522	164	111
*WQ6X	"	31,590	158	117
*N6UNH	"	30,015	140	115
*K2DMS	"	29,150	153	110
*W8GJK	"	27,336	140	102
*K6BBQ	"	26,125	135	95
*KA6MIB	"	24,840	117	92
*W6YXY	"	23,859	130	99
*W7TR	"	22,176	105	96
		(OP: KH2TJ)		
*N6JSO	"	18,486	102	78
*WB6KQA	"	16,892	98	82
*KA5WSS	"	16,490	105	85
*NA6NA	"	16,020	112	90
*AG6JA	"	15,552	88	72
*KC7XE	"	14,282	84	74
*KB6DKK	"	14,235	87	73
*N6ZE	"	13,612	97	82
*KC6CSL	"	11,700	88	75
*AE6YB	"	11,247	85	69
*W6AAE	"	10,863	79	71
*KN6ODG	"	10,540	73	62
*N8JOE	"	10,032	79	66
*K6ACV	"	9,600	70	64
*KN6NSK	"	9,408	66	56
*NR7Z	"	9,108	72	66
*AJ6RX	"	9,042	72	66
*N6XEW	"	8,037	65	57
*K6TLH	"	6,888	62	56
*W6APH	"	6,670	73	58
*KB6ODH	"	6,615	85	63
*KG6SVF	"	5,800	64	58
*AI2CW	"	5,763	58	51
		(OP: N3KA)		
*W6MSN	"	5,537	60	49
*W6RQ	"	4,940	63	52
*K6JO	"	4,836	58	52
*AJ6IY	"	4,635	55	45
*WF6Q	"	4,171	44	43
*N6AKO	"	3,760	45	40
*N7VM	"	3,663	37	37
*K6OWS	"	2,964	38	38
*KF6ZYD	"	2,916	46	36
*NJ6W	"	2,622	38	38
*K6PGH	"	2,494	32	29
*KD6NFD	"	1,856	29	29
*W6EMR	"	1,311	26	23
*N6BFG	"	1,144	26	26
*WA6FWN	"	1,007	20	19
*W6OOD	"	918	29	27
*KM6RRS	"	693	21	21
*W6RMC	"	560	14	14
*AE6PL	"	96	8	8
*K6EI	"	48	4	4
*W6DMW	"	35	7	5
***WA7BNM**	**28**	**31,800**	**120**	**106**
*NP4IW/KN6	"	12,482	92	79
K6ICS	"	5,856	51	48
***N6RM**	**21**	**60,602**	**182**	**157**
*K7XE	"	23,912	110	98
*KD6HOF	"	7,564	64	62
*N6ORB	"	98	7	7
***W6JLV**	**14**	**225**	**15**	**15**
*K6WBY	"	45	5	5
*AI6TL	"	2	1	1
***W6DOZ**	**7**	**330**	**15**	**15**
***WZ6ZZ**	**3.7**	**3,200**	**45**	**40**
*AB1U	"	720	18	18
		(OP: W6RKC)		

District 7

KA6BIM	**A**	**3,178,440**	**1545**	**729**
AA6AA	"	2,123,520	1312	640
NC7M	"	1,055,937	985	523
W7XQ	"	1,044,582	866	462
WA7AN	"	1,024,420	861	524
K7SS	"	936,540	1027	484
N7ZUF	"	619,332	680	404
KI6QDH	"	470,988	549	378
KN7K	"	335,610	547	330
W7PP	"	331,100	407	308
W7YAQ	"	287,976	339	338
K9RZ	"	282,717	463	283
NZ7/KH7X	"	257,985	388	315
		(OP: KH6ND)		
W7GES	"	255,580	390	260
KS7T	"	248,489	529	311
KT6VV	"	219,573	426	279
WX7P	"	203,928	291	232
KØNG	"	201,641	364	253
N7WS	"	189,144	293	222
KE6GFI	"	185,730	366	246
K7BA	"	169,690	346	239
K7JQ	"	118,014	295	221
WB6JJJ	"	117,250	248	175
K7QA	"	86,337	224	181
N7DSX	"	85,003	235	167
WB7BBQ	"	79,632	202	168
NZ2S	"	71,292	204	156
W7EY	"	68,949	187	141
WA7CPA	"	57,300	150	150
NU7J	"	56,970	164	135
K7VIT	"	55,008	213	144
K7EKD	"	48,498	173	137
NN7ZZ	"	46,599	184	147
		(OP: N5LZ)		
W7CAR	"	45,220	161	140
W1YY	"	41,535	128	117
AI1K	"	40,656	151	121
KT7P	"	40,040	167	130
N9NA	"	37,366	138	119
N7EPD	"	36,408	135	123
K7STO	"	35,685	135	117
W7PV	"	34,100	142	124
K7BVT	"	32,875	137	125
KD7VIK	"	30,625	149	125
K7MY	"	28,080	129	120
KG7QXE	"	27,775	125	101
KM7OH	"	26,448	145	114
AC7S	"	24,642	173	111
W7DBA	"	23,618	120	98
W7FD	"	23,328	117	96
KK7PW	"	22,272	117	87
KC7V	"	22,220	112	101
K7GS	"	17,340	90	85
KJ7YYI	"	17,052	97	84
_AC7GL_	_"_	_16,458_	_83_	_78_
W7RIS	"	16,182	105	87
W6AGZ	"	16,089	125	93
AG7KO	"	13,277	80	71
KA7A	"	10,956	93	83
W7FCL	"	10,922	104	86
W2HZ	"	9,760	66	61
WD7E	"	9,610	69	62
WN3Q	"	9,240	95	70
W7SS	"	9,135	73	63
WG7X	"	8,832	69	64
AI7MG	"	6,985	63	55
K7SZY	"	6,800	51	50
N6LB	"	5,880	65	56
_KK7GO_	_"_	_4,872_	_42_	_42_
W6ABM	"	4,620	52	44
KF7ZN	"	2,848	33	32
N7MGW	"	2,400	30	30
W7SLS	"	2,048	39	32
W7AUM	"	1,311	23	23
KB7AZ	"	735	16	15
KA6RWL	"	372	12	12
NS1L	**28**	**159,581**	**334**	**227**
		(OP: N6SS)		
WZ7ZR	"	55,080	190	135
		(OP: W7ZR)		
KY7M	**21**	**345,828**	**537**	**358**
K7AR	"	186,955	291	269
NX7Q	"	47,704	148	134
WA7BAM	"	65	5	5
N6MZ	"	3	1	1
W7WA	**14**	**1,363,208**	**1264**	**616**
KN7Y	**7**	**8,232**	**58**	**56**
KB7QFE	"	48	3	3
N7GP	**1.8**	**7,728**	**89**	**69**
***KB7JJG**	**A**	**208,005**	**375**	**245**
*N7MZW	"	169,926	433	254
*W1DGL	"	166,019	362	259
*W6US	"	164,302	369	226
*N7UVH	"	156,891	385	241
*N7ESU	"	155,680	313	224
*WN6W	"	151,389	371	243
*K6PF	"	142,800	305	204
*AF7NX	"	98,484	253	174
*W4IDX	"	86,940	233	161
*K4YO	"	63,627	293	167
*N6ITY	"	55,080	168	136
*K7FYI	"	52,264	186	139
*K7STU	"	49,178	205	134
*AG2TH	"	46,720	174	128
*N7VZU	"	46,540	174	130
*N7AME	"	45,114	188	146
*KC7H	"	42,532	169	124
_*N7VS_	_"_	_38,625_	_163_	_125_
*KI7Y	"	37,878	153	118
*K7TDM	"	33,488	151	112
*WB7UOF	_"_	_31,388_	_141_	_118_
*W7STV	"	26,862	143	111
*WA7YXY	"	23,868	111	102
*W7VC	"	22,135	120	95
*AG7KU	"	20,025	122	89
*W7IBI	"	15,936	111	96
*N6XT	"	15,708	106	84
*W7KK	"	12,960	88	80
*WAØPFC	"	12,555	97	81
*KB7AK	"	11,592	79	72
*N7SF	"	10,443	67	59
*KI7VWP	"	9,372	77	66
*KE7ZAC	"	9,086	76	59
*N9MS	"	8,909	66	59
*AA6X	"	8,775	84	75
*WK7P	"	7,872	68	64
*NK2J	"	7,686	73	61
*NY7N	"	7,623	70	63
*WØAO	"	7,616	59	56
*N7EEL	"	7,605	72	65
*K6ST	"	7,442	76	61
*N7VGO	"	6,600	62	55
*NE7TS	"	5,520	71	69
*W7KWT	"	5,406	64	53
*W7LRM	"	5,350	62	50
*K6PSR	"	5,202	55	51
*N7TPR	"	4,949	63	49
*KC7SVI	"	4,429	47	43
*W7OXB	"	4,320	53	48
*KF7GMV	"	4,263	50	49
*W7MTL	"	3,977	50	41
*K7CNT	"	3,792	51	48
*KI7N	"	3,444	50	42
*AC7CA	"	3,362	43	41
*KB7KLT	"	3,250	52	50
*KE7DZ	"	2,501	49	41
*K7JKM	"	2,241	29	27
*K7DSG	"	2,200	40	40
*KG7WFQ	"	2,135	41	35
*WA7RJ	"	2,052	44	36
*W7PDX	"	1,694	32	22
*KG7TUO	"	1,560	31	26
*K1AUS	"	1,479	31	29
*KK7A	"	1,325	28	25
*KF6MIQ	"	1,276	32	29
*W7MKE	"	940	20	20
*WE7G	"	775	26	25
*KI7RES	"	180	12	12
*AB7WP	"	36	6	6
_*KT7G_	_"_	_21_	_3_	_3_
*K7YJ	"	18	3	3
*K7ORZ	"	9	3	3
***KF7KTC**	**28**	**11,820**	**78**	**60**
*K7ULS	"	2,784	38	32
***KA7T**	**21**	**14,476**	**131**	**94**
*W8TJM	"	9,628	61	58
*WA8ZNC	"	6,215	58	55
*W7TX	"	705	16	15
***NX7W**	**14**	**11,537**	**89**	**83**
		(OP: N7FLT)		
*WAØWWW	"	7,424	59	58
*KD7FQI	"	330	17	15
*WB7QMR	"	312	14	13
*AF7O	"	294	14	14
*KE7MRA	"	180	12	12
*K7ALM	"	63	7	7
*KD7GHZ	"	48	8	8
*AF7LZ	"	20	4	4
*N7SNW	"	10	2	2
***K7BWC**	**7**	**14,472**	**68**	**67**
*N7XCZ	"	1,344	27	24

District 8

W8MJ	**A**	**5,017,584**	**2229**	**946**
N8CWU	"	2,492,700	1742	700
N8BI	"	1,123,996	810	487
NA8V	"	800,394	693	413
KW8N	"	775,968	751	472
KC9LA	"	755,802	775	422
N8BJQ	"	657,195	641	385
K8RR	"	480,810	550	330
WA8MCD	"	447,392	499	352
NX8T	"	403,200	490	288
AD8FD	"	400,785	406	385
W8ASA	"	382,731	456	339
W8GNM	"	378,603	421	279
KE8NBC	"	354,599	501	283
WR8AA	"	295,947	403	291
		(OP: K3ZJ)		
WA8Z	"	220,875	345	285
WD8S	"	179,784	299	227
N8SDR	"	159,840	256	216
W8PT	"	159,258	260	209
KE8SIQ	"	151,164	322	234
W8RID	"	121,334	223	206
W8LRJ	"	108,256	232	199
WB8AKW	"	93,330	235	170
KE8E	"	86,730	215	177
KC8QDQ	"	82,476	183	174
N8QNT	"	63,616	194	142
WA8LRW	"	59,496	186	134
WB8AXK	"	57,486	165	134
KX8AA	"	52,479	182	147
		(OP: K2CUB)		
KZ8ZZ	"	45,480	147	120
KD8NKY	"	38,913	128	109
AG8Y	"	32,928	124	112
		(OP: W8EH)		
ND8D	"	26,433	112	99
NQ8O	"	26,030	121	95
KX8D	"	15,450	88	75
WF8D	"	7,469	87	77
K8GQ	"	5,805	51	45
K8AJS	"	3,800	40	40
KF8MZ	"	1,104	23	23
K8EAW	_"_	_336_	_31_	_28_
K8ALH	"	44	4	4
W8CZN	**21**	**20,995**	**95**	**95**
K8TS	**14**	**15,280**	**88**	**80**
AB8YK	"	8,190	65	63
KD8JAM	"	816	17	16
WZ8P	**7**	**98,150**	**176**	**151**
WN8HCV	"	76,983	316	201
		(OP: W8GP)		
ND8DX	**3.7**	**898,012**	**920**	**454**
***K8ZM**	**A**	**662,634**	**662**	**378**
*AA8CA	"	642,114	950	414
*K8LY	"	405,000	498	300
*N8WCP	"	266,751	405	277
*AA8OY	"	211,250	363	250
*WB8TCB	"	176,788	320	229
*W8JMZ	"	173,824	337	224
*W8LYO	"	166,551	320	231
*KB8HHA	"	145,140	272	236
*K7DR	"	133,104	265	188
*N8BV	"	129,689	253	191
*W8ZDT	"	121,432	239	172

*N8PPF	"	86,779	235	161
*KB8TL	"	67,548	191	156
*N5JED	"	62,726	202	158
*KC8LA	"	56,259	156	141
*KD8TJB	"	53,654	167	139
*KW8KW	"	47,880	156	133
*AB8OU	"	47,328	157	116
*NN8UU	"	46,530	133	110
		(OP: N8VW)		
*W8WTS	"	42,790	133	110
*KI8N	"	37,516	125	113
*KA8NJW	"	36,188	135	109
*N5MKY	"	35,380	156	116
*AD8BV	"	30,780	140	114
*AA8SW	"	29,848	133	104
*K8BL	"	29,799	115	99
*N8OZY	"	24,476	121	116
*W8KNO	"	24,384	122	96
*W4YPW	"	21,483	104	93
*W8JJ	"	20,293	108	91
*N8BZN	"	19,608	104	86
*KBØUPC	"	19,436	101	86
*W8JRK	"	19,278	94	81
*KE8UAD	"	18,620	100	98
*W8GX	"	17,794	97	82
*KB8KLK	"	17,015	86	83
*KD8VTT	"	16,464	98	84
*K8YQ	"	15,600	92	80
*N4LSJ	"	13,601	89	67
*K8NW	"	12,222	76	63
*KA8BSA	"	10,440	75	60
*WB8MIW	"	8,911	79	67
*AD8AL	"	8,037	62	57
*WB8JAY	"	7,336	64	56
*WF8C	"	6,300	63	50
*KA8TOA	"	6,273	56	51
*N8CWX	"	6,018	57	51
*KE8BKP	"	5,800	57	50
*WA8YZB	"	5,415	62	57
*WA8RR	"	5,076	61	54
*KE8HAF	"	4,968	49	46
*KE8MOI	"	4,089	51	47
*N8AJM	"	2,992	36	34
*W1CHL	"	2,627	37	37
*KB8ZUN	"	2,432	34	32
*N8FYL	"	2,291	32	29
*AD8WA	"	1,872	30	26
*W8MK	"	1,416	26	24
*KV8Z	"	1,320	24	24
*AC8HZ	"	1,218	31	29
*AB8SF	"	1,209	31	31
*AE8Q	"	903	22	21
*WT8E	"	855	19	19
*W8NFM	"	828	18	18
*WA8UMT	"	741	20	19
*NF8M	"	720	20	20
*KB8QAS	"	561	17	17
*N8VSI	"	496	16	16
*W8IDW	"	448	17	16
*N8MRS	"	324	12	12
*N8NX	"	224	14	14
*KC8RFP	"	112	7	7
*KD8VIY	"	18	2	2
***WB8JUI**	**28**	**1,260**	**24**	**20**
***N8II**	**21**	**661,116**	**616**	**444**
*AC8WC	"	14,040	77	72
*K8MJZ	"	774	18	18
***NK8D**	**14**	**4,320**	**50**	**48**
*WN8Q	"	45	9	9
***LZ2AO/W8**	**7**	**245**	**7**	**7**
*W8MET	"	24	2	2

District 9

N2BJ	**A**	**2,310,992**	**1398**	**688**
K9KE	"	1,624,462	1176	589
AC9S	"	1,044,662	926	502
KBØV	"	917,100	803	450
W9KEY	"	662,872	752	392
W9YK	"	575,140	714	386
K9NW	"	407,363	453	319
W9GT	"	379,988	538	331
KC9K	"	337,134	416	322
N9DR	"	329,121	466	291
NC9F	"	306,600	509	292
		(OP: KØPG)		
N9EP	"	291,430	493	302
WB8BZK	"	239,750	364	274
W9KXQ	"	223,626	380	282
WB9VGO	"	206,343	359	227
K9YZ	"	197,104	320	194
K9XN	"	156,640	308	220
W9NZ	"	155,092	303	203
NF9Z	"	146,509	259	209
N9EA	"	143,244	299	207
W9YG	"	131,031	309	207
AJ9C	"	120,315	266	195
K9DUR	"	95,230	235	178
KG9N	"	87,660	305	180
W9TC	"	74,880	191	144
KC9BG	"	66,976	178	161
K9SM	"	56,580	177	138
K9CI	"	52,029	156	123
KM9E	"	48,160	137	112
N9GUN	"	45,872	136	122
AK9PL	"	43,956	154	132
KB9ITE	"	*35,250*	*142*	*125*
KC9EOQ	"	33,063	125	103
K9AWS	"	27,800	122	100
KA9GDW	"	23,265	111	99
NA9US	"	21,920	95	80
		(OP: N9GH)		
W3HDH	"	21,500	96	86
K9LA	"	17,556	86	76
KEØYI	"	16,400	97	82
W9CY	"	14,756	68	62
WI9Z	"	14,700	84	75
W9RE	"	10,744	72	68
N9RMB	"	9,338	64	58
N9IO	"	6,439	50	47
NN9C	"	4,416	59	48
KD9MS	"	2,304	32	32
N9TO	"	1,408	22	22
W9ILY	**21**	**163,968**	**265**	**224**
KG9X	**14**	**656,450**	**841**	**475**
KW9A	"	283,360	489	322
N9LR	**7**	**302,588**	**419**	**299**
W9JOE	"	111,699	206	189
K9ZO	**3.7**	**250,772**	**511**	**284**
***N9UA**	**A**	**562,950**	**613**	**417**
*WD9CIR	"	335,360	584	320
*N7ZZ	"	295,069	466	289
*WB9HFK	"	270,909	441	279
*W9RN	"	203,280	362	240
*AC9TO	"	176,341	412	253
*WR9L	"	172,380	307	221
*N9DJ	"	161,138	314	226
*KC9JML	"	139,049	298	211
*KD4ULW	"	137,708	306	199
*KY9IN	"	133,131	265	199
		(OP: K9GX)		
*NY1V	"	104,368	254	176
*WA9LEY	"	101,314	266	179
*KD9ERS	"	95,407	253	179
*W9VTD	"	93,290	276	190
*N9LYE	"	83,130	237	163
*K9WBT	"	77,262	212	163
*WE9R	"	72,756	172	172
*KB9OZI	"	69,309	191	153
*W9ADN	"	68,760	265	180
*AC9BJ	"	63,655	186	145
*N9UPU	"	56,471	200	149
**KD9NYE*	"	*54,752*	*161*	*118*
*AE9LL	"	45,466	165	127
*KY9Q	"	44,160	163	138
*K9MJA	"	41,886	161	117
*K9PMV	"	40,950	149	126
*WQ9F	"	33,984	155	118
*WB9BWP	"	31,584	143	112
*KD9DBQ	"	31,350	133	114
*W9MR	"	31,164	113	98
*AC9XX	"	28,152	133	102
*K9PG	"	24,150	99	69
*AG9A	"	22,359	101	87
*AC9QM	"	20,256	122	96
*N9SB	"	20,152	117	88
*K9KDE	"	14,852	94	79
*KZ9V	"	14,476	91	77
*K9DRS	"	13,780	73	65
*NV9X	"	12,282	74	69
*KB9LGS	"	11,550	75	70
*KD9LVR	"	11,088	91	72
*N9VPV	"	9,686	62	58
*KC9YL	"	8,909	70	59
*WB9QVR	"	8,804	70	62
*KD9EFO	"	8,721	63	57
*KC9WOM	"	7,623	72	63
*W9SUN	"	6,750	64	54
*KD9REA	"	6,486	53	47
*K9WPV	"	4,773	48	43
*AJ9U	"	4,601	48	43
*N8HWV	"	4,316	56	52
*W8NWG	"	4,100	45	41
*KD9NHZ	"	3,564	45	44
*N9MT	"	2,775	37	37
*K9BRS	"	2,600	44	40
*KB9FPY	"	2,263	32	31
*KB9JD	"	1,296	25	24
*K9AMP	"	931	20	19
*W9LSE	"	867	17	17
*AA9RK	"	286	13	13
*N9OQC	"	221	13	13
***K9MCK**	**28**	**6,157**	**54**	**47**
*WE9V	"	2,212	30	28
*KJ9C	"	481	14	13
***N9TGR**	**21**	**261,744**	**403**	**304**
*W9QL	"	88,044	204	174
*W9EBK	"	16,632	90	84
*W9VQ	"	15,876	85	81
*WD9IGY	"	512	17	16
*K9SMM	"	91	7	7
*N9AJD	"	60	5	5
***K9MWG**	**14**	**828**	**18**	**18**
*W3ZAP	"	225	9	9
*WD9GYM	"	176	8	8
*AC9ZU	"	32	8	8

District Ø

NTØEE	**A**	**3,827,628**	**2241**	**854**
		(OP: NØHJZ)		
KØTT	"	2,448,036	1843	684
WØMB	"	1,042,272	1072	504
NØGN	"	926,772	995	476
KVØI	"	861,334	1187	482
KØYR	"	838,530	895	462
N7WY	"	698,800	673	400
KØAD	"	669,552	778	444
KBØEO	"	595,746	616	414
WTØO	"	451,104	651	381
		(OP: WØPR)		
W1JGM	"	419,832	478	343
KØCN	"	381,900	443	268
W8XAL	"	304,824	553	312
WAØMHJ	"	293,584	420	311
NØAB	"	291,456	413	276
KØDG	"	234,073	309	281
ADØH	"	229,658	411	286
WDØJ	"	229,593	383	273
NIØG	"	173,038	345	241
WXØZ	"	157,538	302	227
KEØUI	"	150,750	351	225
KFØGV	"	141,414	318	222
KA9OZP	"	120,582	245	203
W7II	"	116,383	236	181
WAØJZK	"	107,730	248	189
WFØGM	"	87,945	232	195
		(OP: KJØI)		
NØEG	"	*61,760*	*173*	*160*
NØUU	"	61,612	176	146
WØBM	"	53,856	151	144
NWØM	"	46,991	183	137
WD5ACR	"	36,068	147	127
KØGYQ	"	34,545	117	105
AKØBC	"	33,512	118	118
N9GB	"	33,264	123	99
KØJM	"	24,651	105	83
KØWPM	"	*24,182*	*143*	*107*
		(OP: KDØEZS)		
WØMN	"	17,480	111	95
K8MCN	"	17,400	101	87
K7TD	"	14,570	79	62
KDØNPT	"	14,399	85	77
WAØO	"	10,721	83	71
KCØUUT	"	3,838	40	38
ACØJX	"	2,924	52	43
K9TWW	"	936	20	18
KØMD	**28**	**216**	**9**	**9**
WTØDX	**21**	**86,976**	**230**	**192**
WØETT	"	63,672	189	168
NCØB	"	39,474	147	129
KØRJW	"	6,486	47	47
WBØHHM	"	2,952	41	41
WIØWA	**14**	**2,711,648**	**1989**	**808**
		(OP: WØEWD)		
KØBBB	"	439,945	564	421
KYØK	"	82,616	196	184
WØFK	"	8,379	59	57
KØWMB	"	247	14	13
***NGØC**	**A**	**1,154,044**	**1177**	**526**
*W4IFI	"	605,640	701	420
*AD1C	"	577,841	634	401
*AIØL	"	444,928	543	352
*KØUK	"	366,420	459	310
*KØXF	"	309,134	533	311
*AI6O	"	171,171	354	247
*AAØAJ	"	169,689	409	247
*AGØMN	"	154,117	341	229
		(OP: KØJP)		
*AAØAW	"	146,757	301	213
*KAØPQW	"	139,104	344	207
*NØEX	"	137,108	322	227
*WØYJT	"	132,158	297	221
*WZØW	"	104,342	297	203
*KBØARZ	"	87,608	231	188
*KEØITC	"	85,176	199	169
*WØADL	"	82,899	221	183
*NDØTS	"	82,810	272	182
*WØZF	"	81,216	188	188
*KØKX	"	74,734	185	158
*KNØL	"	69,608	197	154
*WØUC	"	59,472	192	168
*KØJJM	"	58,353	201	159
*KBØNES	"	56,118	206	141
*WØPMO	"	53,978	192	137
*NØAD	"	53,130	172	138
*NØTXW	"	49,068	171	141
*KØMPH	"	45,568	165	128
*WØWLA	"	42,291	167	127
*KØOP	"	41,760	174	144
*KCØVDY	"	36,036	161	126
*WA1FMM	"	33,875	165	125
*KCØJRW	"	33,814	138	106
*KØSCO	"	33,744	158	114
*WØIZ	"	33,147	164	127
*AEØDX	"	31,301	140	113
*NØMMA	"	31,096	136	104
*ADØYL	"	29,095	132	115
*KRØES	"	28,294	109	94
*KF9MT	"	24,030	111	89
*WØPI	"	22,325	97	95
*KDØWAN	"	22,230	123	95
*NØUJJ	"	19,488	104	87
*KCØMYY	"	19,440	109	90
*NUØQ	"	18,432	105	96
*KBØGT	"	18,430	116	95
*AEØIB	"	18,382	102	91
*KCØDWZ	"	16,100	96	92
*NIØDX	"	15,438	92	83
*NØHDR	"	14,960	78	68
*KDØFED	"	14,418	92	81
*KCØDMF	"	14,359	102	83
*WO7U	"	12,155	99	85
*NØAT	"	11,718	64	63
*KF6YU	"	11,628	86	76
*KØRC	"	10,752	72	64
*KØWOI	"	10,304	75	64
*KWØU	"	10,058	104	94
*WBØWIV	"	9,971	63	59
*WØOJW	"	9,520	92	68
*WØBLG	"	9,039	73	69
*KEØME	"	8,636	82	68
*NØLLH	"	7,772	67	58
*AAØZ	"	6,477	51	51
*WJØW	"	5,700	64	57
		(OP: KH6XX)		
*KYØO	"	4,635	50	45
*KO9V	"	4,590	54	51
*ADØWB	"	3,120	46	40
*WBØMLI	"	2,964	40	38
*AJØCM	"	2,542	43	31
*KFØFQV	"	2,520	36	36
*NØVRM	"	2,376	32	27
*NYØA	"	1,581	33	31
*KAØREN	"	1,560	32	30
*K3CDY	"	1,170	31	30
*KEØEIN	"	1,092	24	21
*KØATY	"	680	42	40
*NØRC	"	608	16	16
*KEØJYJ	"	608	20	19
*NNØJS	"	555	16	15
*KØTJT	"	352	17	16
*KCØIUY	"	290	13	10
*WØAEL	"	252	14	14
*KJØP	"	120	8	8
*KFØAIT	"	108	6	6
*WØJOP	"	78	6	6
*KFØADU	"	54	6	6
*WØALIF	"	36	4	3
***WBØLQC**	**28**	**2,610**	**34**	**30**
*KB4SBY	"	96	6	6
*KEØKME	"	66	6	6
***N9HDE**	**21**	**14,256**	**89**	**88**
*KØMKL	"	3	1	1
***KD5FQF**	**14**	**1,836**	**40**	**36**

Alaska

AL2F	*A*	*1,957,515*	*1464*	*515*
NL7V	**"**	**1,614,240**	**1121**	**608**
AL7AF	"	534,674	497	362
KL7KK	"	386,570	401	310
AL7LO	"	75,990	179	149
NL8F	**3.7**	**517**	**12**	**11**
***KL1JP**	**A**	**19,035**	**111**	**81**
*AL1G	"	8,208	69	54
*AL7JR	"	1,628	26	22
*KL5IO	"	1,160	23	20
*WL7LYK	"	189	9	9
		(OP: KL7DG)		

Bahamas

C6AGU	**14**	**598,216**	**767**	**376**
		(OP: KN4EEI)		

Barbados

***8P1W**	**A**	**562,484**	**681**	**377**

Belize

V31XX	**A**	**19,794,390**	**5103**	**1210**
		(OP: K4XS)		
***V31MA**	**A**	**564,333**	**575**	**349**
*V31AX	"	167,580	294	228

Canada

District 1

VE9XX	**A**	**305,768**	**400**	**296**
VO1BQ	"	172,422	291	206
VO2AC	"	40,002	123	113
VA1CC	"	33,912	108	108
VO1HP	**28**	**3,276**	**38**	**36**
VA1RST	"	96	6	6
VO1CH	**21**	**306,079**	**393**	**307**
VA1MM	"	5,535	46	45
VA1XH	**7**	**173,008**	**195**	**176**
***VE1RF**	**A**	**143,280**	**273**	**199**
*VE9RLW	"	54,264	158	136
*VO1TX	"	27,264	103	96
***VE1BSD**	**21**	**61,537**	**157**	**149**
*VY2LI	"	25,284	104	98
***VE1SQ**	**14**	**168,240**	**272**	**240**
*VE9WH	"	15,428	80	76

District 2

VC2A	**A**	**13,313,652**	**3606**	**1122**
		(OP: VA2WA)		
VA2EW	"	6,834,304	2309	856
VE2GSO	"	1,888,705	1319	593
VC2Z	"	994,455	711	451
		(OP: VA2UR)		
VA2MP	"	543,123	523	333
VA2QR	"	158,360	259	185
VE2OWL	"	41,650	126	119
VA2EBI	"	7,344	49	48
VE2GT	**21**	**60**	**5**	**5**
VE2JM	**14**	**197,376**	**299**	**257**
***CF2Z**	**A**	**5,428,150**	**1981**	**910**
		(OP: VA2CZ)		
*VE2HIT	"	761,648	630	362
*VE2IAA	"	390,319	454	269
*VA2CO	"	177,451	292	211
*VE2HEW	"	145,152	278	192
*VA2MVR	"	94,985	192	157
*VA2KD	"	76,608	187	144
*VE2LJV	"	8,568	65	56
*VA2LGQ	"	8,517	54	51
*VE2RRE	"	874	20	19
***VE2AIU**	**14**	**656**	**18**	**16**
*VE2MRN	"	260	10	10

District 3

CJ3A	**A**	**14,190,905**	**3837**	**1135**
		(OP: VE3AT)		
CG3T	"	10,664,296	3100	1039
		(OP: VE3DZ)		
VA3AR	"	4,000,488	1716	744
VE3LRL	"	1,011,716	751	398
VA3MW	"	912,120	677	440
VE3TW	"	888,486	713	397
VE3GJP	"	702,780	612	340
VE3KTB	"	583,530	532	318
VE3ZZ	"	381,429	402	277
VE3GYL	"	337,155	410	285
VE3BFU	"	300,828	379	258
VE3DZP	"	216,832	282	256
VE3XN	"	198,609	303	239
VE3BR	"	175,958	273	194
VE3YT	"	109,062	236	166
VE3VN	"	96,361	209	173
VE3JZT	"	86,388	199	138
VE3JM	"	81,900	192	150
VE3RCC	"	67,968	177	144
VA3EPM	"	27,450	110	90
VA3PGL	"	22,618	103	86
VE3KBI	"	14,555	77	71
VA3LUK	"	1,501	19	19
VA3QR	"	1,292	20	19
VE3EJ	**21**	**6,398,721**	**2489**	**987**
VE3QQ	**14**	**16,480**	**83**	**80**
***VE3PJ**	**A**	**1,751,351**	**1027**	**553**
*VA3WB	"	1,595,160	960	540
*VA3PDX	"	1,487,000	909	500
*VA3IDD	"	1,232,777	847	437
*VA3NW	"	952,648	752	386
*VE3BX	"	686,720	645	320
*VE3VY	"	654,288	588	317
*VE3HZ	"	405,132	446	273
*VA3TPS	"	323,919	431	243
*VA3EJN	"	238,212	349	234
*VA3KRT	"	232,760	330	220
*VE3RVZ	"	232,070	337	230
*VA3RTG	"	173,283	303	177
*VE3EPS	"	155,916	266	213
*VA3GD	"	149,460	277	212
*VE3OMV	"	144,396	268	191
*VA3GKO	"	126,484	225	206
*VE3TTP	"	114,972	214	156
*VA3QB	"	96,272	212	176
*VA3PAF	"	92,511	237	171
*VE3KMQ	"	89,835	202	159
*VA3IJK	"	79,417	198	149
*VA3DBT	"	79,086	179	147
*VE3SMA	"	71,100	155	150
*VE3FAC	"	56,049	146	119
*VE3WG	"	50,173	144	131
*VE3DZG	"	46,669	137	113
*VE8ØLAN	"	44,730	146	126
		(OP: VE3KGK)		
*VA3RSA	"	42,586	133	107
*VA3UG	"	26,790	107	95
*VE3DC	"	25,296	108	93
		(OP: VE3QEE)		
*VE3FZ	"	24,104	101	92
*VA3CBU	"	23,925	101	87
*VA3BAH	"	21,840	85	78
*VE3SGK	"	17,658	87	81
*VA3KTT	"	17,255	91	85
*VA3CK	"	16,353	92	79
*VE3ZDR	"	15,844	76	68
*VE3AC	"	10,175	61	55
*VE3HG	"	9,682	57	47
*VE3UGT	"	9,680	57	55
*VE3OU	"	5,586	42	42
*VE3RTG	"	3,744	38	36
*VA3YI	"	1,675	28	25
*VE3IQZ	"	1,020	24	20
**VA3CN*	"	*240*	*16*	*16*
***VE3IEL**	**28**	**2**	**2**	**1**
***VA3IPG**	**21**	**109,880**	**222**	**205**
*VE3GRA	"	42,560	143	133
*VE3HEU	"	12,638	78	71
*VE3JGO	"	2,754	35	34
*VA3MZD	"	18	3	3
***VA3OOL**	**7**	**31,562**	**99**	**86**
***VE3SST**	**3.7**	**378**	**12**	**9**

District 4

VE4IM	**A**	**144,321**	**304**	**219**
VE4SG	**14**	**277,530**	**479**	**290**
***VE4VT**	**A**	**4,110,073**	**1943**	**709**
*VA4HZ	"	179,960	300	220
*VE4DL	"	39,389	147	119
**VE4XM*	"	*24,948*	*110*	*81*
*VE4GKM	"	22,120	108	79

District 5

VE5MX	**A**	**24,672**	**100**	**96**
***VE5UO**	**A**	**466,057**	**540**	**313**
*VE5SF	"	185,701	344	233
*VE5SPR	"	2,464	31	28
***VE5GC**	**28**	**464**	**16**	**16**

District 6

VE6WP	**A**	**1,135,680**	**949**	**520**
VE6LQ	"	619,340	686	346
VA6DJ	"	328,015	519	289
VE6CSX	"	92,480	219	160
VE6TK	"	50,232	124	104
VE6WQ	**14**	**605,871**	**673**	**413**
VE6CA	"	17,091	98	81
***VA6RCN**	**A**	**49,560**	**155**	**118**
		(OP: VE3RCN)		
*VA6AN	"	46,609	167	127
*VE6CLG	"	30,450	113	105
*VA6AGR	"	14,100	85	75
*VE6AX	"	9,240	68	60
*VA6TVA	"	9,088	70	64
*VE6NRO	"	3,024	39	36
*VE6FRD	"	2,523	30	29
**VE6FXL*	*14*	*240*	*16*	*15*

District 7

VA7TU	**A**	**433,561**	**514**	**361**
VE7CV	"	106,964	212	187
VA7DX	"	9,802	64	58
VE7BNR	"	4,655	41	35
VE7NY	**14**	**1,721,917**	**1355**	**613**
VA7OM	"	1,299,596	1064	569
***VE7JMN**	**A**	**111,228**	**233**	**186**
*VE7CUP	"	68,320	166	140
*VE7ZX	"	38,500	140	100
*VA7EGZ	"	20,910	102	85
*VA7USD	"	17,544	97	68
*VE7CKF	"	16,629	91	69
*VE7BGP	"	5,382	49	46
*VA7EET	"	640	17	16
***VA7DBJ**	**14**	**2,044**	**29**	**28**
*VE7DJE	"	1,007	20	19

District 8

VY1XY	**14**	**357**	**22**	**21**

Cayman Islands

ZF2PG	**A**	**9,746,295**	**3407**	**993**
		(OP: K8PGJ)		
***ZF5T**	**A**	**3,163,860**	**1889**	**651**
		(OP: LU8EOT)		
*ZF2RJ	"	71,288	199	133
*ZF2OO	"	52,197	154	127

Costa Rica

TI2OY	**A**	**2,576,400**	**1669**	**600**
TI7W	"	709,995	653	331
		(OP: N3KS)		
TI2VVV	**21**	**1,423,036**	**1145**	**578**
TI1K	**3.7**	**390,250**	**356**	**250**
		(OP: TI5CDA)		
***TI2JS**	**A**	**1,310,400**	**1201**	**468**
*TI2WMP	"	297,106	402	298
*TI2LCO	"	43,053	133	113
*TI3YAM	"	19,800	107	90
*TI2RLA	"	512	16	16
***TI5VWR**	**28**	**900,850**	**973**	**430**
*TI3ATS	"	15,355	94	83
***TI5GCO**	**21**	**240,664**	**353**	**268**
***TI5VMJ**	**7**	**347,764**	**425**	**227**
***TI2KAC**	**3.7**	**1,120**	**20**	**20**

Cuba

CO2GG	**A**	**816,319**	**886**	**421**
***CO6HZ**	**A**	**757,428**	**706**	**381**
*CO2VDD	"	285,242	400	254
*CM6AW	"	54,172	140	116
*CO7HH	"	17,556	93	84
*CO8BYT	"	14,904	75	72
***CO8RH**	**28**	**357,408**	**608**	**288**
***CO6LE**	**21**	**654,591**	**676**	**427**
***CM2JR**	**7**	**39,468**	**97**	**92**

Dominican Republic

***HI8RD**	**A**	**1,539,512**	**1190**	**524**
*HI8HRD	"	425,068	500	323
*HI8ILK	"	32,040	101	90
*HI8ADK	"	1,232	29	28
***HI3RWP**	**21**	**237,249**	**411**	**261**
***HI3TT**	**7**	**46,851**	**102**	**97**

El Salvador

***YS1JFE**	**A**	**18,150**	**80**	**75**

Guadeloupe

FG4KH	**A**	**3,453,418**	**1935**	**761**
		(OP: F6ASS)		
***FG5GP**	**A**	**47,702**	**159**	**122**
***TO1Q**	**28**	**1,279,713**	**1217**	**489**
		(OP: F1ULQ)		

Guatemala

***TG9ANF**	**14**	**562,496**	**685**	**374**

Haiti

***HH2JA**	**21**	**8,201**	**61**	**59**

Martinique

FM5BH	**A**	**11,282,432**	**3439**	**1024**

Mexico

XE1CKJ	**A**	**568,160**	**764**	**335**
XE1BRX	"	100,113	203	151
***6D1A**	**A**	**1,102,884**	**1280**	**438**
		(OP: XE1SPM)		
*4A9ØØQRO	"	288,972	551	276
		(OP: XE1CL)		
*XE2YWB	"	118,958	261	203
*XE1ACA	"	11,092	64	59
*6D1CRG	"	4,144	44	37
		(OP: XE1CIC)		
*XE2W	"	3,500	37	35
***XIØX**	**28**	**109,611**	**285**	**171**
		(OP: XE1KK)		
*XE1CIC	"	67,760	224	140
*4A9ØEMX	"	2,088	32	29
		(OP: XE1ZTW)		

*6F6F 21 835,072 810 466
(OP: XE3N)
*6D5C 7 12,584 53 52
(OP: XE1H)

Panama
HP1XT A 29,700 118 99
(OP: K2GO)
HP1ELV 28 864 21 18
*HP2BWJ A 51,612 170 132
*HP1GDS " 3,616 33 32
*HP1OIA 28 6,664 52 49

Puerto Rico
WP4RF A 783,668 773 428
KP3V 28 570,630 804 345
WP4WW 21 235,412 423 257
(OP: KP4JRS)
KP4PK 14 2,331,863 1648 653
WP3R 7 143,528 176 154
*WP3C A 4,590,718 2392 781
(OP: N2TTA)
*NP4TX " 947,050 697 470
*WP3GW " 196,026 310 222
*NP4VM " 76,260 215 164
*WP4YR " 44,330 137 110
*KP4KJ " 9,130 59 55
*WP4JD " 2,418 27 26
*WP4SD 28 1,419,262 1376 494
*WP3B " 616,485 800 365
*NP3MR " 263,624 502 248
*KP4NET " 46,920 168 120
*KP4PMP " 56 10 8
*KP4PUA 21 2,189,226 1516 663
*NP4ET 7 10,152 50 47
*KP4JFR " 1,242 24 23
*KP3L 3.7 648 12 12

Saba & St. Eustatius
PJ5/SP9FIH 21 5,056,300 2363 857
*PJ5/
SP9MQA 14 25,351 123 101

St. Kitts & Nevis
*V4/K5ZD 21 216 9 9

U.S. Virgin Islands
KP2M A 20,439,244 5574 1267
(OP: NN3W)
WP2Z " 4,150,350 2007 802
(OP: K9VV)
*KP2B A 3,923,920 2143 770
(OP: EB7DX)
*KP2DX 7 28,875 80 75
(OP: KP2BH)

AFRICA

Canary Islands
EA8W A 32,524 121 94
EA8DED " 8,976 54 44
(OP: OH2BP)
EA8/OHØXX 28 2,100,225 1191 615
EA8/IK1PMR " 461,758 517 302
*ED8W A 3,680,849 1600 677
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*EA8DGO " 288,340 394 260
*ED8L " 139,490 244 185
(OP: EA8DHH)
*EA8AQV " 107,706 204 174
*EA8DIB " 16,352 79 73
*EA8CQW " 13,662 75 66
*EA8AUW 21 60,320 160 130
*EA8CZK 7 357,298 288 227

Cape Verde
*D44PM A 618,030 599 378

Ghana
9G5AF A 256,086 369 246

Guinea
3X2Ø21 A 330,050 440 287

Madeira Islands
CQ9T A 8,033,674 2595 979
(OP: CT3KN)
CT3HF " 1,061,958 782 467
CQ3J 28 630,720 616 360
(OP: CT3MD)
CR3DX 21 11,205,482 3354 1139
(OP: OM3RM)
*CT3IQ 21 509,421 527 359

Mauritius
3B8CW A 27,368 113 88

Morocco
*CN8YE A 418,094 438 298
*CN8SG 14 221,970 312 245

Namibia
V55Y 28 3,593,891 1639 743
(OP: V51WH)
*V51JP A 65,416 159 136
*V51MA " 48,512 147 128

Senegal
6W1TG A 2,739,249 1415 579

South Africa
ZS1OPB A 1,541,500 1099 500
ZS2ABE " 115,325 215 175
ZS6PS " 13,325 70 65
ZS1RJQ " 10,878 54 49
ZS2CJ " 270 11 10

St. Helena
ZD7BG A 664,768 598 376

Zambia
9J2BS A 67,398 180 141

ASIA

Asiatic Turkey
TA3DE A 3,267,818 1640 641
TA2ANL " 488,097 507 281
TA2LG " 1,350 30 27
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*TA5O A 209,101 320 211
*TA2UCT " 184,320 265 180
*TA2E " 143,256 250 188
*TA2L " 110,808 214 171
*TA6B " 59,595 165 137
*TAØACL " 54,096 135 112
*TA4/OH2KW " 35,599 123 97
*TA3EP " 24,192 106 96
*TA6MCU " 8,820 54 49
*TA8DX " 6,432 55 48
*TA4RC " 6,026 51 46
*TA3P " 3,180 30 30
*TA3GO " 9 3 3
*TA2BW 21 850 18 17
*TA2BRJ " 408 12 12
*TA2TC " 21 3 3
*TAØN 14 275 11 11
*TA4AU 7 61,380 109 99
*TA4J " 12,690 49 47

China
BD4UNT A 1,149,088 1024 482
(OP: BH4RNX)
BH1MCB " 280,725 465 285
BG4FRZ " 242,640 450 240
BG5BAA " 167,776 339 214
BA4DL " 93,016 325 154
BD4QJP " 7,548 88 74
BA3MC " 5,967 63 39
BA7LRT " 4,550 63 50
BI4SDT " 1,600 36 32
BA3MM 21 409,013 559 361
BD3CB " 396,630 524 339
BG3ODZ " 7,865 79 65
BG2VIA " 1,734 37 34
*BI8AM A 63,899 266 157
(OP: BG8FZU)
*BH2RO " 57,812 245 149
*BH3EMV " 53,820 199 130
*BH4FBB " 47,594 166 106
*BD4STG " 40,382 138 122
*BH6KOK " 26,967 155 101
*BD3QT " 20,416 110 88
*BD6JN " 18,445 123 85
*BH8PVC " 16,766 100 83
*BD2IAQ " 13,930 86 70
*BI1JBV " 13,764 98 74
*BH3DAX " 9,396 78 58
*BH5HQQ " 8,640 71 64
*BA3GG/4 " 6,042 64 53
*BI1JPC " 5,978 52 49
*BH2SWB " 5,290 53 46
*BG8NG " 5,280 64 55
*BI1NJI " 2,883 42 31
*BD4TWZ " 1,025 29 25
*BA5AB " 990 18 18
*BD4SVU " 720 26 20
*BH6AIK " 594 21 18
*BI1JOT " 364 14 14
*BG5GDP " 330 12 11
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*BD4QXR " 198 12 11
*BA4KW " 88 9 8
*BY1TL " 80 8 8
*BG3GBZ " 20 5 4
*BH8MDV 28 2,666 34 31
*BI7MPS " 133 7 7
*BG7TWJ 21 116,205 371 183
*BG7XVX " 113,544 372 171
*BD7LQM " 93,912 350 182
*BH4AAD " 34,335 139 109
*BD1RCR " 21,944 127 104
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*BH4AHC " 16,380 100 78
*BG8KCQ " 11,808 74 72
*BG8IL " 11,396 76 74
*BH1CXR " 4,300 66 50
*BA3AX " 3,294 69 54
*BH3DBF " 2,964 52 39
*BI4VKA " 2,835 39 35
*BH8OCW " 1,870 60 55
*BG8LCQ " 1,323 23 21
*BG5UZW " 1,296 26 24
*BH4ESK " 1,050 22 21
*BH1HWF " 750 28 25
*BI8DEQ " 182 14 13
*BG8PW " 144 10 9
*BD7JIR " 91 7 7
*BG3ILY " 63 7 7
*BH6AGG " 45 5 5
*BI1BDS " 9 3 3
*BH6JFR " 1 1 1
*BG7LDM 14 6,084 61 52
*BG7IEJ " 3,762 43 38
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Cyprus
H25A A 14,874,840 4080 1080
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*5B4ALS 21 11,328 69 64

Georgia
4L2M A 5,695,785 2247 837

Hong Kong
VR2XYL 21 143,313 509 201
VR2CC 14 22,542 175 102
(OP: VR2XMT)
*VR2VRC 28 297 11 11
*VR2UNG " 121 11 11
*VR2YDC 21 8,184 66 62
*VR2WKL 14 252 13 12

India
VU2DED A 404,340 486 293
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*VU2IBI " 23,250 102 93
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*VU2MCW " 1,377 33 27
*VU3SPD " 816 22 17
*VU2MYL " 690 41 30
*VU3RGP " 432 20 16
*VU2BQN " 429 17 13
*VU3SXL " 288 26 24
*VU3LMS " 143 11 11
*VU3SIO " 133 7 7
*VU3IYE " 48 8 8
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*VU3LWE " 168 12 12
*VU3VBK " 1 1 1
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*VU2UI " 8 2 2

Israel
4X6FR A 8,735,136 2991 912
4Z5LY " 2,572,910 1363 563
4X1IM " 111,784 234 178
4X1VF 28 440,726 530 299
*4X1ST A 448,416 458 288
*4Z5OI " 817 19 19
*4X6DK 21 510,534 536 339
*4Z5MV " 7,803 51 51
*4Z5FI 3.7 69,510 121 105

Japan

District 1
JM1LPN A 1,414,256 886 563
JR1GSE " 523,768 558 329
7K4XNN " 485,906 491 361
8N1FT " 434,343 509 301
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JH1HIC " 392,368 514 274
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JF1LMB " 107,270 232 170
JH1CTV " 107,092 233 164
JA1IAZ " 99,981 211 161
JQ1CIV " 95,877 205 159
7L1FFH " 78,645 187 147
JE1FQV " 75,180 177 140
JP1TRJ " 73,712 175 136
JA1CRJ " 67,680 172 141
JA1XRA " 45,430 133 118
JL1CNY " 41,514 132 111
JI1ALP " 34,580 113 95
JF1UOX " 31,383 121 99
JA1XEC " 28,896 98 96
JE1QHP " 28,512 116 99
JH1DGJ " 27,896 104 88
JJ1XBQ " 20,079 81 69
JR1WYW " 17,925 102 75
JI1JPJ " 16,478 90 77
JM1PIH " 10,143 61 49
JR1JCB " 7,462 57 41
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JS1NDM " 2,856 28 28
JH1LYE " 1,680 28 28
JH1JNJ " 945 22 21
JA1VUA " 495 15 15
7M2FTR " 390 10 10
JH1ASG " 160 8 8
JR1BAS " 84 4 4
JE1RZR 28 28,500 109 100
JE1RXJ " 21,248 102 83
JJ1RDX " 5,875 47 47
JN1BMX " 2,523 33 29
JE1LFX 21 1,688,948 990 626
JM1NKT " 794,109 657 453
7K4VPV " 157,300 273 220
7K4PTY " 72,842 181 154
JK1WSH " 61,864 167 152
JG1ITH " 54,128 156 136
JG1LHB " 34,153 125 119
JG1TUC " 10,626 75 66
JJ1ONK " 15 3 3
JK1HIY " 3 1 1
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*JG1FML " 102,384 210 162
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*JS1KKY " 85,824 190 149
*JH1BHW " 81,708 207 132
*JR1QBA " 55,998 175 122
*JK1TCV " 33,915 122 95
*JG1XIO " 28,000 110 100
*JJ1IMG " 19,197 92 81
*JR1DVB " 17,679 91 71
*JF1MIA " 17,464 98 74
*JJ1VFE " 16,965 76 65
*JK1BVN " 15,744 90 64
*JJ1GXY " 13,978 71 58
*JR1LEV " 12,993 73 61
*JK1AKP " 5,889 47 39
*JI1UPL " 5,822 52 41
*JA1ATM " 5,781 59 47
*JN1CNJ " 5,577 47 39
*7M3RFZ " 5,538 48 39
*JK1AUY " 4,968 47 46
*JA1CHY " 4,332 40 38
*JR1JRW " 3,430 39 35
*JI1RSF " 2,728 33 31
*JA1JNM " 2,280 30 30
*JR1MRG " 2,256 29 24
*JH1HMC " 1,608 34 24
*7K2QNI " 1,560 26 26
*JP1GUW " 1,430 27 22
*JI1LAI " 1,150 24 23
*JO1PZR " 774 18 18
*JA1UOA " 663 17 17
*7M4CFW " 540 20 18
*JI1FWH " 494 28 26
*JN1KMI " 410 11 10
*JJ1LRD " 372 13 12
*JJ1ILX " 210 7 7
*JH1MZG " 112 7 7
*JF1PEQ " 72 9 8
*JQ1PCT " 48 4 4
*JH1NLF " 30 3 3
*JG1CMT " 21 3 3
*JL1EEI 28 24,564 106 89
*7N2UQC " 20,445 99 87
*JE1UPB " 6,713 57 49
*JF1OVA " 6,627 55 47
*JH1RFM " 5,612 50 46
*JA1QIF " 2,175 31 29
*JA1GQC " 660 16 15
*JO1VRK " 546 15 14
*JA1MYW " 65 5 5
*JJ1VJQ 21 77,920 177 160
*JJ1ENZ " 76,230 192 165
*JM1LAW " 66,990 169 154
*JR1AKD " 51,480 156 132
*JA1RYC " 16,224 90 78
*JE1RRK " 15,484 80 79
*JA1SCE " 12,390 75 70
*JP1LRT " 12,180 74 70
*JA1UXV " 9,688 59 56
*JJ1FHR " 4,680 48 45
*7K4TKB " 3,496 38 38
*JO1KTD " 3,240 43 40
*JK1NSR " 2,296 28 28
*JA1DBG " 2,183 41 37
*JA1LKY " 720 20 20
*JJ1PFC " 697 17 17
*JG1TJA " 560 14 14
*JA1GZK " 432 12 12
*JH1WHA " 408 12 12
*JE1NHF " 351 13 13
*JJ1UBX " 162 10 9
*7K3CZU 14 2,625 37 35
*JE1GZB " 1,274 27 26
*JI1DGW " 1,113 23 21
*JJ1RJR " 900 18 18
*JG1GCO " 40 4 4
*JA1SVP 7 61,215 127 105
*JJ1AEB " 31,980 91 78
*JH1RDU " 594 11 11
*JK1ECX " 24 2 2
*JE1SPY 1.8 621 24 23

District 2
JF2QNM A 3,961,440 1703 786
JA2XCR " 345,450 408 282
JA2JWH " 111,931 237 173
JJ2CJB " 94,112 210 173
JR2PMT " 88,033 189 151
JE2OTM " 73,080 175 140
JF2OZH " 65,520 172 130
JA2AXB " 61,275 157 129
JA2XLV " 59,850 173 133
JE2BOM " 55,062 158 126
JE2LPC " 44,840 132 118
JA2HOL " 39,490 129 110
JA2HYD " 28,688 110 88
JN2GPQ " 21,070 97 86
JH2XQY " 9,072 58 54
JF2FIU " 4,446 39 38
JR2BCF " 4,025 35 35
JA2BIV " 2,848 35 32
JH2KKW 28 20,570 96 85
JA2KQE 21 81,162 199 162
JH2BTM " 21,931 95 91
JR2IOB 14 17,242 85 74
(OP: JA1KFX)
JA2GTW 7 42,315 95 93
JA2PFO " 13,209 57 51
*JG2RFJ A 162,816 301 192
*JA2GHP " 92,664 234 156
*JA2KPW " 88,050 212 150
*7K1MAG/2 " 60,928 170 136
*JR2KQE " 29,500 119 100
*JS2KWL " 25,844 108 91
*JM2LEI " 9,381 67 59
*JF2VAX " 5,676 47 44
*JG2QUM " 4,815 53 45
*JI2KUJ " 1,876 29 28
*8J22SH " 1,071 23 21
(OP: JS2GGD)
*JS2IWE " 684 18 18
*JR2KHB " 666 19 18
*JH2PWY " 21 3 3
*JS2FZH 28 16,279 105 73
*JH2RIH " 234 14 13
*JH2JNU 21 25,064 109 104
*JS2PHO " 10,270 70 65
*JH2MYN " 9,234 60 57
*JS2ITI " 4,240 40 40
*JS2GYN " 663 19 17
*JA2KKA " 390 14 13

District 3
JA3AOP A 1,184,500 816 500
JA3IBU " 145,040 271 185
JN3SAC " 109,824 222 176
JR3RIU " 80,920 210 136
JE3RMQ " 78,155 194 145
JA3KKE " 35,805 130 93
JR3NZC " 26,966 106 97
JA3RAR " 26,130 93 78
JA3FRI " 25,491 116 87
JP3UBR " 22,092 94 84
JA3MQY " 20,335 93 83
JA3LIL " 20,335 95 83
JR3UIC " 11,542 72 58
JF3QJR " 11,264 68 64
JF3KCH " 3,760 44 40
JM3UGA " 3,255 37 35
JA3IJW " 168 7 7
JA3QOS 28 39,675 137 115
JA3XOG " 6,885 57 51
JF3NDW " 720 17 16
JR3RIY 21 822,208 666 464
JO3DDD " 543,840 576 412
JA3LEZ " 23,114 96 91
JA3VOV " 1,624 30 28
JN3MXT " 1,392 24 24
JE3VRJ 7 34,320 110 88
*JL3VUL/3 A 728,850 734 430
*JF3DCH " 124,244 246 178
*JL3MCM " 106,250 203 170
*JQ3BVC " 99,056 268 151
*JA3KDJ " 11,456 77 64
*JE3EDJ " 10,440 60 58
*JH3GMI " 8,624 73 56
*JH3JSJ " 5,124 58 42
*JA3EBT " 4,588 46 37
*JA3PFY " 4,488 68 51
*JA3PYH " 2,871 37 33
*JL3AYP " 759 23 23
*JP3MAL " 629 17 17
*JA3RAZ 28 260 10 10
*JI3XOM " 96 6 6
*JF3IYW 21 127,022 240 211
*JI3XOK " 31,806 125 114
*7L3ETZ/3 " 8,580 68 55
*JF3RLV " 1,368 25 24
*JA3BBG " 286 12 11
*JL3DQX 14 15 3 3
*JA3YVI 7 14 2 2

District 4
JH4UYB A 5,225,508 2018 828
JE4USZ " 128,712 240 173
JH4CPC " 98,842 169 146
JI4WHS " 66,176 175 128
JA4CZM " 52,098 165 114
JG4AKL " 32,965 114 95
JR4VEV " 10,464 50 48
JE4ADO " 7,568 44 44
JA4KTG 21 3,626 38 37
JA4BEV " 1,265 25 23
JA4EZP 7 4,446 43 38
JM4WUZ 1.8 567 27 21
*JE4MHL A 189,640 309 220
*JH4CES " 11,280 67 48
*JR4DTG " 976 19 16
*JH4RUM " 90 6 6
*JA4JLT 21 71,557 185 163
*JH4FUF " 15,958 84 79
*JH4PUS " 3,382 45 38
*JN4ESD " 840 20 20

District 5
*JJ5PXO A 105 5 5
*JH5FTY 28 1,026 20 19

District 6
JH6QFJ A 815,776 670 416
JA6EML " 114,741 235 183
JA6MWW " 108,852 230 188
JE6WGT " 30,303 125 91
JA6BWH " 24,885 95 79
JA6FEG " 10,382 60 58
JH6TNH " 3,220 40 35
JA6CNX " 735 21 21
JE6CMG 21 45,212 138 127
*JH6OPP A 135,420 246 183
*JA6CVR " 51,837 169 111
*JA6ONQ " 46,515 160 105
*JH6FTJ " 32,736 113 93
*JF6KKC " 17,706 91 78
*JA6PTH/6 " 9,625 58 55
*JA6HZN " 8,007 55 51
*JS6UGC " 7,584 65 48
*8J6YAB " 6,525 55 45
(OP: JA6VZB)
*JE6KFN " 576 16 16
*JM6URL 28 2,464 34 28
*JA6CDC " 319 11 11
*JH6WHN " 133 7 7
*JA6WFM 21 618,743 591 401
*JF6ABL " 14,819 81 73
*JH6SCA " 4,884 47 44
*JE6PJP " 3,404 42 37
*JG6VMO " 2,448 36 36

District 7
JA7NVF A 3,184,990 1522 730
JH7QXJ " 1,600,380 987 523
JG7AMD " 1,501,948 918 553
JF7PHE " 294,624 376 264
JM7SKE " 248,688 346 264
JA7ACM " 72,576 174 144
JA7GYP " 30,005 101 85
JJ7PMS " 6,864 51 39
JA7AUM " 6,204 53 47
JP7XDO " 170 11 10
JH7RTQ " 160 8 8
JQ7BCM " 60 5 4
JA7OWD 28 249,983 441 223
JA7MSQ " 16,720 88 76
JO7KMB " 4,484 42 38
JA7QVI 21 1,314,384 852 556
JH7MQD 7 1,201,088 662 383
*JA7BEW A 47,670 138 105
*JA7KED " 28,365 119 93
*JH7VTE " 25,956 106 84
*JH7IHT " 15,424 81 64
*JP7GRU " 9,338 68 58
*JE7SRK " 2,407 30 29
*JA7ZP " 384 12 12
*JR7ASO " 96 6 6
*JA7HYS 21 129,150 233 210
*JH7ZKI " 1,023 33 33
(OP: JR7FEK)
*JE7SWJ " 893 21 19

District 8
JA8COE A 3,099,744 1486 687
JA8RUZ " 978,134 764 466
JA8IJI " 186,784 308 208
JH8FIH " 26,790 100 95
JA8RUU " 23,760 100 90
JG8TDZ 28 71,520 196 149
JA8TGD 21 13,505 75 73
*JA8RWU A 364,896 485 288
*JK8PBO " 261,807 356 273
*JM8FEI " 45,621 150 111
*JH8RXM " 9,761 55 43
*JK8CEE " 6,760 57 52
*JE8UHY " 693 21 21
*7K1AEU/8 " 36 6 6
*JK8NIP 21 1,350 26 25
*JA8HBO " 324 13 12
*JM8LND " 48 4 4

District 9
JH9DRL A 236,334 374 238
JA9BCV " 104,098 204 146
JH9CEN " 67,983 184 129
JH9FCP " 22,022 93 77
JA9CCG " 16,224 92 78
JF9JTS 21 663,920 562 430
(OP: JAØTEA)
*JF9NWL 21 3 1 1

District Ø
JJØJML A 761,760 644 414
JAØFVU " 268,380 348 252
JJØACA " 84,084 192 147
JJØAWX " 18,460 74 71
JJØPKS 21 1,108,380 846 490
(OP: JH7PKU)
JJØUSR " 1,248 24 24
JHØNOS 14 228,956 344 259
JHØILL 7 6,264 40 36
*JHØNEC A 58,682 166 122
*JHØDUG " 19,988 103 76
*JAØBJY " 14,271 75 71
*JAØVFN " 8,060 61 52
*JRØBNF " 5,760 61 48
*JIØWVQ " 602 14 14
*JHØAHI 21 56,682 152 141
*JJØVFV " 2,376 34 33
*JRØGXA " 147 7 7
*JHØEPI 14 6,028 55 44

Kazakhstan

UPØL	**A**	**13,438,056**	**3583**	**1096**
			(OP: UN9LW)	

Kuwait

9K2HN	**A**	**209,990**	**319**	**230**
9K9A	**14**	**2,420,880**	**1328**	**655**

Kyrgyzstan

***EX8MK**	**A**	**2,886**	**27**	**26**

Lebanon

***OD5UI**	**A**	**155,558**	**285**	**193**
*OD5PY	A	48,120	143	120

Macao

***XX9LQ**	**21**	**1,242**	**28**	**27**

Mongolia

***JT1BZ**	**28**	**19,701**	**169**	**99**

Nepal

9N7AA	**A**	**2,055,624**	**1448**	**582**

Qatar

A71GO	**A**	**92,710**	**178**	**146**
A71AE	**28**	**251,392**	**350**	**256**
A71BX	**14**	**506,190**	**526**	**359**

Republic of Korea

HL2ZN	**A**	**141,933**	**269**	**187**
HL2AHL	"	43,010	164	115
HL5BCH	"	24,120	103	90
HL2DBP	"	12,627	81	61
HL4CEL	"	7,571	93	67
HL2EIZ	"	3,936	32	32
HL5ZEE	**21**	**5,104**	**46**	**44**
***DS1ORJ**	**A**	**9,408**	**73**	**56**
*HL2KV	"	5,952	60	48
*DS3EXT	"	5,772	54	37
*HL2VXK	"	5,280	48	44
*6K2ILX	"	4,264	45	41
*HL4CFN	"	1,768	28	26
*HL5YI	"	760	22	20
DS2GOO	*28*	*96*	*8*	*8*
***HL1VAU**	**21**	**74,555**	**183**	**155**
***6K2KUS**	**7**	**1,240**	**21**	**20**

Saudi Arabia

HZ1TT	**A**	**3,468,928**	**1642**	**661**
HZ1HZ	**21**	**1,923,900**	**1156**	**583**
***HZ1TL**	**A**	**2,140,863**	**1303**	**529**
*HZ1BW	"	11,352	67	66
*HZ1DG	"	5,434	40	38
***HZ1SK**	**28**	**716,142**	**688**	**357**
***7Z1VD**	**21**	**418,284**	**475**	**324**

Singapore

9V1YC	**A**	**563,850**	**613**	**358**
9V1ZV	"	201,091	330	181
9V1PL	"	2,398	27	22
***9V1DE**	**A**	**26,530**	**104**	**70**
***9V1BC**	**14**	**6,958**	**58**	**49**

Taiwan

BV2LA	**A**	**107,387**	**263**	**161**
BV4VQ	"	1,242	24	23
BU2FK	"	768	26	24
BW2/ JP1RIW	**21**	**64,527**	**291**	**157**
BV4VR	"	17,290	118	91
***BV2NT**	**A**	**341,088**	**854**	**272**
*BU2EP	"	92,628	270	186
*BX2AJF	"	89,433	371	171
*BV3US	"	15,785	99	77
*BU2FJ	"	10,296	88	66
*BU2EV	"	5,610	64	51
*BU2ES	"	1,440	36	30
*BV3UN	"	351	13	13
*BX2AJL	"	114	7	6
***BX2AHP**	**28**	**101,996**	**343**	**172**

Thailand

E2A	**A**	**4,706,336**	**2088**	**824**
			(OP: E21EIC)	
HS5NMF	"	2,121,932	1422	619
E25KAE	"	79,992	213	132
HS3PIK	*"*	*64,820*	*226*	*140*
HS5TXB	"	220	11	10
E29TGW	**21**	**446,272**	**548**	**367**
E22UUW	"	353,920	500	320
HS3NBR	**14**	**13,703**	**77**	**71**
***E21YDP**	**A**	**117,502**	**273**	**154**
*E25ETT	"	97,875	279	135
*HS7BHK	"	87,870	222	145
*HS8NKB	"	62,775	197	135
*HSØZME	"	43,784	177	104
*E2ØXMG	"	33,201	145	93
*HS8JWH	"	31,100	137	100
*E25CRF	"	25,938	156	99
*HS8GLR	"	25,696	116	73
*HS5AES	"	20,520	114	72
*HS5ZLD	"	10,065	82	55
*HS1ZRP	"	2,492	35	28
*HS4MLV	"	1,273	26	19
*HS3QGB	"	140	10	10
***E24OYI**	**21**	**118,374**	**267**	**218**
*E2ØPFE	"	49,077	185	133
*HS8HEX	"	18,549	89	81
*E29AHU	"	14,775	91	75
HS8LVC	*"*	*12*	*2*	*2*
***HS2UPR**	**14**	**532**	**14**	**14**
***E2ØTWR**	**7**	**234**	**9**	**9**

United Arab Emirates

***A61FJ**	**28**	**118,940**	**256**	**190**
***A61ZX**	**14**	**10,207**	**63**	**59**
*A65GT	"	96	6	6
			(OP: 4G1QAZ)	

Uzbekistan

***UK8IQ**	**14**	**85,007**	**187**	**169**

West Malaysia

9M2WAZ	**A**	**68,264**	**202**	**92**
9M2WAN	"	22,646	104	67
***9M2SAF**	**A**	**404,376**	**593**	**249**
*9W2VGR	"	136,136	289	187
*9M2MAD	"	120,978	272	99
*9M2HUS	"	69,305	214	83
*9M2VVH	"	25,636	116	58
*9M2SPN	"	13,740	102	60
*9M2GDX	"	10,277	64	43
*9W2SAN	"	8,112	60	39
*9M2DGA	"	4,975	57	25
*9M2CKG	"	784	16	14
***9W2XTK**	**7**	**53,874**	**146**	**73**
*9W2W	"	27,376	108	58
			(OP: 9W2HXP)	
*9W2BAF	"	21,526	92	47
*9W2ATB	"	11,840	65	37
*9W2XBS	"	11,271	71	39
*9M2CIF	"	6,014	59	31
*9M2RSI	"	5,096	44	28
*9W2KUN	"	2,093	32	23

EUROPE

Aland Islands

OHØZ	**A**	**399,000**	**502**	**285**
			(OP: OH2XX)	

Austria

OE2S	**A**	**5,189,853**	**2002**	**939**
			(OP: OE2VEL)	
OE6MDF	"	1,631,252	1160	644
OE1HHB	"	797,368	771	451
OE3IDE	"	675,584	690	416
OE3NHW	"	108,388	238	196
OE1TKW	"	46,632	160	134
OE5KKP	"	31,185	119	99
OE2WNL	*"*	*17,190*	*97*	*90*
OE9MON	"	8,721	61	57
OE2ATN	*"*	*2,040*	*36*	*34*
OE1PMD	"	672	16	16
OE3LLQ	"	48	8	8
OE5TXF	**7**	**527,835**	**635**	**385**
			(OP: G3TXF)	
***OEØHLF**	**A**	**603,882**	**672**	**422**
			(OP: OE6HLF)	
*OE5CWO/P	"	139,320	294	215
			(OP: OE5CWO/P)	
*OE1HLB	"	64,185	214	165
*OE1XA	"	38,640	152	115
			(OP: OE1LZS)	
*OE4CHZ	"	38,352	171	141
*OE3OPW	"	30,480	148	127
*OE9IHR	"	13,746	96	87
*OE1VMC	"	13,275	93	75
*OE3KAR	"	12,555	94	81
*OE2RPL	"	11,174	90	74
*OE1KFR	"	6,844	62	58
*OE2IJL	"	6,350	50	50
*OE3EDS	"	645	15	15
*OE6LUN	"	299	14	13
*OE5FDM	"	36	4	3
***OE1WWL**	**21**	**8,476**	**63**	**52**
*OE1KSG	"	3,996	40	37
*OE3MCS	"	2,030	30	29
***OE6CPJ**	**14**	**1**	**1**	**1**
***OE6MMD**	**7**	**28,455**	**126**	**105**

Azores

CQ8Q	**14**	**2,285,400**	**1844**	**780**
			(OP: PT2FM)	
***CS8ABI**	**A**	**166,656**	**289**	**217**
*CU2YK	"	140,685	336	249
CU2ZG	*7*	*80*	*6*	*5*

Balearic Islands

EC6DX	**14**	**56,322**	**226**	**189**
***EA6VY**	**A**	**137,696**	**305**	**208**
*EA6AOH	"	45,792	199	159
*EC6FK	"	30,492	138	121

Belgium

OR3A	**A**	**2,787,877**	**1524**	**701**
ON6NL	"	1,127,168	844	544
OR1Z	"	964,436	924	506
OP5T	"	763,490	699	455
ON4TTT	"	206,797	352	227
ON1DU	"	77,233	209	169
ON7ET	"	23,184	100	72
OT2X	*"*	*19,776*	*111*	*103*
ON8AH	"	4,200	41	40
OT2A	**7**	**3,820,432**	**1549**	**784**
OR4T	"	48,640	166	128
***ON3AR**	**A**	**503,100**	**609**	**390**
*ON4AVJ	"	81,340	233	196
*ON7AH	"	76,066	168	146
*ON5ZZ	"	29,484	129	117
*ON3PDM	"	28,197	140	117
*ON5DEW	"	27,921	138	123
*ON3PAT	"	22,895	107	95
*ON3UN	"	17,402	88	77
*ON3GG	"	16,720	116	95
*ON5WL	"	13,041	95	81
*ON4CJR	"	10,585	73	73
*ON3AT	"	3,234	34	33
*ON4JY	"	1,449	25	23
***OP4K**	**21**	**41,200**	**140**	**103**
***ON7BBR**	**14**	**128,104**	**290**	**239**
*OPØJ	"	29,078	173	134
			(OP: ON5GF)	
*ON3MAT	"	9,672	86	78
*ON3ND	"	8,991	103	81
*ON3SB	"	702	29	26
***ON8PL**	**7**	**861**	**21**	**21**

Bosnia-Herzegovina

E77X	**A**	**1,574,594**	**1355**	**658**
E74E	"	286,750	432	310
E72U	"	18,144	79	72
E77A	**28**	**521,612**	**603**	**364**
E77CFG	**21**	**2,730**	**33**	**30**
***E73RB**	**A**	**66,417**	**207**	**169**
*E76MB	"	28,141	130	107
*E74O	"	21,489	100	87
*E7ØAW	"	7,280	59	56
*E74TC	"	390	15	15
*E78CB	"	126	8	7
***E75M**	**28**	**31,740**	**123**	**92**
***E73ESP**	**21**	**400,693**	**475**	**337**
			(OP: E77FA)	
*E74SL	"	2,233	33	29
***E72MM**	**14**	**9,652**	**87**	**76**
***E75RKP**	**7**	**3,330**	**37**	**37**
			(OP: E75MHM)	
***E7AA**	**3.7**	**298,304**	**460**	**316**
			(OP: E73AA)	
*E7CW	"	240,366	389	291
			(OP: E73QI)	
*E76BV	"	8,357	67	61
***E7ØE**	**1.8**	**1,500**	**30**	**30**
*E78T	"	1,431	27	27

Bulgaria

LZ5R	**A**	**12,741,728**	**4016**	**1228**
			(OP: LZ5DB)	
LZ3ZZ	"	1,295,244	1199	603
LZ6E	"	166,536	398	257
			(OP: LZ1GU)	
LZ1AQ	"	104,860	273	214
LZ4A	"	96,520	219	152
LZ3V	*"*	*19,488*	*140*	*116*
LZ7EA	"	14,320	109	80
LZ1W	"	2,581	31	29
LZ4TX	**28**	**387,801**	**515**	**271**
LZ7G	**21**	**59,160**	**191**	**136**
			(OP: LZ1NK)	
LZ1QN	**14**	**1,391,544**	**1410**	**693**
LZ2ZG	"	156	13	12
LZ5K	**7**	**692,626**	**551**	**418**
***LZ7X**	**A**	**122,408**	**249**	**214**
*LZ2ZY	"	79,800	207	152
*LZ1UBO	"	62,825	201	175
*LZ2EHO	"	20,800	126	100
*LZ1YR	"	4,949	49	49
*LZ7MT	"	4,176	54	48
*LZ5PL	"	1,026	28	27
*LZ1MC	"	592	16	16
***LZ2GS**	**28**	**3,800**	**42**	**38**
*LZ5ØYE	"	2,970	33	30
			(OP: LZ1YE)	
*LZ5GM	"	1,320	27	24
***LZ6V**	**21**	**1,000,252**	**1051**	**508**
*LZ2JA	"	132,020	372	205
***LZ1G**	**14**	**49**	**7**	**7**
			(OP: LZ5RG)	
LZ6C	*"*	*45*	*5*	*5*
			(OP: LZ2UW)	

Corsica

***TK4TH**	**A**	**296,140**	**585**	**340**
*TK4RC	"	11,628	73	68

Crete

SV9OFS	**A**	**165,251**	**406**	**257**
SV9JI	"	149,058	416	273
***SV9QCF**	**A**	**80,523**	**371**	**207**

Croatia

9A1AA	**A**	**100,280**	**326**	**218**
9A1CVG	"	77,562	248	186
			(OP: 9A5OIA)	
9A7R	"	50,274	151	133
9A1KDE	"	40,848	126	111
			(OP: 9A2VR)	
9A2R	"	4,674	46	41
9A7V	**21**	**4,127,580**	**1863**	**828**
9A9RR	"	666,261	655	409
9A1CC	**7**	**44,145**	**145**	**135**
9A8M	**3.7**	**1,639,208**	**1054**	**578**
			(OP: 9A7DM)	
9A3DUH	"	52,416	187	144
***9A2ZI**	**A**	**845,724**	**691**	**516**
*9AØW	"	842,520	762	476
*9A1VV	"	245,644	365	283
*9A1AL	"	32,964	141	123
*9A1EJ	"	29,412	133	114
*9A1EA	"	23,647	125	107
*9A4TX	"	18,873	97	81
*9A1BN	"	13,280	90	80
*9A5ISS	"	8,990	61	58
*9A3MA	"	8,211	57	51
*9A9J	"	7,375	60	59
			(OP: 9A7ZZ)	
*9A5ALC	"	1,372	28	28
*9A3GVD	"	70	7	7
***9A9R**	**28**	**74,304**	**208**	**129**
***9AØBR**	**21**	**50,176**	**154**	**128**
			(OP: 9A4W)	
***9A4KJ**	**14**	**9,956**	**91**	**76**
*9A5CZK	"	8,236	82	71
*9A4DD	"	7,475	69	65
***9A6DJX**	**7**	**17,480**	**93**	**92**
*9A4MZ	"	9,656	72	68
*9A3SAI	"	912	20	19
***9A1AY**	**3.7**	**17,711**	**101**	**89**

Czech Republic

OK7W	**A**	**8,940,162**	**2898**	**1046**
OK1OA	"	687,014	712	431
OL1T	"	144,840	282	204
			(OP: OK6DJ)	
OLØW	"	132,252	282	214
			(OP: OK1DSZ)	
OK4X	"	72,105	199	165
OK2QA	"	41,100	158	137
OK7MH	"	40,128	132	114
OK1FED	**21**	**11,346**	**68**	**61**
OL9Z	**14**	**3,067,830**	**1834**	**801**
OL3R	"	735,126	690	483
			(OP: OK1VWK)	
OK8NM	**3.7**	**1,421,280**	**1067**	**564**
			(OP: OM6NM)	
OL7P	"	482,032	574	376
			(OP: OK1CRM)	
***OK2MBP**	**A**	**719,055**	**772**	**435**
*OK1ALX	"	373,842	410	378
*OK2BRX	"	274,482	436	299
*OL5Y	"	268,345	363	287
*OK5OK	"	168,144	324	248
*OK4DZ	"	132,066	259	198
*OK2TS	"	104,178	247	194
*OK2AK	"	86,592	221	192
*OK1ULL	"	56,206	189	157
*OK2PIM	"	42,296	164	136
*OK1DEK	"	38,676	145	132
*OK1KTW	"	32,011	137	119
			(OP: OK1DEZ)	
*OK1BR	"	29,524	162	122
*OK1BJ	"	28,680	140	120
*OK7SE	"	24,990	111	105
*OK7N	"	23,114	97	91
*OK1TD	"	22,446	97	86
*OK1JCB	"	15,826	91	82
*OK1WSL	"	14,022	93	82
*OK2BQN	"	12,090	80	65
*OK1FIA	"	10,472	77	68
*OK1TK	"	3,936	53	48
OK1HBO	*"*	*2,856*	*34*	*34*
*OL5G	"	2,460	30	30
*OK1MGA	"	1,617	37	33
*OK1PFM	"	999	29	27
*OK5VT	"	966	21	21
*OK2EQ	"	936	27	26
*OK1BLU	"	221	13	13
***OK2ABU**	**28**	**18**	**3**	**2**
***OL9R**	**14**	**805,623**	**777**	**507**
			(OP: OK6RA)	
*OK1K	"	31,552	120	116
			(OP: OK1XOE)	
*OK2DIK	"	4,140	52	46
*OK3ON	"	3,498	60	53
*OK1DVA	"	1,872	46	39
***OK6RP**	**7**	**370,786**	**532**	**338**
***OK6T**	**3.7**	**690,261**	**735**	**429**
			(OP: OK1WCF)	
*OK1AY	"	233,700	393	285
*OK7T	"	19,834	110	94
			(OP: OK1FHI)	
*OL2T	"	4,185	50	45
*OK1DPU	"	2,673	33	33
*OK5D	"	1,711	33	29
			(OP: OK1DTP)	
***OK6Y**	**1.8**	**119,548**	**291**	**209**
			(OP: OK2PTZ)	
*OK2BRQ	"	14,940	100	83

Denmark

OZ3ØEU	**A**	**2,607,264**	**1534**	**792**
OZ1KEF	"	356,044	436	334
OZ1FHU	"	341,365	494	335
OZ1KZX	"	83,190	227	177
OZ1T	"	33,672	139	122
OZ1KIH	"	16,245	113	95
OZ1D	"	1,536	25	24
			(OP: OZ1HHH)	
OZ8AGB	"	225	9	9
OZ1AA	"	8	2	2
OZ3BJ	**28**	**1,281**	**21**	**21**
***OZ1KVM**	**A**	**480,445**	**641**	**371**
*OZ6CM	"	127,281	247	203
*OZ1DYI	"	108,782	268	218
*OZ4MU	"	69,264	157	156
*OZ6TM	"	60,648	196	168
*OZ1KKH	"	24,232	113	104
*OZ1THC	"	20,301	138	101
*OZ2PJ	"	7,399	55	49
OU2P	*"*	*7,398*	*62*	*54*
*5P8Z	"	6,669	64	57
*OZ6AGX	"	4,992	56	48
***OZ4NA**	**7**	**190,662**	**333**	**258**
*OZ9V	"	16,896	97	88

Dodecanese

***SV5SKD**	**A**	**25,122**	**127**	**106**

England

G8A	**A**	**1,602,924**	**1063**	**599**
			(OP: G3XSV)	
G3Q	"	1,275,456	986	546
			(OP: G3RXQ)	
MØMCV	"	918,138	935	474
GØCNN	"	836,808	946	476
G4R	"	807,488	904	496
			(OP: YO4RDW)	
MØWLF	"	792,880	722	424
G2K	"	740,805	777	435
			(OP: MØICR)	
G2NV	"	459,010	635	394
M7Q	"	288,561	399	273
			(OP: G4PIQ)	
MØNVK	"	176,847	347	253
GØMTN	"	165,322	332	262
MØOIA	"	151,822	267	206
G6MC	"	150,300	289	225
MØLTE	"	82,654	245	187
G9D	"	68,208	201	168
			(OP: G6NHU)	
G6AD	"	64,896	188	156
G4G	"	60,690	201	170
			(OP: G4FZN)	
G1SCT	"	58,560	197	160
M1X	"	50,370	178	146
			(OP: GØCKP)	
M2J	"	38,864	124	112
			(OP: G4NBS)	
GØDJQ	"	33,770	121	110
MØNGN	"	28,196	116	106
G4LPP	"	24,480	94	90
MØMDS	"	19,401	93	87
MØNJW	"	18,048	118	94
G4PIQ	"	15,111	79	73
G1EIX	"	13,692	90	84
MØTXE	"	11,704	82	76
MØEAS	"	10,650	81	75
MØKCV	"	7,612	52	44
MØXAC	"	2,263	31	31
MØGLV	"	12	2	2
G2C	**21**	**162,385**	**283**	**235**
M1B	**14**	**416,944**	**648**	**412**
			(OP: G1YBB)	
***G4PVM**	**A**	**1,054,702**	**920**	**502**
*MØPLX/M	"	744,336	807	432
			(OP: MØPLX/M)	
*G9X	"	737,380	729	458
			(OP: M1LCR)	
*2EØINN	"	498,575	641	385
*M9T	"	397,935	575	333
			(OP: GØKYS)	
*MØKYB	"	315,543	488	321
*2E1TAP	"	268,191	482	301
*G3SVK	"	217,600	373	272
*GØRAH	"	185,640	389	260
*G3R	"	155,946	329	237
			(OP: GØCDA)	
*MØIRU	"	129,384	282	216
*G8S	"	127,238	299	226
			(OP: G4IDF)	
*MØKPW	"	124,576	324	229
*G1PCR	"	114,124	289	206
*GØH	"	100,224	263	216
			(OP: GØHEU)	
*G4POF	"	99,115	265	215
*MØJND	"	91,008	250	192
*MØLGW	"	80,190	253	198
*G4OZG	"	58,500	208	156
*G8GHD	"	58,404	188	157
*GØC	"	57,038	193	158
			(OP: GØCER)	
*G8ZRE	"	54,793	207	157
*2EØOBM	"	53,756	193	151
*GØJDL	"	53,491	184	149
*2EØEVM	"	47,180	191	140
*MØAUG	"	47,125	189	145
*MØMPM	"	41,344	165	136
*M7CAX	"	34,632	200	148
*G3RTU	"	33,728	161	124
*M7TXR	"	32,382	146	126
*MØKKM	"	26,730	122	110
*MØTQR	"	26,322	141	123
*G7H	"	26,280	139	120
			(OP: G7SYW)	
*MØXYG	"	25,740	142	130
*MØEUK	"	25,584	113	104
*GX4ALE	"	25,380	121	108
			(OP: G3VYI)	
*2EØPLA	"	24,521	121	113
*M6KCI	"	24,192	127	112
*MØLKW	"	22,848	143	119
*G4IUA	"	21,060	98	81
*MØJHV	"	19,153	129	107
*M7ALE	"	18,928	115	104
*MØVLX	"	16,450	112	94
*2EØIFC	"	16,275	99	93
*2EØGYI	"	12,835	107	85
*G3YBO	"	12,705	77	55
*MØVQP	"	11,840	78	74
*GØOOF	"	11,041	72	61
*M7NZL	"	11,020	87	76
*G4DYC	"	9,216	70	64
*M6ETL	"	9,108	73	66
*2EØFLZ	"	8,901	75	69
*G4PNC	"	8,742	63	62
*M5C	"	8,710	73	65
			(OP: MØMGP)	
*M7CDJ	"	7,552	68	64
*G7NIB	"	7,552	78	64
*MØJQQ	"	7,469	88	77
*M7SNG	"	7,410	70	65
*G4FFN	"	7,208	70	68
*2EØGKW	"	5,874	69	66
*MØHWO	"	4,446	59	57
*MØKEA	"	3,283	52	49
*G4HYG	"	3,024	56	48
*M7EGD	"	2,465	30	29
*G8NVY	"	2,052	37	36
*G7IYK	"	1,734	36	34
*2EØHEK	"	1,725	25	25
*MØLLT	"	1,248	36	32
G8NVX	*"*	*874*	*20*	*19*
*M7TPO	"	864	28	27
*M3EMO	"	621	24	23
*2EØSFK	"	561	33	33
*G4HPY	"	513	20	19
*2EØHFW	"	450	18	18
*MØYOB	"	442	19	17
*MØHFY	"	429	13	13
*MØXWN	"	256	16	16
*MØYTE	"	192	8	8
***G1FQD**	**28**	**45**	**5**	**5**
***GØFGI**	**21**	**41,375**	**129**	**125**
*MØYTT	"	20,060	88	85
*G4OTU	"	19,184	102	88
*G4OED	"	16,646	91	82
*G4JFS	"	27	3	3
*G4NXG/M	"	3	3	3
***MØAQM**	**14**	**62,205**	**239**	**195**
*MØORY	"	35,420	182	154
*MØKUH	"	32,116	181	148
			(OP: GØWJK)	
*G1VGK	"	21,971	133	127
*M5P	"	17,004	126	109
			(OP: M5BIR)	
*2EØYBJ	"	6,724	88	82
*MXØKIO	"	2,024	46	44
			(OP: GØVDZ)	
*G4WGE	"	483	21	21
*2EØYML	"	483	23	23
*MØOEB	"	480	20	20
*MØIPU	"	99	9	9
***G8X**	**7**	**1,112,146**	**922**	**518**
			(OP: G4FJK)	
*G9P	"	241,367	362	287
			(OP: MØNCG)	
*G7RDX	"	3,956	48	43

Estonia

ES6RW	**A**	**5,318,693**	**2532**	**953**
ESØIA	"	53,949	186	147
ES5MG	"	47,728	160	152
ES5TTT	**14**	**1,555,766**	**1274**	**713**
ES4RD	"	96,074	331	242
***ES1BH**	**A**	**76,128**	**227**	**183**
*ES6RMR	"	55,924	189	164
*ES2DJ	"	10,902	70	69
*ES3HEA	"	4,968	59	54
***ES5QA**	**21**	**187,989**	**355**	**223**
*ES8SX	"	5,916	58	51
***ES1TAR**	**14**	**136,206**	**369**	**282**
*ES5RIM	"	20,750	128	125

European Turkey

TA1API	**A**	**56,170**	**188**	**137**
***TA1BX**	**A**	**101,352**	**394**	**246**

Fed. Rep. of Germany

DM6V	**A**	**8,653,892**	**2922**	**988**
			(OP: DL7FER)	
DL4VDA	"	4,313,127	1858	793
DK9IP	"	2,922,561	1378	729
DL1WA	"	2,550,996	1398	764
DL9UP	"	1,880,900	1199	700
DL1NKS	"	1,689,975	1253	609
DK7R	"	1,456,356	1016	561
			(OP: DK7AM)	
DQ5T	"	1,280,848	882	578
			(OP: DL4LAM)	
DHØGHU	"	1,076,730	802	570
DP5N	"	1,056,384	866	504
DL7ON	"	969,030	770	555
DL2RMC	"	934,176	852	526
DL8RDL	"	824,915	707	455
DL4ZA	"	815,301	837	471
DL35EUDXF	"	784,890	747	486
			(OP: DJ5AN)	
DL2LBK	"	714,136	711	472
DH8BQA	"	704,919	653	447
DP8M	"	639,108	658	433
			(OP: DL6NDW)	
DH9ET	"	609,462	633	441
DR4A	"	557,375	522	343
			(OP: DK5PD)	
DK6WL	"	534,230	542	410
DJ4MO	"	501,840	587	369
DD8SM	"	497,280	546	384
DQØY	"	495,300	539	381
			(OP: DF2RG)	
DQ1P	"	495,096	536	392
			(OP: DK1IP)	
DC2AN	"	494,128	550	356

DL1ATZ	"	461,625	529	375
DG1IU	"	409,427	536	383
DLØLK	"	404,060	516	356
(OP: DG7AK)				
DD5VL	"	385,170	487	347
DJ1AN	"	383,274	527	321
DL1EKO	"	374,920	521	364
DJ6HR	"	353,256	437	328
DAØC	"	269,005	461	335
(OP: DK8WG)				
DJ5IW	"	241,500	377	300
DK2AT	"	237,800	400	290
DG1ATN	"	202,020	362	273
DJ4WT	"	196,011	349	261
DL1PT	"	192,256	375	256
DG1YBN	"	192,253	353	263
DL7CX	"	181,521	333	249
DL6MHW	"	152,424	294	219
DL4DBM	"	146,957	252	223
DL5ANT	"	145,314	289	207
DL5ST	"	139,668	297	226
DJ5MO	"	125,712	276	216
DL6DVU	"	116,775	274	225
DL1YCF	"	103,179	264	211
DH2RTW	"	99,682	260	197
DL2FQ	"	98,992	217	184
DB7BN	"	69,797	213	169
DK5PH	"	68,960	189	160
DL5ASK	"	67,488	178	148
DL5AWE	"	59,645	184	151
DL5NSM	"	59,041	175	151
DL2DQL	"	58,050	165	150
DL6HBQ	"	57,888	172	144
DL1NEO	"	52,820	142	139
DK5JM	"	51,972	149	122
DQ6Q	"	49,654	153	122
DL6NAV	"	44,020	149	124
DK5TX	"	43,920	142	122
DL1KFS	"	43,166	136	113
DH5WB	"	42,408	150	124
DH6DAO	"	40,415	147	137
DJ9MH	"	39,168	136	136
DC2VE	"	38,720	141	121
DF2LH	"	38,372	130	106
DH1TST	"	36,240	135	120
DJ2QV	"	36,079	131	109
DL9NDW	"	31,622	122	97
DF1LON	"	30,634	124	106
DLØAH	"	27,451	126	97
(OP: DG5YHE)				
DJ7OQ	"	27,180	104	90
DK1AX	"	25,542	99	99
DM2X	"	24,661	99	91
(OP: DL2OE)				
DF8V	"	23,407	104	89
(OP: DF8VO)				
DL5YM	"	23,232	96	88
DF6RI	"	22,936	103	94
DK4VW	"	21,984	109	96
DC7DX	"	20,418	93	82
DD1TT	"	20,145	97	85
DG2NMH	"	19,623	104	93
DH2PA	"	18,954	88	81
DL8WEM	"	18,306	90	81
DF1IC	"	13,386	72	69
DL4JLM	"	12,462	69	62
DJ6TB	"	12,285	70	65
DL6ON	"	12,096	79	72
DL8YDU	"	11,088	64	56
DF6QE	"	10,150	65	58
DP7P	"	9,782	78	73
(OP: DM5CB)				
DL8DSL	"	8,281	52	49
DB2CLK	"	7,869	62	61
DB8LM	"	4,770	59	53
DK2CC	"	4,620	45	44
DL1BUG	"	4,512	49	47
DL1LSW	"	3,564	37	36
DN5PW	"	2,520	42	40
DL1DBR	"	2,387	32	31
DL7LX	"	2,128	30	28
DL8MKG	"	1,764	28	28
DK2YL	"	1,120	22	20
DL4XD	"	828	26	23
DM5ML	"	748	18	17
DGØOAT	"	384	17	16
DL8RB	"	21	3	3
DK5DQ	28	65,405	189	127
DH1AKY	"	4,212	47	36
DL1PAN	"	1,254	22	19
DL2ARD	21	6,767,244	2573	1012
DL8AAE	"	245,300	326	275
DL5IC	"	52,007	147	131
DL5AXX	"	31,752	118	98
DL2MDU	"	27,257	101	97
DH6BH	"	13,578	78	73
DL8OBF	14	692,186	722	431
DA3X	"	406,065	499	345
(OP: DL5JS)				
DK2OY	"	217,672	368	299
DR5M	"	96,300	241	180
(OP: DL5NEN)				
DG4UF	"	63,546	203	178
DL9LM	"	11,316	95	92
DL/E79AA	7	371,952	439	324
DL4RCE	"	144,480	325	224
DL1OJ	"	124,865	268	221
DL5RU	"	63,724	198	178
DM8HH	"	37,084	159	127
DL7URH	"	23,484	111	103
DKØ5ØBN	3.7	1,292,340	1091	543
(OP: DL2SAX)				
DM6ØUEA	"	1,037,520	989	528
(OP: DL3BQA)				
DM4M	"	11,242	86	73
DL6DH	"	5,096	54	52
DBØGSN	1.8	26,751	146	111
(OP: DM1CG)				
DK5NJ	"	25,877	133	113
DL5KVV	"	11,466	90	78
DM3VL	"	1,392	29	29
***DJ3HW**	A	1,291,360	987	560
*DO4OD	"	918,048	772	524
*DL3RAR	"	903,444	809	474
*DP5P	"	850,080	759	480
(OP: DL1MHJ)				
*DL6MRM	"	657,248	764	437
*DJ2FL	"	447,372	573	387
*DF4ØBGK	"	441,515	592	389
*DG5MLA	"	342,720	483	360
*DR9ØTJU	"	263,676	424	301
(OP: DL2SWR)				
*DO1SSB	"	245,600	442	307
*DB5SM	"	204,764	431	284
*DJ4MX	"	160,686	294	237
*DL7VX	"	147,501	321	243
*DL9DX	"	141,540	291	210
*DL3DRN	"	138,600	300	231
*DL1EHG	"	131,570	296	223
*DK8NC	"	127,512	288	198
*DL9OLI	"	124,017	262	201
*DR7T	"	106,820	244	196
(OP: DF1DN)				
*DD3JN	"	97,674	268	219
*DL8UV	"	88,245	224	185
*DG1IAN	"	85,840	232	185
*DB1VQ	"	80,190	208	165
*DL75DRG	"	74,800	235	187
(OP: DL4EAX)				
*DJ4WM	"	71,064	246	168
*DL6RBH	"	66,096	216	162
*DB5ABS	"	64,320	199	160
*DL9YJ	"	64,000	206	160
*DJ6DO	"	62,951	198	161
*DK9NCX	"	62,370	213	154
*DJ7TW	"	60,480	204	160
*DC5AQ	"	57,915	205	165
*DL7NY	"	57,456	202	152
*DO1SJF	"	57,232	162	146
*DL2NBU	"	56,457	168	153
*DD5AJ	"	56,064	168	146
*DL9HB	"	54,322	181	157
*DL4YR	"	52,542	148	139
*DC3HSB	"	52,350	178	150
*DO1IBJ	"	51,030	141	126
*DK7SM	"	49,896	188	154
*DB2WD	"	46,866	152	146
*DH9DX/P	"	46,508	185	154
*DJ6TK	"	45,150	176	150
*DF2AJ	"	42,480	132	120
*DB4LI	"	37,820	156	124
*DL6USA	"	35,658	139	126
*DK2BO	"	35,511	159	133
*DA2R	"	35,123	119	103
*DR6N	"	34,615	136	115
(OP: DL6WT)				
*DL5RMH	"	33,990	125	110
*DJ3GE	"	33,855	129	111
*DB6MC	"	33,274	139	127
*DL2SKY	"	32,964	134	123
*DL1VJL	"	32,364	101	87
*DL9GMN	"	31,248	136	126
*DL73AFUG	"	30,360	157	132
(OP: DM4EAX)				
*DL4DW	"	30,193	119	109
*DL1BSN	"	29,887	140	121
*DL1FPG	"	29,512	134	119
*DF9IX	"	28,431	135	117
*DL1EEL	"	26,772	104	97
*DO3UW	"	26,700	106	100
*DO3HTV	"	26,159	108	101
*DK1KC	"	25,641	111	111
*DF7JU	"	25,398	118	102
*DG9BEO	"	23,836	126	101
*DL6JZ	"	22,080	99	92
*DM6EE	"	21,100	110	100
*DM5Z	"	20,661	106	97
(OP: DM5JBN)				
*DL7VRG	"	20,280	113	104
*DL1RTO	"	19,669	107	89
*DF7IH	"	19,400	113	100
*DB2BJT	"	19,306	108	98
*DL4YWO	"	18,135	100	93
*DF2DR	"	17,920	98	80
*DA3T	"	17,836	102	91
(OP: DL8DXL)				
*DC2CT	"	17,136	82	72
*DJ2FR	"	16,942	96	86
*DJ4PK	"	16,284	101	92
*DG1RS	"	16,055	113	95
*DA1KK	"	15,732	101	92
*DF3IS	"	15,633	87	81
*DL1GO	"	15,390	95	90
*DK4EF	"	15,334	88	82
*DG7FB	"	14,691	95	83
*DL1BFR	"	14,516	85	76
*DL2YET	"	14,415	101	93
*DG3NAB	"	14,344	99	88
*DHØDM	"	14,022	91	82
*DF3FX	"	13,706	84	77
*DO1TOM	"	13,031	85	83
*DC2CB	"	12,640	89	80
*DD1OP	"	11,400	78	76
*DB4LL	"	10,686	91	78
*DG2ELK	"	10,112	97	79
*DL7ACN	"	10,088	63	52
*DH1NGE	"	10,011	80	71
*DB5ZF	"	9,842	81	74
*DB2ZJ	"	9,198	84	73
*DL8ULO	"	9,072	76	72
*DL/SP2RBA	"	8,787	106	87
*DM6LE	"	8,601	65	61
*DL8AX	"	8,532	56	54
*DO9LDT	"	7,503	64	61
*DK5WN	"	6,996	57	53
*DH1HAM	"	6,890	58	53
*DL9ZWG	"	6,552	67	63
*DF2FM	"	6,069	57	51
*DC9LJ	"	5,700	62	57
*DL3LJ	"	5,635	51	49
*DL8ZU	"	5,336	47	46
*DK2TG	"	5,040	44	42
*DG6MDG	"	4,284	48	42
*DF4WO	"	4,094	47	46
*DL2MM	"	4,042	45	43
*DK2WU	"	3,959	37	37
*DK4JV	"	3,933	62	57
*DG7DBR	"	3,871	55	49
*DM7AK	"	3,760	42	40
*DL1NUX	"	3,710	38	35
*DL3MB	"	3,362	42	41
*DJ7ZZ	"	3,330	40	37
*DO8DAM	"	3,306	40	38
*DM6RAC	"	3,237	39	39
*DD6MH	"	2,992	45	44
*DJ9SN	"	2,886	39	39
*DL8MV	"	2,415	36	35
*DO5MN	"	2,263	31	31
*DN4PSG	"	2,233	30	29
*DO7CX	"	2,108	35	31
*DL1NKB	"	2,010	34	30
*DO9JOC	"	1,767	31	31
*DL2LRT/P	"	1,650	31	30
*DL7CU	"	1,632	34	34
*DM2XM	"	1,595	30	29
*DK9ZE	"	1,566	29	29
*DM7W	"	1,408	22	22
(OP: DL8MAS)				
*DM5RE	"	1,350	28	27
*DL5DWF	"	1,344	24	21
*DL4NHP	"	1,323	28	27
*DL3DCM	"	1,276	22	22
*DL2FBG	"	1,035	25	23
*DL1MPR	"	936	18	18
*DO2SBS	"	864	25	24
*DF8IU	"	840	20	20
*DB6MG	"	561	18	17
*DL2GMK	"	544	17	16
*DG8EX	"	496	16	16
*DM2AWM	"	494	19	19
*DO2KMA	"	405	15	15
*DO1PE	"	330	11	11
*DL9HCO	"	286	13	13
_*DM1RM_	"	210	15	15
_*DL7GA_	"	208	13	13
*DB4RG	"	136	8	8
*DO1RWM	"	126	8	7
*DN1ADA	"	126	9	9
*DG5BCM	"	110	10	10
*DF1LX	"	99	10	9
*DL7ULM	"	64	5	4
*DL2COM	"	8	2	2
*DF2RS	"	4	2	2
***DF5RF**	28	12,141	75	57
*DK9JC	"	432	14	12
*DL2LDE	"	330	11	10
*DF7LS	"	90	6	5
*DL9MFY	"	12	2	2
***DK1RS**	21	123,310	223	190
*DO2YX	"	79,868	179	164
*DO1OTW	"	75,674	176	157
*DO4TP	"	51,745	137	131
*DO5ABC	"	30,704	108	101
*DO4OS	"	18,240	84	80
*DO3GE	"	10,595	65	65
*DO7JLF	"	7,650	53	50
*DBØDH	"	7,191	53	51
(OP: DL3CQ)				
*DO7OO	"	3,936	42	41
*DO1SLB	"	3,264	36	34
*DO2MS	"	3,162	34	31
*DO2MAV	"	2,604	32	31
*DO9YY	"	2,052	28	27
*DG1BQC	"	189	9	9
*DO6AN	"	75	5	5
*DO2DST	"	75	5	5
*DL1RNH	"	48	4	4
*DO6GT	"	24	4	4
_*DF2KK_	"	12	2	2
*DG1UAE	"	8	2	2
***DG2BHB**	14	17,480	112	95
*DL7FB	"	3,504	57	48
*DK8CK	"	2,070	50	45
*DH4GB	"	1,612	32	31
*DM1MC	"	930	34	31
*DF7JU	"	484	22	22
*DL4HCF	"	153	9	9
*DF2ET	"	135	11	9
*DL8RWO	"	80	8	8
*DL1SBF	"	63	7	7
*DK2NI/M	"	16	4	4
*DL1YAW	7	40,365	135	117
*DL1BAX	"	9,152	54	52
*DL4LT	"	2,176	35	34
*DL4ZAN	"	1,980	31	30
*DKØBM	"	84	7	7
*DL8FAN	"	28	4	4
*DO7AX	3.7	19,602	115	99
*DL2RZG	"	14,344	99	88
*DO4DXA	"	10,087	83	77
*DO6NI	"	9,310	81	70
*DO8WM	"	3,139	44	43
*DLØHDB	"	704	22	22
(OP: DO1FFE)				
*DO6CH	"	510	17	17
*DH9BAJ	"	160	10	10
*DB1TK	"	45	5	5
*DM3CH	"	20	5	4
*DO7BM	"	15	5	5
Finland				
OH1F	A	3,446,072	1844	826
(OP: OH1NOA)				
OH2PQ	"	2,034,806	1275	674
OH8KXK	"	1,608,440	1258	632
OG73X	"	1,240,291	973	533
(OP: OH8LQ)				
OH1VR	"	1,066,720	949	565
OH1TM	"	943,368	1103	552
OH7KBF	"	849,574	872	529
OH6RE	"	569,422	870	457
OH8Z	"	534,017	766	473
(OP: OH8MCT)				
OH6OS	"	401,820	502	370
OH9GGY	"	360,018	515	354
OH6MSZ	"	126,735	387	255
OH7KC	"	102,480	288	210
(OP: OH7MFO)				
OG1D	"	92,925	226	177
OH1ØA	"	84,960	213	180
(OP: OH1X)				
OH8MJ	"	29,106	112	99
OH1MM	"	16,117	83	71
_OG7F_	"	15,840	82	72
OH1HB	"	6,493	47	43
OH3KX	"	5,673	70	61
OH2KI	"	3,936	44	41
OH5BM	"	8	4	4
OH1LEG	28	1,488	26	24
OH1RX	"	481	15	13
OG6N	21	1,501,102	1003	562
(OP: OH6NIO)				
OG7A	"	1,138,104	904	479
(OP: OH6MW)				
OH2PM	"	15,096	76	68
OH1TD	"	7,852	59	52
OH6FSG	"	7,623	71	63
_OH7JL_	14	80,660	286	218
OH1Z	7	854,320	766	472
(OP: OH1LEG)				
OG6B	"	966	21	21
(OP: OH1ZAA)				
***OH7GGX**	A	293,864	456	337
*OH8RX	"	239,425	459	305
*OH3MM	"	184,440	391	265
*OH3MZ	"	60,990	240	190
*OH5BE	"	31,746	119	111
*OH2BRG	"	24,157	137	119
*OH3JP	"	19,465	88	85
*OH3UAI	"	8,560	81	80
*OH1TS	"	6,525	89	75
*OH6LDJ	"	105	7	7
*OH9GIT	"	72	9	9
*OH4EBD	"	27	3	3
***OH3HS**	21	4,018	44	41
*OH7L	"	3,465	35	35
***OH5MQ**	14	1,155	33	33
***OH6NIO**	1.8	171	10	9
France				
TM9C	A	3,253,152	1681	752
(OP: F5OHM)				
F5LIW	"	2,712,710	1473	715
F4ARU	"	2,048,166	1151	538
F6IRA	"	1,080,800	925	560
TM5DX	"	919,776	839	429
(OP: F4HAU)				
F4DPW	"	552,762	578	369
F8CRS	"	378,056	439	344
F6EZV	"	367,815	499	339
TMØGL	"	275,440	355	313
(OP: F6DBA)				
F5TVG	"	267,200	320	320
F4HZZ	"	231,902	329	254
F8CRH	"	229,824	328	252
F6GPT	"	217,775	365	281
F4HRM	"	70,200	195	156
F1ADG	"	39,688	138	121
F6BLP	"	27,720	95	70
F5JFU	"	22,161	99	83
F8TRT	"	20,930	93	91
F4FRG	"	11,774	71	58
F4HRS	"	4,902	41	38
F5BTH	"	1,972	32	29
F5NBX	28	144,808	309	184
TM6M	21	7,631,405	2925	955
(OP: F4DXW)				
F1UVN	"	2,657,710	1490	653
F4FFZ	"	832,216	784	386
F2CT	"	691,752	667	456
TM8A	14	3,308,211	1773	831
(OP: F8DVD)				
F1AGR	"	1,094,742	881	582
F4EMI	"	415,480	593	376
F1PNJ	7	23,688	120	94
***TM3Z**	A	3,891,456	1759	864
(OP: F4DSK)				
*F4CDR	"	484,125	577	375
*F4FVA	"	342,040	513	340
*F5GKW	"	279,720	425	296
*F4FTA	"	267,565	397	295
*F4HRG	"	252,586	454	323
*F5GGL	"	193,050	292	270
*F1IEH	"	192,046	414	262
*F4IVC	"	180,768	375	269
*F4ARM	"	151,032	277	232
*F5DBT	"	144,240	299	240
*F4PCM	"	114,318	271	219
*F4WBL	"	111,320	229	184
*F4CZV	"	104,160	274	217
*F4FHV	"	104,127	227	183
*F6DRP	"	97,970	250	202
*F4WDL	"	96,140	263	190
*F5SGI	"	79,152	211	194
*F6FNA	"	75,650	211	170
*F6KRK	"	69,204	175	158
(OP: F4AFQ)				
*F1HTU	"	66,967	195	167
*F4ADZ	"	62,370	196	165
*F5MMX	"	61,236	190	162
*F4IAY	"	61,008	197	164
*F5JME	"	56,496	196	176
*F5PXF	"	49,050	187	150
*F4HAQ	"	39,625	148	125
*F4GQP	"	38,340	158	135
*F1GKS	"	37,050	162	130
*F1JGJ	"	34,177	178	143
*F5JU	"	33,770	123	110
*F4IZG	"	30,504	158	123
*F4IAW	"	26,565	122	105
*F4GDO	"	26,322	122	107
*F4JBG	"	24,273	109	93
*F4IZH	"	24,038	127	101
*TM22P	"	21,328	98	86
(OP: F6HRP)				
*F4IDB	"	20,330	127	107
*F5DRD	"	19,838	104	91
*F5FDC	"	18,868	97	89
*F4EKH	"	16,575	106	85
*F4IIQ/P	"	16,170	108	98
(OP: F4IIQ/P)				
*F5IRP	"	15,939	85	69
*F5PBG	"	15,372	94	84
*F4IYB	"	13,195	102	91
*F5TAB	"	12,580	95	85
*F4FMU	"	9,676	64	59
*F8CPA	"	9,108	75	69
*F4HOT	"	8,008	60	56
*F4IZC	"	7,540	66	65
*F4FBP	"	7,448	65	56
*F4DUZ	"	7,139	62	59
*F5KLE	"	6,527	68	61
*F4EPP	"	3,528	30	28
*F4FRF	"	2,130	31	30
*F4IYJ	"	1,400	28	28
*F1TRF	"	616	15	14
*F4IXJ	"	44	4	4
***F6ITD**	28	270	10	9
***F4VSD**	21	1,875	29	25
***F4IRT**	14	39,368	148	148
*F4INY	"	754	30	29
*F4FRC	"	11	11	11
***F4IEX**	7	21,097	77	73
*F1IKA	"	18,216	94	88
*F5MLJ	"	50	5	5
*F4JAO	"	2	1	1
*F4VUL	3.7	5,616	53	52
Greece				
SV6JHA	A	335,965	359	331
SV3SPD	"	76,814	268	199
SV2CXI	"	14,080	67	64
SV3AQT	"	45	4	3
SV1BFW	21	15,038	74	73
SV2BXA	"	3,034	38	37
***SV3RPQ**	A	922,789	1137	547
*SV2HJQ	"	728,816	867	451
*SV2HJW	"	363,902	603	374
*SV4SCL	"	97,902	249	189
*SV7QNV	"	43,292	182	137
*SY8DQX	"	31,824	132	117
*SV8NBI	"	31,740	148	115
*SV4RNT	"	28,000	147	125
*SV1OCR	"	27,776	139	124
*SV2SIF	"	23,532	132	111
*SV1ONV	"	20,600	123	103
*SV2SIG	"	20,394	107	99
*SV1PMZ	"	19,008	113	96
*SV1CEI	"	6,204	51	47
*SV2DXG	"	2,880	37	36
*SV1LIQ	"	1,144	26	26
*SV1MO	"	836	22	19
***SV1KYC**	21	27,500	130	110
*J41J	"	9,047	97	83
(OP: SV1PMQ)				
*SV2RIM	14	700	26	25
***SX8V**	7	581,196	582	407
(OP: SV1JG)				
***SV2DSJ**	3.7	39,243	151	127
Guernsey				
***GUØUVH**	A	1,460	21	20
*GUØBEZ	"	798	21	21
Hungary				
HG3R	A	11,111,461	3293	1153
HG8R	"	10,907,680	3366	1120
(OP: HA8JV)				
HA8A	"	9,640,185	2912	1119
(OP: HA8DZ)				
HG1A	"	2,748,955	1630	755
(OP: HA1ZN)				
HA3OU	"	271,791	405	303
HA5MIG	"	171,094	367	242
HA7VK	28	29,532	115	92
HA7SQ	"	1,800	28	25
HG1S	21	3,400,544	1686	752
(OP: HA1DAE)				
HA9RX	"	2,155,852	1312	622
HAØLZ	"	14,118	85	78
HA8M	"	6,550	59	50
HA1AH	14	3,344,495	1911	833
HGØY	"	822,854	848	467
(OP: HA7GN)				
HG4I	"	620,118	704	423
HA8MD	7	113,856	237	192
HG8YKO	"	29,298	128	114
HA1TJ	3.7	1,035,500	819	500
HA2KMR	"	487,025	654	385
***HGØR**	A	2,183,704	1234	712
(OP: HAØNAR)				
*HA5PP	"	300,672	387	288
*HA8MV	"	54,720	174	144
*HA3FHH	"	25,470	101	90
*HA8KM	"	15,624	109	93
*HA4BF	"	10,800	84	75
*HA3FMR	"	10,608	88	78
*HA3HO	"	7,205	59	55
*HG2UK	"	4,545	53	45
***HA3HA**	14	83,528	278	212
_*HA5PT_	"	1,029	21	21
***HA6ZQ**	7	212,076	347	274
Iceland				
TF3T	A	3,343,725	1753	825
TF8KY	"	14,287	104	91
TF3W	14	551	19	19
***TF2MSN**	A	146,316	309	267
_*TF3SG_	"	221	13	13
***TF1AM**	14	49	7	7
Ireland				
EI6JK	A	188,672	293	268
EI9ØIRTS	"	132,820	315	229
(OP: EI9FVB)				
EI5KG	"	34,656	136	114
***EI4GNB**	A	721,056	798	464
*EI3CTB	"	123,136	320	208
*EI4II	"	120,800	251	200
*EI8GP	"	100,416	269	192
*EI9ES	"	30,016	164	112
*EI6IQB	"	1,260	33	30
*EI2HIB	"	630	21	18
***EI8KW**	21	12	2	2
***EI6KW**	14	28,178	169	146
Italy				
IR4M	A	10,922,415	3246	1055
(OP: IK4MGP)				
IO6A	"	5,014,710	2327	906
(OP: IK6QON)				
IBØL	"	4,172,004	1961	802
(OP: IKØETA)				
IUØOVB	"	3,288,267	1818	831
IK3UNA	"	3,040,112	1671	757
I5MXX	"	2,969,968	1496	716
II8M	"	2,794,520	1596	760
(OP: IZ8EYP)				
IR4K	"	2,308,320	1414	630
(OP: IZ4ZZB)				
IW1CHX	"	1,731,138	1315	654
IQ2VA	"	1,261,638	994	558
(OP: IK2LFF)				
IU3BTY	"	867,790	794	506
I1JTQ	"	663,884	689	442
4U9A	"	576,114	581	406
(OP: E73A)				
IB5B	"	496,510	618	410
(OP: IK5AEQ)				
IO4X	"	489,346	519	319
(OP: IK4ZGO)				
IV3UHL	"	449,174	579	374
I2OLV	"	332,150	420	325
IZ2ZOZ	"	314,000	477	314
IB6B	"	269,973	425	303
(OP: IZ6FXS)				
IZ6OUX	"	237,667	435	271
IR8M	"	227,265	481	327
(OP: IZ8CCW)				
IU2EFB	"	195,920	314	248
IU1FSL	"	150,732	324	237
IU4LEC	"	124,640	268	205
IZ3XEF	"	120,224	226	208
IQ5LV	"	115,648	262	208
(OP: IZ5EBL)				
IZ1SAI	"	115,596	300	228
IZ2ODM	"	97,188	196	182
IK2ANI	"	78,396	194	141
IZ2QGB	"	77,468	194	181
IK2FIR	"	72,000	185	144
IZ1HHT	"	67,200	194	160
I4XNN	"	48,498	146	118
IZ3VTH	"	38,628	118	116

IZ3ZLG	"	30,360	128	115
IO4T	"	28,620	120	90
(OP: IK4VET)				
IO4M	"	25,252	118	107
IZ2LQD	"	18,382	101	91
IK3XJP	"	18,330	81	78
IZ1GCV	"	16,920	108	94
IW3FVZ	"	13,320	78	74
IK7ZLW	"	10,833	71	69
I1DXD	"	10,812	70	68
IZ8EQG	"	4,944	54	48
IV3VFR	"	2,842	34	29
IK5FKF	"	2,484	39	36
IZ1MLS	"	1,850	27	25
IU7OTK	"	1,650	24	22
IU7QCH	"	1,400	22	20
IK2QIN	"	1,134	21	21
IU2LVV	"	450	10	10
IV3IPA	"	231	14	11
IU8IYE	"	35	5	5
IZØCVF	28	40,144	146	104
IWØBCF	"	37,168	146	101
I3JKI	"	33,756	128	97
IZ4REF	"	5,940	49	44
IV3ZYB	21	456,456	484	364
IZØPAU	"	386,242	478	313
IZ6JTZ	"	301,781	385	307
IK4POI	"	120,192	238	192
IWØHLZ	"	83,398	206	161
IR4E	"	22,172	97	92
(OP: IK4ZHH)				
IO3M	14	839,876	880	514
(OP: IU3PMA)				
IQ2MI	"	555,972	603	428
(OP: IZ2BMM)				
IZ2GNQ	"	416,898	553	414
IQ5GR	"	413,875	565	385
IR4X	"	406,000	595	400
(OP: IT9RGY)				
IR8I	"	309,572	538	386
IR8O	"	161,250	413	258
(OP: IZ8GCB)				
IC8POF	"	73,153	235	191
IZ2ZQP	"	32,130	143	126
IZ4UFG	"	14,276	84	83
IZ2JCD	"	7,680	64	64
IK2YFT	"	5,555	57	55
I3/OE6MBG	7	1,186,515	774	495
IX1HPN	"	813,954	887	463
IZ2BVC	"	555,733	727	383
IZ8GUQ	"	311,933	499	311
IN3AHO	"	39,480	161	140
IK1VQY	"	5,490	46	45
I4AVG	3.7	1,016,060	843	503
IZ4TOA	"	49,984	172	142
*IK4RQJ	A	820,800	747	480
*IU1NKS	"	713,680	723	440
*IZ2OOS	"	243,360	393	288
*IU1MRG	"	237,888	407	288
*IK2SAR	"	232,086	350	282
*IUØDHV	"	150,495	308	237
*IK6GPZ	"	143,750	291	230
*IW2FUT	"	142,065	304	231
*I4ABG	"	137,344	300	232
*IW5ECP	"	112,463	254	211
*I2BRT	"	103,916	216	166
*IW2NBL	"	102,968	276	211
*IU1OPK	"	97,704	241	184
*IZ2BKA	"	94,464	233	192
*IKØVSY	"	86,907	224	177
*IU7IGI	"	82,476	202	158
*IZ1AEL	"	82,290	236	195
*IU2JWF	"	79,686	214	171
*IU4MTO	"	78,489	201	171
*IU5KRE	"	74,481	224	183
*IV3JAK	"	71,632	210	176
*IZØCKJ	"	62,208	202	162
*IW2BZY	"	58,916	166	143
*IZ7ZKV	"	57,600	279	192
*IU1FIB	"	48,672	171	144
*IZ3PYR	"	44,992	170	152
*IZ3XNJ	"	43,885	156	131
*IU2NKC	"	39,480	161	140
*IN3IGL	"	39,151	151	119
*IK8ARF	"	37,926	153	126
*IK4QJF	"	36,108	128	118
*IU8JPG	"	36,005	130	95
*IQ5LI	"	34,860	131	105
*IU5HES	"	34,163	134	127
*IU7GRA	"	32,092	125	113
*IU2DGV	"	30,552	131	114
*IU1PZX	"	30,324	135	114
*IW3RPS	"	29,748	118	111
*I2IOJ	"	28,476	130	113
*IZ8CLM	"	27,730	99	94
*IW1DQS	"	27,250	135	109
*IU3OCN	"	25,441	116	103
*IWØAZS	"	24,969	103	87
*IK6OIN	"	22,659	105	91
*I1YGQ	"	21,890	123	110
*IZ4KAN	"	20,928	100	96
*IU3GKJ	"	20,880	90	87
*IK2ZJJ	"	20,088	104	93
*IW1RLC	"	19,665	103	95
*IK2AUK	"	19,502	109	98
*IZ1YTK	"	18,810	110	90
*IZ5FSA	"	18,056	82	74
*IN3HDE	"	16,950	124	113
*IZ3KNK	"	16,430	80	62
*IU7EDX	"	16,008	99	87
*IW2ENA	"	15,939	91	69
*IU1IMC	"	15,624	82	72
*IU2CVS	"	13,802	78	67
*IU5CJP	"	13,736	78	68
*IW2MYG	"	12,900	90	86
*IK4MTF	"	12,489	79	69
*IW3RPW	"	11,700	92	90
*IU6DVS	"	10,492	74	61
*IZ1ZJO	"	9,694	84	74
*IQØPH	"	9,184	98	82
*IK2MMM	"	8,568	63	56
*IK8DYM	"	8,448	74	66
*IW3SOA	"	8,246	66	62
*IZ2NYY	"	8,064	58	56
*I1RB	"	8,056	76	76
*IW2OEV	"	7,860	62	60
*IU8CFS	"	7,410	68	65
*IWØAEN	"	7,332	59	52
*IZ6WSJ	"	7,320	63	60
*IK2RLS	"	7,314	54	53
*IN3IIR	"	7,254	69	62
*IZ2KWV	"	6,240	65	60
*IZ1GRH	"	5,418	44	43
*IU4FKM	"	5,311	52	47
*IK2YSJ	"	4,230	53	47
*IZ2YNB	"	4,002	49	46
*IK8YFU	"	3,885	39	37
*IK3XTT	"	3,567	45	41
*IZ2BHQ	"	3,360	35	32
*IU4KET	"	2,881	48	43
*IN3MNS	"	2,640	40	40
*IZ1MDJ	"	2,623	43	43
*IU2IQX	"	2,465	29	29
*IK3MLF	"	2,214	29	27
*IW5DPF	"	2,002	26	26
*IW1RLS	"	1,984	31	31
*IU2HEE	"	1,798	30	29
*IU1OLR	"	1,736	30	28
*IZ1EOP	"	1,610	24	23
*I6FDJ	"	1,575	35	35
*IW1RGP	"	1,450	30	29
*IU1PZC	"	1,428	35	34
*IK2IKW	"	1,296	28	27
*IU2LTO	"	1,274	28	26
*IWØEZW	"	1,066	27	26
*IW3HV	"	966	26	23
*IU1OQZ	"	936	24	24
*IK3XTV	"	774	19	18
*IU3OCW	"	672	19	16
*IZ5AXV	"	455	15	13
*IU3PDF	"	455	14	13
*IW2MXO	"	288	12	12
*IZ4BKK	"	220	11	11
*IZ5IOM	"	117	9	9
*I2RBR	"	102	6	6
*IU2LVS	"	90	7	6
*I5FIP	"	70	8	7
*IU2PKQ	"	56	9	8
*IK6XEJ	"	40	4	4
*IK1VQO	"	32	8	8
*IW2KIC	"	16	4	4
*IK5AMB	28	20,748	97	76
*IK4LFI	"	15,436	83	68
*IZ2ABI	"	4,720	42	40
*IV3DLW/P	"	1,898	29	26
*IU1CKN	"	1,725	29	23
*IR4Q	"	1,679	25	23
(OP: IU4MRU)				
*IC8FBU	"	912	19	16
*IU4CSS	"	12	2	2
*IZØCOG	21	66,015	185	163
*IU4HMY	"	44,125	141	125
*IKØEIE	"	22,446	87	86
*IZ5ILK	"	7,644	52	49
*IQ2DN	14	342,370	514	365
(OP: IZ2JQP)				
*IV3JAG	"	143,510	339	254
*IZ8EFD	"	101,465	371	223
*IR8L	"	89,640	403	216
(OP: IZ8GNR)				
*IUØDUM	"	63,180	274	195
*IK2ODD	"	59,760	174	166
*IU1JFH	"	1,219	23	23
*IZ1GLX	"	192	12	12
*IW2NOO	"	100	10	10
*IU7CUE	7	102,910	247	205
*IV3EAD	"	75,900	189	165
*IK7NXU	"	65,860	179	178
*IK7JVE	"	30,876	137	124
*IV3APH	"	22,680	119	108
*IUØOPT	"	19,760	98	95
*IU3EDK	"	19,600	111	100
*IV3RYP	"	7,810	56	55
*IZ3CTT	"	162	9	9
*IU4OAY	"	8	2	2
*IR4P	3.7	60,164	203	169
*IK1PMR	"	45,540	159	138
*IZ5OVP	"	78	13	13
*IB5A	1.8	18	3	3

Latvia

YL2KO	A	130,622	350	241
YL9T	"	1,938	40	38
YL2VW	"	1,344	24	24
YL3FT	1.8	170,586	354	243
*YL2EA	A	89,820	239	180
*YL3AND	"	44,697	161	141
*YL3GY	"	21,105	123	105
*YL2NK	"	14,027	95	83
*YL3IR	"	588	14	14
*YL5W	21	83,496	217	168
(OP: YL2GN)				
*YL2LW	"	39,606	150	123
*YL2PP	"	21,449	93	89
*YL7X	7	537,420	551	390
(OP: YL2LY)				

Liechtenstein

HBØDX	A	678,944	781	433
(OP: DL2JRM)				
HBØWR	"	175,134	296	202
HBØ/DF8DX	14	1	1	1
*HBØY/DO6XX	3.7	50	5	5

Lithuania

LY5AX	A	1,942,752	1337	686
LY2MM	"	683,397	700	429
LY1LB	"	348,492	483	339
LY2N	"	114,268	273	212
LY9Y	"	103,964	233	188
LY7M	"	102,438	264	189
LY4T	"	78,300	221	174
LY3CY	"	77,605	260	187
LY4OO	"	36,771	133	119
LY2K	"	22,880	102	88
LY2BAW	"	2,175	33	25
LY1R	28	54,990	161	130
LY5W	14	2,564,688	1693	816
LY4A	"	50,100	190	150
*LY4L	A	3,670,144	2103	848
*LY5XX	"	710,240	812	460
*LY2TS	"	528,295	586	415
*LY5BT	"	213,890	460	293
*LY2GN	"	91,364	227	182
*LYØNAS	"	51,009	186	147
*LY2DX	"	49,319	177	149
*LY1NDN	"	13,968	101	97
*LY4MP	"	1,300	28	26
*LY4BF	21	7,896	67	56
*LY3S	"	4,472	44	43
*LY3AB	14	52,700	202	170
*LY1ILY	7	4,770	49	45
*LY4Q	"	6	1	1

Luxembourg

LX1HD	7	127,926	232	207
*LX1ER	A	386,482	458	346

Malta

*9H5DX	A	167,753	297	227
*9H/TA1HZ	7	1,104	25	24

Moldova

*ER3CT	A	201,216	397	262
*ER1JA	14	32,918	196	151

Monaco

*3A/IK1TTD	7	19,190	133	95

Netherlands

PA3AAV	A	951,792	836	502
PC2T	"	366,242	470	298
PA6AA	"	346,692	447	346
(OP: PB7Z)				
PD9X	"	287,986	439	311
PE1PIX	"	249,854	391	277
PA3ETM	"	243,860	365	274
PAØMIR	"	238,960	393	290
PAØGJV	"	163,098	292	234
PA1BD	"	155,710	307	230
PC4H	"	84,280	240	196
PA4GDR	"	84,224	244	188
PA7FK	"	56,240	188	148
PA3ELQ	"	41,022	147	129
PI4FL	"	29,890	138	122
PA9JO	"	19,200	103	96
PA3ADU	"	13,790	77	70
PA3J	"	5,232	51	48
PA3EWP	21	1,559,019	1051	561
PE1GWX	14	19,548	127	108
*PA9M	A	1,725,456	1088	618
*PC3T	"	1,597,200	1018	600
*PG7M	"	595,448	591	434
*PE4BAS	"	475,488	545	381
*PC1PM	"	423,336	604	372
*PE1EWR	"	416,628	537	326
*PD1RO	"	352,256	499	344
*PD4RD	"	340,366	465	338
*PA8KW	"	239,476	366	274
*PA65UL	"	211,806	385	287
(OP: PA5UL)				
*PF1SCT	"	181,473	361	251
*PA7KY	"	146,746	311	239
*PH5M	"	143,166	297	223
*PEØCD	"	130,390	293	221
*PAØKDV	"	129,360	297	210
*PD7V	"	128,255	303	227
*PC4AD	"	128,133	285	207
*PA2JCB	"	112,404	263	204
*PD1RP	"	109,080	248	202
*PA3EVY	"	106,420	220	170
*PD5ISW	"	105,930	297	214
*PE1FTV	"	97,218	252	198
*PG1R	"	89,110	253	190
*PDØME	"	88,356	245	199
*PA3BUD	"	72,252	195	162
*PD5S	"	72,210	208	166
*PDØMHZ	"	70,560	221	180
*PA3CGJ	"	68,400	237	180
*PH4E	"	62,484	202	164
*PA2CVD	"	60,204	220	173
*PD7K	"	58,080	191	165
*PAØPIW	"	57,619	202	157
*PDØTB	"	56,561	194	163
*PDØJMH	"	52,965	194	165
*PA3DTR	"	50,112	182	144
*PA1BK	"	44,574	146	138
*PA3MM	"	42,700	144	122
*PA3DNA	"	39,930	145	121
*PA9LUC	"	38,610	157	130
*PA3BQP	"	37,632	143	128
*PA2VS	"	36,036	151	132
*PD1ABO	"	35,750	160	130
*PD6Z	"	35,245	157	133
*PA3ARM	"	34,688	145	128
*PA2Z	"	31,850	147	130
*PA6Q	"	30,996	149	126
(OP: PC9F)				
*PA1VS	"	30,360	132	115
*PG7R	"	28,980	146	126
*PA7TG	"	28,917	149	119
*PDØWVB	"	28,575	151	127
*PD2TW	"	23,210	117	110
*PC5D	"	22,220	122	110
*PA5W	"	21,917	106	101
*PE1OBL	"	21,624	116	106
*PD2DVB	"	19,800	104	90
*PA1TO	"	17,955	108	95
*PC4K	"	17,765	105	95
*PA9RW	"	15,958	84	79
*PI4DLZ	"	14,320	97	80
(OP: PH4E)				
*PG6F	"	12,672	105	88
*PA5P	"	12,040	88	86
*PA3EWG	"	11,039	94	83
*PC7E	"	10,773	92	81
*PA3GEO	"	8,556	73	69
*PE1HWO	"	6,272	57	56
*PEØCWK	"	5,243	53	49
*PD1AK	"	5,032	46	37
*PAØTCA	"	4,551	41	41
*PA8VK	"	4,508	49	46
*PA4DN	"	4,324	51	47
*PE1LDS	"	3,900	50	50
*PAØMJM	"	3,174	49	46
*PDØFK	"	2,924	46	43
*PD5ML	"	1,464	25	24
*PA3DDP	"	1,326	26	26
*PD4V	"	1,200	20	20
*PAØCT	"	1,118	26	26
*PD1BHZ	"	940	21	20
*PA1JN	"	924	29	28
*PD4BER	"	891	27	27
*PA2WLE	"	693	21	21
*PDØYL	"	589	21	19
*PD5JOS	"	558	18	18
*PA1SJP	"	60	6	6
*PD3RFR	"	54	6	6
*PA2LO	21	8,798	56	53
*PAØJED	"	1,403	23	23
*PI4F	"	12	2	2
*PD8DX	14	219,773	399	269
*PDØMGX	"	19,838	126	109
*PE1MCF	"	7,488	82	72
*PA4OES	"	5,896	74	67
*PI4IPA	"	928	30	29
*PD9CT	"	812	32	29
*PA2ADX	"	315	23	21
*PE1LTY	7	1,800	30	30

North Macedonia

Z33B	21	11,607	83	73
*Z35M	A	92,720	262	190
*Z32ZZZ	"	14,168	93	77
*Z34PEC	"	4,004	53	52
*Z3ØA	"	324	16	12
*Z33F	14	17,120	118	107

Northern Ireland

MI1A	A	91,323	275	219
(OP: MIØULK)				
MIØGTA	21	55	5	5
*MIØI	A	349,888	525	352
*2IØWMN	"	67,512	243	174
*MIØOBC	"	56,235	211	163
*GI7NKK	"	24,563	149	121

Norway

LC5Z	A	2,224,310	1568	730
(OP: LB5GI)				
LA1ØØB	"	1,471,974	1145	606
(OP: LA6VQ)				
LA9TY	"	681,768	691	408
LA2AB	"	511,336	671	397
(OP: LB4UH)				
LA8OM	"	475,774	663	377
LA4WKA	"	254,448	433	279
LA6ZP	"	232,218	441	266
LC5C	"	154,710	396	270
(OP: LA6KOA)				
LA8IM	"	48,763	166	143
LB6VI	"	26,840	140	122
LC5L	"	21,917	113	101
(OP: LB4FH)				
LB6KC	21	1,144	26	26
*LA3BPA	A	189,837	350	267
*LC9A	"	186,624	377	288
*LA7WRA	"	175,864	427	247
*LA2Z	"	88,816	240	182
(OP: LA9JRA)				
*LA7TN	"	63,627	229	167
*LA2HFA	"	61,824	225	168
*LBØFI	"	51,660	197	164
*LB4YI	"	30,302	129	109
*LA9RY	"	18,139	114	97
*LB4ZI	"	16,268	97	83
*LA8RTA	"	9,918	98	87
*LB6UH	"	2,250	31	30
*LA5YJ	21	101,772	230	198
*LAØGE	14	13,774	102	97

Poland

SN7Q	A	7,401,334	2751	982
(OP: SP7GIQ)				
SN7D	"	6,488,024	2709	953
(OP: SQ7D)				
SN8Z	"	2,796,015	1831	795
(OP: SP8KP)				
SP3HLM	"	1,486,636	955	631
SQ7BFC	"	1,221,045	992	609
SP6JZL	"	1,069,634	848	514
SQ7CL	"	935,300	979	470
SN7R	"	853,376	971	472
(OP: SP7RFF)				
SP1NY	"	804,608	719	449
SP7TEE	"	381,463	489	323
SO3O	"	373,584	513	344
SP4LVG	"	315,798	418	309
SP5GNI	"	154,108	317	236
SP4Z	"	150,079	275	223
SP6A	"	146,466	315	237
SP9DTE	"	135,648	297	216
SQ8N	"	76,347	181	153
SP1JQJ	"	69,324	194	159
SQ2A	"	68,376	170	154
SP6OH	"	54,568	186	152
SO5N	"	53,108	174	142
(OP: SP5BMU)				
SP3HRN	"	35,332	141	121
SP3A	"	17,550	103	90
SP8AB	"	13,690	88	74
SN8V	"	10,191	87	79
(OP: SP8HPW)				
SP6MAA	"	5,332	46	43
SQ6LJV	"	867	17	17
HF2R	"	378	14	14
SP6AEG	28	7,452	56	46
SP9JBE	"	1,140	20	19
SN2B	21	4,138,952	1905	824
(OP: SP2WKB)				
SP2JMR	"	47,343	147	129
SP3JUN	"	1,575	25	25
SP3CMX	"	273	15	13
SO7M	14	476,630	708	385
(OP: SP7/UY5ZZ)				
SP3P	"	330,252	495	348
SP9EML	"	82,212	236	186
SP8BQL	"	23,730	124	113
SP7IFM	"	15,106	128	91
SQ3WW	"	11,473	81	77
SP2MKI	"	11,023	87	73
SO5L	"	2,556	37	36
(OP: SP5WIT)				
SP5ENA	"	3	1	1
SN3A	7	6,586,840	2095	956
(OP: SP3GEM)				
SP3J	"	670,096	713	434
SP9EJH	"	208,810	367	266
HF6R	"	151,348	332	241
SP7MU	"	143,220	298	231
SO4P	3.7	19,458	97	94
(OP: SP4DEU)				
SP3SLU	"	11,644	92	71
SP8K	1.8	544	17	17
*SP2GMA	A	598,728	714	404
*SP7Y	"	589,239	682	423
*SN8J	"	576,243	643	387
(OP: SP8ALT)				
*SP5UFK	"	465,561	619	387
*SO9B	"	339,552	524	324
(OP: SQ9IUB)				
*SQ9PUW	"	267,484	464	287
*SN3J	"	249,050	438	293
(OP: SP3DAT)				
*SP5TE	"	218,680	414	284
*SQ7OVT	"	154,584	322	228
*SP8BDF	"	142,016	321	224
*SO9P	"	114,851	255	197
*SP5UGP	"	113,280	252	192
*SP6U	"	112,140	279	210
*SO5V	"	109,005	257	215
(OP: SQ5PMB)				
*SN7F	"	96,822	268	198
(OP: SP7AH)				
*SP8GNF	"	95,550	231	182
*SP7TEX	"	84,796	219	172
*SP3BKR	"	82,944	246	192
*SP7SF	"	70,884	202	179
*SP9ODM	"	54,479	197	157
*SQ5DTL	"	53,793	178	139
*SQ6POC	"	42,525	152	135
*SQ3POS	"	38,280	160	120
*SN4D	"	36,039	146	123
(OP: SP4GAP)				
*SP9HZW	"	35,775	150	135
*SQ2ZE	"	35,644	151	134
*SQ5WH	"	34,432	156	128
*SQ9CXC	"	30,444	130	118
*SN5WD	"	30,226	153	119
(OP: SO5WD)				
*SP7JDI	"	29,412	141	129
*SP6NIV	"	28,016	135	103
*SP5BN	"	24,288	127	96
*SP9BMH	"	23,712	136	114
*SP6MI	"	21,836	122	106
*SP9GMI	"	21,060	99	78
*SP2MHS	"	20,094	113	102
*SP2GCE	"	19,894	110	98
*SP4SP	"	17,820	114	99
*SP3GTP	"	16,728	98	82
*SQ9MR	"	16,643	105	89
*SQ3TGN	"	15,485	105	95
*SP9IHP	"	15,314	79	62
*SP6DHH	"	15,228	100	94
*SP2TQQ	"	13,932	96	86
*SQ3IOE	"	13,760	95	80
*SP2WGB	"	13,440	93	84
*SN3N	"	12,825	87	75
(OP: SP3ATB)				
*SP2DKI	"	12,264	66	56
*SP5LCT	"	12,136	96	82
*SP2AYC	"	10,553	69	61
*SP6ARC	"	10,336	82	76
*SQ1BHH	"	9,685	69	65
*SP7LK	"	8,280	79	72
*SQ1WO	"	8,174	68	61
*SP1GDK	"	7,350	53	50
*SQ7BCN	"	5,984	49	44
*SP3SFM	"	5,800	54	50
*SP9DLS	"	5,643	62	57
*SQ9JXO	"	3,807	53	47
*SP9FMP	"	3,555	48	45
*SP3BVI	"	2,574	34	33
*SP3WKW	"	1,152	20	18
*SP3BBS	"	765	17	17
*SQ3R	"	714	17	17
*SQ5LTA	"	390	13	13
*SP3PGX	"	196	14	14
(OP: SP3LM)				
*SQ1BVG	"	168	13	7
*SP6JOE	28	12,711	77	57
*SNØW	"	8,100	58	50
(OP: SQ9HQ)				
*SNØR	"	1,071	21	17
(OP: SQ9IAU)				
*SQ9BQW	"	429	13	13
*SP9XCN	21	357,599	429	319
*SP3W	"	42,592	132	121
*SP3LD	"	13,650	75	70
*SQ8BGR	"	5,544	48	44
*SP5LGN	"	2,516	34	34
*SP4TB	"	2,460	30	30
*SP6GTN	"	1,281	21	21
*SQ9GOL	"	931	23	19
*SP3FSM	"	720	18	18
*SP/UT5UT	14	164,934	385	294
*SP9MAT	"	88,200	233	200
*3Z6V	"	70,288	262	184
(OP: SP6DVP)				
*SP8CGU	"	24,840	145	120
*SP2GR	"	17,201	129	103
*SP3PW	"	16,910	112	95
*SP4SAF	"	16,320	118	102
*SP3QFZ	"	5,766	71	62
*SO1MK	"	5,280	66	60
*SP3BAH	"	4,592	64	56
*SP8PA	"	3,402	63	54
*SP9TS	"	456	24	19
*SP3AYA	7	442,603	527	371
*SP7JS	"	114,784	254	211
*SP3DFB	"	50,268	162	142
*SP8BRT	"	22,172	97	92
*SP9MX	"	18,957	92	89
*SP6EIY	"	7,623	65	63
*SQ8AL	"	5,472	50	48
*SQ5NPX	"	2,108	33	31
*SP1FRC	"	2	1	1
*SN9B	3.7	497,168	640	386
(OP: SQ9OB)				
*HF7A	"	256,650	434	295
*SP4SHD	"	165,912	326	248
*SP4AWE	"	75,116	233	178
*SQ6H	"	27,911	135	113
(OP: SQ6PLH)				
*SP2BP	"	1,215	27	27
*SQ8MFM	1.8	71,307	227	171
*SQ9PPT	"	1,080	24	24

Portugal

CR6K	A	13,808,760	4348	1190
(OP: CT1CJJ)				
CR6T	"	9,120,174	3050	938
(OP: CT1ESV)				
CT7AHV	"	914,746	740	446
CT1GFK	"	380,443	431	391
CT1ENV	"	367,628	444	292
CT1DSV	"	352,885	457	305
CR6E	"	250,822	403	286
(OP: CT7AIX)				
CT7AKW	"	106,326	232	198
CT2IFE	"	21,525	115	105
CT1EBM	"	14,094	93	81
CT1BWO	"	1,470	23	21
CT1BOL	28	142,494	286	187
CT2GFJ	21	210,600	398	325
CT1AL	7	8,745	58	55
*CT7AQF	A	485,545	618	361
*CT2IMG	"	333,120	444	320
*CT2JBD	"	166,140	419	284
*CT2HUU	"	62,930	187	155
*CR7AWL	"	17,266	98	89
*CS7AUC	"	11,305	93	85
*CS7AMC	"	10,868	81	76

*CT5GOJ	28	5,376	46	42
*CT1BWW	21	184,009	319	271
*CT1EEK	14	152,438	341	286
*CS2F	"	51,620	182	178
		(OP: CT1FOQ)		
*CT7AKG	"	81	9	9
*CT1BXT	7	82,998	178	159
*CR7BCY	"	18	3	3

Republic of Kosovo

Z62FB	A	31,330	162	130
*Z62NS	A	1,365	37	35

Romania

YPØC	A	3,819,392	2234	848
		(OP: YO3CZW)		
YO7WC	"	3,003,620	1763	839
YO8BDW	"	1,086,185	1061	545
YO8SBQ	"	1,039,515	1122	555
YO4NF	"	808,128	1016	488
YO5ER	"	706,605	938	489
YO9HP	"	357,725	539	349
YO4HAB	"	210,630	452	295
YO9AYN	"	189,952	331	256
YO7CW	"	118,144	274	208
YO2AA	"	93,055	250	185
YO3GNF	"	76,208	239	176
YO3CIY	"	13,608	101	84
YP1D	28	76,230	221	126
		(OP: YO4RIU)		
YO2LEL	"	5,016	44	38
YO3HOT	21	90,500	204	181
YO9XC	"	21,930	127	102
YQ6A	7	1,721,844	1020	596
		(OP: YO6BHN)		
YO3RU	"	368,165	511	335
YR8D	3.7	923,018	813	478
		(OP: YO8TTT)		
*YO7SR	A	1,031,345	981	553
*YO6GUU	"	550,206	866	443
*YR2X	"	446,796	542	378
		(OP: YO2LEA)		
*YO4DG	"	240,994	426	299
*YO9IAB	"	235,188	437	278
*YO6BLM	"	142,320	342	240
*YO7ARZ	"	129,986	279	206
*YO5QDI	"	117,334	307	203
*YO2LTA	"	80,545	221	181
*YO6MP	"	50,402	191	158
*YO7OWI	"	45,474	173	143
*YO6HSU	"	42,799	153	127
*YO6DBL	"	41,340	149	130
*YO4AAC	"	40,500	182	135
*YO6QCD	"	36,820	182	140
*YO5PVZ	"	30,875	152	125
*YO5DGE	"	30,003	155	137
*YO8SFF	"	26,676	138	117
*YO2DFA	"	18,630	102	90
*YO9GDN	"	18,330	85	78
*YO2MOO	"	13,113	111	93
*YO3GCL	"	3,680	44	40
*YO3VU	"	2,176	33	32
*YO5BXI	28	2,511	33	27
*YO4FZX	"	2,100	28	25
*YO3ND	21	19,176	112	94
*YO3GK	"	5,454	67	54
*YO9FLL	"	117	9	9
*YO5AVN	"	55	5	5
*YP3A	14	504,334	912	461
		(OP: YO3GOD)		
*YO3HEX	"	88,165	351	229
*YO8RCN	"	34,602	181	146
*YO5PAP	"	23,205	153	119
*YO9GR	"	9,222	108	87
*YO6LA	"	8,134	94	83
*YO8PUF	"	108	13	12
*YO8THR	"	100	10	10
*YO3JW	7	37,994	131	121
*YO2MJZ	"	12,337	77	73
*YO8BGD	"	6,812	54	52
*YO6DMR	"	1,092	28	28
*YO7MSJ	"	2	1	1
*YO8RZJ	1.8	3,315	43	39

Sardinia

*ISØLYN	A	37,570	148	130
*ISØDJA	7	13,224	81	76

Scotland

MM2N	A	4,332,444	2123	892
		(OP: MMØGPZ)		
MM9I	"	3,887,952	2002	856
MMØAOQ	"	1,285,856	1220	562
GM5BDX	"	139,605	296	227
GM4ZUK	"	114,202	238	179
GS2MP	"	78,050	195	175
		(OP: GM3WOJ)		
GM4OIJ	"	15,543	117	99
MMØGGG	"	4,947	58	51
MMØTFU	28	11,682	66	59
GM2Y	14	4,050	48	45
		(OP: MMØDXH)		
*2MØKIE	A	207,944	440	278
*GM4NNC	"	24,336	146	117
*MM2T	"	19,788	114	97
*MM7TXY	"	6,580	76	70
*2MØSVM	"	5,040	62	60
*MMØINH	21	19,890	101	90
*MM7DMW	14	2,756	57	52

Serbia

YTØC	A	4,098,870	2041	855
YT3D	"	2,699,892	1518	702
YT6X	"	501,028	530	386
YU7KW	"	90,712	219	184
YT8WW	28	323,072	468	256
YU7BW	21	1,226,645	911	505
YT9A	"	185,562	311	234
YT7X	"	22,880	100	88
		(OP: YU7CF)		
YT2ISM	14	357,822	693	386
YT2ZZ	7	100,440	221	186
YU1LD	3.7	447,426	589	371
YT8A	1.8	151,164	321	234
YT7B	"	64,800	209	160
*YU5R	A	271,432	393	296
			(OP: YT3PL)	
*YU4GUV	"	27,972	132	111
*YT2MMP	"	27,000	147	120
*YU6TM	"	21,008	112	101
*YT3RAW	"	20,544	108	96
*YU4PTL	"	6,901	78	67
*YU4SAX	"	99	9	9
*YT3T	28	5,168	46	38
*YU5M	14	866,848	1048	526
*YT7E	"	255,125	579	325
*YT5LD	"	48,672	256	156
*YU7XW	"	10,000	93	80
*YU1ML	"	651	21	21
*YT4ZZ	7	90,574	203	179
*YU4BAH	"	12,358	78	74
*YU4VIK	"	9,984	65	64
*YU4DON	"	4,095	47	45
*YU5T	"	2,176	33	32
*YT5ANA	3.7	134,775	285	225
*YU4SRB	"	7,992	77	74
*YU1P	1.8	3,157	42	41

Sicily

IT9ESW	A	184,402	324	274
IT9OPR	"	178,269	329	273
IT9DWF	"	360	15	15
IR9W	28	576,312	610	354
IB9T	21	4,502,181	1943	919
		(OP: IT9BLB)		
IB9A	"	3,004,566	1591	762
		(OP: IT9RBW)		
IO9R	"	640,920	696	436
		(OP: IT9YAO)		
IO9J	"	149,151	323	249
IT9STX	14	1,704,516	1600	698
*IT9FIQ	A	271,152	523	336
*IT9HTV	"	232,845	431	285
*IT9AJP	"	130,895	299	235
*IT9IRL	"	108,112	322	232
*IT9BGE	"	62,118	223	174
*IT9IVU	"	53,200	177	140
*IT9GHW	"	18,144	87	81
*IT9BYS	"	4,692	52	46
*IT9LKX	"	3,774	58	51
*IT9AZK	"	2,346	36	34
*IT9PHU	"	275	11	11
*IT9NSM	"	153	9	9
*IT9ORA	"	128	8	8
*IT9IHB	21	33,677	129	119
*IF9A	14	1,473,435	1499	685
		(OP: IT9WDC)		
IR9Z	"	232,848	617	336
		(OP: IT9VCE)		
*IT9CAR	"	131,104	428	272
*IT9DGG	"	86,645	321	215
*IR9K	7	28,024	120	113
		(OP: IT9KXK)		

Slovak Republic

OMØR	A	11,956,947	3430	1183
		(OP: OM3GI)		
OM7M	"	10,646,913	3210	1093
		(OP: SP9LJD)		
OM7RU	"	4,483,068	1883	851
OM1DK	"	1,217,680	988	491
OM4KK	"	809,008	841	472
OM3CPF	"	311,311	492	311
OM3CW	"	236,368	401	272
OM7LM	"	46,835	168	145
OM6MW	"	26,432	138	112
OM5WW	7	1,381,575	952	545
*OM6DN	A	545,652	653	414
*OM4IK	"	279,174	457	289
*OM1EE	"	120,830	308	215
*OM3KHT	"	114,268	283	212
		(OP: OM6AT)		
*OM2DT	"	112,761	278	201
*OM7AG	"	98,857	288	209
*OM1AKU	"	69,888	202	182
*OM7ANT	"	58,072	165	136
*OM1AVV	"	43,928	144	136
*OM8ST	"	27,610	136	110
*OM7AHJ	"	20,910	98	85
*OM6APR	"	19,491	103	89
*OM8AA	"	4,558	59	53
*OM1WS	"	3,666	48	47
*OM7AT	"	3,388	49	44
*OM6ABF	21	330	11	10
*OM8JP	14	15,717	101	93
*OM2AGN	"	2,376	36	36
*OM7LW	"	1,012	22	22
*OM1ST	7	32,376	124	114
*OM6TX	3.7	116,413	265	209
*OM6MM	"	80,892	221	189
*OM8ATS	"	29,631	131	119

Slovenia

S52WW	A	1,729,152	1188	632
S53K	"	945,770	848	458
S5ØLD	"	754,820	570	470
S53M	"	616,217	693	329
		(OP: S51FB)		
S55G	"	29,832	129	113
S56NE	"	23,232	107	96
S51DX	"	11,147	86	71
S53F	"	3,895	41	41
S56B	28	12,744	82	54
S57AL	21	3,633,336	1706	801
S5ØR	"	3,073,364	1570	742
S55OO	14	5,343,618	2500	987
S57DX	"	4,528,907	2317	883
S5ØK	"	2,445,696	1638	704
S51YI	7	5,129,552	1776	848
S51CK	"	3,442,944	1584	768
S53O	1.8	196,238	386	262
S54ZZ	"	165,808	352	241
*S55X	A	770,377	733	443
*S53KS	"	61,760	199	160
*S55KA	"	58,188	196	156
*S5ØPB	"	51,623	169	143
*S57WW	"	19,260	106	90
*S57KM	"	11,286	73	66
*S58D	"	10,920	68	60
*S57C	14	4,370	49	46
*S53MR	7	382,200	503	350
*S57O	"	20,240	93	88
*S56C	"	5,076	48	47
*S55BA	3.7	95,149	251	193

Spain

EB5A	A	8,089,416	2584	918
EA1L	"	4,402,632	2120	822
EA4KD	"	3,473,331	1692	699
EA3CI	"	3,165,304	1766	776
EA1SA	"	2,745,360	1460	738
EA3AR	"	2,663,038	1457	679
EA2DMH	"	1,256,283	1087	621
EA7DHT	"	779,466	925	489
EA7BD	"	675,555	721	435
EA3PT	"	656,320	620	448
EA1U	"	590,187	612	409
ED4T	"	550,710	619	435
		(OP: EA4R)		
EA4HPY	"	392,392	532	392
EC1T	"	374,946	454	286
EA2XR	"	336,930	464	330
EA3AER	"	287,793	436	297
EA1BNF	"	269,374	365	271
EC3AIT	"	255,080	366	280
EA1FDJ	"	223,340	399	260
EF5T	"	216,495	404	283
		(OP: EA5JDN)		
EA2CCG	"	203,524	404	292
EA1UR	"	127,462	282	202
EA3OW	"	77,824	192	152
EA1DA	"	55,300	198	158
EE4Y	"	49,104	138	132
EA7BUU	"	9,845	63	55
EA7IWX	"	1,440	28	24
ED3X	28	67,693	189	139
		(OP: EA3QP)		
EA7MT	"	9,744	62	56
EA3C	"	6,407	51	43
ED3B	"	*6,192*	*53*	*48*
		(OP: EA3BOX)		
EE7K	"	5,809	55	37
ED3C	21	938,501	765	463
		(OP: EA3IBV)		
EE7P	"	486,414	618	443
EF5U	"	376,270	571	382
EA4DW	"	265,862	348	307
EC5K	"	166,335	329	195
EC5C	"	133,703	267	227
EA3OH	"	58,293	163	153
EA5J	"	28,815	149	113
EA2DDE	"	21	3	3
ED3E	14	1,298,529	1243	647
		(OP: EA3AQ)		
EA7KI	"	758,350	1010	523
EA1WH	"	493,050	684	475
EA7Q	"	408,128	767	448
EA7TS	"	203,952	483	336
EC5CC	"	45,000	212	180
EA3ILM	7	1,872	36	36
ED5R	3.7	1,763,055	1013	579
		(OP: EA5Z)		
EE7L	"	1,110,340	854	490
		(OP: EA7HLU)		
EA1IT	1.8	18,860	108	92
*EE7E	A	1,637,124	1356	681
*EA4EUI	"	670,636	699	431
*EA5W	"	362,838	504	326
*EA7EQ	"	301,070	449	322
*EA3CO	"	262,260	431	279
*EA1G	"	252,990	346	270
*EF3T	"	243,388	376	284
		(OP: EA3T)		
*ED1O	"	233,090	378	286
*EA4HKF	"	152,604	323	243
*EA2QU	"	135,596	274	218
*EC5EA	"	130,416	258	209
*EA5DGK	"	126,294	283	217
*EA1IXQ	"	112,761	256	201
*EC3ALS	"	105,248	276	208
*EE2A	"	100,744	262	196
		(OP: EA2SN)		
*EB5CS	"	95,816	250	203
*EA4BAS	"	89,584	205	176
*EA3KE	"	85,794	219	181
*EA1OT	"	74,909	211	173
*EA2ESB	"	66,348	246	194
*EA3XR	"	57,565	167	145
*EA3DJL	"	52,136	159	133
*EA3GYT	"	45,441	163	153
*EA5MT	"	38,907	156	131
*EA3WR	"	32,120	132	110
*EB3AKL	"	31,857	129	111
*EA1AS	"	31,347	146	129
*EA5DD	"	28,119	117	103
EA5IWZ	"	*26,976*	*109*	*96*
*EA5XA	"	19,847	101	89
*EA3AKA	"	19,272	96	88
*EA4AAF	"	17,850	117	105
*EA1FW	"	16,198	108	89
*EA7JVV	"	15,840	110	90
*EA3W	"	15,660	98	87
*EA5FCW	"	15,309	86	81
*EA5JFL	"	15,015	106	91
*EA5WA	"	12,411	77	63
*EA3GEO	"	12,224	67	64
*EA3RP	"	11,956	70	61
*EA3CN	"	10,440	64	60
*EA5EJG	"	8,664	80	76
EA2KV	"	*8,255*	*65*	*65*
*EA1T	"	8,120	62	58
*EA1IQ	"	6,678	68	63
*EA4EZ	"	6,630	59	51
*EA5JAX	"	5,494	69	67
*EA4K	"	5,400	54	50
*EA1FHQ	"	5,304	55	51
*EC5ALJ	"	4,400	45	44
*EA3AXM	"	4,140	48	45
*EA1HWD	"	3,120	43	40
*EA1JBW	"	2,898	45	42
*EA3HWC	"	2,668	34	29
*EA7BF	"	2,444	31	26
*EA4EMC	"	1,026	19	18
*EA1FHT	"	738	19	18
*EA5UJ	"	720	15	15
EA1JAI	"	*532*	*15*	*14*
*EB3A	"	348	13	12
*EA3IOJ	"	169	14	13
*EA5IXO	"	60	4	4
*EA3GSS	"	48	4	4
*EB3DKE	"	32	4	4
*EA2LMI	28	220,000	370	220
*EA7CVF	"	168,951	315	199
*EE3Z	"	29,920	118	88
		(OP: EA3NO)		
*EA5GJ	"	14,490	77	70
*EA4AA	"	10,395	67	55
*EA4HRJ	"	9,936	66	54
*EA7VJ	"	1,083	19	19
*EB5EWM	"	12	2	2
*EA7K	21	93,530	228	199
*EA1JCZ	"	90,280	216	185
*EA1KP	"	81,982	214	179
*EA3HXT	"	51,359	189	161
*EA3KT	"	44,488	152	134
*EA4FJX	"	37,620	139	132
*EA7ELY	"	18,800	104	100
*EA1Z	"	3,478	48	47
*EA3IFV	"	2,890	35	34
*EA4GF	"	2,146	30	29
*EA5HJO	"	1,219	25	23
*EC7DZZ	"	1,200	30	30
*EB3AM	"	330	12	11
*EA5DFV	"	297	11	11
*EA5BAH	"	220	10	10
*EC3CVD	14	575,000	930	500
*EA1BCK	"	142,915	331	283
*EA7JF	"	111,752	320	244
*EE1B	"	104,489	305	253
		(OP: EA1Y)		
*EA5JN	"	91,310	273	230
*EA3FUJ	"	41,307	155	147
*EA3HAB	"	40,317	163	151
*EA5JEB	"	9,240	98	84
*EA1DHB	"	5,580	65	60
*EA4RR	"	5,103	65	63
*EA3IKT	"	2,408	46	43
*EA2XG	"	858	34	33
*EA2ERX	"	64	8	8
*ED7R	7	1,633,203	853	517
		(OP: EA7GX)		
*EA2CE	"	38,745	130	123
*EA3IAZ	"	20,648	96	89
*EA3ARP	"	10,350	77	75
*EA3EAN	"	552	25	24
*EA2WD	3.7	364	13	13

Svalbard

JW7QIA	A	1,996,409	1302	683

Sweden

8SØC	A	999,364	854	577
		(OP: SMØMPV)		
8S8S	"	713,592	752	477
		(OP: SM5XSH)		
SA6NIA	"	639,004	833	428
SC7DX	"	419,712	487	384
		(OP: SM7GIB)		
SMØN	"	138,575	310	241
		(OP: SMØJCA)		
SM6MVE	"	136,575	322	225
SM2S	"	65,238	189	166
SF6U	"	61,313	161	133
		(OP: SM6CMU)		
SM3PZG	"	61,180	168	140
SD3T	"	49,225	231	179
		(OP: SM7XEN)		
SD6M	"	42,441	173	141
		(OP: SA6BGR)		
SE5N	"	42,375	156	125
		(OP: SM5ISM)		
SA6SKA	"	41,595	188	141
SM6YNO	"	7,138	46	43
SE3T	"	1,840	24	23
SA6U	"	1,537	29	29
		(OP: SM6LJU)		
SD1A	21	19,006	95	86
		(OP: SM1TDE)		
*SM5S	A	214,668	417	268
		(OP: SM5SIC)		
*SE4L	"	122,850	339	234
		(OP: SAØFIA)		
*SA6CCZ	"	117,040	304	209
*SDØN	"	103,296	245	192
		(OP: SMØNSJ)		
*SE4E	"	93,030	269	210
		(OP: SM4DQE)		
*SB5X	"	82,560	226	192
*SM5ACQ	"	82,270	245	190
*SM5JVF	"	72,944	258	194
*SA6FAX	"	58,951	234	167
*SM6IQD	"	50,076	192	156
*SA6CBN	"	39,497	166	127
*SF5M	"	33,669	165	129
		(OP: SM5SYO)		
*SK7A	"	20,972	126	107
		(OP: SA7AOI)		
*SM5DXR	"	17,325	122	105
*SA6KOD	"	7,300	86	73
*SA5EED	"	3,510	49	45
*SA6AUN	"	2,628	37	36
*SM6USS	"	375	15	15
SA6IMI	"	*91*	*7*	*7*
*SA6ANH	3.7	16	4	4

Switzerland

HB9TOC	A	1,807,810	1186	617
HB9DQL	"	1,706,640	1065	624
HB7X	"	1,408,848	971	588
		(OP: HB9BGV)		
HB9CVQ	"	1,210,308	959	519
HB9EXQ	"	563,013	531	423
HB9AWS	"	432,588	583	354
HB9OAU	"	265,824	428	312
HB9HJI	"	55,728	181	144
HB9ODK	"	38,739	123	111
HB9CVE	"	33,813	133	117
HB9EGA	"	33,276	132	118
HB9HHN	"	22,800	120	100
HB9S	21	52,528	144	134
		(OP: HB9AOF)		
HB9FWB	"	17,091	89	81
*HB9WDY	A	142,363	327	233
*HB9GPG	"	66,861	212	171
*HB9IIH	"	28,815	138	113
*HB9FAP	"	13,930	75	70
*HB9HDK	"	11,325	89	75
*HB9HEI	"	10,143	75	69
*HB9GSR	"	7,830	57	54
*HB9GKM	"	3,680	51	46
*HB9DXB	"	864	24	24
*HB9FPG	"	33	3	3
*HB9FBK	28	8	2	2
*HB9TSX	21	12	2	2
*HB3XAG	"	12	2	2
*HB5ØSH	7	474,714	630	354
		(OP: HB9CIC)		

Wales

MWØJKU	A	358,732	496	341
MWØLKX	"	131,819	275	193
GWØJWC	"	19,278	113	102
MWØYVK	7	400,356	567	337
*GW5L	A	107,118	249	198
		(OP: GW4ZAR)		
*MW1MDH	"	69,174	231	183
*GW8KBO	"	55,130	198	149
*GWØARK	"	34,155	117	99
*GW5JHE	"	5,481	64	63
*MW8R	28	52,554	165	114
		(OP: GW4SHF)		
*GW4W	21	60,060	158	143
		(OP: GW4EVX)		
*MCØPMT/P	7	76,395	184	165
		(OP: MØVWK)		

OCEANIA

Austral Islands

TX5AQ	A	645,290	779	346
		(OP: SP5EAQ)		

Australia

VJ4T	A	6,818,172	2387	908
VK4A	"	2,494,475	1559	565
		(OP: VK4NM)		
VJ2W	"	820,080	666	402
VJ2Z	"	487,812	477	354
VK3Y	"	393,867	451	321
VL4U	"	370,760	448	310
VK2BY	"	331,500	404	300
VK4L	"	272,800	370	275
VK6SJ	"	226,338	394	238
VK6MK	"	217,592	404	236
VK3IO	"	182,722	258	206
VK2DG	"	152,040	267	210
VL3E	"	133,084	233	194
		(OP: VK3TZ)		
VJ3A	"	118,594	236	197
VK3C	"	56,420	150	130
		(OP: VK3BDX)		
VK7C	"	56,320	127	110
		(OP: VK7GH)		
VL5K	"	48,236	142	124
		(OP: VK5AKH)		
VK5T	"	45,872	143	122
VL5Q	"	44,280	150	123
VJ5W	"	35,425	122	109
		(OP: VK5GR)		
VL2N	"	20,944	106	88
		(OP: VK2PN)		
VK5ZZ	"	14,673	77	73
VL5L	"	*12,285*	*76*	*65*
VJ2A	"	11,220	70	66
		(OP: VK2ZG)		
VK3H	"	2,904	38	33
VJ2X	28	658,031	671	367
VK6EA	21	9,702	74	63
VJ2J	14	1,409,496	916	562
		(OP: VK2CZ)		
VK3X	"	589,302	541	378
		(OP: VK3GK)		
VK3XV	"	47,250	140	125
VJ2D	"	26,304	102	96
*VK5PAS	A	1,146,855	801	505
*VL4A	"	507,210	528	330
*VK2PAA	"	239,365	400	245
*VK4Y	"	170,130	336	214
*VK4ZP	"	41,280	145	120
*VK4N	"	26,578	110	97
		(OP: VK4BXX)		
*VK4SP	"	17,082	79	73
*VK5COL	"	16,132	97	74
*VK7DW	"	11,214	70	63
*VJ5Q	"	6,480	46	45
*VK3OM	"	5,499	55	47
*VK6WR	"	4,905	51	45
*VK2JEH	"	2,925	44	39
*VK6NCB	"	360	16	12
VL2W	"	*350*	*14*	*14*
*VK2I	"	60	5	4
*VL3O	28	11,584	71	64
*VL4Y	"	3,220	40	35
*VK4FJ	"	512	16	16
*VK2HJ	"	84	16	14
*VK2VO	"	60	6	5
*VK3VDX	21	351	13	13
*VK5NIG	14	615	15	15
*VK5UE	"	336	12	12
*VK3W	"	228	13	12
*VL3M	7	232	8	8

Brunei Darussalem

*V85AHV	A	108,696	272	168
*V85T	"	63,840	225	140
*V85AVE	7	29,492	120	73

East Malaysia

9M8DEN	A	403,332	603	244
*9M6MUL	A	79,068	227	132
*9W8C	"	45,264	186	92
*9W6PKJ	"	1,500	45	25
*9W6EZ	28	40,608	161	96
*9W6AJA	7	20,340	106	60

Fiji

3D2AG	A	686	27	14

Guam

WH2DX	7	151,548	201	146
			(OP: KH2JU)	
*KH2INC	A	98,892	297	123
			(OP: KH2ZZ)	
*KH2BD	"	744	24	24

Hawaii

WH7T	A	6,871,212	2580	846
			(OP: WH7W)	
KH6TU	"	990,990	755	330
			(OP: AD6E)	
AH7C	"	244,496	317	259
KH6PE	"	187,308	318	198
WH6R	"	70,418	192	137
AH6T	"	14,152	66	58
*KH6HT	A	71,019	160	117
*WH6EY	"	28,569	117	89
WH6FQI	"	*1,988*	*29*	*28*
*KH6MOI	"	1,425	20	19
*NH6AB	28	11,900	90	70
*AF1R/KH6	"	128	8	8

Indonesia

YBØAGW	A	2,092,720	1320	592
YB1AR	"	1,970,205	1185	589
YB2DX	"	1,877,040	1199	540
YB4IR	"	1,601,985	1059	511
YE9BJM	"	607,110	609	354
YB2MM	"	566,835	615	345
YB2IQ	"	458,640	497	315
YB9BAC	"	386,958	621	246
YBØECT	"	380,686	547	262
YB8UTI	"	354,776	492	244
YBØJVZ	"	267,547	395	259
YBØBAC	"	220,337	370	221
YC2GBS	"	214,570	439	215
YC5DDE	"	170,952	315	204

YB1DIU	"	149,107	306	179
YBØFLY	"	114,291	212	153
YC2CQO	"	99,203	255	169
YB1CQU	"	98,276	275	158
YB2HAF	"	62,480	226	142
YC5TEB	"	62,220	190	122
YCØSCZ	"	61,695	160	135
YB4NY	"	57,536	294	116
YC7YGR	"	45,240	156	116
YB4HPI	"	32,485	213	89
YB3DY	"	30,432	160	96
YB5MB	"	27,612	217	78
YCØSAS	"	20,250	132	81
YBØPJF	"	11,328	69	64
YBØET	"	10,912	69	62
YB1WCK	"	9,576	72	63
YB7WW	"	6,660	56	45
YC5YBZ	"	4,181	56	37
YB4DCE	"	3,444	73	41
YE3DFB	"	2,208	30	23
YC1CRR	"	2,106	30	26
YC8AQY	"	680	26	20
YC5KXI	"	*96*	*9*	*8*
YB3BX	"	81	9	9
YB3IZK	**28**	**5,194**	**54**	**49**
YB3FTD	"	1,425	25	25
YB7MD	**21**	**113,634**	**258**	**177**
YF8DJ	"	99,006	261	174
YC4SIZ	"	69,138	184	167
YB3BLJ	"	37,392	124	114
YB2TS	"	27,398	122	103
YF3FZR	"	3,870	48	43
YB8OUN	"	1,184	41	32
YC6BTI	"	204	18	17
YB1RKT	**14**	**18,486**	**84**	**79**
YB8SB	"	12,150	78	75
YC7EVA	**7**	**250,866**	**403**	**198**
YC8MJG	"	208,550	365	194
YB8RVI	"	200,972	385	188
YBØDRV	"	24,720	107	80
YE9CZY	"	22,125	163	75
YC3BUE	"	18,850	180	65
YB4PDT	"	13,601	134	67
YB2SPP	"	9,765	139	63
YB7CV	"	8,786	113	46
YC1IDB	"	8,379	99	49
YC9BYY	"	8,007	98	51
YC7CNU	"	6,720	79	42
YC1VHC	"	5,698	48	37
YB7CDI	"	5,375	99	43
YC3GEV	"	5,358	107	47
YE8TPA	"	4,636	47	38
YB2NDX	"	4,488	35	33
YC8SBD	"	3,597	55	33
YBØULI	"	3,567	79	41
YC8SGY	"	3,420	59	45
YB7DEG	"	3,325	62	35
YC8ET	"	2,576	122	46
YC8BNZ	"	2,208	65	32
YC8AYJ	"	1,988	61	28
YC7IZJ	"	896	14	14
YC7DDU	"	168	11	8
YF8AAA	"	4	2	2
***YC2VOC**	**A**	**1,590,472**	**1080**	**533**
*YB9VED	"	570,024	579	312
*YC5AKH	"	383,019	577	273
*YBØNSI	"	302,192	453	272
*YB1DMK	"	295,260	459	259
*YC3DOC	"	287,868	431	276
*YB8RW	"	267,400	430	200
*YB8UFM	"	180,792	283	162
*YB9MX	"	169,736	413	196
*YC9DPO	"	135,270	363	167
*YB7WR	"	134,940	247	173
*YB3KM	"	134,208	269	192
*YD3GIF	"	126,036	383	162
*YB7SKM	"	122,150	312	175
*YC8MUZ	"	119,928	346	152
*YB3BBF	"	101,412	265	162
*YB1MW	"	100,860	326	164
*YB8JEC	"	100,000	334	160
*YE9PBZ	"	99,703	266	179
*YB2CAA	"	95,904	322	162
*YB9LCM	"	87,520	244	160
*YC3CNE	"	86,578	245	146
*YB7OO	"	79,508	186	139
*YB9YSS	"	78,336	209	153
*YB5ELS	"	73,112	264	152
*YC2DBW	"	72,384	209	156
*YCØNIU	"	71,370	306	130
**YB9DE*	"	*59,400*	*218*	*132*
*YCØJOY	"	51,471	168	133
*YB1UUN	"	50,160	146	132
*YC1RYX	"	45,980	132	110
*YB7MYS	"	45,792	265	108
*YB2GV	"	44,676	198	102
*YEØPO	"	40,293	161	121
*YB2VYY	"	36,080	140	110
*YC7URE	"	32,635	147	107
*YB1LUE	"	28,482	111	94
*YC9UAB	"	28,449	151	109
*YF4IDW	"	28,302	146	89
*YB9AOS	"	27,104	142	88
*YD9BIJ	"	26,910	181	90
*YE3ESW	"	26,696	151	94
*YB3ATK	"	26,208	176	91
*YC5SLA	"	25,428	155	78
*YD9UAN	"	25,198	132	86
*YC7UDD	"	24,288	109	96
*YB1MAE	"	24,017	199	73
*YC1HLT	"	23,352	180	84
*YCØSCV	"	22,596	151	84
*YF4ICC	"	21,504	147	84
*YF9EGU	"	21,074	207	82
*YB1DNR	"	19,908	120	84
*YB6IUP	"	18,907	91	73
*YBØXTU	"	18,865	135	77
*YB1SNS	"	18,389	95	71
*YC1CLE	"	17,982	129	74
*YE8DWC	"	16,353	148	69
*YC1KAJ	"	15,840	128	66
*YB8VK	"	15,552	134	72
*YB1ABY	"	14,823	94	81
*YD5NBY	"	13,747	78	59
*YC5YDD	"	13,328	99	68
*YF3CZW	"	13,082	118	62
*YBØYAD	"	12,978	129	63
*YC2AUP	"	12,711	138	57
*YD6IOV	"	12,224	80	64
*YB9JIP	"	12,172	155	68
*YD1CZE	"	12,084	175	53
*YB1HBO	"	12,064	145	58
*YB3COY	"	12,033	100	63

*YB2CRN	"	11,868	98	69
*YC7VGB	"	11,859	118	67
*YC2MPF	"	10,710	133	63
*YC7UQU	"	10,440	109	58
*YB9BAJ	"	10,200	81	60
*YF4IFT	"	10,176	111	64
*YB2TDP	"	9,548	96	62
*YB1GAL	"	9,515	77	55
*YB3FUA	"	9,434	121	53
*YB9IPY	"	9,230	98	65
*YC1AMI	"	8,723	90	61
*YBØDOS	"	8,250	100	55
*YE3ESH	"	8,208	73	54
*YF8DX	"	8,188	110	46
*YG1AEX	"	7,800	71	50
*YB7WBC	"	7,399	55	49
*YC1DGR	"	6,588	85	54
*YCØRWL	"	5,852	76	44
*YB1IM	"	5,428	70	46
*YF1ANL	"	5,292	78	63
*YC1TCA	"	5,280	72	48
*YB1EFR	"	5,014	71	46
*YD2BIU	"	4,796	64	44
*YC2KEJ	"	4,494	49	42
*YC2CLH	"	4,387	76	41
*YCØNAN	"	4,182	51	41
*YB9GDP	"	3,780	54	42
*YB1MIG	"	3,706	36	34
*YCØOXA	"	3,698	46	43
*YBØOHG	"	3,317	33	31
*YB9LAI	"	3,168	49	44
*YC1BBD	"	3,080	54	40
*YDØBCG	"	3,066	61	42
*YB1DUU	"	2,625	47	35
*YB1DGG	"	2,520	54	35
*YE3DGO	"	2,448	44	36
**YC3RBI*	"	*2,240*	*54*	*35*
*YB1LRG	"	1,890	49	30
*YB9LQC	"	1,400	51	35
*YC5YC	"	1,232	41	28
*YC1AWT	"	1,122	25	22
*YC2KBO	"	968	32	22
*YC1OOY	"	561	19	17
*YDØRCH	"	320	20	16
***YB9ELS**	**28**	**73,050**	**195**	**150**
*YB2CPO	"	67,353	185	143
*YD2UWF	"	48,384	162	126
*YD9MBM	"	12,768	92	76
*YD3ASV	"	8,555	71	59
*YB1HR	"	6,380	60	55
*YG3EMH	"	2,856	38	34
*YG9EPK	"	1,775	33	25
*YD1CHM	"	1,064	28	28
*YF3FBV	"	351	15	13
***YC9FAR**	**21**	**309,136**	**432**	**278**
*YB9UA	"	227,911	409	271
*YC9KNX	"	188,889	377	237
*YC5ACD	"	126,599	293	187
*YB4FIK	"	94,675	219	175
*YC2KJC	"	59,130	177	146
*YC9AAI	"	48,863	145	131
*YC8DUL	"	48,776	146	134
*YB3GER	"	45,890	147	130
*YB3BGM	"	35,280	129	112
*YBØKXO	"	21,087	119	99
*YC2XCD	"	20,492	104	94
*YB3OK	"	12,320	78	70
*YB9VIZ	"	8,736	58	56
*YB9GWR	"	4,644	46	43
*YC8FLE	"	2,990	51	46
*YB1GBN	"	1,782	28	27
*YCØBAS	"	1,144	22	22
*YCØKBE	"	966	22	21
*YB2CBF	"	527	17	17
*YC1GHZ	"	55	5	5
***YE4IJ**	**14**	**9,610**	**67**	**62**
*YB7NUS	"	6,171	61	51
*YB9GV	"	5,537	67	49
*YB2BSE	"	4,788	46	42
*YB1HDR	"	697	17	17
*YB8VRA	"	117	9	9
***YD9VE**	**7**	**454,818**	**425**	**238**
*YD7ACD	"	262,080	417	208
*YDØNHG	"	153,440	373	160
*YC5LCZ	"	140,756	300	154
*YD9WTS	"	94,804	221	137
*YC7BNN	"	35,690	201	83
*YC4MSZ	"	32,144	243	82
*YC7YDB	"	17,025	140	75
*YD5AKO	"	15,895	140	55
*YD7ICF	"	15,572	117	68
*YF4FFH	"	15,162	173	57
*YC1BMI	"	14,219	162	59
*YD5AOU	"	13,500	109	54
*YC8SXS	"	13,390	128	65
*YD9FLO	"	12,636	149	54
*YD6HSK	"	11,568	120	48
*YB7UTO	"	11,505	118	59
*YG3CMS	"	11,480	101	56
*YC9BOE	"	11,269	109	59
*YC1LFI	"	11,236	140	53
*YC2CZF	"	11,130	145	53
*YB8SHY	"	10,761	64	51
*YC2DMA	"	10,680	137	60
*YF8FY	"	9,964	141	53
*YB4PE	"	9,350	111	50
*YD2UFR	"	8,722	118	49
*YC1GBR	"	8,722	121	49
*YC1CBY	"	8,550	108	57
*YD9GHS	"	7,866	105	46
*YD1CUN	"	7,568	115	44
*YF8FMM	"	7,344	122	48
*YC8FIL	"	7,252	143	49
*YC3AJO	"	7,020	104	45
*YD1EFU	"	7,008	114	48
*YD1EOZ	"	6,862	122	47
*YB1NIN	"	6,804	147	42
*YD7AAE	"	6,776	92	44
*YC4PSG/8	"	6,721	127	47
*YD3BRP	"	6,468	127	44
*YB7JZ	"	6,384	72	57
*YG8AMR	"	6,251	109	47
*YD1LNS	"	5,891	86	43
*YC2DEW	"	5,776	86	38
*YE1BHR	"	5,720	95	40
*YC2NUV	"	5,544	111	44
*YC9AUY	"	5,289	101	43
*YB9OBQ	"	5,207	74	41
*YG9BKM	"	4,920	92	41
*YD3CQX	"	4,914	91	42
*YD3BSB	"	4,872	103	42
*YC2DOP	"	4,826	76	38
*YD4SMK	"	4,800	71	40

*YB2UFM	"	4,588	79	37
*YF5VUN	"	4,360	85	40
*YD7AIQ	"	4,360	71	40
*YF9DCH	"	4,343	90	43
*YCØUCS	"	4,212	90	39
*YD3TWK	"	4,116	73	42
*YF9EAV	"	3,885	85	35
*YG9DIM	"	3,864	81	42
*YCØACR	"	3,808	61	34
*YD2VET	"	3,800	74	38
*YC7HPF	"	3,700	69	37
*YD3CYO	"	3,696	55	33
*YC8RSJ	"	3,441	66	37
*YG1ALO	"	3,344	113	38
*YC8UDV	"	3,256	49	37
*YF5YZR	"	3,120	53	26
*YD6HRI	"	3,096	48	24
*YC1BVK	"	3,069	61	33
*YG4IJV	"	3,060	81	36
*YC9CGM	"	3,045	78	35
*YC1LGO	"	3,036	90	33
*YC9BVB	"	3,010	69	35
*YC8SEO	"	2,856	26	24
*YDØBMC	"	2,821	57	31
*YD2CRO	"	2,686	71	34
*YD8SPY	"	2,670	38	30
*YCØAJM	"	2,548	40	28
*YD9ALM	"	2,480	47	31
*YF8XRT	"	2,438	24	23
*YG8BH	"	2,380	59	35
*YC4SIO	"	2,345	56	35
*YD3RAN	"	2,291	59	29
*YD7MAW	"	2,077	56	31
*YG2AMA	"	2,075	52	25
*YC9UBG	"	1,975	32	25
*YB2LGF	"	1,922	51	31
*YC4SJA	"	1,736	64	28
*YD1HUQ	"	1,682	52	29
*YDØTRR	"	1,647	58	27
*YG8FX	"	1,600	61	25
*YD3AVN	"	1,530	70	30
*YC8GPH	"	1,512	46	27
*YD2WAU	"	1,496	71	34
*YG1BDV	"	1,488	37	24
*YD6VXO	"	1,458	41	27
*YC7UAH	"	1,188	46	27
*YB3PIN	"	1,005	17	15
*YC1FNY	"	936	43	24
*YG8AEC	"	920	43	23
*YB1LKD	"	880	35	22
*YF4IHG	"	864	36	24
*YC2PST	"	836	26	22
*YF9UBD	"	833	19	17
*YD2RTG	"	748	27	17
*YF3CXB	"	726	33	22
*YB1GUE	"	720	35	20
*YB1MBV	"	680	48	20
*YB7FII	"	660	24	15
*YC1LHI	"	640	65	32
*YD9NRM	"	630	26	21
*YD3AMT	"	620	35	20
*YC4RWH	"	570	18	15
*YG1AES	"	540	35	18
*YD1DQK	"	540	29	20
*YG3EOY	"	324	19	12
*YC5ARZ	"	304	24	16
*YCØNDB	"	288	14	12
*YD3AFX	"	272	9	8
*YD7BEB	"	264	14	11
*YG9DXH	"	260	20	13
*YB8ACM	"	260	15	13
*YC3FTY	"	231	16	11
*YG3DGK	"	216	13	12
*YC1LHQ	"	210	11	10
*YD1ETH	"	209	13	11
*YC1DDO	"	192	18	12
*YD9GWS	"	180	10	9
**YD9ABC*	"	*91*	*8*	*7*
*YC7WHE	"	52	36	26
*YD7AJD	"	36	4	4
*YD2BLD	"	36	9	9
*YDØRFS	"	30	6	5
*YF8AIK	"	15	5	3

New Caledonia

FK4RD	**A**	**97,200**	**196**	**144**
FK8IK	"	62,100	157	135
FK4QX	**28**	**551,655**	**605**	**345**
***FK4UJ**	**A**	**1,612**	**26**	**26**

New Zealand

ZL1T	**A**	**266,054**	**386**	**274**
		(OP: ZL1ANH)		
ZL2UO	"	158,840	267	220
ZL4FZ	"	3,600	36	36
ZM4T	**21**	**2,528,484**	**1390**	**651**
		(OP: ZL3IO)		
ZL1BBW	**14**	**572,669**	**537**	**379**
ZM4YY	"	24,656	108	92
		(OP: ZL4YY)		
***ZL1CAP**	**A**	**15,264**	**83**	**72**
*ZL3CRG	"	9,794	65	59
*ZL2MM	"	1,320	22	22
***ZL4AS**	**14**	**17,440**	**84**	**80**

Norfolk Island

VK9DX	**7**	**3,596,050**	**1193**	**575**

Philippines

DU3T	**A**	**2,463,132**	**1480**	**588**
DY1T	"	1,494,450	1223	405
		(OP: DU1IVT)		
DV1SCO	"	939,432	1015	312
DU3DW	"	480,770	763	262
DV3A	"	340,578	552	238
DU1AV	**28**	**216,879**	**449**	**201**
4D3X	**21**	**1,264,560**	**1036**	**440**
		(OP: DU3LA)		
DU1EG	"	672,078	691	374
4GØT	**14**	**165,996**	**327**	**212**
		(OP: DU1RB)		
4F3FSK	"	1,848	38	28
DU1R	**7**	**190,495**	**287**	**155**
		(OP: DU1UGZ)		
***DV6XDS**	**A**	**30,363**	**158**	**87**
*DU1/N6HPX	"	26,220	132	95
*4F9HKZ	"	24,024	129	77
*DU1JM	"	23,655	128	83
**DV3TSJ*	"	*14,553*	*100*	*63*
*DV1TBT	"	9,460	73	55
*DU4RER	"	3,895	59	41
*DW7EON	"	1,122	42	34
*DU1/NFØO	"	1,012	24	23
*DU7PH	"	646	22	19
*4G1FCI	"	348	15	12
***DV1DLX**	**28**	**91,520**	**259**	**128**
*DW7EVQ	"	71,185	225	115
***DV1MM**	**21**	**183,111**	**389**	**201**
*DV1UCX	"	144,551	349	187
*DV9IHK	"	85,100	295	148
*DU1SH	"	35,934	188	113
*4G1FKH	"	9,272	66	61
*4I1BNC	"	5,828	64	47
*4G1OAL	"	1,960	32	28
**4I1AGJ*	"	*600*	*22*	*20*
***4E1RA**	**14**	**24,360**	**128**	**87**
***4E9VVN**	**7**	**41,251**	**123**	**83**
*DW8VEF	"	12,189	69	51
*DU1VNA	"	9,416	67	44
*DU9BX	"	5,560	59	40
*DU3AW	"	1,577	26	19

Wallis & Futuna Islands

***FW1JG**	**A**	**245,575**	**385**	**235**

SOUTH AMERICA

Argentina

LU7MT	**A**	**2,018,759**	**1257**	**601**
LU3DK	"	605,085	611	377
LP7D	"	389,865	498	329
		(OP: LW3DN)		
LU7MCJ	"	199,348	335	244
LU1KCQ	"	47,520	149	135
LU8DY	"	29,040	140	110
LW1F	**28**	**6,487,221**	**2567**	**919**
		(OP: LU5FC)		
LO5D	"	4,976,580	2120	867
		(OP: LU9ESD)		
LU8DPM	"	3,155,064	1600	748
		(OP: LU5YF)		
LU3WC	"	827,106	792	419
LQ5H	"	244,278	409	246
		(OP: LU3HS)		
LU5FF	"	19,425	89	75
L2ØX	"	2,911	49	41
LP1H	**21**	**3,073,005**	**1475**	**765**
LR3M	"	858,405	719	445
		(OP: LU9MDH)		
LT1E	"	590,736	632	397
LQ5A	"	181,879	331	239
LT5T	"	177,360	325	240
		(OP: LU5OM)		
LU6DU	"	40	4	4
LW1D	**14**	**274,256**	**384**	**281**
		(OP: LW1EUD)		
LU3DDH	"	70,632	190	162
LT5V	**7**	**406**	**14**	**14**
		(OP: LU8VCC)		
LU2DVI	**3.7**	**459**	**17**	**17**
***LS5H**	**A**	**1,733,592**	**1056**	**607**
		(OP: LW5HR)		
*LV1F	"	227,328	391	256
		(OP: LU4FTA)		
*LT1K	"	83,160	240	165
		(OP: LU6KA)		
*LU4JEA	"	42,108	162	132
*LP1A	"	41,624	175	121
*LU7DLS	"	19,096	137	88
**LU9LZR*	"	*18,145*	*129*	*95*
*LU1JHF	"	13,940	77	68
*LU1DW	"	10,140	63	60
*LU9JDZ	"	8,118	94	66
***LU4DJB**	**28**	**760,914**	**727**	**462**
*LU1HHT	"	224,500	398	250
*LV7H	"	138,831	339	231
		(OP: LU1HO)		
*LW7DQW	"	130,380	281	212
*LQ5D	"	85,671	251	167
		(OP: LU9DA)		
*LU5UFM	"	60,047	199	149
*AY8A	"	51,030	195	126
		(OP: LU8ADX)		
*LU3EBG	"	21,630	138	103
*LU4DPL	"	14,025	111	75
*LU1WCL	"	10,335	99	65
*LU8DST	"	7,620	81	60
*LU4SAA	"	6,216	97	56
*LU9EAE	"	1,219	35	23
*LU7FMA	"	198	12	11
**LU1RAF*	"	*182*	*17*	*14*
***L71D**	**21**	**312,268**	**422**	**302**
		(OP: LU7DUE)		
*LU2NI	"	80,240	212	170
*LU5EVK	"	3,280	42	40
*LU7DV	"	2,496	36	32
***LT5L**	**14**	**88**	**11**	**8**
***LU5ILA**	**7**	**3,895**	**53**	**41**

Aruba

***P4ØL**	**A**	**13,745,550**	**4059**	**1007**
		(OP: W6LD)		

Bonaire

PJ4K	**A**	**27,353,511**	**6284**	**1227**
		(OP: N6KT)		
PJ4R	"	9,967,888	3241	854
		(OP: KK9A)		
PJ4DX	**28**	**3,855,600**	**2052**	**675**

Brazil

ZW2N	**A**	**8,030,328**	**2886**	**939**
		(OP: PY2MNL)		
ZZ7A	"	7,050,624	2479	903
		(OP: PY7ZC)		
PV2K	"	6,981,275	2566	973
		(OP: PY2KNK)		
PX2V	"	5,901,036	2262	899
		(OP: PY2KJ)		
ZV5M	"	2,581,824	1422	672
		(OP: PY5AMF)		
PS2M	"	1,302,376	927	526
		(OP: PY2OX)		
PY6HD	"	1,160,544	875	471
PT7WM	"	699,972	528	364
PY2LSM	"	694,512	600	424
PY2SBY	"	691,968	690	408
PT7BI	"	670,306	710	377
PY1VOY	"	405,744	441	316
PY3PA	"	335,818	446	289
PV4T	"	288,357	395	277
PY3LX	"	93,874	244	187
PY2EU	"	57,304	179	152
PY2REC	"	45,500	153	130
PY2FSR	"	36,192	131	116
PY5AL	"	14,707	93	77
PY3PS	"	13,806	90	78
PY2KDU	"	12,792	93	82
PP2DX	"	9,840	66	60
PY2NZ	"	9,360	70	60
PY1GAM	"	7,980	65	60
PS8RV	"	3,136	60	49
PY2GZ	"	2,688	40	32
PY2VN	"	2,670	31	30
PT2NP	"	1,311	23	23
PX2A	**28**	**6,859,382**	**2664**	**943**
		(OP: PY2LED)		
ZZ5K	"	2,317,825	1345	695
		(OP: PP5RT)		
PX5M	"	2,199,694	1257	658
		(OP: PP5BT)		
PY2EX	"	1,517,562	1062	537
PY5IN	"	1,283,598	939	522
PY2CP	"	786,470	751	430
PY2ZEA	"	743,435	701	385
PP5PD	"	198,500	336	250
PY4RGS	"	*43,206*	*141*	*114*
ZY2Y	"	22,878	112	93
		(OP: PY2ZZ)		
PY2MOH	"	14,018	113	86
PU2PMY	"	5,334	47	42
PY5WW	"	4,488	48	44
PY3TR	"	2,479	39	37
PS7DX	"	2,340	47	36
PP5RG	"	40	4	4
ZX5J	**21**	**11,783,086**	**3459**	**1226**
		(OP: PP5JR)		
PV2P	"	7,392,385	2529	1055
		(OP: PY2DY)		
PY3TD	"	51,183	165	141
PY2PPZ	"	2,666	44	43
PP4T	**14**	**6,973,018**	**2434**	**997**
		(OP: PY4BZ)		
PT6T	"	174,464	296	232
		(OP: PY6TS)		
PY2PT	"	90,589	215	157
PY2MM	"	13,104	74	72
PP5BJF	"	9,453	81	69
PP5OT	"	*3,827*	*45*	*43*
PY5FO	**7**	**1,487,300**	**666**	**428**
PT4A	"	649,060	415	332
		(OP: PY4AZ)		
PY9MP	"	62,814	122	114
PY3CB	"	1,134	22	21
PY5DC	**3.7**	**276**	**19**	**12**
***PY2KC**	**A**	**1,572,345**	**993**	**613**
*PT2AW	"	751,712	669	416
*PV7M	"	344,124	463	316
		(OP: PT7ZT)		
*PY2SGL	"	236,208	432	266
*PY2AB	"	141,910	306	230
*PY3RS	"	138,346	313	221
*PR7RBA	"	135,807	311	223
*PY2DR	"	125,460	271	204
*PY1RY	"	121,088	218	176
*PY1AX	"	112,944	265	208
*PY4ARS	"	101,376	249	192
*PP2RON	"	89,441	225	173
*PY2YVN	"	78,374	215	149
*PP5RB	"	76,120	206	173
*PP5FZ	"	61,387	185	157
*PY2XL	"	53,376	158	139
*PY2PDF	"	52,272	193	144
*PY1XS	"	50,765	172	143
*PP2CS	"	47,124	168	132
*PS2B	"	38,571	194	129
*PY2HBS	"	34,560	166	128
*PR7LO	"	30,736	155	113
*PY5IQ	"	28,899	139	117
*PV8AAS	"	28,700	121	100
*PY2RMY	"	28,380	128	110
*PY2MIA	"	26,418	150	111
*PY1SX	"	22,680	96	81
*PY2UGO	"	22,470	116	105
*PP5XA	"	18,216	108	92
*PY2BBQ	"	18,063	92	81
*PP5TI	"	18,000	106	90
*ZV2T	"	17,430	89	83
		(OP: PY2CT)		
*PY2RAR	"	16,728	93	82
*PY2RE	"	15,810	96	85
*PU1VKG	"	12,210	83	74
*PY1WG	"	11,544	100	78
*PY2KS	"	11,165	100	77
*ZV2F	"	8,052	74	61
		(OP: PY2SFA)		
*PR7KSA	"	7,788	95	66
*PU2OIG	"	7,500	77	60
*PP5WEB	"	6,579	57	51
*PY5ZW	"	6,324	54	51
*PY2VCP	"	5,700	67	60
*PY1FOG	"	5,312	83	64
*PY1PM	"	5,244	66	57
*PY2OKB	"	3,570	39	35
*PY2ERC	"	3,354	44	43
*PY2MPB	"	2,698	46	38
*PY2POA	"	2,052	41	36
*PY2MAM	"	1,242	31	27
*PT2ZDX	"	1,150	30	25
*PY2MIB	"	1,088	36	32
*PY3TAM	"	1,035	28	23
*PY2ITM	"	920	22	20
*PY1VA	"	728	14	14
*PY2SG	"	546	15	14
*PY2NF	"	325	13	13
*PY1ZB	"	216	12	12
*PY2MIG	"	210	13	10
*PY5DP	"	198	21	18
*PY4KM	"	176	13	11
*PY1FC	"	168	14	14
*PY3ON	"	132	16	11
*PY5PLL	"	117	9	9
**PY3IE*	"	*52*	*14*	*13*
*PU3LOB	"	5	5	5
***PQ5B**	**28**	**2,553,600**	**1398**	**672**
		(OP: PP5BZ)		
*PU5FJR	"	2,029,872	1191	624
*PP5KW	"	1,036,836	800	498
*PY2HT	"	834,330	770	435
*PU2UAF	"	681,492	644	427
*PU3RCV	"	640,770	612	403
*PY2CPS	"	431,151	511	343
*PR8KW	"	322,168	464	308
*PU4MMZ	"	314,340	410	310
*PU1JSV	"	285,880	415	280
*PU5DUD	"	184,623	319	237
*PY2SR	"	174,592	308	248
*PU2USK	"	161,975	321	209
*PU2UBY	"	131,040	256	208

*PU2WDX	"	118,482	271	182
*PY2BRP	"	110,955	257	195
*ZY2WDX	"	98,975	231	185
*PY2MDF	"	77,922	195	162
*PU2MST	"	73,272	202	172
*PY2VZ	"	71,222	190	149
*PY1NS	"	65,772	190	162
*PU2MZI	"	65,728	188	158
*PY1FJ	"	61,230	210	157
*PU2TWZ	"	60,502	206	169
*PU2MIW	"	56,550	172	145
*PU2WME	"	39,804	141	124
*PU8PSF	"	38,958	236	129
*PU2OCY	"	36,288	146	126
*PY6BK	"	29,694	137	98
*PU2VLW	"	26,290	131	110
*PU8YPL	"	25,400	132	100
*PY4DK	"	25,245	113	99
*PU5LMJ	"	25,149	107	101
*PU5JDA	"	23,352	108	84
*PY2EBD	"	23,265	113	99
*PY1CD	"	18,990	101	90
*PP5DF	"	18,711	113	99
*PU2ULN	"	18,326	109	98
*PU2NZV	"	16,652	107	92
*PU8MGB	"	15,664	124	88
*PU2RDB	"	15,486	102	87
*PU3YST	"	13,600	98	85
*PU3VON	"	13,524	93	84
*PU2TBK	"	12,782	100	83
*PU2PKL	"	11,928	80	71
*PU2LOD	"	9,088	68	64
*PU1KGG	"	7,869	67	61
*PU2OGQ	"	6,944	72	62
*PY7GB	"	6,710	80	55
*PU5JAT	"	6,678	70	63
*PP5KT	"	6,380	60	55
*PU2LFU	"	6,050	66	55
*PU2OKW	"	5,152	48	46
*PU2LJY	"	5,130	64	57
*PU2MLO	"	4,608	82	64
*PY2MZM	"	4,420	61	52
*PU1SKO	"	4,371	53	47
*PY1MK	"	4,176	55	48
*PU2MKU	"	3,864	69	56
*PY2ZDU	"	3,828	47	44
*PU5NAO	"	3,655	49	43
*PU7ASP	"	3,315	49	39
*PU3ELH	"	3,268	48	43
*PT7PT	"	3,160	51	40
*PU2NKT	"	2,485	37	35
*PV8AJ	"	2,442	40	37
*PU7BCG	"	2,415	63	35
*PY2ATR	"	2,275	35	35
*PY1AN	"	2,016	42	36
*PU2NKC	"	1,716	42	39
*PU2XPX	"	1,702	44	37
*PU2RTO	"	1,232	32	28
*PY2RPM	"	1,071	21	21
*PU2KMM	"	900	39	36
*PU5AOF	"	891	27	27
*PU2RND	"	891	37	27
*PU3RIN	"	792	22	22
*PY2DSN	"	640	22	20
*PU3DRM	"	527	17	17
*PU2PTU	"	513	19	19
*PY2PLC	"	484	24	22
*PU7BEN	"	416	14	13
*PY2WLM	"	350	17	14
*PU3EBJ	"	350	15	14
*PY2GAS	"	234	14	13
*PU5ADF	"	132	13	12
*PY1OX	"	121	11	11
*PY2KME	"	120	16	15
*PU9OJZ	"	65	5	5
*PU2PNB	"	50	6	5
*PU2YFP	"	24	4	4
*PU2NHD	"	3	3	3
PY5QW	**21**	**1,828,108**	**1021**	**628**
*ZV2C	"	1,750,536	1058	593
			(OP: PY2CX)	
*PY2QT	"	1,530,660	986	582
*PY1PL	"	1,272,282	900	521
*PY4LH	"	157,960	288	220
*ZZ2P	"	141,372	248	231
			(OP: PY2GTA)	
*PY8WW	"	126,868	266	197
*PV2R	"	106,578	232	191
			(OP: PY2KO)	
*PY2ZR	"	75,686	201	142
*PR4A	"	49,046	146	137
			(OP: PY4RP)	
*PY2RSA	"	25,203	103	93
*PY1DX	"	21,385	99	91
*PY1EZ	"	5,088	50	48
*PY2AD	"	1,820	29	28
*PR7AD	"	1,176	28	28
*PY1KB	"	119	7	7
*PY3BEG	"	21	3	3
*PY3AV	"	2	2	1
PY2W8T	**14**	**822,020**	**671**	**460**
			(OP: PS8NF)	
*PY2NY	"	813,232	706	424
*ZY2B	"	748,612	621	436
			(OP: PY2UD)	
*PY2WH	"	670,680	636	405
*PY2TC	"	348,226	427	314
*PY2XJ	"	49,266	149	126
*PS8ET	"	10,824	74	66
*PY2LCD	"	75	5	5
*PY2YAS	"	21	3	3
PY1KW	**7**	**16,038**	**96**	**66**
*PT2ZXR	"	2,052	28	27
PP2CC	**3.7**	**161**	**7**	**7**
*PU2TNT	"	4	2	2

Chile

CB8E	**A**	**2,643,069**	**1438**	**671**
			(OP: CE8EIO)	
CE1TT	"	1,865,325	1189	595
CE3CLF	"	590,010	666	355
XQ1CY	"	130,764	297	204
CE3NC	"	122,166	257	198
CE3KH	"	2,210	35	34
XQ1KZ	**21**	**517,376**	**506**	**376**
CE2DX	**14**	**364,794**	**447**	**326**
CE3NR	"	143,003	277	217
CE2LE	"	73,884	206	131
***CE4PPC**	**A**	**840,546**	**784**	**441**
*CE2SCZ	"	172,666	348	229
*CE5PR	"	49,700	192	142
*CE3UVT	"	35,880	191	120
*CE4WT	"	33,630	148	118
*CA1BPV	"	23,760	153	110
*CE4CBJ	"	5,985	90	57
*CE1JHA	"	4,845	66	51
*CA7TWY	"	4,171	50	43
*CD1CUO	"	1,952	41	32
*CE4JW	"	784	34	28
***CE7VP**	**28**	**1,545,360**	**1080**	**548**
*CB6LR	"	1,261,386	980	497
			(OP: CE6GDR)	
*CA1FCS	"	617,932	606	406
*XQ3WD	"	425,115	521	335
*CE4CBK	"	153,265	325	203
*CB4A	"	24,288	164	92
*CE1LEW	"	23,544	140	109
*CD7OFZ	"	1,998	42	37
*CB7A	"	207	9	9
			(OP: CE6TTL)	
***CE1PTT**	**21**	**376,656**	**449**	**336**
*CE1RT	"	19,669	97	89
*CE1UGE	"	14,596	94	82
*CE7KF	"	7,991	63	61
***CE4JZO**	**14**	**97,110**	**235**	**166**

Colombia

HK3C	**A**	**1,066,892**	**861**	**436**
HK4L	"	959,196	783	399
HK4W	"	186,842	290	206
***HJ4GXY**	**28**	**2,553**	**39**	**37**
***HK3ZD**	**21**	**1,210**	**23**	**22**
***HK3TK**	**3.7**	**130,500**	**177**	**150**

Ecuador

HC4ER	**28**	**425,400**	**530**	**300**
***HC2TKV**	**21**	**54,625**	**157**	**125**

Peru

OA4SS	**A**	**1,306,770**	**1061**	**430**
OA7/DD5ZZ	**21**	**951,418**	**766**	**481**
***OA4DOS**	**A**	**23,124**	**141**	**94**
*OA4DAG	"	21,526	108	94

Suriname

PZ5RA	**A**	**1,244,910**	**887**	**510**

Trinidad & Tobago

***9Z4A**	**A**	**89,708**	**217**	**164**

Uruguay

CX4CP	**A**	**6,150**	**57**	**50**
CX1AV	**28**	**1,749,981**	**1123**	**607**
CX2CC	"	1,407,500	1034	563
CW1ØØA	**21**	**28,674**	**139**	**118**
***CX9ARH**	**28**	**1,231,056**	**934**	**498**
*CX8DS	"	585,000	592	390
*CX2BAH	"	545,283	615	387
*CX2RA	"	279,887	401	283
*CX5ABM	"	148,135	321	215

Venezuela

YV6BXN	**A**	**177,000**	**222**	**200**
YV4ABR	**28**	**720,954**	**793**	**338**
YV2IF	**3.7**	**7,650**	**53**	**51**
***YV5RAB**	**A**	**324,356**	**311**	**262**
*YV6CA	"	26,038	113	94
*YY4AJL	"	4,312	48	44
*YY5AVS	"	3,627	32	31
*YV5LMW	"	2,464	30	28
***4M1W**	**28**	**337,512**	**484**	**287**
			(OP: YV1SW)	
*YY5DBA	"	5,782	78	59
***YV4EK**	**14**	**906,984**	**730**	**442**
***YV5AEP**	**7**	**48,576**	**96**	**88**

QRP

LY9A	**A**	**852,885**	**898**	**495**
K3WW	■	**616,610**	**600**	**394**
NDØC	■	**399,832**	**538**	**328**
LZ1DM	■	**391,472**	**599**	**344**
DK8R	■	**241,640**	**390**	**280**
			(OP: DL8LFI)	
IZ4AIF	■	**219,934**	**379**	**286**
SO2U	■	**207,473**	**375**	**277**
			(OP: SP2UUU)	
K2YG	■	**199,617**	**336**	**253**
MI5JYK	■	**199,500**	**417**	**266**
JJ1XAS	■	**162,410**	**317**	**218**
W6QU	■	**156,524**	**315**	**218**
			(OP: W8QZA)	
HG6C	■	**151,140**	**328**	**229**
			(OP: HA6IAM)	
JH7UJU	■	**138,600**	**269**	**175**
YU1LM	■	**137,984**	**312**	**224**
YCØVM	■	**136,935**	**328**	**179**
EA2AFV	■	**123,297**	**301**	**219**
KA8SMA	■	**107,830**	**291**	**205**
MW7FON	■	**104,832**	**285**	**208**
PY2BN	■	**100,036**	**226**	**178**
MI7DGO	"	67,716	208	198
PE2K	■	**63,837**	**221**	**173**
HA5BA	"	62,192	203	169
NR3DT	"	54,285	161	141
			(OP: KD4IZ)	
IT9RJE	■	**49,640**	**164**	**136**
N4RJ	■	**42,586**	**165**	**107**
9A4OP	■	**39,336**	**149**	**132**
IK3BVD	"	39,128	147	134
W7LG	"	36,076	137	116
PAØAWH	"	35,547	152	123
LB1LG	■	**32,718**	**165**	**133**
CE1EBQ	■	**28,644**	**173**	**124**
LZ3RR	"	28,193	135	121
WMØG	■	**24,528**	**99**	**84**
DV9IGT	■	**23,490**	**137**	**81**
HK4KM	■	**22,246**	**127**	**98**
HG7J	"	20,856	116	88
YC1BBW	"	18,240	93	80
PFØ1MAX	"	16,287	102	89
			(OP: PC2F)	
HA2MM	"	15,604	90	83
DF5GO	"	14,362	101	86
DL5CV	"	13,350	103	89
EA7JTP	"	13,024	97	88
OK1DMP	■	**11,644**	**71**	**71**
DK9BM	"	11,607	86	73
WØVQ	■	**11,592**	**87**	**72**
E2ØNGF	■	**10,856**	**78**	**59**
N3CI	■	**10,744**	**75**	**68**
DS1TUW	■	**10,126**	**66**	**61**
K3TW	"	9,360	58	52
PDØPMS	"	9,078	101	89
SP9RQH	"	8,094	63	57
VP2V/VA2AE	■	**7,600**	**58**	**50**
BA7LFI	■	**6,750**	**70**	**45**
DF7XR	"	6,489	66	63
JE1ICU	"	5,940	50	45
OH3KQ	■	**5,880**	**59**	**56**
EA5GX	"	4,902	45	43
SP5ETS	"	3,713	53	47
BH5HYB	"	3,367	44	37
IKØUGC	"	3,220	48	46
N7JI	"	3,162	50	34
YB3BAR	"	2,916	55	36
HA9RC	"	2,419	44	41
OM2LT	■	**2,412**	**40**	**36**
EA4U	"	2,040	32	30
YB8MGN	"	1,876	49	28
YC1RIK	"	1,827	49	29
9W2EYR	■	**1,581**	**21**	**17**
SP5PDA	"	1,540	29	28
YC1HBP	"	1,512	34	28
DL8SYL	"	1,296	25	24
DL1DXA	"	1,081	24	23
JG6XYS	■	**1,080**	**19**	**18**
7L1DST	"	1,060	21	20
PY2MQ	"	990	39	30
IK3XTY	"	986	30	29
K8ZT	"	846	20	18
JH3DMQ	■	**795**	**17**	**15**
KS4X	"	782	17	17
VE3MIC	■	**680**	**20**	**20**
EA4FIT	"	574	15	14
S52KJ	■	**527**	**17**	**17**
KCØLQL	"	475	19	19
AF9J	■	**462**	**21**	**21**
DK5FF	"	435	15	15
NH6O	■	**364**	**16**	**14**
YU7TBA	"	345	15	15
SY9DIN	"	330	16	15
OE3VET	"	322	15	14
TA1AWG	■	**272**	**17**	**17**
DH1DH	"	247	14	13
2EØHNB	■	**192**	**16**	**16**
WR4I	"	152	8	8
DG8KAJ	"	147	7	7
IT9JGX	"	135	9	9
AC1KM	"	133	7	7
DL5EC	"	117	9	9
PA3GLK	"	112	7	7
PP5LC	"	105	7	7
JI1AEP	"	80	6	5
3Z7Z/P	"	54	6	6
			(OP: SQ9OZM)	
KEØWPA	"	48	4	4
DO1OKE	"	45	5	5
JJØSFV	■	**14**	**3**	**2**
YD8MDT	"	2	2	1
TIØRC	**28**	**98,230**	**253**	**190**
			(OP: TI2YO)	
PU9YCZ	■	**27,750**	**166**	**111**
PY6GOE	"	25,365	137	95
DU7JAY	■	**20,377**	**111**	**71**
YU7ZZ	■	**13,760**	**79**	**64**
LW9HZI	■	**13,505**	**99**	**73**
PU2VOR	"	11,856	90	76
PY1CMT	"	10,437	79	71
PU2GTA	"	9,514	76	67
YB9KA	■	**9,280**	**89**	**64**
IZ8IEV	■	**8,976**	**64**	**51**
EF7W	■	**7,038**	**53**	**46**
			(OP: EC7KW)	
JA1NEZ	■	**5,060**	**53**	**44**
YP8A	■	**3,996**	**43**	**36**
NK4O	■	**3,861**	**41**	**39**
JA2MWV	■	**2,511**	**37**	**31**
EC4AA	"	2,320	32	29
9W2UPI	■	**1,914**	**34**	**29**
PU2MVA	"	1,656	40	36
BH6KWC	■	**1,456**	**28**	**26**
CO2KL	■	**1,392**	**25**	**24**
S59GS	■	**1,008**	**22**	**18**
NP3V	■	**882**	**23**	**14**
K2GMY	■	**665**	**19**	**19**
ZB2TEN	■	**588**	**14**	**14**
			(OP: MMØGOR)	
OK1LV	■	**585**	**15**	**13**
F8CGL	■	**300**	**10**	**10**
PU2YMH	"	247	13	13
YD5AKV	"	168	9	8
LU4AER	"	121	13	11
CA3FJK	■	**120**	**10**	**10**
E77BW	■	**75**	**5**	**5**
7K2VNA	"	72	6	6
YG3FAP	"	50	6	5
DX9M	"	3	1	1
			(OP: 4F9AM)	
YBØSSF	**21**	**387,840**	**514**	**303**
JT1BV	"	255,032	386	284
EF3O	■	**193,224**	**302**	**249**
			(OP: EA3O)	
YC1LJT	"	169,081	303	209
ES2MC	■	**154,100**	**274**	**230**
SP7M	■	**120,344**	**234**	**196**
HZ1LG	"	86,337	193	159
JQ1NGT	■	**73,315**	**195**	**155**
KG1E	■	**56,994**	**149**	**138**
MM8Z	■	**51,972**	**158**	**142**
			(OP: GM7VSB)	
TA2IB	■	**40,992**	**130**	**112**
LZ2RS	■	**40,132**	**156**	**127**
PA5DX	■	**27,573**	**113**	**91**
JR1NKN	"	20,445	97	87
PY2IML	■	**11,856**	**78**	**76**
SQ8IFG	"	10,919	71	61
SP4NKJ	"	8,940	73	60
IZ2KPE	■	**8,480**	**60**	**53**
JI1NZA/1	"	6,448	56	52
MW8T	■	**6,272**	**50**	**49**
			(OP: MMØCWJ)	
DO1FDK	■	**6,072**	**50**	**46**
4Z4UO	■	**3,996**	**38**	**37**
EX8AY	■	**3,708**	**37**	**36**
SP2QOT	"	3,612	48	43
I5JHW	"	2,945	33	31
IW2NRI	"	1,925	27	25
BH4DCE	■	**1,110**	**37**	**30**
JA1KPF	"	1,100	22	22
SP9W	"	1,026	22	19
YC9WH	"	867	17	17
JK1CNL	"	760	20	20
IZ3NVR	"	672	18	16
KM4NNE	■	**660**	**15**	**15**
MM7BWK	"	486	19	18
4F9AM	■	**405**	**17**	**15**
WC4J	"	286	11	11
PY2VQ	"	286	12	11
JEØCBS/1	"	240	10	10
BD7LNE	"	224	16	16
M6NNC	■	**99**	**9**	**9**
CB4R	■	**77**	**9**	**7**
			(OP: XQ3SK)	
DO1HFS	"	75	5	5
AEØEE	"	35	5	5
JI6NFX	■	**32**	**4**	**4**
N6AN	■	**3**	**1**	**1**
MI1M	**14**	**59,475**	**183**	**183**
			(OP: MIØLLG)	
W2VRK	■	**47,064**	**158**	**148**
JH7VHZ	■	**44,247**	**145**	**129**
HF5WIM	■	**39,960**	**172**	**148**
F1AKK	■	**33,428**	**144**	**122**
N4CW	■	**27,400**	**102**	**100**
HAØGK	■	**23,180**	**152**	**122**
SP5ENG	"	20,618	153	122
PP5IP	■	**16,554**	**112**	**93**
SA3PAT	■	**8,772**	**98**	**86**
MØJBA	■	**7,719**	**93**	**83**
N7SVI	■	**6,600**	**64**	**60**
N2JJ	"	4,692	50	46
SP9PAW	"	3,328	66	52
IZ2QKG	■	**3,315**	**57**	**51**
TA1ED	■	**1,666**	**35**	**34**
OK1DSA	■	**1,518**	**40**	**33**
F4GWM	"	1,026	28	27
YO3IJ	■	**736**	**24**	**23**
S56OA/P	■	**728**	**28**	**26**
MØXXM	"	702	28	27
PD2OR	■	**651**	**21**	**21**
YB3DXG	■	**414**	**19**	**18**
TA1APD	"	289	17	17
YTØI	■	**160**	**10**	**10**
IW2EPE	"	135	15	15
VK4LW	■	**133**	**7**	**7**
DG5TW	■	**81**	**9**	**9**
IK5MEP	"	60	6	6
DF8AN	"	32	4	4
PA8MM/P	"	16	4	4
KE8OWX	■	**12**	**2**	**2**
KG6LSE	"	0	0	0
JA6GCE	**7**	**108,251**	**193**	**143**
OE3MDB	■	**48,477**	**166**	**143**
SO55K	■	**45,756**	**179**	**164**
G4Y	■	**24,120**	**139**	**120**
			(OP: M6OXO)	
UN9LDC	■	**19,432**	**60**	**56**
PA2REH	■	**19,380**	**100**	**95**
ISØAGY	■	**15,088**	**97**	**92**
YD6ROA	■	**11,050**	**94**	**50**
YB2CTE	"	10,584	135	56
IK5LWE	■	**9,230**	**72**	**71**
IK7XNF	"	8,680	73	70
NØZIB	■	**2,448**	**35**	**34**
YD9WFT	"	1,659	28	21
DZ1Z	■	**611**	**14**	**13**
			(OP: DV1YAI)	
JR1ABS	■	**560**	**10**	**10**
JU1DX	"	378	9	9
OK2IKT	■	**231**	**11**	**11**
CB3R	■	**152**	**8**	**8**
			(OP: XQ3SK)	
F4JDI/P	■	**112**	**8**	**7**
			(OP: F4JDI/P)	
VK4Z	■	**80**	**5**	**5**
YD2NIR	"	20	11	10
9W2AIX	■	**4**	**2**	**2**
HB9EHJ	■	**2**	**1**	**1**
VA3TTQ	■	**1**	**1**	**1**
OE5DHP	"	1	1	1
JA5NSR	■	**1**	**1**	**1**
YD1EZT	"	0	2	2
DG3T	3.7	23,004	119	108
			(OP: DF5RF)	
LY2OU	■	**17,017**	**102**	**91**
BD4JA	■	**24**	**4**	**4**
KT3Q	■	**1**	**1**	**1**
DL1AOB	**1.8**	**10,658**	**84**	**73**
HA1TI	■	**8,127**	**69**	**63**
YO8WW	■	**2,016**	**32**	**32**
HA8BE	"	1,984	32	31
CT7AGE	■	**1,300**	**30**	**26**
YT1BD	■	**286**	**13**	**13**
EA5Y	■	**6**	**2**	**2**

ROOKIE

United States

District 1

***KC1QEM**	**A**	**41,625**	**146**	**125**
*K1THE	"	378	14	14

District 2

KD2UBH	**A**	**9,891**	**69**	**63**
***KI2D**	**A**	**115,290**	**281**	**210**
*KD2SGM	"	17,248	99	88
*W2CHZ	"	11,165	91	77
*K2MJP	"	4,418	49	47

District 3

AA3R	**A**	**1,692,449**	**1155**	**583**
W3FR	"	170,568	301	207
N3AML	"	58,496	171	128
***N3BAS**	**A**	**112,761**	**211**	**201**
*AC3MB	"	56,304	173	136
*KR3L	"	46,624	154	124
*N3GT	"	41,019	127	121
*K3BZZ	"	17,680	89	80
*NW2W	"	12,324	84	78
*KC3NLT	"	8,883	66	63
*W4GMN	14	240	12	12

District 4

WB4DKU	**A**	**24,395**	**96**	**85**
KO4DJG	14	4,650	51	50
***K1MWH**	**A**	**70,858**	**181**	**142**
*KY4KP	"	32,912	130	121
*KO4VFA	"	29,400	132	105
*KO4ENU	"	11,400	94	76
*K2LAT	"	10,584	80	72
*KO4EZG	"	4,480	41	40
*KO4YJA	28	342	20	19
*AC4AG	7	126	6	6
*KO4IJH	A	112	8	8

District 5

KI5LST	**28**	**48**	**4**	**4**
***WX7V**	**A**	**78,490**	**234**	**167**
*W3PWF	"	44,880	156	132
*KI5TJW	"	30,956	133	109
*AG5XW	"	25,064	137	104
*KI5PED	"	3,042	42	39
*KI5MOO	"	459	19	17

District 6

***N6JSO**	**A**	**18,486**	**102**	**78**
*KN6ODG	"	10,540	73	62
*KN6NSK	"	9,408	66	56
*AJ6RX	"	9,042	72	66
*W6OOD	"	918	29	27

District 7

W6AGZ	**A**	**16,089**	**125**	**93**
***K4YO**	**A**	**63,627**	**293**	**167**
*W7VC	"	22,135	120	95
*AA6X	"	8,775	84	75
*N7EEL	"	7,605	72	65
*K7ORZ	"	9	3	3

District 8

KE8SIQ	**A**	**151,164**	**322**	**234**
***KE8UAD**	**A**	**18,620**	**100**	**98**
*N8CWX	"	6,018	57	51
*KE8MOI	"	4,089	51	47
*W1CHL	"	2,627	37	37

District 9

*KD9NYE	A	54,752	161	118
***AC9XX**	**A**	**28,152**	**133**	**102**
*KD9NHZ	"	3,564	45	44
*K9BRS	"	2,600	44	40
*K9MWG	14	828	18	18
*AC9ZU	"	32	8	8

District Ø

KØGYQ	**A**	**34,545**	**117**	**105**
***WØADL**	**A**	**82,899**	**221**	**183**
*K3CDY	"	1,170	31	30
*KFØADU	"	54	6	6

NORTH AMERICA

Alaska

***KL5IO**	**A**	**1,160**	**23**	**20**

Canada

District 2

***VA2MVR**	**A**	**94,985**	**192**	**157**

District 3

VE3GJP	**A**	**702,780**	**612**	**340**
VE3JZT	"	86,388	199	138
VA3EPM	"	27,450	110	90
***VA3IDD**	**A**	**1,232,777**	**847**	**437**
*VA3OOL	7	332,677	99	86

District 6

***VE6CLG**	**A**	**30,450**	**113**	**105**
*VA6AGR	"	14,100	85	75
*VE6NRO	"	3,024	39	36

District 7

***VA7USD**	**A**	**17,544**	**97**	**68**

Costa Rica

***TI3YAM**	**A**	**19,800**	**107**	**90**

AFRICA

Cape Verde

***D44PM**	**A**	**618,030**	**599**	**378**

ASIA

Asiatic Turkey

***TA2BRJ**	**21**	**408**	**12**	**12**

China

***BH3EMV**	**A**	**53,820**	**199**	**130**
*BH4FBB	"	47,594	166	106
*BI4VKA	21	4,356	39	35
*BD4SVU	A	720	26	20
*BD4QXR	"	198	12	11
*BH5HYB	A	3,367	44	37

India

***VU3IYE**	**A**	**48**	**8**	**8**

Japan

District 1

JK1BAB	**7**	**130**	**5**	**5**
***JJ1VJQ**	**21**	**114,573**	**177**	**160**
*JK1AUY	A	4,968	47	46
*JK1ECX	7	24	2	2

District 5

***JJ5PXO**	**A**	**105**	**5**	**5**

District 6

***JS6UGC**	**A**	**7,584**	**65**	**48**

Singapore

9V1PL	**A**	**2,398**	**27**	**22**
***9V1BC**	**14**	**7,200**	**58**	**49**

Thailand

***E25CRF**	**A**	**25,938**	**156**	**99**
*E2ØTWR	7	234	9	9
*HS3QGB	A	140	10	10

West Malaysia

***9M2MAD**	**A**	**120,978**	**272**	**99**
*9M2VVH	"	25,636	116	58
*9W2ATB	7	11,840	65	37

EUROPE

Austria

***OE3KAR**	**A**	**12,555**	**94**	**81**

Corsica

***TK4TH**	**A**	**296,140**	**585**	**340**

Croatia

***9A1AY**	**3.7**	**17,711**	**101**	**89**
*9A3SAI	7	912	20	19

Czech Republic

***OK1JCB**	**A**	**15,826**	**91**	**82**

Dodecanese

***SV5SKD**	**A**	**25,122**	**127**	**106**

England

MØNVK	**A**	**176,847**	**347**	**253**
***MØKYB**	**A**	**315,543**	**488**	**321**
*M7TXR	"	32,382	146	126
*MØLKW	"	22,848	143	119
*M7ALE	"	18,928	115	104
*MØJQQ	"	7,469	88	77
*2EØYBJ	14	6,724	88	82
*2EØGKW	A	5,874	69	66
*M7EGD	"	2,465	30	29
*2EØHEK	"	1,725	25	25
*2EØYML	14	483	23	23
*MØYTE	A	192	8	8

Estonia

***ES3HEA**	**A**	**4,968**	**59**	**54**

Fed. Rep. of Germany

DD5VL	**A**	**385,170**	**487**	**347**
DK5PH	"	68,960	189	160
***DL9DX**	**A**	**141,540**	**291**	**210**
*DC5AQ	"	57,915	205	165
*DL/SP2RBA	"	8,787	106	87
*DM6LE	"	8,601	65	61
*DJ1HAM	"	6,890	58	53
*DO7OO	21	3,936	42	41
*DM7AK	A	3,760	42	40
*DO8DAM	"	3,306	40	38
*DO1SLB	21	3,264	36	34
*DO2MAV	"	2,604	32	31
*DO5MN	A	2,263	31	31
*DO7CX	"	2,108	35	31
*DO9JOC	"	1,767	31	31
*DM5RE	"	1,350	28	27
*DM1MC	14	930	34	31
*DO6GT	21	24	4	4
*DM3CH	3.7	20	5	4
*DL8SYL	A	1,296	25	24

Finland

***OH8RX**	**A**	**239,425**	**459**	**305**

France

***F4IVC**	**A**	**180,768**	**375**	**269**
*F4IZG	"	30,504	158	123
*F4IZH	"	24,038	127	101
*F4IYB	"	13,195	102	91
*F4DUZ	"	7,139	62	59
*F4IYJ	"	1,400	28	28
F4INY	*14*	*754*	*30*	*29*
*F4JAO	7	2	1	1
*F4JDI/P	7	112	8	7
				(OP: F4JDI/P)

Hungary

HA5MIG	**A**	**171,094**	**367**	**242**
***HA8KM**	**A**	**15,624**	**109**	**93**

Ireland

***EI6IQB**	**A**	**1,260**	**33**	**30**

Italy

IUØOVB	**A**	**3,288,267**	**1818**	**831**
IU7OTK	"	1,650	24	22
IU7QCH	"	1,400	22	20
IV3IPA	"	231	14	11
***IU1NKS**	**A**	**713,680**	**723**	**440**
*IU1MRG	"	237,888	407	288
*IV3JAG	14	143,510	339	254
*IU1OPK	A	97,704	241	184
*IU4MTO	"	78,489	201	171
*IV3JAK	"	71,632	210	176
*IU2NKC	"	39,480	161	140
*IN3IGL	"	39,151	151	119
*IU1PZX	"	30,324	135	114
*IU3OCN	"	25,441	116	103
*IUØOPT	7	19,760	98	95
*IN3IIR	A	7,254	69	62
*IU1OLR	"	1,736	30	28
*IR4Q	28	1,679	25	23
				(OP: IU4MRU)
*IU1OQZ	A	936	24	24
*IU2PKQ	"	56	9	8

Latvia

***YL3AND**	**A**	**44,697**	**161**	**141**

Norway

LB6VI	**A**	**26,840**	**140**	**122**
***LBØFI**	**A**	**51,660**	**197**	**164**

Poland

SP6MAA	**A**	**5,332**	**46**	**43**
***SN3J**	**A**	**249,050**	**438**	**293**
				(OP: SP3DAT)
*SP7JS	7	114,784	254	211
*SP3BKR	A	82,944	246	192
*SP7SF	"	70,884	202	179
*SQ9MR	"	16,643	105	89
*SP3WKW	"	1,152	20	18

Portugal

***CS7AUC**	**A**	**11,305**	**93**	**85**

Romania

***YO3HEX**	**14**	**88,165**	**351**	**229**
*YO7OWI	A	45,474	173	143

Scotland

***MM7TXY**	**A**	**6,580**	**76**	**70**
*MM7DMW	14	5,727	57	52
*2MØSVM	A	5,040	62	60

Serbia

***YT3RAW**	**A**	**20,544**	**108**	**96**
*YU4SAX	"	99	9	9

Sicily

***IT9IVU**	**A**	**53,200**	**177**	**140**
*IT9IHB	21	33,677	129	119

Slovenia

S56NE	**A**	**23,232**	**107**	**96**

Spain

EF5T	**A**	**216,495**	**404**	**283**
				(OP: EA5JDN)
***EA4HKF**	**A**	**152,604**	**323**	**243**
*EA2ESB	"	66,348	246	194
*EA4HRJ	28	9,936	66	54
*EA5JEB	14	9,240	98	84
*EA5JAX	A	5,494	69	67
*EA1FHQ	"	5,304	55	51
*EA5IXO	"	60	4	4

Sweden

***SA6FAX**	**A**	**58,951**	**234**	**167**
*SA6KOD	"	7,300	86	73
*SA5EED	"	3,510	49	45
SA6IMI	"	*91*	*7*	*7*

Switzerland

HB9HHN	**A**	**22,800**	**120**	**100**

Wales

***GW5JHE**	**A**	**5,481**	**64**	**63**

OCEANIA

Australia

***VK6NCB**	**A**	**360**	**16**	**12**
*VL3M	7	232	8	8

Indonesia

YC3BUE	**7**	**18,850**	**180**	**65**
***YD3GIF**	**A**	**126,036**	**383**	**162**
*YC8MUZ	"	119,928	346	152
*YC7URE	"	32,635	147	107
*YD9BIJ	"	26,910	181	90
*YF4FFH	7	15,162	173	57
*YD1CZE	A	12,084	175	53
*YB2CRN	"	11,868	98	69
*YD9GHS	7	7,866	105	46
*YD1EOZ	"	6,862	122	47
*YC1DGR	A	6,588	85	54
*YD3BSB	7	4,872	103	42
*YD6HRI	"	3,096	48	24
*YC1BVK	"	3,069	61	33
*YDØBCG	A	3,066	61	42
*YD2CRO	7	2,686	71	34
*YB1DGG	A	2,520	54	35
*YD3AVN	7	1,530	70	30
*YG1BDV	"	1,488	37	24
*YD3AMT	"	620	35	20
*YD9GWS	"	180	10	9
*YB8VRA	14	117	9	9
*YD5AKV	28	168	9	8
*YD1EZT	7	0	2	2

New Zealand

***ZL3CRG**	**A**	**9,794**	**65**	**59**

Philippines

***4G1FKH**	**21**	**9,272**	**66**	**61**
*4G1OAL	"	1,960	32	28
*4G1FCI	A	348	15	12

SOUTH AMERICA

Argentina

***LU1WCL**	**28**	**10,335**	**99**	**65**
*LU8DST	"	7,620	81	60

Brazil

***PP5KW**	**28**	**1,036,836**	**800**	**498**
*PY2MDF	"	77,922	195	162
*PU2TWZ	"	60,502	206	169
*PU2MIW	"	56,550	172	145
*PU2PKL	"	11,928	80	71
*PU2OKW	"	5,152	48	46
*PU2PTU	"	513	19	19
*PU2YFP	"	24	4	4

Venezuela

***YY5DBA**	**28**	**5,782**	**78**	**59**
*YY5AVS	A	3,627	32	31

CLASSIC
NORTH AMERICA

United States

District 1

NG1M	**A**	**1,801,521**	**1283**	**621**
ND1X	"	899,100	773	450
W1GD	"	429,048	432	303
W3SM	"	305,728	383	272
K1OUH	"	286,764	431	276
W1OHM	"	42,362	152	118
***KR5X**	**A**	**2,700,894**	**1575**	**749**
				(OP: K1BX)
*AB1XQ	"	171,564	311	204
*N1SFE	"	127,459	288	197
*NE1V	"	79,050	195	155
*N1IBM	"	55,440	139	132
*AE1P	"	25,296	99	93
*KC1RLS	14	20,116	103	94
*W1LAG	A	2,546	39	38
*N1YIS	"	1,938	35	34
*KC1IBR	28	119	7	7

District 2

KD2RD	**A**	**3,080,528**	**1722**	**761**
WU2X	"	2,058,110	1016	554
				(OP: N2QV)
NS2N	"	141,480	260	216
KX2NY	3.7	73,392	210	139
				(OP: W2XL)
***N2MTG**	**A**	**305,715**	**444**	**267**
*AC2RL	"	213,666	355	239
*AF2V	"	169,000	270	250
*W2MJR	"	60,888	174	129
*AB2NM	"	43,384	160	136
*K2PH	"	29,539	123	109
*KS2A	"	21,942	148	106
*KD2REH	"	19,800	115	90
*WB2UDC	"	17,425	95	85
*W2STM	"	16,400	90	82
*K2HVE	"	4,042	44	43
*W3EH	14	2,952	36	36

District 3

W3LL	**A**	**1,820,620**	**1222**	**584**
N3FCP	"	537,168	654	361
W3BGN	3.7	496,740	618	340
***N2EM**	**A**	**109,335**	**240**	**185**
*N3OJU	"	39,444	128	114
*AC3EU	"	15,520	94	80
*KD3CR	"	14,514	96	82
*K3ZE	"	5,109	46	39
*KE3O	"	645	16	15
*NR3DT	A	54,285	161	141
				(OP: KD4IZ)

District 4

WS7X	**A**	**3,914,010**	**2107**	**792**
W3DQS	"	287,385	399	255
WG4MC	"	86,400	208	150
N4WPJ	"	400	16	16
***WA3LXD**	**A**	**495,600**	**544**	**336**
*NN4DX	"	394,295	545	335
*NC4MI	"	176,472	320	228
*WA4JA	"	153,920	295	208
*N4QI	"	111,838	258	199
*W9TCV	"	101,430	231	161
*K1HG	"	85,575	245	175
*K4JSK	"	76,760	195	152
*W2QU	14	22,990	113	110
*WS4Z	A	16,269	95	87
*NØFIR	"	16,072	95	82
*AC4G	"	14,910	94	71
*AF6G	"	7,875	82	75
*NB3A	"	7,791	58	53
*KN4MSE	"	5,520	54	48
*KC4S	"	3,724	43	38
*KF4QFJ	"	2,944	32	32
*NM9X	"	60	5	5
*NK4O	28	3,861	41	39

District 5

WK5T	**A**	**6,889,410**	**2786**	**990**
				(OP: N2IC)
WQ5L	"	401,280	523	352
KG5GM	"	58,145	198	145
K1JHS	"	9,455	71	61
***WA5JMZ**	**A**	**429,450**	**656**	**357**
*K5FUV	"	403,048	520	332
*AA3C	"	126,072	304	206
*N5DTT	"	83,213	207	173
*AI5A	"	30,875	170	125
*AA5DF	"	21,024	120	96
*NT5TM	21	5,512	57	53

District 6

NJ6G	**A**	**2,332,998**	**1552**	**666**
		(OP: N7MH @W6YX)		
AJ6V	"	786,240	980	480
NN6DX	"	421,056	558	344
				(OP: W1PR)
K6YK	"	50,796	185	153
AI6LY	"	20,440	89	73
KA6KEN	"	*528*	*17*	*16*
***NG6O**	**A**	**230,538**	**366**	**231**
				(OP: K6GHA)
*N6PGQ	"	149,628	312	222
*AJ6CE	"	54,567	197	141
*K6KTS	"	41,358	158	122
*WA7BNM	28	31,800	120	106
*N6UNH	A	30,015	140	115
*WZ6ZZ	3.7	24,800	45	40
*KA5WSS	A	16,490	105	85
*N6XEW	"	8,037	65	57
*K6TLH	"	6,888	62	56
*KM6RRS	"	693	21	21
*N6AN	21	3	1	1

District 7

K7SS	**A**	**936,540**	**1027**	**484**
W7YAQ	"	287,976	339	338
K7JQ	"	118,014	295	221
K7MY	"	28,080	129	120
KA7A	"	10,956	93	83
AI7MG	"	6,985	63	55
***N7VZU**	**A**	**46,540**	**174**	**130**
*W7KK	"	12,960	88	80
*KF7KTC	28	11,820	78	60
*N7VGO	A	6,600	62	55
*WA8ZNC	21	6,215	58	55
*W7MTL	A	3,977	50	41
*KE7DZ	"	2,501	49	41
*W7MKE	"	940	20	20
*KD7FQI	14	330	17	15
*K7ALM	"	63	7	7
*WØVQ	A	11,592	87	72
*N7JI	"	3,162	50	34

District 8

ND8DX	**3.7**	**851,860**	**920**	**454**
NA8V	A	800,394	693	413
K8RR	"	480,810	550	330
KE8E	"	86,730	215	177
***N8II**	**21**	**706,615**	**616**	**444**
*AA8OY	A	211,250	363	250
*W8JMZ	"	156,555	337	224
*KD8TJB	"	53,654	167	139
*N5MKY	"	35,380	156	116
*AA8SW	"	29,848	133	104
*KA8BSA	"	10,440	75	60
*WB8JAY	"	7,336	64	56
*WA8YZB	"	5,415	62	57
*NK8D	14	4,320	50	48
*N8FYL	A	2,291	32	29
*AD8WA	"	1,872	30	26
*KV8Z	"	1,320	24	24
*WB8JUI	28	1,260	24	20
*AC8HZ	A	1,218	31	29
*AE8Q	"	903	22	21
*NF8M	"	720	20	20

District 9

W9GT	**A**	**379,988**	**538**	**331**
W9YG	"	131,031	309	207
***WD9CIR**	**A**	**335,360**	**584**	**320**
*N7ZZ	"	295,069	466	289
*AC9TO	"	176,341	412	253
*WR9L	"	172,380	307	221
*KY9IN	"	133,131	265	199
				(OP: K9GX)
*NY1V	"	104,368	254	176
*W9QL	21	88,044	204	174
*N9UPU	A	56,471	200	149
*WQ9F	"	33,984	155	118
*AJ9U	"	4,601	48	43

District Ø

KØBBB	**14**	**420,847**	**564**	**421**
WFØGM	A	87,945	232	195
				(OP: KJØI)
WØETT	21	63,672	189	168
KØJM	A	24,651	105	83
***NØEX**	**A**	**137,108**	**322**	**227**
*KCØVDY	"	36,036	161	126
*KØSCO	"	33,744	158	114
*WØPI	"	22,325	97	95
*NØUJJ	"	19,488	104	87
*WBØLQC	28	2,610	34	30
*AJØCM	A	2,542	43	31
*KD5FQF	14	1,836	40	36
*KB4SBY	28	96	6	6
*WØJOP	A	78	6	6
*KEØKME	28	66	6	6

Belize

***V31MA**	**A**	**564,333**	**575**	**349**

Canada

District 1

VA1XH	**7**	**173,008**	**195**	**176**

District 2

VA2EW	**A**	**6,834,304**	**2309**	**856**
VE2GT	21	84	5	5

District 3

VE3GYL	**A**	**337,155**	**410**	**285**
VE3VN	"	96,361	209	173
***VA3KRT**	**A**	**232,760**	**330**	**220**
*VE3TTP	"	114,972	214	156
*VA3RSA	"	42,586	133	107
*VE3ZDR	"	15,844	76	68

District 4

VE4SG	**14**	**262,542**	**479**	**290**
***VE4DL**	**A**	**39,389**	**147**	**119**
*VE4GKM	"	22,120	108	79

District 6

VE6CA	**14**	**17,091**	**98**	**81**

Dominican Republic

***HI8HRD**	**A**	**318,092**	**500**	**323**
*HI3TT	7	46,851	102	97

Haiti

***HH2JA**	**21**	**8,201**	**61**	**59**

Mexico

XE1CKJ	**A**	**354,760**	**764**	**335**
***XE1CIC**	**28**	**72,500**	**224**	**140**
*4A9ØEMX	"	2,325	32	29
				(OP: XE1ZTW)

Puerto Rico

KP3V	**28**	**570,630**	**804**	**345**
WP3R	7	143,528	176	154
***KP4NET**	**28**	**46,920**	**168**	**120**
*KP4KJ	A	9,130	59	55
*KP4PMP	28	56	10	8

AFRICA

Canary Islands

EA8/ OHØXX	**28**	**2,100,225**	**1191**	**615**

Madeira Islands

***CT3IQ**	**21**	**509,421**	**527**	**359**

Namibia

***V51MA**	**A**	**48,512**	**147**	**128**

ASIA

Asiatic Turkey

***TA2L**	**A**	**110,808**	**214**	**171**

China

***BG7TWJ**	**21**	**116,205**	**371**	**183**
*BG8NG	A	5,280	64	55
*BG7IEJ	14	3,762	43	38
*BA3AX	21	3,294	69	54
*BH6AIK	A	594	21	18
*BG8PW	21	144	10	9

Cyprus

C4W	**A**	**1,458,130**	**977**	**430**
				(OP: 5B4WN)
***5B4ALS**	**21**	**11,328**	**69**	**64**

India

VU2DED	**A**	**404,340**	**486**	**293**
***VU2MCW**	**A**	**1,377**	**33**	**27**
*VU2JOS	14	945	25	21
*VU2MYL	A	690	41	30
VU3SXL	"	*288*	*26*	*24*
*VU3LMS	"	143	11	11
*VU3SIO	"	133	7	7
*VU2UI	14	8	2	2
*VU3VBK	21	1	1	1

Japan

District 1

JR1GSE	**A**	**523,768**	**558**	**329**
JH1CTV	"	107,092	233	164
JE1QHP	"	28,512	116	99
JE1RXJ	28	21,248	102	83
JH1LYE	A	1,680	28	28
7M2FTR	"	390	10	10
*JS1KKY	A	85,824	190	149
*JR1AKD	21	51,480	156	132
*7N2UQC	28	20,445	99	87
*JR1LEV	A	12,993	73	61
*JI1UPL	"	5,822	52	41
*JA1ATM	"	5,781	59	47
*JA1CHY	"	4,332	40	38
*7K2QNI	"	1,560	26	26
*JE1GZB	14	1,274	27	26
*JH1WHA	21	1,007	12	12
*JA1GQC	28	660	16	15
*JE1SPY	1.8	621	24	23
*7M4CFW	A	540	20	18
*JA1GZK	21	432	12	12
*JA1MYW	28	65	5	5
*JQ1PCT	A	48	4	4
***JJ1XAS**	**A**	**162,410**	**317**	**218**
*7L1DST	"	1,060	21	20
*JEØCBS/1	21	240	10	10
*JI1AEP	A	80	6	5
*7K2VNA	28	72	6	6

District 2

***JG2RFJ**	**A**	**159,744**	**301**	**192**
*JS2PHO	21	10,270	70	65
*8J22SH	A	1,071	23	21
				(OP: JS2GGD)
*JA2KKA	21	390	14	13

District 3

JR3RIU	**A**	**80,920**	**210**	**136**
JP3UBR	"	22,092	94	84
***JI3XOK**	**21**	**31,806**	**125**	**114**
*JA3KDJ	A	11,456	77	64
*JL3DQX	14	495	3	3
*JA3YVI	7	52	2	2

District 4

JR4VEV	**A**	**10,464**	**50**	**48**
JM4WUZ	1.8	759	27	21
***JH4FUF**	**21**	**15,958**	**84**	**79**

District 6

JA6BWH	**A**	**24,885**	**95**	**79**
***JA6CVR**	**A**	**51,837**	**169**	**111**
*JF6ABL	21	21,497	81	73

District 7

JG7AMD	**A**	**1,501,948**	**918**	**553**
JH7QXJ	"	1,482,844	987	523
JA7QVI	21	1,226,610	852	556
JQ7BCM	A	60	5	4
***JA7HYS**	**21**	**129,150**	**233**	**210**

District 8

JA8RUZ	**A**	**978,134**	**764**	**466**
JA8IJI	"	186,784	308	208
***JA8RWU**	**A**	**355,395**	**485**	**288**
*JK8PBO	"	261,807	356	273
*JH8RXM	"	9,761	55	43
*JK8NIP	21	1,404	26	25
*JE8UHY	A	693	21	21
*JA8HBO	21	324	13	12
*JM8LND	"	48	4	4

District Ø

***JHØDUG**	**A**	**19,988**	**103**	**76**

Lebanon

***OD5UI**	**A**	**155,558**	**285**	**193**

Singapore

9V1ZV	**A**	**201,091**	**330**	**181**

Taiwan

BV4VR	**21**	**17,290**	**118**	**91**

Thailand

***E25ETT**	**A**	**97,875**	**279**	**135**
*E2ØXMG	"	33,201	145	93
*HS2UPR	14	532	14	14

United Arab Emirates

***A65GT**	**14**	**96**	**6**	**6**
				(OP: 4G1QAZ)

West Malaysia

***9W2AIX**	**7**	**4**	**2**	**2**

EUROPE

Austria

***OE1HLB**	**A**	**64,185**	**214**	**165**
*OE1WWL	21	8,476	63	52
*OE3MCS	"	2,356	30	29

Balearic Islands

***EA6VY**	**A**	**137,696**	**305**	**208**
*EA6AOH	"	41,695	199	159

Belgium

***OPØJ**	**14**	**29,078**	**173**	**134**
				(OP: ON5GF)
*ON3PAT	A	22,895	107	95

Bosnia-Herzegovina

***E76MB**	**A**	**28,141**	**130**	**107**

Croatia

***9A9R**	**28**	**74,304**	**208**	**129**
*9A5CZK	14	8,236	82	71
*9A4OP	A	39,336	149	132

Czech Republic

***OK7N**	**A**	**23,114**	**97**	**91**
*OL2T	3.7	4,185	50	45
*OK1TK	A	3,936	53	48
*OK3ON	14	3,498	60	53
*OK1LV	28	1,584	15	13
*OK2IKT	7	231	11	11

Denmark

OZ1D	**A**	**1,536**	**25**	**24**
				(OP: OZ1HHH)
***OZ4NA**	**7**	**190,662**	**333**	**258**

England

GØCNN	**A**	**836,808**	**946**	**476**
G4R	"	807,488	904	496
				(OP: YO4RDW)
M1B	14	416,944	648	412
				(OP: G1YBB)
MØLTE	A	82,654	245	187
G9D	"	68,208	201	168
				(OP: G6NHU)
G1EIX	"	13,692	90	84
***G9X**	**A**	**737,380**	**729**	**458**
				(OP: M1LCR)
*MØPLX/M	"	457,017	807	432
				(OP: MØPLX/M)
*G3R	"	155,946	329	237
				(OP: GØCDA)
*MØIRU	"	129,384	282	216
*MØKPW	"	124,576	324	229
*MØAQM	14	62,205	239	195
*G8ZRE	A	54,793	207	157
*2EØEVM	"	47,180	191	140
*G4OTU	21	19,184	102	88
*G4OED	"	16,646	91	82
*MØVLX	A	16,450	112	94
*G8NVY	"	2,052	37	36
*G7IYK	"	1,734	36	34
*M3EMO	"	621	24	23
*MØJBA	14	7,719	93	83

Estonia

ES6RW	**A**	**5,318,693**	**2532**	**953**

ESØIA	"	53,949	186	147
***ES1TAR**	**14**	**129,168**	**369**	**282**
*ES5RIM	"	20,750	128	125
*ES8SX	21	5,916	58	51

Fed. Rep. of Germany

DH8BQA	**A**	**704,919**	**653**	**447**
DA3X	14	406,065	499	345
			(OP: DL5JS)	
DR5M	"	96,300	241	180
			(OP: DL5NEN)	
DG4UF	"	63,546	203	178
DK5NJ	1.8	25,877	133	113
DM4M	3.7	16,704	86	73
DP7P	A	9,782	78	73
			(OP: DM5CB)	
***DL6MRM**	**A**	**435,183**	**764**	**437**
*DL2NBU	"	56,457	168	153
*DL9HB	"	54,322	181	157
*DH9DX/P	"	46,508	185	154
*DL1BSN	"	29,887	140	121
*DF9IX	"	28,431	135	117
*DK1KC	"	25,641	111	111
*DG9BEO	"	23,836	126	101
*DM6EE	"	21,100	110	100
*DL1RTO	"	19,669	107	89
*DA3T	"	17,836	102	91
			(OP: DL8DXL)	
*DO4DXA	3.7	14,863	83	77
*DO1TOM	A	13,031	85	83
*DB4LL	"	10,686	91	78
*DO3GE	21	10,595	65	65
*DG6MDG	A	4,284	48	42
*DO8WM	3.7	3,139	44	43
*DL8MV	A	2,415	36	35
*DO9YY	21	2,052	28	27
*DL5DWF	A	1,344	24	21
*DL1MPR	"	936	18	18
*DF8IU	"	840	20	20
*DL2GMK	"	544	17	16
*DKØBM	7	84	7	7
			(OP: DK7CH)	
*DL9MFY	28	12	2	2
*DF5GO	A	14,362	101	86
*DO1FDK	21	6,627	50	46
*DG5TW	14	81	9	9

Finland

OH1F	**A**	**3,446,072**	**1844**	**826**
			(OP: OH1NOA)	
OH2PQ	"	2,034,806	1275	674
OH1VR	"	1,066,720	949	565
OH1ØA	"	84,960	213	180
			(OP: OH1X)	
OG6B	7	966	21	21
			(OP: OH1ZAA)	
***OH3MZ**	**A**	**60,990**	**240**	**190**

France

F5LIW	**A**	**1,320,405**	**1473**	**715**
***F4FVA**	**A**	**291,640**	**513**	**340**
*F4WDL	"	96,140	263	190
*F4IAY	"	61,008	197	164
*F5JME	"	56,496	196	176
*F4GQP	"	38,340	158	135
*F4IIQ/P	"	16,170	108	98
			(OP: F4IIQ/P)	

Greece

***SV4SCL**	**A**	**97,902**	**249**	**189**

Hungary

HG1S	**21**	**2,129,606**	**1686**	**752**
			(OP: HA1DAE)	
HA1TJ	3.7	934,443	819	500
***HA6ZQ**	**7**	**212,076**	**347**	**274**
*HA3HA	14	83,528	278	212
*HA4BF	A	10,800	84	75
*HA3HO	"	7,205	59	55
*HA2MM	A	15,604	90	83
*HA9RC	"	2,419	44	41

Iceland

*TF3SG	A	221	13	13

Italy

I5MXX	**A**	**2,969,968**	**1496**	**716**
I3/OE6MBG	7	1,186,515	774	495
IB5B	A	496,510	618	410
			(OP: IK5AEQ)	
IZØPAU	21	386,242	478	313
IZ2ZOZ	A	314,000	477	314
IZ6OUX	"	237,667	435	271
IU1FSL	"	150,732	324	237
IZ1SAI	"	115,596	300	228
IWØHLZ	21	83,398	206	161
IK7ZLW	A	10,833	71	69
IK1VQY	7	5,490	46	45
IU2LVV	A	450	10	10
***IUØDHV**	**A**	**150,495**	**308**	**237**
*IW2NBL	"	102,968	276	211
*IU7CUE	7	102,910	247	205
*IZ2BKA	A	94,464	233	192
*IU7IGI	"	82,476	202	158
*IUØDUM	14	63,180	274	195
*IZ7ZKV	A	57,600	279	192
*IU1FIB	"	48,672	171	144
*IZ3PYR	"	44,992	170	152
*IZ3XNJ	"	43,885	156	131
IK8ARF	*"	*37,926*	*153*	*126*
*IU7GRA	"	32,092	125	113
*IU2DGV	"	30,552	131	114
*IW3RPS	"	29,748	118	111
*IV3APH	7	22,680	119	108
*IU3GKJ	A	20,880	90	87
*IZ1YTK	"	18,810	110	90
*IN3HDE	"	16,950	124	113
*IU7EDX	"	16,008	99	87
*IW3RPW	"	11,700	92	90
*IZ1ZJO	"	9,694	84	74
*IQØPH	"	9,184	98	82
*IK2MMM	"	8,568	63	56
*IK8DYM	"	8,448	74	66
*IW3SOA	"	8,246	66	62
*IV3RYP	7	7,810	56	55
*IU8CFS	A	7,410	68	65
*IZ2KWV	"	6,240	65	60
*IU4FKM	"	5,311	52	47
*IZ2YNB	"	4,002	49	46
*IV3DLW/P	28	1,898	29	26
*IU1PZC	A	1,428	35	34
*IU1JFH	14	1,219	23	23
*IWØEZW	A	1,066	27	26
*IW2MXO	"	288	12	12
*IZ5OVP	3.7	78	13	13
*IK1VQO	A	32	8	8
*IU4CSS	28	24	2	2
*IK5LWE	7	9,230	72	71

Latvia

***YL2LW**	**21**	**59,015**	**150**	**123**
*YL3GY	A	21,105	123	105

Lithuania

LY4T	**A**	**78,300**	**221**	**174**
***LY5BT**	**A**	**213,890**	**460**	**293**
*LYØNAS	"	51,009	186	147
*LY3S	21	4,472	44	43

Netherlands

PA3ETM	**A**	**241,332**	**365**	**274**
***PG1R**	**A**	**89,110**	**253**	**190**
*PA2VS	"	36,036	151	132
*PA9RW	"	15,958	84	79
PE1MCF	*14*	*7,488*	*82*	*72*
*PEØCWK	A	5,243	53	49

North Macedonia

***Z35M**	**A**	**92,720**	**262**	**190**

Northern Ireland

***GI7NKK**	**A**	**24,563**	**149**	**121**

Norway

LA6ZP	**A**	**232,218**	**441**	**266**
***LB1LG**	**A**	**32,718**	**165**	**133**

Poland

SQ7BFC	**A**	**838,457**	**992**	**609**
SP9EJH	7	208,810	367	266
SP9EML	14	82,212	236	186
SP6OH	A	54,568	186	152
SP8BQL	14	23,730	124	113
SP9JBE	28	1,140	20	19
***SP5TE**	**A**	**218,680**	**414**	**284**
*SQ7OVT	"	154,584	322	228
*SO5V	"	109,005	257	215
			(OP: SQ5PMB)	
*SQ5WH	"	34,432	156	128
*SQ9CXC	"	30,444	130	118
*SQ6H	3.7	27,911	135	113
			(OP: SQ6PLH)	
*SP9GMI	A	21,060	99	78
*SP9MX	7	18,957	92	89
*SP2GR	14	17,201	129	103
*SP4SAF	"	16,320	118	102
*SP2TQQ	A	13,932	96	86
*SP3LD	21	13,650	75	70
*SQ5NPX	7	2,108	33	31
*SP5ENG	14	20,984	153	122
*SP4NKJ	21	8,940	73	60
*SP2QOT	"	3,612	48	43
*SP9PAW	14	3,328	66	52
*3Z7Z/P	A	54	6	6
			(OP: SQ9OZM)	

Portugal

CR6T	**A**	**9,080,720**	**3050**	**938**
			(OP: CT1ESV)	
CT1AL	7	8,745	58	55
***CT1EEK**	**14**	**152,438**	**341**	**286**
*CS2F	"	51,620	182	178
			(OP: CT1FOQ)	
*CT7AGE	1.8	1,300	30	26

Romania

YO8BDW	**A**	**690,656**	**1061**	**545**
YO2AA	"	93,055	250	185
***YO5PAP**	**14**	**23,205**	**153**	**119**
*YO4FZX	28	2,100	28	25

Sardinia

*ISØDJA	7	13,224	81	76
***ISØAGY**	**7**	**15,088**	**97**	**92**

Scotland

MMØGGG	**A**	**4,947**	**58**	**51**

Serbia

YT3D	**A**	**2,699,892**	**1518**	**702**
YT2ZZ	7	100,440	221	186
***YT4ZZ**	**7**	**90,574**	**203**	**179**
*YT2MMP	A	27,000	147	120
*YU4PTL	"	6,901	78	67

Sicily

IT9DWF	**A**	**360**	**15**	**15**
***IT9FIQ**	**A**	**271,152**	**523**	**336**
*IR9Z	14	232,848	617	336
			(OP: IT9VCE)	
*IT9BGE	A	62,118	223	174
*IT9AZK	"	2,346	36	34
*IT9JGX	A	135	9	9

Slovak Republic

OM4KK	**A**	**547,452**	**841**	**472**
***OM4IK**	**A**	**279,174**	**457**	**289**
*OM8ST	"	27,610	136	110
*OM7AT	"	3,388	49	44
*OM2AGN	14	2,553	36	36

Slovenia

S5ØR	**21**	**2,674,100**	**1570**	**742**
***S57WW**	**A**	**19,260**	**106**	**90**
*S56OA/P	14	728	28	26

Spain

EA4KD	**A**	**3,473,331**	**1692**	**699**
EA2DMH	"	1,256,283	1087	621
ED3B	*28*	*6,192*	*53*	*48*
			(OP: EA3BOX)	
EE7K	"	5,809	55	37
***EF3T**	**A**	**243,388**	**376**	**284**
			(OP: EA3T)	
*ED1O	"	233,090	378	286
*EA1BCK	14	142,915	331	283
*EA7JF	"	123,617	320	244
*EE2A	A	100,744	262	196
			(OP: EA2SN)	
*EA1JCZ	21	90,280	216	185
*EA3HAB	14	40,317	163	151
*EA1FW	A	16,198	108	89
*EA3W	"	15,660	98	87
*EA3ARP	7	10,350	77	75
*EC5ALJ	A	4,400	45	44
*EA5DFV	21	297	11	11
*EA3GSS	A	48	4	4
*EA5Y	1.8	20	2	2

Sweden

***SM5S**	**A**	**214,668**	**417**	**268**
			(OP: SM5SIC)	
*SB5X	"	82,560	226	192

Switzerland

HB9S	**21**	**52,528**	**144**	**134**
			(OP: HB9AOF)	
***HB9GPG**	**A**	**66,861**	**212**	**171**
*HB9IIH	"	28,815	138	113
*HB9GSR	"	7,830	57	54
*HB9DXB	"	864	24	24

Wales

***GW4W**	**21**	**60,060**	**158**	**143**
			(OP: GW4EVX)	
*GW8KBO	A	55,130	198	149
*MW8R	28	52,554	165	114
			(OP: GW4SHF)	

OCEANIA

Austral Islands

TX5AQ	**A**	**645,290**	**779**	**346**
			(OP: SP5EAQ)	

Australia

VK4A	**A**	**2,494,475**	**1559**	**565**
			(OP: VK4NM)	
***VK4ZP**	**A**	**41,280**	**145**	**120**

Hawaii

WH7T	**A**	**6,871,212**	**2580**	**846**
			(OP: WH7W)	
KH6TU	"	990,990	755	330
			(OP: AD6E)	
*AF1R/KH6	28	200	8	8
***NH6O**	**A**	**364**	**16**	**14**

Indonesia

YB2MM	**A**	**566,835**	**615**	**345**
YB8UTI	"	354,776	492	244
YC8MJG	7	208,550	365	194
YC5DDE	A	170,952	315	204
YC5TEB	"	62,220	190	122
YB8SB	14	12,150	78	75
YB7CV	7	8,786	113	46
YBØULI	"	3,567	79	41
YC8SGY	"	3,420	59	45
YB3BX	A	81	9	9
***YC5AKH**	**A**	**383,019**	**577**	**273**
*YB8RW	"	267,400	430	200
*YC9KNX	21	188,889	377	237
*YC9DPO	A	135,270	363	167
*YB3KM	"	134,208	269	192
*YD9WTS	7	94,804	221	137
*YB2CPO	28	67,353	185	143
*YC8DUL	21	48,776	146	134
*YB3GER	"	45,890	147	130
*YB3BGM	"	35,280	129	112
*YB3ATK	A	26,208	176	91
*YC2XCD	21	20,492	104	94
*YF3CZW	A	13,082	118	62
*YB3OK	21	12,320	78	70
*YB1HBO	A	12,064	145	58
*YC7VGB	"	11,859	118	67
*YC9BOE	7	11,269	109	59
*YF4IFT	A	10,176	111	64
*YC1GBR	7	8,722	121	49
*YF8DX	A	8,188	110	46
*YD7AAE	7	6,776	92	44
*YC2DOP	"	4,826	76	38
*YG9DIM	"	3,864	81	42
*YC8UDV	"	3,256	49	37
*YD8SPY	"	2,670	38	30
*YB1LRG	A	1,890	49	30
*YG9EPK	28	1,775	33	25
*YG3DGK	7	216	13	12
*YB2CTE	7	10,584	135	56
*YC9WH	21	867	17	17

Philippines

DY1T	**A**	**1,439,566**	**1223**	**405**
			(OP: DU1IVT)	
4F3FSK	14	1,848	38	28
***DV1UCX**	**21**	**144,551**	**349**	**187**
*DV1DLX	28	91,520	259	128
*DV9IHK	21	85,100	295	148
*4E1RA	14	58,652	128	87
*4E9VVN	7	41,251	123	83
*DU1VNA	"	9,416	67	44
*4I1BNC	21	5,828	64	47
*DU4RER	A	3,895	59	41
*DU3AW	7	1,577	26	19
*DZ1Z	7	611	14	13
			(OP: DV1YAI)	

SOUTH AMERICA

Argentina

LQ5A	**21**	**181,879**	**331**	**239**
LU3DDH	14	49,594	190	162
LZØX	28	4,698	49	41
***LW7DQW**	**28**	**130,380**	**281**	**212**
*LQ5D	"	85,671	251	167
			(OP: LU9DA)	
*LU2NI	21	80,240	212	170
*AY8A	28	51,030	195	126
			(OP: LU8ADX)	

Bonaire

PJ4R	**A**	**9,967,888**	**3241**	**854**
			(OP: KK9A)	

Brazil

PY2ZEA	**28**	**1,121,952**	**701**	**385**
PY5WW	"	4,488	48	44
***PY2NY**	**14**	**813,232**	**706**	**424**
*PR8KW	28	417,092	464	308
*PU4MMZ	"	314,340	410	310
*ZZ2P	21	141,372	248	231
			(OP: PY2GTA)	
*PV2R	"	106,578	232	191
			(OP: PY2KO)	
*ZY2WDX	28	98,975	231	185
*PY2YVN	A	78,374	215	149
*PY2XL	"	53,376	158	139
*PU5LMJ	28	25,149	107	101
*PP5XA	A	18,216	108	92
*PY2RAR	"	16,728	93	82
*PT2ZDX	"	1,150	30	25
*PU2TNT	3.7	4	2	2
*PY2BN	A	100,036	226	178
*PY6GOE	28	25,365	137	95
*PU2VOR	"	11,856	90	76

Chile

CE3CLF	**A**	**590,010**	**666**	**355**
***CB3R**	**7**	**152**	**8**	**8**
			(OP: XQ3SK)	
*CB4R	21	77	9	7
			(OP: XQ3SK)	

Colombia

HK3C	**A**	**1,066,892**	**861**	**436**
HK4L	"	959,196	783	399

Ecuador

***HC4ER**	**28**	**425,400**	**530**	**300**
*HC2TKV	21	55,440	157	125

Peru

OA4SS	**A**	**1,306,770**	**1061**	**430**
OA7/DD5ZZ	21	966,483	766	481

Venezuela

***4M1W**	**28**	**337,512**	**484**	**287**
			(OP: YV1SW)	
*YV5AEP	7	48,576	96	88
*YV6CA	A	26,038	113	94

TRIBANDER / WIRES

NORTH AMERICA

United States

District 1

WT1A	**A**	**4,034,277**	**1884**	**841**
W1HS	"	1,474,245	1157	543
KI1P	"	1,148,156	1136	478
AB1QP	"	90,036	218	164
W1TO	"	62,205	158	143
N1RPS	"	15,265	81	71
***N1DID**	**A**	**572,601**	**586**	**393**
*WO1N	"	441,936	494	341
*KR1A	"	314,974	447	278
			(OP: KL7JT)	
*N1SFT	"	89,586	195	158
*AB1J	7	83,367	99	87
*N1UMJ	A	24,720	107	80
*W1NSK	"	18,549	97	81

District 2

WR2G	**A**	**3,007,917**	**1633**	**759**
W2GDJ	"	1,917,846	1161	651
KE2D	"	1,877,225	1188	595
WO2X	"	1,624,686	1005	606
NN2NN	"	1,454,390	965	553
WO2T	"	1,210,559	893	511
AB2E	"	497,377	620	353
WB2NVR	"	383,474	461	301
AD2BO	"	265,000	421	265
K2QB	"	83,333	196	167
***N2SQW**	**A**	**1,498,128**	**1030**	**552**
*KS2G	"	418,817	504	329
*WB2KLD	"	205,160	313	230
*KC2WUF	"	164,280	349	222
*KD2JOE	"	98,868	220	154
*N2JJ	14	4,692	50	46
*KT3Q	3.7	1	1	1

District 3

N3QE	**A**	**3,171,867**	**1826**	**743**
4U1WB	"	1,011,395	1098	497
			(OP: AJ3M)	
NY3B	"	390,104	497	341
NF3R	"	350,778	490	323
K3AU	"	228,735	304	255
			(OP: K2YWE)	
KD3H	"	188,742	331	249
AC3U	"	163,404	297	204
			(OP: W3UL)	
K3MD	"	65,849	192	161
N3MWQ	21	54,810	155	145
W3OU	A	29,925	124	105
WA3AAN	"	23,647	107	107
***N3AAA**	**A**	**1,393,536**	**1107**	**573**
*N3QXC	"	339,264	494	279
*N1EK	"	287,803	424	277
*N3ZA	21	159,828	256	228
*N3WD	A	112,112	274	196
*KO3T	7	96,707	228	173
*WI3K	A	74,016	188	144
*W3RFX	14	47,192	147	136
*N3KUN	"	3,268	38	38

District 4

K3DNE	**A**	**2,562,564**	**1800**	**716**
NU4E	"	1,496,460	1006	588
NF4A	"	995,428	828	511
N5GF	"	868,700	768	425
K5VIP	"	845,340	665	438
AA5JF	"	441,280	480	320
NR4O	"	433,200	547	304
KJ4YLR	"	330,020	470	290
WA4AH	"	274,183	328	299
K4NV	"	197,802	323	243
KT4O	"	155,491	301	229
K4BAI	"	145,873	322	229
W4BBT	"	73,450	191	130
KU4FX	"	69,905	201	155
***KK4BZ**	**A**	**487,553**	**503**	**349**
*K4SBZ	"	350,118	426	318
*K4DMR	"	348,076	469	346
*K9OM	"	309,386	348	287
*K6ES	"	154,830	302	195
*WN4AFP	"	139,968	291	216
*K4TMC	"	134,067	262	201
*K4DR	"	132,512	284	202
*NJ8J	"	120,582	285	189
*WA1PMA	21	109,214	211	203
*N4NTO	A	90,112	249	176
*WA8YVF	"	75,682	188	158
*WV2B	"	38,870	132	115
*K4FTO	3.7	4,361	53	49
*NX4N	21	1,102	20	19
*KB4DW	14	592	16	16
*WB4E	A	81	9	9
*KO4DFE	14	1	1	1
*KS4X	A	782	17	17

District 5

AD5XD	**A**	**3,127,900**	**2292**	**775**
WZ5M	"	2,252,030	1706	694
WW5L	"	1,160,267	985	521
AI5SF	"	322,436	451	298
***WB5N**	**A**	**224,439**	**416**	**237**
*KI5MM	"	197,593	326	253
*K5TS	"	158,782	269	197
*AF5CC	21	16,728	75	72
*N5PA	A	3,320	47	40
*W6FB	28	90	6	6

District 6

KE8FT	**A**	**560,790**	**727**	**402**
K6TQ	"	396,252	499	324
NT6X	"	176,816	402	257
AK6M	"	137,540	247	230
			(OP: K6MM)	
W6PNG	"	92,415	245	183
KB6A	"	32,528	140	107
NN6C	"	27,492	110	87
N6VOH	"	16,074	108	94
***KD6RMS**	**A**	**66,402**	**198**	**153**
*KD6HOF	21	47,880	64	62
*K6ICS	28	30,396	51	48
*W7TR	A	22,176	105	96
			(OP: KH2TJ)	
*WB6KQA	"	16,892	98	82
*N6ZE	"	13,612	97	82
*K6CSL	"	11,700	88	75
*W6RQ	"	4,940	63	52
*N7VM	"	3,663	37	37
*AB1U	3.7	1,863	18	18
			(OP: W6RKC)	
*K6EI	A	48	4	4

District 7

KI6QDH	**A**	**470,988**	**549**	**378**
W7PP	"	331,100	407	308
K9RZ	"	282,717	463	283
W7EY	"	68,949	187	141
K7VIT	"	55,008	213	144
KC7V	"	22,220	112	101
KA6RWL	"	372	12	12
***N7MZW**	**A**	**169,926**	**433**	**254**
*KI7Y	"	37,878	153	118
*W7KWT	"	5,406	64	53
*KI7N	"	3,444	50	42
*W7PDX	"	1,694	32	22

District 8

WA8MCD	**A**	**447,392**	**499**	**352**
W8GNM	"	378,603	421	279
WR8AA	"	295,947	403	291
			(OP: K3ZJ)	
WD8S	"	179,784	299	227
KX8AA	"	52,479	182	147
			(OP: K2CUB)	
AG8Y	"	32,928	124	112
			(OP: W8EH)	
ND8D	"	26,433	112	99
KD8JAM	14	816	17	16
***K8ZM**	**A**	**662,634**	**662**	**378**
*AA8CA	"	642,114	950	414
*WB8TCB	"	176,788	320	229
*K7DR	"	133,104	265	188
*KW8KW	"	47,880	156	133
*K8BL	"	29,799	115	99
*W8GX	"	17,794	97	82
*W8MK	"	1,416	26	24

District 9

AC9S	**A**	**1,044,662**	**926**	**502**
NC9F	"	306,600	509	292
			(OP: KØPG)	
K9YZ	"	197,104	320	194
W9ILY	21	163,968	265	224
***N9UA**	**A**	**562,950**	**613**	**417**
*N9DJ	"	161,138	314	226
*WA9LEY	"	101,314	266	179
*KD9LVR	"	11,088	91	72

District Ø

W8XAL	**A**	**304,824**	**553**	**312**
NWØM	"	46,991	183	137
***NGØC**	**A**	**1,154,044**	**1177**	**526**
*W4IFI	"	605,640	701	420
*KØXF	"	309,134	533	311
*WZØW	"	104,342	297	203
*WØZF	"	81,216	188	188
*KØKX	"	74,734	185	158
*KBØNES	"	56,118	206	141
*KF6YU	"	11,628	86	76
*WJØW	"	5,700	64	57
			(OP: KH6XX)	
*NDØC	A	399,832	538	328

Canada

District 1

***VY2LI**	**21**	**28,482**	**104**	**98**

District 2

VE2JM	**14**	**197,376**	**299**	**257**
VA2QR	A	158,360	259	185

District 3

VE3LRL	**A**	**1,011,716**	**751**	**398**
***VA3PDX**	**A**	**1,487,000**	**909**	**500**
*VA3DBT	"	79,086	179	147
*VE3WG	"	50,173	144	131

District 5

***VE5GC**	**28**	**464**	**16**	**16**

District 6

VE6WQ	**14**	**608,166**	**673**	**413**
***VA6RCN**	**A**	**49,560**	**155**	**118**
			(OP: VE3RCN)	

District 7

VE7CV	**A**	**106,964**	**212**	**187**

Cayman Islands

***ZF5T**	**A**	**3,163,860**	**1889**	**651**
			(OP: LU8EOT)	
*ZF2RJ	"	71,288	199	133

Costa Rica

TI2OY	**A**	**2,576,400**	**1669**	**600**

Dominican Republic

***HI8RD**	**A**	**1,539,512**	**1190**	**524**
*HI8ADK	"	1,232	29	28

Guadeloupe

FG4KH	**A**	**3,439,720**	**1934**	**761**
				(OP: F6ASS)

Mexico

**6D5C*	*7*	*12,584*	*53*	*52*
				(OP: XE1H)

Puerto Rico

WP4WW	**21**	**557,088**	**423**	**257**
				(OP: KP4JRS)
***NP4TX**	**A**	**947,050**	**697**	**470**
*NP3MR	28	263,624	502	248
*WP3GW	A	196,026	310	222
*KP4JFR	7	27,472	24	23

AFRICA

Canary Islands

EA8DED	**A**	**8,976**	**54**	**44**
				(OP: OH2BP)
***ED8W**	**A**	**3,680,849**	**1600**	**677**
				(OP: EA1BP)

Madeira Islands

CQ9T	**A**	**8,033,674**	**2595**	**979**
				(OP: CT3KN)

Mauritius

3B8CW	**A**	**27,368**	**113**	**88**

Namibia

V55Y	**28**	**3,593,891**	**1639**	**743**
				(OP: V51WH)

ASIA

Asiatic Turkey

TA2ANL	**A**	**488,097**	**507**	**281**
***TA3EP**	**A**	**24,192**	**106**	**96**
*TA4RC	"	6,026	51	46

China

***BD7LQM**	**21**	**93,912**	**350**	**182**
*BD4RDU	14	216	12	12

India

***VU2SMS**	**A**	**188,864**	**321**	**227**
*VU2IBI	"	23,250	102	93
*VU3SPD	"	816	22	17

Israel

4Z5LY	**A**	**2,572,910**	**1363**	**563**
4X1VF	28	440,726	530	299

Japan

District 1

JH1HIC	**A**	**392,368**	**514**	**274**
7K4VPV	21	157,300	273	220
JA1CRJ	A	67,680	172	141
JI1JPJ	"	16,478	90	77
***JK1HWU**	**A**	**112,646**	**243**	**151**
*JF1WNT	"	99,698	201	158
*JH1BHW	"	81,708	207	132
*JJ1AEB	7	31,980	91	78
*JG1XIO	A	28,000	110	100
*JN1CNJ	"	5,577	47	39
*7M3RFZ	"	5,538	48	39
*JI1RSF	"	2,728	33	31
*JR1MRG	"	2,256	29	24
*JP1GUW	"	1,430	27	22
*JJ1RJR	14	900	18	18
*JH1RDU	7	594	11	11
*JJ1LRD	A	372	13	12

District 2

JA2JWH	**A**	**111,931**	**237**	**173**
JA2XLV	"	59,850	173	133
JE2BOM	"	55,062	158	126
JA2PFO	7	13,209	57	51
JF2FIU	A	4,446	39	38
JR2BCF	"	4,025	35	35
***JA2GHP**	**A**	**92,664**	**234**	**156**
*7K1MAG/2	"	60,928	170	136

District 3

JN3SAC	**A**	**109,824**	**222**	**176**
JM3UGA	"	3,255	37	35
***JL3MCM**	**A**	**106,250**	**203**	**170**
*JA3EBT	"	4,588	46	37

District 4

***JE4MHL**	**A**	**189,640**	**309**	**220**
*JR4DTG	"	976	19	16

District 6

JA6EML	**A**	**114,741**	**235**	**183**
JH6TNH	"	3,220	40	35
***JH6OPP**	**A**	**135,420**	**246**	**183**
*JH6FTJ	"	32,736	113	93
*JA6PTH/6	"	9,625	58	55
*8J6YAB	"	6,525	55	45
				(OP: JA6VZB)
*JH6SCA	21	4,884	47	44
*JE6KFN	A	576	16	16

District 8

***JM8FEI**	**A**	**45,621**	**150**	**111**

District 9

JH9DRL	**A**	**236,334**	**374**	**238**
JH9CEN	"	67,983	184	129
JA9CCG	"	16,224	92	78

District Ø

JJØJML	**A**	**761,760**	**644**	**414**
***JHØNEC**	**A**	**58,682**	**166**	**122**

Saudi Arabia

HZ1TT	**A**	**3,468,928**	**1642**	**661**
***HZ1TL**	**A**	**2,140,863**	**1303**	**529**
***HZ1BW**	**"**	**11,352**	**67**	**66**

Thailand

***E29AHU**	**21**	**14,775**	**91**	**75**

EUROPE

Austria

OE6MDF	**A**	**1,631,252**	**1160**	**644**

Belgium

OP5T	**A**	**763,490**	**699**	**455**

Bosnia-Herzegovina

E77X	**A**	**1,574,594**	**1355**	**658**
***E7ØE**	**1.8**	**1,500**	**30**	**30**

Bulgaria

LZ3ZZ	**A**	**1,295,244**	**1199**	**603**
LZ6E	"	166,536	398	257
				(OP: LZ1GU)
***LZ7X**	**A**	**122,408**	**249**	**214**
*LZ7MT	"	4,176	54	48

Croatia

9A1AA	**A**	**100,280**	**326**	**218**
9A1KDE	"	40,848	126	111
				(OP: 9A2VR)
9A2R	"	4,674	46	41
***9A4MZ**	**7**	**9,656**	**72**	**68**
*9A3MA	A	8,211	57	51

Czech Republic

OK1OA	**A**	**687,014**	**712**	**431**
***OK4DZ**	**A**	**132,066**	**259**	**198**
*OK1K	14	31,552	120	116
				(OP: OK1XOE)
*OK1BJ	A	28,680	140	120
*OK7T	3.7	19,834	110	94
				(OP: OK1FHI)

Denmark

***OZ1KKH**	**A**	**24,232**	**113**	**104**

England

MØMCV	**A**	**918,138**	**935**	**474**
MØWLF	"	792,880	722	424
M2J	"	38,864	124	112
				(OP: G4NBS)
G4PIQ	"	15,111	79	73
***G4PVM**	**A**	**1,054,702**	**920**	**502**
*G9P	7	241,367	362	287
				(OP: MØNCG)
*GØRAH	A	185,640	389	260
*MØJND	"	91,008	250	192
*MØYTT	21	44,478	88	85
*2EØPLA	A	24,521	121	113
*MØVQP	"	11,840	78	74
*G4HPY	"	513	20	19

Estonia

ES4RD	**14**	**96,074**	**331**	**242**

Fed. Rep. of Germany

DL1WA	**A**	**2,550,996**	**1398**	**764**
DKØSØBN	3.7	1,292,340	1091	543
				(OP: DL2SAX)
DQ5T	A	1,280,848	882	578
				(OP: DL4LAM)
DHØGHU	"	1,076,730	802	570
DL2RMC	"	934,176	852	526
DP8M	"	639,108	658	433
				(OP: DL6NDW)
DJ4MO	"	501,840	587	369
DL4RCE	7	144,480	325	224
DJ5MO	A	125,712	276	216
DH2RTW	"	99,682	260	197
DL2DQL	"	58,050	165	150
DL6HBQ	"	57,888	172	144
DL1NEO	"	52,820	142	139
DK5TX	"	43,920	142	122
DBØGSN	1.8	26,751	146	111
				(OP: DM1CG)
DL5YM	A	23,232	96	88
DF6RI	"	22,936	103	94
DL6DH	3.7	5,096	54	52
DL7LX	A	2,128	30	28
***DO4OD**	**A**	**918,048**	**772**	**524**
*DL3RAR	"	903,444	809	474
*DP5P	"	850,080	759	480
				(OP: DL1MHJ)
*DJ2FL	"	447,372	573	387
*DK8NC	"	127,512	288	198
*DB5ABS	"	64,320	199	160
*DB4LI	"	37,820	156	124
*DK2BO	"	35,511	159	133
*DJ3GE	"	33,855	129	111
*DB6MC	"	33,274	139	127
*DL9GMN	"	31,248	136	126
*DL6JZ	"	22,080	99	92
*DM5Z	"	20,661	106	97
				(OP: DM5JBN)
*DJ4PK	"	16,284	101	92
*DF5RF	28	16,038	75	57
*DBØDH	21	7,191	53	51
				(OP: DL3CQ)
*DF2FM	A	6,069	57	51
*DJ9SN	"	2,886	39	39
*DM7W	"	1,408	22	22
				(OP: DL8MAS)
**DG3T*	*3.7*	*23,004*	*119*	*108*
				(OP: DF5RF)

Finland

OH8KXK	**A**	**1,608,440**	**1258**	**632**
OH1TM	"	943,368	1103	552
***OH3MM**	**A**	**184,440**	**391**	**265**
*OH3JP	"	19,465	88	85
*OH3HS	21	4,018	44	41
*OH7L	"	3,465	35	35

France

F8CRS	**A**	**378,056**	**439**	**344**
***F4CDR**	**A**	**484,125**	**577**	**375**
*F4ARM	"	151,032	277	232
*F4IEX	7	22,496	77	73

Greece

***SV1OCR**	**A**	**27,776**	**139**	**124**
*SV1KYC	21	27,500	130	110

Hungary

HG1A	**A**	**2,748,955**	**1630**	**755**
				(OP: HA1ZN)
HA3OU	"	271,791	405	303
***HA3FMR**	**A**	**10,608**	**88**	**78**
*HA1TI	1.8	8,127	69	63

Ireland

EI9ØIRTS	**A**	**132,820**	**315**	**229**
				(OP: EI9FVB)
***EI3CTB**	**A**	**123,136**	**320**	**208**

Italy

IO6A	**A**	**5,014,710**	**2327**	**906**
				(OP: IK6QON)
IK3UNA	"	3,040,112	1671	757
IX1HPN	7	813,954	887	463
IV3ZYB	21	456,456	484	364
IZ2GNQ	14	416,898	553	414
IQ5GR	"	413,875	565	385
IZ6JTZ	21	301,781	385	307
IR8M	A	227,265	481	327
				(OP: IZ8CCW)
IR8O	14	161,250	413	258
				(OP: IZ8GCB)
IQ5LV	A	115,648	262	208
				(OP: IZ5EBL)
IK2ANI	"	78,396	194	141
IZØCVF	28	40,144	146	104
IWØBCF	"	37,168	146	101
IZ2ZQP	14	32,130	143	126
IW3FVZ	A	13,320	78	74
I1DXD	"	10,812	70	68
IZ2JCD	14	7,680	64	64
IZ4REF	28	5,940	49	44
IZ1MLS	A	1,850	27	25
***IK4RQJ**	**A**	**820,800**	**747**	**480**
*IR8L	14	170,469	403	216
				(OP: IZ8GNR)
*IW5ECP	A	112,463	254	211
*IZ8EFD	14	101,465	371	223
*IK7NXU	7	65,860	179	178
*IZØCKJ	A	62,208	202	162
*IU4HMY	21	44,125	141	125
*IK4QJF	A	36,108	128	118
*IZ8CLM	"	27,730	99	94
*IK2AUK	"	19,502	109	98
*IZ3KNK	"	16,430	80	62
*IW2ENA	"	15,939	91	69
*IK4LFI	28	15,436	83	68
*IK4MTF	A	12,489	79	69
*I1RB	"	8,056	76	76
*IZ2ABI	28	4,720	42	40
*IU2HEE	A	1,798	30	29
*IK2IKW	"	1,296	28	27
**IZ1GLX*	*14*	*192*	*12*	*12*
*IU2LVS	A	90	7	6
*IZ4AIF	A	219,934	379	286
*IZ2QKG	14	3,315	57	51
*IK3XTY	A	986	30	29
*IZ3NVR	21	765	18	16

Latvia

YL2VW	**A**	**1,344**	**24**	**24**

Liechtenstein

HBØDX	**A**	**678,944**	**781**	**433**
				(OP: DL2JRM)

Lithuania

LY2N	**A**	**114,268**	**273**	**212**
LY4OO	"	36,771	133	119
***LY5XX**	**A**	**710,240**	**812**	**460**
*LY2TS	"	528,295	586	415
*LY3AB	14	52,700	202	170

Luxembourg

***LX1ER**	**A**	**386,482**	**458**	**346**

Moldova

***ER3CT**	**A**	**201,216**	**397**	**262**

Netherlands

PAØMIR	**A**	**238,960**	**393**	**290**
PC4H	"	84,280	240	196
PE1GWX	14	19,548	127	108
***PA9M**	**A**	**1,725,456**	**1088**	**618**
*PC3T	"	1,597,200	1018	600
*PG7M	"	595,448	591	434
*PA65UL	"	211,806	385	287
				(OP: PA5UL)
*PA1BK	"	44,574	146	138
*PA3BQP	"	37,632	143	128
*PE1HWO	"	6,272	57	56
*PA3DDP	"	1,326	26	26

North Macedonia

***Z33F**	**14**	**17,120**	**118**	**107**

Northern Ireland

***MIØI**	**A**	**349,888**	**525**	**352**
*MI7DGO	A	67,716	208	198

Norway

LA8IM	**A**	**48,763**	**166**	**143**
***LA2HFA**	**A**	**61,824**	**225**	**168**

Poland

SP7TEE	**A**	**381,463**	**489**	**323**
SP5GNI	"	154,108	317	236
SP9DTE	"	135,648	297	216
SP8AB	"	13,690	88	74
SO5L	*14*	*2,556*	*37*	*36*
				(OP: SP5WIT)
***SP7Y**	**A**	**589,239**	**682**	**423**
*SN8J	"	576,243	643	387
				(OP: SP8ALT)
*HF7A	3.7	454,152	434	295
*SP/UT5UT	14	164,934	385	294
*SN7F	A	96,822	268	198
				(OP: SP7AH)
*SP6MI	"	21,836	122	106
*SP1GDK	"	7,350	53	50
*SQ9GOL	21	1,368	23	19
**SQ9PPT*	*1.8*	*1,080*	*24*	*24*
*SO2U	A	207,473	375	277
				(OP: SP2UUU)

Portugal

CR6E	**A**	**250,822**	**403**	**286**
				(OP: CT7AIX)

Romania

YO4NF	**A**	**808,128**	**1016**	**488**
***YR2X**	**A**	**446,796**	**542**	**378**
				(OP: YO2LEA)
*YO9IAB	"	235,188	437	278
*YO5QDI	"	117,334	307	203
*YO3JW	7	37,994	131	121
*YO5DGE	A	30,003	155	137
*YO2DFA	"	18,630	102	90
*YO6LA	14	8,134	94	83
*YO3VU	A	2,176	33	32
*YO5AVN	21	60	5	5

Scotland

MM9I	**A**	**3,887,952**	**2002**	**856**
GM2Y	14	4,050	48	45
				(OP: MMØDXH)
***MM2T**	**A**	**19,788**	**114**	**97**

Serbia

YU7BW	**21**	**1,226,645**	**911**	**505**
YT6X	A	501,028	530	386
YT8A	1.8	151,164	321	234
***YT1BD**	**1.8**	**286**	**13**	**13**

Sicily

IT9OPR	**A**	**178,269**	**329**	**273**
***IT9HTV**	**A**	**232,845**	**431**	**285**
*IT9ORA	"	128	8	8

Slovak Republic

***OM7ANT**	**A**	**58,072**	**165**	**136**

Slovenia

S52WW	**A**	**1,729,152**	**1188**	**632**
S53K	"	945,770	848	458
S53O	1.8	196,238	386	262
S51DX	A	11,147	86	71
***S55BA**	**3.7**	**95,149**	**251**	**193**
*S57KM	A	11,286	73	66

Spain

EA3CI	**A**	**3,165,304**	**1766**	**776**
EE7L	3.7	1,110,340	854	490
				(OP: EA7HLU)
ED4T	A	550,710	619	435
				(OP: EA4R)
EA1WH	14	493,050	684	475
EF5U	21	376,270	571	382
EA2CCG	A	203,524	404	292
EC5C	21	151,250	267	227
EA3OH	"	58,293	163	153
EA1DA	A	55,300	198	158
***EE7E**	**A**	**1,637,124**	**1356**	**681**
*EA7K	21	500,939	228	199
*EA7EQ	A	301,070	449	322
*EA3CO	"	262,260	431	279
*EE1B	14	104,489	305	253
				(OP: EA1Y)
*EA5JN	"	91,310	273	230
*EA4BAS	A	89,584	205	176
*EE3Z	28	60,450	118	88
				(OP: EA3NO)
*EA3DJL	A	52,136	159	133
*EA5MT	"	38,907	156	131
*EA1IQ	"	6,678	68	63
*EA4K	"	5,400	54	50
*EA2WD	3.7	364	13	13
*EA4U	A	2,040	32	30

Svalbard

JW7QIA	**A**	**1,996,409**	**1302**	**683**

Sweden

8SØC	**A**	**999,364**	**854**	**577**
				(OP: SMØMPV)
8S8S	"	713,592	752	477
				(OP: SM5XSH)
SM6MVE	"	136,575	322	225
SM2S	"	65,238	189	166
SD1A	21	19,006	95	86
				(OP: SM1TDE)
SM6YNO	A	7,138	46	43
***SDØN**	**A**	**103,296**	**245**	**192**
				(OP: SMØNSJ)
*SF5M	"	33,669	165	129
				(OP: SM5SYO)
*SM6USS	"	375	15	15

Switzerland

HB9DQL	**A**	**1,706,640**	**1065**	**624**
***HB9WDY**	**A**	**142,363**	**327**	**233**

Wales

MWØYVK	**7**	**675,377**	**567**	**337**
***GW5L**	**A**	**107,118**	**249**	**198**
				(OP: GW4ZAR)
*MCØPMT/P	7	76,395	184	165
				(OP: MØVWK)

OCEANIA

Australia

VJ2Z	**A**	**487,812**	**477**	**354**
VK4L	"	272,800	370	275
VK6MK	"	217,592	404	236
VK3IO	"	182,722	258	206
VL3E	"	133,084	233	194
				(OP: VK3TZ)
VL5K	"	48,236	142	124
				(OP: VK5AKH)
***VK5PAS**	**A**	**1,146,855**	**801**	**505**
*VK4Y	"	170,130	336	214
*VJ5Q	"	6,480	46	45
**VL2W*	*"*	*350*	*14*	*14*

Hawaii

KH6PE	**A**	**187,308**	**318**	**198**

Indonesia

YE9BJM	**A**	**607,110**	**609**	**354**
YBØECT	"	380,686	547	262
YB2HAF	"	62,480	226	142
YB4NY	"	57,536	294	116
YB2TS	21	38,760	122	103
YB5MB	A	27,612	217	78
YB3FTD	28	20,418	25	25
***YB9UA**	**21**	**293,000**	**409**	**271**
*YC5ACD	"	198,555	293	187
*YB4FIK	"	94,675	219	175
*YB9ELS	28	73,050	195	150
*YB9VIZ	21	21,000	58	56
*YBØOHG	A	3,317	33	31
*YDØBMC	7	2,821	57	31
*YD2WAU	"	1,496	71	34
*YC5ARZ	"	414	24	16
*YDØRCH	A	320	20	16

New Zealand

ZM4YY	**14**	**25,203**	**108**	**92**
				(OP: ZL4YY)

Philippines

DU3T	**A**	**2,463,132**	**1480**	**588**
DU3DW	"	480,770	763	262
***DW7EVQ**	**28**	**71,185**	**225**	**115**
*DU7PH	A	646	22	19

Wallis & Futuma Islands

***FW1JG**	**A**	**245,575**	**385**	**235**

SOUTH AMERICA

Argentina

LW1D	**14**	**274,256**	**384**	**281**
				(OP: LW1EUD)
LU1KCQ	A	47,520	149	135
***LV1F**	**A**	**227,328**	**391**	**256**
				(OP: LU4FTA)
*LT1K	"	83,160	240	165
				(OP: LU6KA)
*LU5UFM	28	60,047	199	149
**LU9LZR*	*A*	*18,145*	*129*	*95*

Bonaire

PJ4DX	**28**	**3,855,600**	**2052**	**675**

Brazil

ZW2N	**A**	**8,030,328**	**2886**	**939**
				(OP: PY2MNL)
PY5FO	7	1,487,300	666	428
PY2CP	28	786,470	751	430
PT7WM	A	699,972	528	364
PY2LSM	"	694,512	600	424
PY3LX	"	93,874	244	187
PP2DX	"	9,840	66	60
PY5DC	3.7	288	19	12
***PT2AW**	**A**	**751,712**	**669**	**416**
*PV7M	"	344,124	463	316
				(OP: PT7ZT)
*PY4LH	21	157,960	288	220
**PY8WW*	*"*	*126,868*	*266*	*197*
*PY1AX	A	112,944	265	208
*PY1NS	28	89,490	190	162
*PY2VZ	"	71,222	190	149
*PU2MZI	"	65,728	188	158
*PP5FZ	A	61,387	185	157
*PR4A	21	49,046	146	137
				(OP: PY4RP)
*PS2B	A	38,571	194	129
*ZV2F	"	8,052	74	61
				(OP: PY2SFA)
*PU7ASP	28	3,315	49	39
*PY2MAM	A	1,242	31	27
*PY2MQ	A	990	39	30

Chile

CB8E	**A**	**2,643,069**	**1438**	**671**
				(OP: CE8EIO)
***CE4PPC**	**A**	**840,546**	**784**	**441**
*CE4JZO	14	97,110	235	166
*CE4WT	A	33,630	148	118

Colombia

***HK3TK**	**3.7**	**130,500**	**177**	**150**

Venezuela

***YV4EK**	**14**	**906,984**	**730**	**442**

YOUTH

NORTH AMERICA

United States

District 1

KC1XX	**A**	**15,186,560**	**4110**	**1220**
				(OP: NN1C)
NTØK	"	6,487,472	2819	976
				(OP: KC1KUG)

District 2

W7AOF	**A**	**13,826**	**73**	**62**

District 4

WWØCJ	**A**	**12,998**	**72**	**67**
***KM4SII**	**A**	**1,122,498**	**987**	**507**
*KO4SGC	28	1,113	23	21

District 8

***N8AJM**	**A**	**2,992**	**36**	**34**

District 9

***W9ADN**	**A**	**68,760**	**265**	**180**

District Ø

***KEØWPA**	**A**	**48**	**4**	**4**

Canada

District 3

***VE3OMV**	**A**	**144,396**	**268**	**191**

ASIA

Asiatic Turkey

***TA3GO**	**A**	**9**	**3**	**3**

China

***BG8INK**	**21**	**16,830**	**90**	**85**
*BH2SWB	A	5,290	53	46
*BG5UZW	21	1,425	26	24
*BG8LCQ	"	1,323	23	21
*BH4ESK	"	1,050	22	21
*BG5GDP	A	330	12	11

Japan

District 1

***JG1CMT**	**A**	**21**	**3**	**3**

District 2

***JS2FZH**	**28**	**16,279**	**105**	**73**
*JR2KHB	A	666	19	18

District 3

***JQ3BVC**	**A**	**99,056**	**268**	**151**

District 7

JP7XDO	**A**	**170**	**11**	**10**

Republic of Korea

***DS1TUW**	**A**	**10,126**	**66**	**61**

Taiwan

***BX2AHP**	**28**	**101,996**	**343**	**172**
*BX2AJF	A	89,433	371	171

Antenna “farm” at II2S.

EUROPE

Bosnia-Herzegovina

*E7ØAW	A	7,280	59	56

Croatia

*9A2ZI	A	845,724	691	516

Czech Republic

*OL5G	A	2,460	30	30

England

*2EØHNB	A	192	16	16

Fed. Rep. of Germany

*DJ4MX	A	160,686	294	237
*DO2YX	21	79,868	179	164
*DN4PSG	A	2,233	30	29
*DN1ADA	"	126	9	9

Greece

*SY8DQX	A	31,824	132	117

Ireland

*EI8KW	21	12	2	2

Lithuania

LY5AX	A	1,942,752	1337	686
LY1LB	*	348,492	483	339

Poland

*SP8BRT	7	22,172	97	92
*SP3GTP	A	16,728	98	82
*SP9DLS	"	5,643	62	57

Portugal

*CT7AKG	14	81	9	9

Romania

*YO8PUF	14	108	13	12
*YO8THR	"	100	10	10

Serbia

YTØC	A	4,098,870	2041	855

Slovenia

*S52KJ	A	527	17	17

Sweden

SA6NIA	A	639,004	833	428

OCEANIA

Indonesia

*YD2UWF	28	60,610	162	126
*YD5AKO	7	15,895	140	55
*YD6IOV	A	12,224	80	64
*YC1LJT	21	169,081	303	209
*YD8MDT	A	2	2	1

New Zealand

*ZL1CAP	A	15,264	83	72

SOUTH AMERICA

Brazil

*PU5JDA	28	23,352	108	84

MULTI-OPERATOR SINGLE-TRANSMITTER HIGH POWER

NORTH AMERICA

United States

District 1

KA1ZD	5,614,080	2298	960

District 2

W2ZQ	202,014	277	258

District 3

NG3R	4,897,896	1988	934
ND3D	4,345,407	2152	891
AG3I	3,582,023	1761	821
NE3MD	79,980	194	155

District 4

NB4C	2,369,718	1569	738
KK4ODQ	1,183,644	1124	549
NY4A	36,822	142	114

District 6

NN6P	782,686	875	479
AG1RL	28,890	100	90

District 7

KU1CW	8,608,137	3167	1037
WW7E	1,840,502	1671	634
KZ1W	1,393,550	1196	593
WN7M	612,896	786	428

District 8

N4RA	2,799,615	1624	735
KI8R	1,522,240	1008	568
KA8YNW	121,920	268	192

District 9

NE9A	54,144	175	141

District Ø

KØDDD	1,093,848	898	476
NSØR	114,912	311	216
AEØPN	64,015	192	155

Canada

District 1

XO2O	3,526,560	1867	711

District 7

VE7SAR	360,640	508	320

Guadeloupe

TO3Z	9,381,752	3592	983

St. Kts & Nevis

V47T	24,741,080	6633	1274

Turks & Caicos Islands

VP5P	7,515,540	3285	860

AFRICA

Reunion Island

FR4KR	8,945,328	3378	948

ASIA

Asiatic Turkey

TC3X	3,783,078	1746	634
YM3VBR	1,572,080	1022	457

China

BA7MT	76,388	295	169

Japan

District 2

JI2ZEY	916,019	744	403

District 3

JL3ZHU	167,188	306	196

District 7

JA7ZFN	5,720,475	2043	857

Qatar

A73A	1,618,696	975	488

United Arab Emirates

A61BR	5,819,385	2384	715

EUROPE

Belgium

OT7L	744,208	852	482

Bosnia-Herzegovina

E7DX	22,416,940	5393	1417

Croatia

9A5Y	17,480,196	4651	1356

Czech Republic

OL7T	5,074,026	2279	947
OK2KOJ	503,487	602	387
OK1KKI	418,506	523	373
OL4D	89,976	219	184

England

G4ANT	6,260,844	2365	956
G3M	4,486,671	2094	861

Fed. Rep. of Germany

DRØW	10,686,450	3278	1119
DQ9M	6,463,036	2532	1028
DP6A	4,066,400	1787	850
DP4G	1,172,880	993	540
DLØWW	696,264	686	433

France

TMØR	9,939,090	3481	1007
TM2RJ	3,072,000	1962	768
F8KCF	778,386	684	431
TM1D	362,940	439	345
TM5NN	291,270	414	285
F4KJN	284,484	393	302

Greece

J42L	11,230,731	4006	1227
SZ1A	5,235,660	2509	986

Hungary

HA3DX	6,217,146	2554	978
HG7Y	1,711,220	1044	595

Isle of Man

GTØSP	597,132	662	388

Italy

II8K	11,149,896	3804	1213
IB1D	5,271,952	2190	914
IO7T	3,701,448	1905	909
IQ8BB	2,610,960	1727	759
IR7R	2,034,084	1434	708
IQ3GK	680,808	834	456
IQ3PN	293,880	492	316
IQ3CO	12,496	72	71

Latvia

YL1ZT	138,470	311	227

Netherlands

PI4RS	1,340,182	1153	586

Poland

SP8R	16,189,285	4465	1333
SO7E	742,463	887	437
SN9AT	694,725	785	471

Romania

YO6KNW	45,298	174	142

San Marino

T7ØA	9,423,212	3351	1084

Sicily

IQ9RG	11,193,426	3763	1179
IO9A	5,625,376	2714	958

Slovak Republic

OM5M	155,996	290	236

Slovenia

S54K	3,325,140	1834	819
S59T	28,421	117	97

Spain

EC5AN	11,974,085	3952	1205
ED2C	177,174	454	306
ED2W	23,192	114	104

Sweden

SJ2W	14,613,312	4509	1344
SEØX	7,584,400	3016	1072
SK6AW	443,250	596	375
SKØQO	348,422	554	346

Switzerland

HB2C	244,815	418	285
HB9BS	234,496	332	256
HB9BC	17,927	105	91

OCEANIA

Australia

VL2L	2,171,223	1193	617

Hawaii

KH7M	3,378,694	1801	649
NH6JC	*1,308,717*	*1089*	*453*

Indonesia

7D1C	1,966,204	1179	596
7AØC	1,010,595	900	445
7AØA	792,648	943	404

SOUTH AMERICA

Argentina

LO7H	5,720,364	2341	884
LU3DX	2,014,804	1255	638
LR3D	1,714,491	1154	591
LV4V	199,200	400	240

Brazil

PP2BO	*33,660*	*126*	*102*

Chile

CB3W	2,308,152	1345	616
XQ1KN	780,140	740	380

French Guiana

FY5KE	23,746,998	5679	1254

Paraguay

ZP5AA	9,535,068	3233	1038

Uruguay

CX5A	1,086,282	979	522

MULTI-OPERATOR SINGLE-TRANSMITTER LOW POWER

NORTH AMERICA

United States

District 2

*NJ1F	63,910	189	154

District 4

*WA1F	713,592	643	477
*KX4AV	37,128	167	119

District 7

*W7SU	4,860	65	60

District 8

*W8AJT	21,854	104	98

Mexico

*4AØBP	136	8	8

ASIA

Asiatic Turkey

*TC61CAT	951,405	697	357
*YM3KC	186,861	286	199
*YM4KF	57,385	136	115

China

*BI7JMD	546,460	740	356
*BH4CAC	11,396	99	74
*BI1JY	30	7	6

Japan

District 2

*JK2VOC	59,130	178	135

District 6

*JA6YLP	13,277	88	71

Republic of Korea

*D7ØLW	1,740	32	29

Thailand

*E21AK	23,305	138	79

West Malaysia

*9M2R	18,096	104	78
9M2S	*100*	*5*	*4*

EUROPE

Bosnia-Herzegovina

*E7GZ	465,920	569	364
*E7ØSIC	164,730	359	255

Croatia

*9A1CRT	2,114,307	1629	663
*9A5G	61,028	191	146
*9A7B	1,980	39	36

Czech Republic

*OL1Z	1,201,556	966	562
*OK2KEA	188,244	373	249
*OL1B	107,310	284	210

England

*MØYRC	303,600	541	330

Fed. Rep. of Germany

*DM5B	1,806,424	1398	647
*DLØTN	12,218	85	82
*DLØIFM	6,935	82	73

France

*F8KGS	1,568,736	1086	624
*F6KPW	112,706	280	218
*F6KGL	25,894	117	107
*F4KMI	10,570	75	70

Gibraltar

*ZB2BU	2,190,474	1870	759

Greece

*SV3BSF	7,250	63	58

Hungary

*HA3KHB	209,350	383	265

Italy

*IO3F	2,884,959	1636	759
*IQ4SC	428,640	489	376
*IQØQJ	123,477	274	237
*IQ2VC	38,880	179	144

Lithuania

*LY2J	1,192,620	958	572

North Macedonia

*Z32ID	3,314,208	1987	874

Poland

*3Z1K	1,173,133	944	533
*SN9H	370,304	600	352
*SN9A	122,734	270	218
*SP9PBB	45,021	159	129
*SP1KZE	30,015	145	115

Romania

*YP1EX	565,212	748	402
*YO4KAK	14,742	100	81

Scotland

GS7A	*7,006*	*69*	*62*

announcements

(from page 2)

SALEM, OREGON — The Pacific Northwest VHF Society will hold the **26th Annual PNVHFS Conference** from Friday, October 7 through Saturday, October 8 at the Holiday Inn Hotel, 33021 Market Street NE. Contact: Jim, K7ND, <secretary@pnwvhfs.org>. Website: <http://pnwvhfs.org>. VUCC card checking.

NORTH HAVEN, CONNECTICUT —The Meriden Amateur Radio Club will the **30th Annual Nutmeg Hamfest** and the **2022 ARRL Connecticut State Convention** from 8 a.m. to 2 p.m., Sunday, October 9 at the Best Western Hotel, 201 Washington Avenue. Contact John Bee, N1GNV, (203) 440-4973 (days only). Email: <nutfest@qsradio.com>. Website: <www.nutmeghamfest.com>. Talk-in 147.36+. VE exams

SAN RAMON, CALIFORNIA — The Mount Diablo Amateur Radio Club will hold **Pacificon 2022** and the **2022 ARRL Pacific Division Convention** from 7 a.m. to 9 p.m., Friday, October 14; 7 a.m. to 11 p.m., Saturday, October 15; and from 6 a.m. to 3 p.m., Sunday, October 16 at the San Ramon Marriott, 2600 Bishop Drive. Email: <info@pacificon.org>. Website: <www.pacificon.org>. VE exams, special event station, Wouff Hong ceremony.

BOONE, IOWA — The 3900 Club will hold the **Hamboree 2022** from 8 a.m. to 1 p.m., Saturday, October 15 at the Boone County Fair Grounds-Community Building, 1601 Industrial Park Road. Contact Clay Conrad, WØFS, (515) 838-2285. Email: <hamboree@3900club.com>. Website: <www.3900club.com>. Talk-in 146.850-. VE exams

CHATTANOOGA, TENNESSEE — The Chattanooga Amateur Radio Club will hold Hamfest Chattanooga 2022 from 7 a.m. to 3 p.m., Saturday, October 15 at the East Ridge Community Center, 1517 Tombras Avenue. Website: <htttp://w4am.net>.

LYNNVILLE, INDIANA — The Tri-State Amateur Radio Society will hold the **Southern Indiana 4th Annual Hamtober Fest** from 7 a.m. to 2 p.m., Saturday, October 15 at the Lynnville Community Center, 416 W. State Road 68. Email: <hamfest@w9og.net>. Website: <www.hamtoberfest.com>.

SEDALIA, MISSOURI — The Sedalia-Pettis Amateur Radio Klub will hold **Sparkfest 2022** from 8 a.m. to noon, Saturday, October 15 at Our Savior Lutheran Church, 3700 W. Broadway Boulevard. Contact: Bret Kuhns (660) 281-6506. Email: <hota2@hotmail.com>. Website: <www.wa0sdo.org>. VE exams.

KALAMAZOO, MICHIGAN — The Kalamazoo Amateur Radio Club and the **Southwest Michigan Amateur Radio Team** will hold the **Kalamazoo Hamfest** from 8 a.m. to noon, Sunday, October 16 at the Kalamazoo County Expo Center and Fairgrounds, 2900 Lake Street. Email: <info@kalamazoo0hamfest.com>. Website: <www.kalamazoohamfest.org>. Talk-in 147.040 (PL 94.8). VE exams.

PERKASIE, PENNSYLVANIA — The RF Holl Amateur Radio Club will hold its **Hamfest** 2.0 from 7 a.m. to 1 p.m., Sunday, October 16 at the Upper County Campus, Bucks Community College on Blooming Glen Road. Contact: John Morrell, KB3EWV, (215) 399-7685. Email: <john@morrelfamily.net>. Website: <www.rfhillarc.club>. Talk-in 145.31- (PL 131.8). VE exams.

HARRISBURG, PENNSYLVANIA — The Harrisburg Radio Amateur Clun will hold its **Oktoberfest Electronics Expo and Hamfest** from 7-11 a.m., Saturday, October 22 at the Vietnam Veterans of America, 800 Derry Street. Contact Bab Saber, K3RTS, (717) 574-2608. Email: <k3rts@w3uu.org>. Website: <www.w3uu.org>. DXCC / WAS / VUCC card checking.

KIRKWOOD, MISSOURI — The Saint Louis Amateur Radio Club will hold its **30th Annual Halloween Hamfest** from 7:30 a.m. to 1 p.m., Saturday, October 29 at the Kirkwood Community Center, 111 S. Geyer Road. Contact: Steve Welton, WØSLW, (314) 941-8500. Email: <slwelton@gmail.com>. Website: <www.halooweenhamfest.org>. Talk-in 147.75-. VE exams.

NOVEMBER

KAUKAUNA, WISCONSIN — The Fox Cities Amateur Radio Club will hold its **2022 Swapfest** beginning 8 a.m., Sunday, November 6 at the Starlite Club, W2091 County Road JJ. Website: <www.fcarc.club>. Talk-in 146.76 (PL 100). VE exams.

MANITOWOC, WISCONSIN — The U.S.S. Cobia World War II submarine will air special event station **NB8QV** from 1400-2100 UTC Saturday, November 12 and from 1400-2100 UTC, Sunday, November 13 to celebrate Veterans Day Weekend. Frequencies include 7.240± and 14.240± MHz. QSL a #10 SASE to Fred Neuenfeldt, W6BSF, 4932 S. 10th Street, Manitowoc, WI 54220-9121. Website: <www.qrz.com/nb9qv>.

LU9HVR operating as part of the LO7H Multi-Single High Power team that finished third in South America.

Spain

***ED1B**	**660,150**	**739**	**450**
*EB3FLY	477,922	627	394
*ED3D	392,522	612	403
*EF3R	189,800	422	292
*EF5A	378	21	21

OCEANIA

Brunei Darussalam

***V85RH**	**27,435**	**128**	**93**

Indonesia

***7I1I**	**723,788**	**708**	**403**
*7E1A	106,812	287	172
7A3A	45,719	208	131
*7E1T	21,450	178	78
*7AØD	16,184	148	68

Philippines

***DX3H**	**313,090**	**590**	**239**
*DV1IIW	220,000	479	220
**4E1AZN*	*150*	*10*	*10*

SOUTH AMERICA

Argentina

***LU1WUD**	**274,000**	**471**	**274**

Chile

***CB1C**	**1,337,130**	**976**	**537**
*CB2R	200,445	396	249
*CB3E	101,332	255	188

Colombia

***HK3RD**	**4,342,170**	**1531**	**690**

Paraguay

***ZP6RAI**	**1,588,079**	**1099**	**569**

MULTI-OPERATOR TWO-TRANSMITTER

United States

ND7K	**16,911,774**	**6257**	**1278**
K9CT	**14,408,304**	**4731**	**1263**
WW2Y	**10,774,258**	**3838**	**1177**
N7DX	8,341,449	3736	1047
WC6H	**8,206,957**	**4513**	**979**
AA4VT	**7,386,551**	**3167**	**1037**
KT7E	5,355,090	2939	897
K3CCR	**1,971,840**	**1237**	**632**
W8BI	**1,636,377**	**1233**	**597**
N1SOH	**1,190,000**	**968**	**500**
WC8VOA	895,200	766	480
*W1JSR	131,670	270	210
*N9AG	103,992	245	168
*WI7J	47,388	183	132
W7DK	14,705	95	85

NORTH AMERICA

VC6R	**9,933,712**	**3577**	**1003**
VE7GL	**8,374,011**	**3256**	**953**
HI3LT	**6,297,984**	**2655**	**924**
VE6FI	2,111,172	1281	613
***VE3VM**	**104,992**	**255**	**193**

AFRICA

ZS6MRK	**695,578**	**625**	**403**

ASIA

A44A	**11,837,000**	**3810**	**1000**
C4I	**10,243,412**	**3153**	**926**
JR8VSE	**9,698,645**	**2990**	**1045**
BA7LOK	**3,587,584**	**2160**	**728**
BPØP	**1,303,016**	**1287**	**536**
E2E	**529,540**	**638**	**332**
E29AE	5,490	61	45

EUROPE

EI1ØØC	**28,875,588**	**7170**	**1428**
II2S	**23,800,248**	**5922**	**1464**
IR6T	23,066,830	5977	1423
ED1R	**21,523,716**	**5976**	**1388**
HG7T	**16,006,000**	**4873**	**1325**
F8KGM	**11,387,446**	**3367**	**1094**
SO4R	**11,306,085**	**4078**	**1185**
CR6P	**8,122,140**	**3461**	**1068**
G5O	**4,453,036**	**2195**	**886**
EE5T	4,012,476	2070	884
PAØAA	**2,258,280**	**1295**	**697**
9H6A	**389,500**	**566**	**380**
LA1K	**18,256**	**129**	**112**
***DLØATS**	**1,216**	**32**	**32**

OCEANIA

***9M6W**	**166,320**	**364**	**168**
***DX7HQ**	**158,068**	**416**	**172**
***7C8C**	**79,508**	**270**	**143**

MULTI-OPERATOR MULTI-TRANSMITTER

UNITED STATES

WX3B	**20,422,761**	**6184**	**1383**
NE1C	**17,307,624**	**5514**	**1322**
NR6O	**13,311,165**	**5608**	**1149**
NE3F	3,710,099	1944	821
***K5LRW**	**45,904**	**191**	**151**

NORTH AMERICA

VA5AA	**1,057,265**	**970**	**409**

AFRICA

D4Z	**75,209,834**	**12894**	**1687**

ASIA

JA1GOY	**597,476**	**589**	**367**
***9M2N**	**312,417**	**486**	**171**
BI1KK	**72**	**6**	**6**

EUROPE

YT5A	**30,459,104**	**7685**	**1534**
LZ9W	**28,029,870**	**7456**	**1518**
OT5A	**18,356,185**	**5441**	**1355**
DP7D	**17,878,297**	**5228**	**1349**
LN8W	**12,204,242**	**4282**	**1237**
HB9NE	**11,488,176**	**3444**	**1179**
ES3V	**4,564,791**	**2324**	**941**
LN2T	1,332,828	1149	602
IQ2XI	**248,581**	**357**	**331**
***CS5CC**	**105,669**	**263**	**199**
*YT5L	47,850	190	165
***EA3RCI**	**43,210**	**184**	**145**
LY2ZO	**26,668**	**129**	**113**

OCEANIA

NH7T	**28,231,020**	**6578**	**1278**
DX1MK	**442,260**	**655**	**252**

SOUTH AMERICA

PJ2T	**31,855,929**	**7397**	**1239**
HD1A	**6,428,226**	**2526**	**861**
CB3VS	**220,065**	**401**	**255**
**CB1Z*	*459*	*35*	*27*

MULTI-OPERATOR MULTI-DISTRIBUTED

NORTH AMERICA

4A7A	**3,790,044**	**2256**	**684**

AFRICA

***ZS2PE**	**112,860**	**231**	**190**

ASIA

BY3CQ	**1,225,114**	**1275**	**478**
***9M2A**	**1,171,020**	**920**	**435**
***JA2YPM**	**594**	**25**	**22**

EUROPE

IQ4FA	**14,688,960**	**4800**	**1284**
ED4W	**3,009,150**	**1921**	**810**
IB2C	3,000,921	1643	847
OO4O	**2,753,610**	**1496**	**789**
ED2R	1,523,657	1199	641
IOØA	1,018,152	962	537
IQ1NO	315,588	457	357
**G8AMC*	*53,725*	*206*	*175*
***F5KAY**	**17,577**	**100**	**93**

SOUTH AMERICA

PR1T	**5,430,900**	**2321**	**842**
PT1K	**5,200,446**	**2123**	**862**

CHECK LOGS

2EØLHG, 2E1FVS, 4X4LF, 4Z1KD, 4Z4DX, 4Z4KX, 7K4GUR, 9A2WB, 9A3GX, 9K2NO, 9V1HY, 9W2FSY, 9Z4CT, 9Z4Y, A65DR, AC2OC, AE2Z, AG8AR, AJ6WB, AK5CT, BG5MVD, BG6GQE, BI4SCC, BY2HIT, BY5HB, CS7AFP, CT7AZT, DB2BMJ, DD2CW, DF2RG, DG3BCZ, DH1OL, DJ3ZF, DK2CW, DK5XG, DK7RD, DK7TX, DK8HE, DL1DVN, DL1GZW, DL2DXA, DL3MY, DL3NSM, DL6AUK, DL6UAA, DL75HIL, DM4CM, DM4EU, DM7CW, DO1FYZ, DO1TKL, DR2C, DSØKBW, DU7RH, E71A, E7AR, EA1DD, EA1R, EA4BVW, EA4D, EA5AML, EA5N, EA7P, EA8CNR, ED3Z, EF2O, EI4KI, EI5LA, EI7CC, ES2RR, ES7A, EU1VA, F1GRH, F4EUG, F4HWS, F4ITW, GØDRM, G4RRM, G5W, GM7ITG, GW4BKG, HA2EAV, HA3HX, HB9DOS, HB9EP, HB9GFT, HB9RB, HB9VAB, IØIJ, IC8TEM, II1WRTC, II3WRTC, II5WRTC, II6WRTC, II8WRTC, IKØFUX, IK1JTP, IK4AUY, IK5BOH, IK5FKE, IK5TBK, ISØIYM, ISØPAH, IT9EWR, IU1IPB, IU1QCW, IU2IHM, IU2LWL, IU5NXG, IU8JLN, IV3OKO, IW1FRU, IZØJCF, IZ3GNG, IZ5MMK, IZ5MOQ, IZ6BYC, IZ8QNS, J72IMS, JA1JPM, JA8AZN, JH5MXB, JQ1IBI, JY4CI, KØEZE, K5KBK, K5TER, K6FEU, K6IAS, K8RDG, K8UHL, KAØN, KA2MGE, KB2KDY, KCØLKV, KC1FOZ, KC3QND, KC4KS, KC8OPV, KC9GPY, KD2WIV, KD3ANX, KD8PQE, KD9PFL, KE7OCA, KE8NQK, KI1U, KI4P, KI7MJU, KL2ZZ, KM4EGK, KN6NMV, KW4LS, LA4NL, LA5LJA, LC5K, LC6C, LT5A, LU1BJW, LU1MAW, LU7YZ, LV7D, LX7I, LY2CO, LY2IJ, LY32A, LZ1JZ, LZ1YF, LZ8E, M6EAM, M7IWH, M7TDV, MIØBHX, MI7RXD, MM7FEM, NØDYG, N2EPE, N2IFA, N2PQJ, N3LH, N3YQG, N4CZ, N4QU, N6PM, N7NWL, N8ACP, N8SXY, N9PPX, NI4TG, NL7WA, NQ9P, NYØK, OE1LZS, OE8TTR, OG5O, OG66X, OH1NDA, OH2IS, OH3MF, OH5NZ, OH5VT, OH6QU, OH8WW, OK1AYU, OK1CZ, OK1TRA, OK2SG, OK3X, OK4GP, OL8M, OM2XW, OM5CD, ON4CVL, ON8WV, P3X, PAØVLY, PAØWBP, PA4J, PA7JWC, PD5J, PP5DZ, PP7DX, RØQAF, R1BIA, R2AL, R2OFF, R3QX, R3RAE, R3RZ, R6FY, RA3DQP, RA3NC, RA4DX, RA9V, RA9W, RA9YE, RCØL, RK2M, RL3T, RMØL, RMØW, RM2A, RN3Z, RU9SO, RX3AEX, RZ3Z, S52MM, SC3A, SN2M, SN2W, SN5ØCA, SN5V, SO5TC, SO6K, SP2BMR, SP2YRY, SP3CET, SP5APW, SP5GDY, SP6CIK, SP6NIN, SP6TRH, SP7CVW, SP7IIT, SP7JLH, SP7JPN, SP7MW, SQ2EEQ, SQ2GXO, SQ5AM, SQ5EBM, SQ8L, SQ9ANS, SQ9DEO, SV1BJW, SV1EKI, SV1ME, SV2RSZ, SV3QUP, SV4FFL, SV8PMM, SV9COL, SX5P, SY1AEA, TA7AO, TA7I, TF3DC, TF3JB, TG9ADM, UA3BL, UA4CC, UA6AK, UA9CUA, UB4Y, UC5D, UFØB, UN7ZO, VE2CSM, VE2OV, VE3KPA, VE3MF, VJ3K, VU3BYD, WØLEN, W1WBB, W4CXT, W4ZTH, W6MVT, W6YA, W7GNM, W7PC, W8EO, WA7YAZ, WA9Q, WE8HAM, WP4KP, WS5ADV, YB1TIA, YB1TJ, YB8SCP, YL2EM, YL2TD, YO2LDU, YO3IPR, YT3X, YT7DS, YU7OPQ, ZL1IF, ZL1TM, ZL3AB, ZS1CDG, ZS2DL, ZS6BRZ.

Disqualified: 4I1EBD, EE1E, IT9FRX.

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RF Parts	57	800-921-4834	www.rfparts.com
RT Systems	7,37	800-921-4834	www.rtsystemsinc.com
Radio Amateur Club of JHS 22	75	516-674-4072	www.wb2jkj.org
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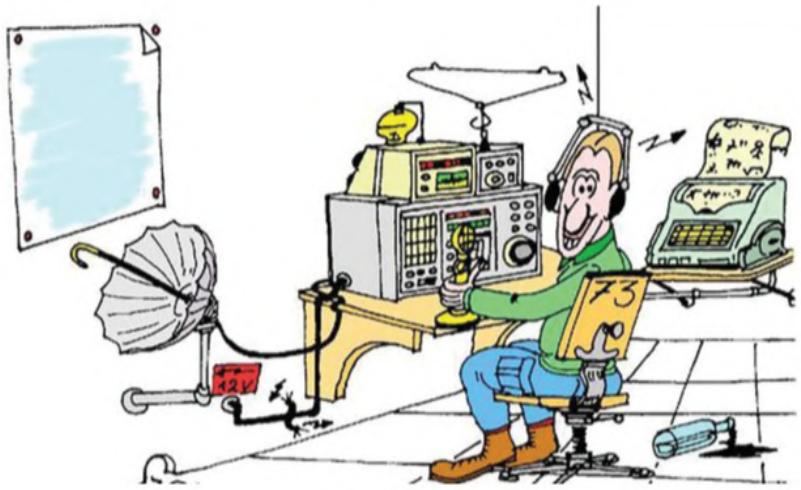

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