ARRL EME Contest 2014 Results

By Rick Rosen, K1DS (rick1ds@hotmail.com)

Moonbounce? Yes, you can!

Hundreds of stations around the globe focused their antennas on the Moon during the three ARRL EME Contest weekends this past fall. From 144 MHz through 10 GHz, the airwaves were ringing with CW and digital activity. Yes, you can do it too! Despite concern that you can't work stations in this mode, there were many who were successful using modest power and a single Yagi antenna. Fortunately, the "big gun" stations with large multi-antenna arrays and huge dishes are able to communicate with the simplest of stations. Try it—you'll be amazed at what can be done, even with a single long Yagi aimed at the horizon at moonrise or moonset and about 100 watts of transmit power. The exhilaration of that first contact will entice you to continue your efforts. If you are fortunate enough to have an EME "Elmer" to help you get started, you'll be that much further along for your first EME contact.

Top Three Scores in Each Category

A=50 MHz, B=144 MHz, D=432 MHz, E=1296 MHz, F= 2.3 GHz, G=3.4 GHz, H=5.7 GHz, I=10 GHz

Call Sign	*Bands*	*QSOs*	*Mults*	*Score*
Single-Operator, All-Mode, All-Band				
UA3PTW	BDEFH	328	147	4,821,600
DF3RU	DEF	142	76	1,079,200
YL2GD	BDE	117	73	854,100
Single-Operator, CW-Only All-Band				
OK1CA	DEFGHI	142	96	1,363,200
G3LTF	DEFGH	142	92	1,306,400
S53MM	EFG	91	61	555,100
Multioperator, All-Mode, All-Band				
K1JT	BDEFGHI	341	167	5,694,700
W6YX	BDEI	256	126	3,225,600
K4EME	BD	128	73	934,400
Multioperator, CW-Only, All-Band				
SP6JLW	DEI	124	67	830,800
SP7DCS	BE	96	49	470,400
SP6OPN	FG	21	19	39,900

What do you need to make an EME contact? Get the antenna and receive portion established first. Start by noting where the Moon rises and sets at your QTH and consider how you will aim your antenna. You can use moonrise and moonset for about an hour during each "pass," or add elevation and track the Moon with your antenna during its full passage. Two meters is often a starting band for many, although some jump right in on 432 MHz or the microwaves with gear for 1296 MHz. A long Yagi and a low noise, high gain preamp mounted at or as close to the antenna as possible is next. Maximizing gain and minimizing noise is essential to hear or decode the very weak reflected signals which have traveled almost one-half-million miles round trip. Short runs of low-loss coaxial cable help. Once you have the receive capability, add transmit power, amplifiers and antenna changeover relays to protect the sensitive receive preamp. There is an excellent chapter on EME theory and operation on the CD-ROM included with the current *ARRL Handbook*.

Outside the contest, you can find which stations are on the air and their frequencies by using information found on various reflectors at **vhfdx.radiocorner.net/EME/loggers.html**. Some weekends are optimal for EME when the Moon is at perigee and activity is highest. There are also several EME activity weekends sponsored by the Italian ARI and DUBUS (April 25th and 26th are the 1.2 GHz weekend this year).You may be able to hear CW EME QSOs by ear or decode JT65 signals using the *WSJT* programs.

Scheduling a first QSO with a large established EME station is often useful. Patience and personal resolve are essential. Top-scoring stations are certainly appreciated by the smaller stations which are able to easily find their signals and complete contacts.

Operating time is one of the most important elements of this contest as the Earth turns and the Moon becomes visible to different groups of operators at various times. Since the multipliers for this contest are both countries and states, moonbounce ops in the western part of the US have a shortened window of opportunity to Europe, but a far greater one to Asia than those stations on the East Coast. Of course, total gain and noise factor of the receive system and effective radiated power (ERP) of the transmit system are the next biggest contributors to success.

Who's On the Moon?

Overall there were 123 participant logs received by ARRL. This number represents less than half of the total participants, as Alex, RU1AA, had 239 QSOs on 144 MHz alone! Activity this year was slightly greater for the digital modes, with a reported 4,370 contacts while CW numbers included 3,045 contacts. The first weekend of the contest had activity focused on bands 2.3 GHz and up. The second and third weekends of the contest opened up activity on the 50 MHz through the 1.2 GHz bands. The 144 MHz band was hopping with digital activity and a modest amount of CW also. Many stations took advantage of using the MAP65 software from Joe Taylor's *WSJT* programs to enhance their ability to rapidly find and work digital contacts. With EME path losses far lower on 144 MHz than 1296 MHz, one might think that the greatest activity focus was on the lower band. However, the results from the submitted logs show that there were more QSOs on the higher band: 3,401 as compared to 3,003.

Seventeen percent of the entries, 21 out of 123, were from the United States. The other 83 percent were DX participants from every corner of the world, including the Åland Islands (OHØ), activated this year by the Mike & Monica portable team, DL1YMK. Typhoon winds brushed the coast of Japan, causing some of the JA operators to anchor their dishes for parts of the first activity weekend. Mr. Murphy was making his rounds as many reported cable, connector and relay problems — EME stations have a lot of connected parts, both stationary and moving. Although some of the entrants from last year's EME contest were missing from this year's log submissions, the total submitted log count was up 5 percent.

The 2015 ARRL EME contest weekends are scheduled for September 5-6 for 2.3 GHz and up followed by October 31-Nov 1 and Nov 28-29 for 50 MHz through 1296 MHz. Check out the calls of EME contest participants to find an "Elmer" near you. There are also moonbounce reflectors for discussion of technical and operating issues at **moon@moonbounce.info** and **moonnet@mailman.pe1itr.com**. The excitement of EME operation will grab you. Get started now. Yes, you can!

The 2014 EME Contest - by Matej OK1TEH

I've been working EME with my small antennas (DK7ZB's design) on 2 meters (10-el) and 70 cm (23-el) since April 2005. (The antennas are shown in the photograph at right.) It's quite difficult to work EME from my QTH in Prague because it's situated on the hill with good view to downtown so I'm getting very big amount of city noise. Because of that noise I'm not able to effectively use the Moon below some 15 degrees of elevation and due to my QTH in city I'm not able to use any advantage of ground gain. Another problem is a nearby tower with FM broadcast on 3 meters and DVB-T broadcast on UHF, which is especially bad during my moonset period when I'm looking for W6 stations. As the result I use a cavity band-pass filter. Despite of my small antennas and local problems with noise and interference, my current overall results on EME are 436 EME initials + 107 DXCC on 2 meters (27 CW/SSB only) and 95 initials on 70 cm (27 CW/SSB only). I'm occasionally active on 23 cm with a small 1 meter WiFi dish, primarily used for tropo operation. With 400 W at the LP feed, I have worked 15 initials for the fun (2x in CW). As I'm the age of 31, I don't have so much free time for EME activities, but that could be partially solved by sleepless nights!

For the 2014 ARRL EME contest, I was active on the second and third weekends, focused on my favorite band—70 cm. I like CW as well as JT65, and if it's possible, I prefer to first try the contact in CW because it's more fun. I use a modified FT847 with separate RX/TX ports, homebrew 800 W SSPA made by my dad, Vladimir, OK1VPZ. With feed line attenuation, I measure 600 W at the dipole of my 23-el DK7DB 5.7 meter long Yagi. For RX I use a CZX3500 relay and a 0.4 dB nF LNA using an ATF54143 device (made by OK1VPZ). More info about some of my equipment is online at: **www.ok2kkw.com/qro_en.htm**.

Four days before the contest I worked my first ever 1 Yagi to 1 Yagi 70 cm EME contact with Z21EME. Degradation was still fine, so I was looking forward to the contest weekend. During the first leg I was very happy with excellent propagation and activity, especially during the Saturday morning of November 8th with perfect conditions to the US. The strongest stations from the US were K3MF and K4EME. I was hearing and decoding them every time when I tuned the band. The strongest stations from Europe were HB9Q, DL7APV and OH2PO. As I suffer from many birdies on this band, I don't use MAP65 and an SDR. I use my SSB filter bandwidth and *SpecJT* capability to search for JT65 stations randomly by tuning my FT847 between 432.050 - 432.100 MHz with about 2 kHz steps every 2 minutes.

My final results included 18 QSOs for 25,200 points in the 432 All-mode category. Two contacts were completed in CW with Franta, OK1CA, and Jan, DL9KR. You can listen to Jan's signal during our QSO at **ok1teh.nagano.cz/eme/dl9kr_70cm061214cq.mp3**. I heard and decoded 10 more stations and I worked a few contacts on 2 meters also, just for give points to others. I was especially happy to contact K1JT and HB9Q on both bands and W6YX.

Final thoughts: If you are thinking about the sense of EME operation with a single Yagi, even from the noisy city, the answer is: TRY IT, IT'S FUN, BUT SOME PATIENCE IS REQUIRED!

Some basic info for EME beginners can be found at:

- **dl7apv.darc.de/start/start.htm**
- **www.ok2kkw.com/next/dj3jj_70cm2010.htm**
- **www.yu7ef.com/ef0210lt_dubus.htm**
- **ok1teh.nagano.cz & ok2kkw.com**

The EME Contest from Stanford by W6YX

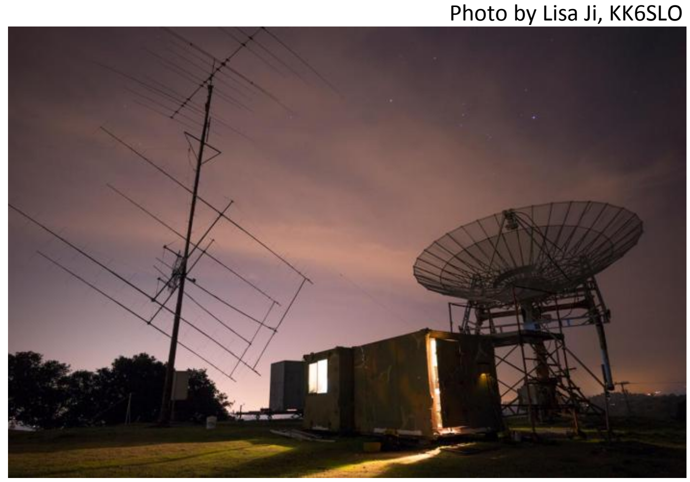
The Stanford Amateur Radio Club worked harder than ever to prepare for the 2014 ARRL EME contest. Our EME team grew larger than ever, and our scores were higher than ever. W6YX (see photo at right) entered as a Multioperator, Multi-band team on 10368 MHz, 1296 MHz, 432 MHz and 144 MHz. It was a rewarding challenge to design, build, and operate four stations, optimized well enough to use the surface of the Moon as a passive reflector to communicate with others on Earth. We heard digital modes, Morse code, and even human voices bouncing off of the Moon!

Team participation was the highest ever with K2YY, KG4UHM, KJ6SDF, AD6FP, W6TCP, K6KLY, KG6NUB, AA6XV, W6LD, KJ6JEX, and DL6DR making radio contacts. Several team members including AG6MZ, KJ4QKA, and AA6IW could not operate, but notably contributed to design and station building.

At W6YX, we effectively utilized software defined radios on all bands with *Linrad* as our prime software, and *MAP65* as our wide-band JT65 (digital) signal decoder.

Compared to most other entrants, being located on the California Pacific coast gives us less mutual Moon time with Europe, where the bulk of the EME stations are located. Relative to a station on the Eastern USA shore, we have 3 hours less Moon time with Europe per pass. Although this 18-hour deficit across all three contest weekends is challenging to overcome, we don't feel we have the right to complain compared to our friends in the southern hemisphere, far north, or over the Pacific. Nevertheless, time is of the essence for us, and we welcome the challenge, as it forces us to work harder, innovate, and stay awake longer to score competitively. Effective use of software defined radio was critical to make the most of our European window, whether we operated a large or small station on the band.

Photo by Lisa Ji, KK6SLO



10368 MHz - 10 contacts. We operated our new 4.6 meter dish (seen in the photo above) making its first full contest weekend debut as can be seen in this video. The 290 dB path loss to the moon and back at 10 GHz is quite challenging to overcome. AA6IW and KD6BPP have been very generous with their resources and contributions to build this station. We've had everyone from freshman and recently licensed students to senior Silicon Valley engineers help with this project. The station is still far from optimized. Initial draft calculations show a substantial 5 dB improvement is obtainable.

1296 MHz - 95 contacts made with our 8 meter dish. From what we can tell, this score could be an all-time record for a non-European/Russian 1296 MHz station in the ARRL EME contest. We ran *Linrad* on CW, while simultaneously feeding *MAP65* for digital decoding. The homebrew amplifier built earlier this year worked excellently. *Linrad* proved to be very popular, especially with our Morse code operators. Virtually all of our contacts were made using a software defined radio as the receiver. The joy of operating random CW has been elevated, and the days of laboriously tuning up and down the band have been permanently replaced with point-and-click efficiency.

The final weekend of the contest resulted in a setback. Around midnight, while the Moon was rising for Japan, our azimuth drive motor stopped working. Given the late hour and the stormy conditions, most would have given up for the night, but giving up is inconsistent with W6YX's reputation in radio contesting. A valiant effort by AD6FP, K2YY and KG6NUB resulted in the heavy azimuth motor being removed, temporarily repaired, and reassembled — all in the late-night rain! By 2 AM we were on the air again with soggy operators making contacts!

432 MHz - 15 contacts made, exceeding our expectations for a temporary and far-from-optimized station. Mike Staal's (K6MYC, founder of M2 Antennas) generosity and contributions were essential to our success. Four of his 12 element Yagi antennas were temporarily attached to our satellite array. This basic station performed surprisingly well and was very fun to operate.

144 MHz - 136 contacts made. Past observers have noted for several years that W6YX has used only a single Yagi on this band, even though our score was competitive with many four-Yagi stations. Last year, our big contest upgrade project was extending our 1296 MHz dish from 6 to 8 meter diameter in about a week.

This year we got considerably more ambitious. Thanks to the generous contributions of Gary Lauterbach, AD6FP, four dual-polarity Yagis arrived on October 24th with the second weekend of the contest just two weeks away! There was a tremendous rush to get this station built in time. Two weeks of non-stop designing, welding, wrenching, drilling and soldering ensued. A considerable amount of time was invested by AD6FP to build a top-performing station in short order.

To meet our deadline, we spent most days working from the morning until midnight or later, and at one point, we even had a team member on a bucket truck, working with a dedicated ground support crew, from 10 AM until 3 AM the following day. Our new 144 MHz station became operational for the first time just minutes after moonrise on November 8th. The station was functional from the start, a testament to the hard work and sound engineering invested into the project.

Making hundreds of random moonbounce contacts across four different frequency bands required a balanced mixture of electrical engineering, computer science, mechanical engineering, and team work. Diversity was key to our success. We greatly benefited from having operators with decades of Morse code operating experience and keen ears, as well as having team members who grew up with the Internet and were intrinsically adept with software defined radios and digital modes. Thank you to everyone who participated in, contributed to, or supported this event. Your design input, lab access, manual labor, and station operation were invaluable. See you in 2015, as we're already busy putting ambitious projects on the drawing board.

Complete Scores by Category

Bands A=50 MHz B=144 MHz D=432 MHz E=1.2 GHz F=2.3 GHz G=3.4 GHz H=5.7 GHz I=10 GHz

Call Sign	Bands Used	QSOS	Mults	Score	Multioperator Call Signs
Single-Operator, All-Mode					
UA3PTW	BDEFH	328	147	4,821,600	
RU1AA	B	239	76	1,816,400	
YTØEME	B	236	73	1,722,800	
OK1DIX	B	209	73	1,525,700	
DF3RU	DEF	142	76	1,079,200	
YL2GD	BDE	117	73	854,100	
K3RWR	B	143	59	843,700	
HG1W	B	136	58	788,800	
SM4GGC	B	126	56	705,600	
UR3EE	B	121	57	689,700	
OK2DL	E	131	47	615,700	
OK1DFC	E	122	46	561,200	
ON5TA	EF	99	49	485,100	
UA4HTS	EI	99	49	485,100	
YL2AJ	B	85	49	416,500	
JA6AHB	DE	85	44	374,000	
IK3COJ	E	90	37	333,000	
PA3FXB	E	85	37	314,500	
RA3AUB	E	84	32	268,800	
LZ1DX	D	73	36	262,800	
RX3A	B	50	42	210,000	
SP1JNY	BD	49	39	191,100	
LZ1DP	B	53	33	174,900	
KAØRYT	B	48	34	163,200	
UY2QQ	B	51	31	158,100	
UW7LL/A	B	53	28	148,400	
RZ6DD	B	51	29	147,900	
YO5BIN	B	46	32	147,200	
KL7UW	B	49	30	147,000	
I5YDI	E	56	25	140,000	
LZ1VPV	B	49	28	137,200	

OK2ULQ	E	47	28	131,600
VK4CDI	BDEG	41	31	127,100
SQ7D	E	49	25	122,500
RV3IG	B	37	30	111,000
YO2BCT	DI	46	24	110,400
UA3MBJ	B	36	26	93,600
WDØE	B	41	21	86,100
K3MF	D	37	23	85,100
OK1YK	E	39	20	78,000
RA9LR	B	33	22	72,600
RD3DA	E	35	20	70,000
W7MEM	BDE	27	24	64,800
G4BRK	E	32	18	57,600
EA3UM	E	32	18	57,600
ES6FX	E	34	16	54,400
W3HMS	E	30	18	54,000
OK2POI	D	25	20	50,000
EA1RJ	E	28	17	47,600
DL2FCN	B	28	16	44,800
UXØFF	B	21	18	37,800
OK1TEH	D	18	14	25,200
R7CK/6	E	19	12	22,800
KG7P	B	17	13	22,100
US7GY	B	16	13	20,800
KD7UO	B	17	12	20,400
SM6FHZ	H	15	12	18,000
RV3YM	B	13	11	14,300
UAØLW	B	13	10	13,000
RWØLDF	E	13	9	11,700
PA5MS	B	11	10	11,000
AI5I	B	12	8	9,600
KC6ZWT	B	11	8	8,800
YL3AEV	E	9	7	6,300
OH3LWP	E	7	6	4,200
K8DIO	B	6	6	3,600

R4YM	E	8	4	3,200
HG5BMU	B	6	4	2,400
LI7DHA	B	4	4	1,600
SP5GDM	E	3	2	600
KA1GT	D	2	2	400
Single-Operator, CW-Only				
OK1CA	DEFGHI	142	96	1,363,200
G3LTF	DEFGH	142	92	1,306,400
S53MM	EF	91	61	555,100
OE5JFL	E	105	43	451,500
I1NDP	E	102	44	448,800
G4CCH	E	101	42	424,200
WA6PY	DEFGHI	76	55	418,000
F5SE/P	E	87	42	365,400
DL3EBJ	E	78	39	304,200
OK1CS	E	80	38	304,000
I5MPK	E	77	35	269,500
SP6ITF	E	72	35	252,000
RA3EC	E	67	32	214,400
SM3AKW	E	59	29	171,100
JA4BLC	EHI	53	30	159,000
VE4SA	E	34	23	78,200
I2FHW	D	28	21	58,800
SP3XBO	BE	30	19	57,000
OK1MS	B	28	20	56,000
LZ2US	B	29	18	52,200
OZ1HNE	B	28	18	50,400
DG5CST	E	55	8	44,000
DJ8FR	E	24	14	33,600
YO2AMU	B	16	12	19,200
IK1FJI	B	15	11	16,500
DL8UCC	B	13	11	14,300
K1DS	E	13	11	14,300
JA4LJB	E	13	10	13,000
F6HLC	D	7	6	4,200

W8TXT	D	6	6	3,600	
JA9BOH	D	4	4	1,600	
Multioperator, All Mode					
K1JT	BDEFGHI	341	167	5,694,700	(+AG6GR, AK2F, K2BMI, K2QM, K2TXB, K2UYH, NE2U)
W6YX	BDEI	256	126	3,225,600	(K2YY, KG4UHM, KJ6SDF, AD6FP, W6TCP, K6KLY, KG6NUB, AA6XV, W6LD, KJ6JEX, DL6DR, ops)
IK5VLS	E	60	25	1,500,000	(+IK5AMB, IZ5DIY, IZ5OVP)
K4EME	BD	128	73	934,400	(+AD4TJ, KR4V)
LU1C	BDE	88	58	510,400	(LU8ENU, LU1CGB, LU9DO, LU1AEE,ops)
OH2PO	D	72	32	230,400	(+OH2BGR, OH2HYT, OH6DD)
VA7MM	E	63	29	182,700	(VE7CMK, VE7CNF,ops)
F6HEO	B	61	24	146,400	(+FØEUI, F1UKQ, F5UNH)
RN3DKE	E	43	24	103,200	(+RD3DA)
YL3CT	B	39	25	97,500	(+YL2OW, YL2NX)
UA4AAV	E	35	18	63,000	(+R4CR)
OK1KIR	I	27	19	51,300	(OK1DAI, OK1DAK,ops)
DLØEF	I	12	9	10,800	(DK2KA, DJ5BV,ops)
TM8B	H	13	8	10,400	(F2CT, F3ME, F1GVU,ops)
SQ6OPG	H	7	7	4,900	(+SP6OPN, SP6JLW)
Multioperator, CW-Only					
SP6JLW	EI	124	67	830,800	(+SP6OPN, SQ6OPG)
SP7DCS	BE	96	49	470,400	(+SP7MC)
9A5AA	E	64	54	345,600	(+9A2WA)
SP6OPN	FG	21	19	39,900	(+SP6JLW)
W1AIM	E	24	15	36,000	(+W1GHZ)
ON5GS	E	24	14	33,600	(+ON4IA, ON6NL, ON6LEO)
WD5AGO	EF	19	17	32,300	(+KF5SYP, KG5EWM, KG5EWO + ops)
Single-Operator, CW-Only, All Band					
OK1CA	DEFGHI	142	96	1,363,200	
G3LTF	DEFGH	142	92	1,306,400	
S53MM	EF	91	61	555,100	
WA6PY	DEFGHI	76	55	418,000	
JA4BLC	EHI	53	30	159,000	
SP3XBO	BE	30	19	57,000	
Single-Operator, All-Mode, All Band					

UA3PTW	BDEFH	328	147	4,821,600
DF3RU	DEF	142	76	1,079,200
YL2GD	BDE	117	73	854,100
ON5TA	EF	99	49	485,100
UA4HTS	EI	99	49	485,100
JA6AHB	DE	85	44	374,000
SP1JNY	BD	49	39	191,100
VK4CDI	BDEG	41	31	127,100
YO2BCT	I	46	24	110,400
W7MEM	BDE	27	24	64,800
Single-Operator, CW-Only 144 MHz				
OK1MS	B	28	20	56,000
LZ2US	B	29	18	52,200
OZ1HNE	B	28	18	50,400
YO2AMU	B	16	12	19,200
IK1FJI	B	15	11	16,500
DL8UCC	B	13	11	14,300
Single-Operator, All-Mode, 144 MHz				
RU1AA	B	239	76	1,816,400
YTØEME	B	236	73	1,722,800
OK1DIX	B	209	73	1,525,700
K3RWR	B	143	59	843,700
HG1W	B	136	58	788,800
SM4GGC	B	126	56	705,600
UR3EE	B	121	57	689,700
YL2AJ	B	85	49	416,500
RX3A	B	50	42	210,000
LZ1DP	B	53	33	174,900
KAØRYT	B	48	34	163,200
UY2QQ	B	51	31	158,100
UW7LL/A	B	53	28	148,400
RZ6DD	B	51	29	147,900
YO5BIN	B	46	32	147,200
KL7UW	B	49	30	147,000
LZ1VPV	B	49	28	137,200

RV3IG	B	37	30	111,000
UA3MBJ	B	36	26	93,600
WDØE	B	41	21	86,100
RA9LR	B	33	22	72,600
DL2FCN	B	28	16	44,800
UXØFF	B	21	18	37,800
KG7P	B	17	13	22,100
US7GY	B	16	13	20,800
KD7UO	B	17	12	20,400
RV3YM	B	13	11	14,300
UAØLW	B	13	10	13,000
PA5MS	B	11	10	11,000
AI5I	B	12	8	9,600
KC6ZWT	B	11	8	8,800
K8DIO	B	6	6	3,600
HG5BMU	B	6	4	2,400
LI7DHA	B	4	4	1,600
Single-Operator,CW-Only, 432 MHz				
I2FHW	D	28	21	58,800
F6HLC	D	7	6	4,200
W8TXT	D	6	6	3,600
JA9BOH	D	4	4	1,600
Single-Operator, All-Mode, 432 MHz				
LZ1DX	D	73	36	262,800
K3MF	D	37	23	85,100
OK2POI	D	25	20	50,000
OK1TEH	D	18	14	25,200
KA1GT	D	2	2	400
Single-Operator, CW-Only, 1.2 GHz				
OE5JFL	E	105	43	451,500
I1NDP	E	102	44	448,800
G4CCH	E	101	42	424,200
F5SE/P	E	87	42	365,400
DL3EBJ	E	78	39	304,200
OK1CS	E	80	38	304,000

I5MPK	E	77	35	269,500	
SP6ITF	E	72	35	252,000	
RA3EC	E	67	32	214,400	
SM3AKW	E	59	29	171,100	
VE4SA	E	34	23	78,200	
DG5CST	E	55	8	44,000	
DJ8FR	E	24	14	33,600	
K1DS	E	13	11	14,300	
JA4LJB	E	13	10	13,000	
Single-Operator, All-Mode, 1.2 GHz					
OK2DL	E	131	47	615,700	
OK1DFC	E	122	46	561,200	
IK3COJ	E	90	37	333,000	
PA3FXB	E	85	37	314,500	
RA3AUB	E	84	32	268,800	
I5YDI	E	56	25	140,000	
OK2ULQ	E	47	28	131,600	
SQ7D	E	49	25	122,500	
OK1YK	E	39	20	78,000	
RD3DA	E	35	20	70,000	
G4BRK	E	32	18	57,600	
EA3UM	E	32	18	57,600	
ES6FX	E	34	16	54,400	
W3HMS	E	30	18	54,000	
EA1RJ	E	28	17	47,600	
R7CK/6	E	19	12	22,800	
RWØLDF	E	13	9	11,700	
YL3AEV	E	9	7	6,300	
OH3LWP	E	7	6	4,200	
R4YM	E	8	4	3,200	
SP5GDM	E	3	2	600	
Single-Operator, All-Mode, 5.7 GHz					
SM6FHZ	H	15	12	18,000	
Multioperator, CW-Only, All Band					
SP6JLW	EI	124	67	830,800	(+SP6OPN, SQ6OPG)

SP7DCS	BE	96	49	470,400	(+SP7MC)
SP6OPN	FG	21	19	39,900	(+SP6JLW)
WD5AGO	EF	19	17	32,300	(+KF5SYP, KG5EWM, KG5EWO + ops)
Multioperator, All-Mode, All Band					
K1JT	BDEFGHI	341	167	5,694,700	(+AG6GR, AK2F, K2BMI, K2QM, K2TXB, K2UYH, NE2U)
W6YX	BDEI	256	126	3,225,600	(K2YY, KG4UHM, KJ6SDF, AD6FP, W6TCP, K6KLY, KG6NUB, AA6XV, W6LD, KJ6JEX, DL6DR, ops)
K4EME	BD	128	73	934,400	(+AD4TJ, KR4V)
LU1C	BDE	88	58	510,400	(LU8ENU, LU1CGB, LU9DO, LU1AEE,ops)
Multioperator, All-Mode, 144 MHz					
F6HEO	B	61	24	146,400	(+FØEUI, F1UKQ, F5UNH)
YL3CT	B	39	25	97,500	(+YL2OW, YL2NX)
Multioperator, All-Mode, 432 MHz					
OH2PO	D	72	32	230,400	(+OH2BGR, OH2HYT, OH6DD)
Multioperator, CW-Only, 1.2 GHz					
9A5AA	E	64	54	345,600	(+9A2WA)
W1AIM	E	24	15	36,000	(+W1GHZ)
ON5GS	E	24	14	33,600	(+ON4IA, ON6NL, ON6LEO)
Multioperator, All-Mode, 1.2 GHz					
IK5VLS	E	60	25	1,500,000	(+IK5AMB, IZ5DIY, IZ5OVP)
VA7MM	E	63	29	182,700	(VE7CMK, VE7CNF,ops)
RN3DKE	E	43	24	103,200	(+RD3DA)
UA4AAV	E	35	18	63,000	(+R4CR)
Multioperator, All-Mode, 5.7 GHz					
TM8B	H	13	8	10,400	(F2CT, F3ME, F1GVU,ops)
SQ6OPG	H	7	7	4,900	(+SP6OPN, SP6JLW)
Multioperator, All-Mode, 10 GHz					
OK1KIR	I	27	19	51,300	(OK1DAI, OK1DAK,ops)
DLØEF	I	12	9	10,800	(DK2KA, DJ5BV,ops)