



ARRL EME Contest 2020 Results

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

The more logs, the merrier!

I'll admit it—I'm addicted to Moonbounce. I picked up the habit while visiting and operating the EME stations of K2UYH and K1JT more than 20 years ago. Since then, I have attended all of the biennial International EME conferences, operated my own EME station on 144, 432, 1296 and 2304 MHz bands and on 222 and 902 MHz with my equipment in the K2UYH dish and feeds. I read all the messages on the EME reflectors and follow the activity on the bands in the NØUK and HB9Q EME loggers.

I troll eBay and postings of radio gear for additions to my station. I spent another few thousand dollars this year to enhance my EME capabilities. I have analyzed and written the ARRL EME Contest commentary for the past several years. Judging from much of the feedback that I get, there are many of you who are afflicted with the same condition.

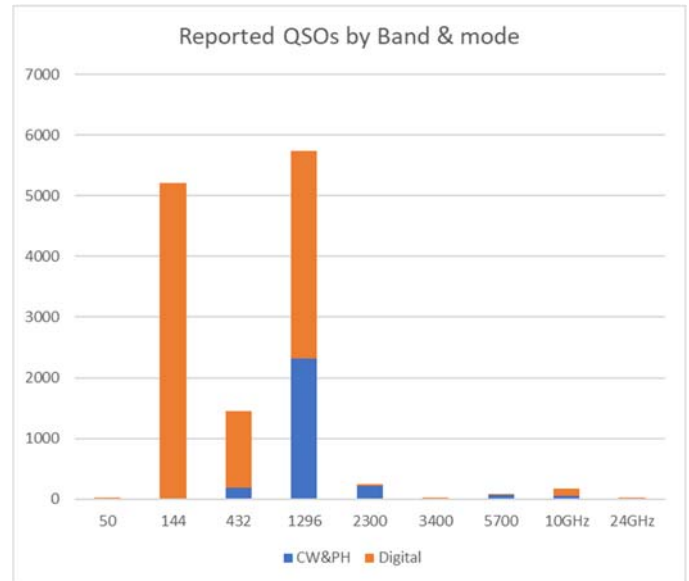
If you are reading this to try and understand what Moonbounce is about, welcome to a wonderful world and universe of challenges, successes, invention and sharing. Although EME is not new, the concept proposed almost 100 years ago, hams have been involved since 1953. There are interesting summaries of the history of Moonbounce on Wikipedia. Since then, we have witnessed technological advances in radio electronics and computerization, with greater receiver sensitivity, increased transmit power, improved antenna performance, the use of Software Defined Radio and digital communications.

Submitted Logs

Judging by the excellent number of logs received, this past year's ARRL EME Contest was one of the most active in recent memory. When the list of submitted logs grew close to 200, I put out a message asking for more and offered assistance to make Cabrillo log conversions. I was elated to see that the number grew to 242 logs, an increase of 49 logs or 25% over last year with a total of 12.9K QSOs on bands from 50 MHz through 24 GHz. Just as I was completing this contest commentary, I was checking the results of some of my Packrat VHF Radio Club members as several are active on the moon.

During the log checking process, we found an additional 16 logs that needed to be added, for a grand total of 258 submitted logs. We still need to encourage stations to

submit their logs as it appears that 60% of stations active in the contest did not send in logs. For the first time in the past 7 years that I have been reporting the results, the number of QSOs on 1.2 GHz surpassed those made on 144 MHz!



Total QSOs Reported by Band and Mode				
Band	CW&PH	Digital	Total QSOs	Logs
50	0	27	27	2
144	2	5,215	5,217	121
222	0	15	15	3
432	190	1,253	1,443	83
1.2GHz	2,316	3,416	5,732	108
2.3GHz	210	43	253	20
3.4GHz	11	2	13	5
5.7GHz	76	1	77	7
10GHz	50	126	176	13
24GHz	5	3	8	2
Total	2,860	10,101	12,961	

This was the first year that all the logs were entered in Cabrillo format and they were all subjected to log checking. Scrutiny and comparison of the correct call signs in each other's logs was completed by computer program. Of the 258 submitted logs, 129 (50%) were error-free. Other entries had points deducted because the

incorrect “busted” call was recorded in the log or their call was not found in the log of the claimed contacted station. One error was spotted in 64 (25%) of the logs. The other 65 logs had more than one “busted” call or “NIL” (not-in-log) issues. Overall, the score reductions did not appear to affect the standings of the top scorers, although some of the results were quite close.

The issue of “NIL” (not-in-log) has been a significant issue for many contesters, especially when using the digital modes. Once the calls and reports are sent, stations often move on to another caller. This may leave one station wondering if the RRR was copied after RO was sent and not entering the QSO in their log. It may also be a failure of the operator to click the QSO into the log or auto-logging if a certain final exchange is not sent.

“Broken calls” are often created by difficulty in CW copy or simple errors in transposing the letters or omitting a letter or number when recording the contact. Paper logs that are transposed into Cabrillo format may also have minor call sign errors. A small number of stations had difficulty making a Cabrillo formatted log.

There are more than 200 of you out there who can share your tools and secrets for creating Cabrillo logs and reduce the angst of many who are unaccustomed to computer logging. I understand that there is a way to use NIMM logging program for EME and I have also used GenLog by W3KM for making a Cabrillo entry.



Skip, W1PV uses this 3.6m dish on 1296MHz with multiple guys on the feed strut. The same dish is used for 432MHz with another feed. [“Skip” Paulsen, W1PV, photo]

Weekend 1

There were excellent moon conditions during the second weekend of September. I watched the HB9Q logger to get a sense of the activity level. Many comments on the

reflector and in the October edition of the *432 & Up EME News* were quite positive. For the first time we have contest QSOs on 24 GHz (1.25cm) reported. There has been little activity on the 3.4 GHz (9cm) band, and with this year’s frequency auctions it appears that we have lost that segment to commercial interests. I found the most entertaining comments posted, and I’ll share a few of them with you here:

“My eyes wear out from focusing on the screen; Crazy time with computer -- let me try to get CW working-- seems to be working -- #\$. Computers. I had continuous computer problems. When I went on CW here, it would not work, When I got up in middle of night, my computer did not - my keyboard did not respond, then WSJT would not interface with rig... I did make some nice QSOs, but the computer fought me to the very end. I am just about out of window; The story of this contest.” --K2UYH

“Equipment is all working perfectly for me this time, just nobody there!!! Maybe on 13 cm. This my worst ever. Everyone is ‘somewhere else.’” --KL6M

“Worked 12 on 6cm but not a single NA station so I may be on there as well. Pretty strange... an ARRL contest, 20 QSOs so far and only one from NA!” --G3LTF

“Getting too complicated for my foggy brain.” --VE6TA

“Paper log, low RAM capacity hi! Cockpit error had RIT on. Sending 2nd. CW is so much simpler!” --VE4MA

“Too many things to click.” --WA3RGQ

“Rain here got into my rotor control box, my keyboard and my keyer - switching to CW and plugging into my radio causes uninterrupted TX. I am going to try to dry things out by tomorrow.” --KNØWS

The submitted logs showed a total of 527 QSOs across the 5 bands 2.3GHz (13cm) through 24 GHz. Using 24 GHz Paul, WA6PY had 1 QSO, and the multi-op group of OK1DAI, OK1DAK, and OK1VAO at OK1KIR had 7 QSOs. This is the first reported ARRL EME contest activity on that band.

The number of reported QSOs on 10 GHz increased from 174 QSOs last year to 176 QSOs this year, with 50 (28%) of them in CW and 126 (72%) digital. At one point I counted over 40 stations on the 10 GHz section of the HB9Q logger, a rough gauge of the growing interest in this band, likely in conjunction with the DLØSHF 10 G EME beacon.

Roger, W3SZ, along with Russ, NN3Q were the top scorers in the Multi-Op 10GHz activity with a score of 34,500 based on 23 QSOs and 15 multipliers. Roger reported, "The repaired Siemens 300W TWT performed well, though we kept it around only 200W output. It gave an occasional BIAS Alarm when T/R switching which would then require the TWT to perform a 5-minute reboot sequence, so we kept the TWT in Tx mode all the time (just running it into a dummy load during receive), which used a bit more mains power but caused no issues and avoided the Bias Alarm reboot issue."

In the Single-Op 10 GHz category, Mirek, OK2AQ and Kjeld, OZ1FF both had 19 10 GHz QSOs, but Mirek had 2 more multipliers than Kjeld. Dario, IW2FZR was in 4th position with 15 QSOs for a score of 18K. Nine other all-band operators gathered contacts and multipliers on 10GHz with this increasing activity.

Activity on 5 GHz jumped by 250% from 22 reported contacts in 2019 to 77 contacts this year. Although there were only 7 logs from the usual suspects showing contacts on this band, it appears that they all got to work each other. I noted that there were at least a dozen stations on the 5 GHz section of the HB9Q logger.

RA3EME multi-op had 14 QSOs on the band, 13 CW and 1 digital, while SP6JLW multi-op had 13 CW contacts, UA3PTW had 12, G3LTF 12, OK1CA 12, KL6M 9 and K2UYH multi-op 5. Not surprisingly, the activity on 3.4GHz fell by 50% from 27 reported contacts to only 13 reported QSOs by 5 participating stations. Due to commercial interest in this frequency, many countries have curtailed amateur radio operation on this band.

We saw a great 62% increase in activity on 2.3 GHz (13cm) with 253 QSOs reported in the submitted logs, 210 (83%) on CW. Twenty stations submitted logs with activity on this band. UA3PTW and RA3EME each showed 29 QSOs on this band, likely accounting for working all the participants at this frequency. Several stations announced their activity plans for the higher microwave bands on the Moonbounce reflector, but they did not submit logs.

Weekends 2 & 3

Stations couldn't wait to get started on bands from 50 MHz through 1296 MHz on the weekends of October 10th and November 28th. A log with 25 EME contacts on 50 MHz was also a first for this contest in recent history, thanks to the activity of Tim, NØTB. Dave, KJ9I was the only other submission on this band with 2 QSOs.

The CW/PH-only All-band category included 8 entries led by Peter, G3LTF with 958,500 points based on 135 contacts and 71 multipliers across 4 bands from 432 MHz through 5 GHz. Second was Mike, KL6M with a 5-band entry and 522K points. Third place went to Franta, OK1CA with 482K across 4 bands.

The Single-Operator all-mode all-band section had 39 entries. It's no surprise that Dimitrij, UA3PTW again was in first place in the All-Band All-Mode category for another year, beating his last year's entry by 9% with a score of 6,673,600 from 388 QSOs and 172 multipliers. He had contacts on 144 MHz, 432 MHz, 1296 MHz, 2.3 GHz and 5.7 GHz. Although he had plenty of digital QSOs on 2m and 70cm, 22% of his contacts were made on CW.

Ned, LZ1DX turned in a fine score of 1,240,200 for 2nd place in this section with 159 contacts and 78 multipliers across 3 bands with 1296 MHz being the most productive. In 3rd place was Gunar, YL2GD scoring 710,400 with 111 contacts and 64 multipliers, also on 3 bands.



Ned, LZ1DX shows his Yagis and dish for his 144 MHz, 432 MHz and 1.2 GHz three band contest effort [Ned Zaprianov, LZ1DX, photo]

The most popular entry category was the Single-Operator 2m section with 81 stations operating exclusively on 144 MHz. Action was brisk and I counted 5212 contacts recorded in the submitted logs with 121 (47% of the stations found on 2m in this contest) stations reporting use of this band.

There were 2 CW contacts(!) reported in the log of OK1DIX, so get out your code key and give it a try, you may be surprised at the results. Three stations including OK1DIX, PA5Y and RX1AS all reported working more than 200 stations on this band, with Sergey reporting a whopping 281 contacts.

The top scorer in the 2m-SO category was Conrad, PA5Y, with a final score of 2,244,000, as he had 264 confirmed QSOs with 85 multipliers, 6 more multipliers than Sergey, RX1AS, who scored 2,219,900 for second place. Lad, OK1DIX, was 3rd with a score of 1,872,000. All of these were a significant improvement over last year's winner in this category, OK1DIX who had a score of 1,742,500 based on 205 QSOs and 53 multipliers. My question, as always is, "Where are the logs of the other 160 stations that participated on 2m this year?"

Although the 1.25m 222 MHz band is not active worldwide, there were 4 US stations including WA4NJP, K7ULS, NØAKC, and W4ZST that submitted a total of 15 QSOs on this band. With the recent availability of the high-powered pallet amplifiers, using a single Yagi and digital modes, many stations in the US are trying to achieve Worked-All-States award on this band. I had a small taste of the activity this past summer as I took my 222 MHz multimode rig and 100 watt SSPA to the K2UYH station and used Al's 8m dish to work a handful of stations using JT65.

The 432 MHz 70cm band was fickle at times with Faraday playing a big part in conditions. Eighty-three stations sent in logs with QSOs on this band for a total of 1443 contacts. The majority of activity on the band was using JT65 with 1252 (87%) contacts and 191 (13%) on CW/PH. Jan, DL9KR was the top scorer of the 6 entries in the Single-Op CW 432 band with 21 QSOs and 12 multipliers for a score of 25,200.



Gene, KB7Q was able to work 29 JT65 QSOs on 1296MHz with this 1.6m foldable metalized fabric dish, circular patch feed and 275W. "It was fun being the Montana multiplier!" The dishes are custom made by Paul W2HRO and come in sizes up to 2.4m [Gene Shea, KB7Q, photo]

In the Single-Operator all-mode category there were 27 submitted logs. Bernd, DL7APV, was the leader of the 27 entries in the Single-Operator all-mode category with 217 mixed CW/PH and digital QSOs and a score of 1,388,800 with 64 multipliers.

To every and all stations on 70cm, Bernd was a beacon to check your receive capabilities. Slava, UT5DL was in 2nd place with 489K points and Sven, SM7THS in 3rd place with 217K. I would have liked to include the logs of the other 134 stations that did not submit.



Chris, PA2CHR shows his 2m and 70cm arrays with a beautiful sky from the Netherlands [Chris Ploeger, PA2CHR, photo]

Activity on 1296 MHz 23cm band was fantastic on both CW/PH and digital modes. There were several SSB QSOs made by those with the big dishes. There were 105 stations submitting logs with activity on 1296 MHz. Sebastian, DG5CST led the 17 entries in the Single-OP CW/PH-only category with 468,000 points based on 104 QSOs and 45 multipliers. Howard, G4CCH followed in 2nd with 392K and Stig, OZ4MM in 3rd with 336K.

We had 48 Single-Operator stations stick to the 23cm all-mode class for the contest and send in their logs. Marek, OK2DL worked 169 stations in the All-Mode category, again showing there are far more active operators than those submitting contest logs. With his 59 multipliers, he scored 997,100 points to top the Single-Op All-Mode 1296 MHz category.

Karl, DF3RU was in 2nd place with 726K points and Chris, DL3EBJ was in 3rd place with a score of 680K. There are a few stations like Dan's at HB9Q who are there to give out points and to work new initial contacts without sending in a log. All of us small station ops appreciate his availability, although I missed him this year.

Skip, W1PV reported, "Plenty of activity, especially on 23cm. Hard to find a clear frequency. Once I started to call CQ, I had callers for 2 hours." Jan, PAØPLY added, "It was so crowded on the band, particularly in the JT section,

that I moved to the CW section several times since there was simply no space to put my JT signal.”

You can find additional comments and station photos at the ARRL collection of soapbox comments that were sent in with the Cabrillo logs and via the web at <https://contests.arrl.org/eme/soaps/2020/>

With his 144 MHz portable setup, Peter, KA6U has traveled through multiple US grids, chronicling his adventures with text and pictures on his QRZ page. Peter created quite a scoring issue without submitting a log. He operated EME on 2 meters from two different states: Nevada on the second weekend and Florida on the third weekend, using his regular call sign in both locations. The computerized log checking needed to be modified to account for the contacts to be scored separately with each weekend as a different multiplier.

Perhaps there is a modification needed in future contests to request that stations that move states during the contest use a portable designation so that computerized logging programs will not reject a call that has been recorded once before as a dupe. It is difficult not knowing the history of the scoring of this contest how using state multipliers developed without having that information as part of the exchange.

Multi-operators

There are three categories with more than 2 entries of Multi-Operator stations: all-band all mode, 2m all mode and 1.2GHz all mode. The RA3EME team of Al, R3YA, Vlad, RA3Y, and Sergj, UA3YY amassed 6,253,000 points to lead the field of 7 entries. They operated on 6 bands, 144, 432, 1296, 2.3, 5 and 10 GHz, completing 370 QSOs with 170 multipliers. In distant second place was the team of Al, K2UYH with Russ, K2TXB and Paul, W2HRO scoring 2,406,900 points with 213 contacts and 113 multipliers. Al operated on the bands from 1.2 GHz through 10 GHz, while Paul did 432 MHz and Russ had 144 MHz.

The Multi-Op 2m all mode class had 6 teams and were led by Joze, S51ZO and S52EZ, managing 167 QSOs and 66 multipliers for a score of 1,102,200. The Stanford University team at W6YX split their moon entries and had two separate Multi-op teams, one on 2m and the other on 1.2 GHz. In second place on 2m was the team of Rob, KG4UHM and Sawson, KG6NUB with a score of 825K. The team of Gary, K6MG; Sawson, KG6NUB; and Jim, N9JIM, operating the W6YX 1.2GHz operation, won first place in the Multi-Op section with 576K points on 113 mixed-mode contacts and 51 multipliers. The Italian pair

of Gabriele, IK5VLS and Iacopo, IK5AMB were in second place on 1.2 GHz with a score of 466K.

The SP6JLW-SP6OPN team was the only entrant in the Multi-Op CW/PH all band class and had 115 verified contacts with 63 multipliers for a score of 724,500. They were active on all 5 bands from 1.2 GHz through 10 GHz. Other Multi-Operator teams are listed in the attached listings.

The Deep Space Exploration Society (KØPRT)



The Deep Space Exploration Society (DSES) operated KØPRT from Colorado. (photo by WA2JQZ)

The team including Ray, AAØL; Myron, KL7YY; Gary, WA2JQZ; Bill, KCØFHN and Glenn Davis activated the 60’ (18m) dish on 1296 MHz for the second weekend of the contest and added Floyd, WDØCUJ and Michael Nameika on the third weekend. This was the first time that the DSES activated the huge dish for EME, having restored the dish to operation. They were easily heard on 1296 MHz using an FT736 through 200’ of coax to a 200 watt amplifier and receive preamplifier at the feed, generating pile-ups. The operators quickly went through several learning curves to make their QSOs on SSB, CW and JT65. Moon tracking accuracy was vital, as well as Doppler signal tracking, as their rig had no RIT. They were also learning to use JT65 for the first time, managing a few QSOs on this mode. It was interesting to read their experience at the following links:

<http://dses.science/our-1st-dses-earth-moon-earth-eme-moon-bounce-communications>

<http://dses.science/dses-succeeds-in-our-2nd-eme-moonbounce-communications-competition>

We hope to have them on the moon again soon, as it’s a new “easy” initial for almost every sized station.

Looking Forward

The trick to working many stations is being on the right band at the right time and the right mode at the right frequency and in the right sequence, free from equipment or logging problems and operator errors. During the microwave weekend, many operators with 5 bands or more, are vexed by having to change feeds for the brief two moon passes. What will happen next year? We are now being equipped with a new digital mode Q65 that is getting a good workout on VHF, microwave bands and EME. Q65 signals are reported to be discernable even without a visible trace on waterfall screens.

Most all of us participate to listen and see and be heard and seen on the air, while others strive to have the top score in a category. Many are just happy to exercise their radios and antennas and give out QSO points and multipliers, work some new initials, and see what's the

smallest station they can contact. There are lots of opportunities for all on EME.

Writing up the contest commentary has been an enjoyable volunteer task because so many of you take the time to drop me a note and picture of your activities. Thank you all for your thoughts and also for submitting all those logs. I look forward to EME contacts with many of you in the near future. I am grateful to my XYL Jani who proof-reads my work and is patient while I'm setting up and operating a portable EME station.

This year's ARRL EME contest dates are October 23-24 for 2.3 GHz and Up, November 20-21 and December 18-19 for 50 MHz-1296 MHz Let's all hope that the weather is cooperative as we are at the edge of the winter months with the third weekend.



The 48 Yagi 432MHz array at Frank NC1I's QTH was removed in 2019 as pictured above and rebuilt for this year's ARRL EME contest. Frank and Robert, W1QA made 101 QSOs on 432 MHz and 56 QSOs on 1296 MHz [Frank Potts, NC1I, photo]

Category Winners (in Bold) – by Category by Score

Single Operator										
Call	Operator(s)	Category	Mode	Band	Score	QSOs CW/PH	QSOs Dig	Mults US	Mults VE	Mults DX
G3LTF	G3LTF	SO-CW-ALL	CW	ALL	958,500	135	0	16	4	51
KL6M	KL6M	SO-CW-ALL	CW	ALL	522,000	90	0	12	1	45
OK1CA	OK1CA	SO-CW-ALL	CW	ALL	482,300	91	0	10	2	41
WA6PY	WA6PY	SO-CW-ALL	CW	ALL	260,000	65	0	13	2	25
F2CT	F2CT	SO-CW-ALL	CW	ALL	255,000	75	0	9	1	24
SP3XBO	SP3XBO	SO-CW-ALL	CW	ALL	213,500	61	0	3	0	32
IK3COJ	IK3COJ	SO-CW-ALL	CW	ALL	6,300	9	0	0	0	7
JJ1NNJ	JJ1NNJ	SO-CW-ALL	CW	ALL	4,000	8	0	1	0	4
DL9KR	DL9KR	SO-CW-432	CW	432	25,200	21	0	0	0	12
DL8UCC	DL8UCC	SO-CW-432	CW	432	8,000	10	0	1	0	7
GØJLO	GØJLO	SO-CW-432	CW	432	5,600	8	0	1	0	6
JA9BOH	JA9BOH	SO-CW-432	CW	432	3,600	6	0	1	0	5
F6HLC	F6HLC	SO-CW-432	CW	432	2,500	5	0	1	0	4
DG5CST	DG5CST	SO-CW-1.2G	CW	1296	468,000	104	0	14	3	28
G4CCH	G4CCH	SO-CW-1.2G	CW	1296	392,000	98	0	14	2	24
OZ4MM	OZ4MM	SO-CW-1.2G	CW	1296	336,000	96	0	10	3	22
DLØSHF	DF9CY	SO-CW-1.2G	CW	1296	316,800	88	0	11	3	22
DL6SH	DL6SH	SO-CW-1.2G	CW	1296	290,500	83	0	11	2	22
OK1CS	OK1CS	SO-CW-1.2G	CW	1296	244,200	74	0	9	2	22
OK1KKD	OK1FAQ	SO-CW-1.2G	CW	1296	192,000	64	0	8	2	20
W4OP	W4OP	SO-CW-1.2G	CW	1296	192,000	64	0	12	2	16
LZ2US	LZ2US	SO-CW-1.2G	CW	1296	180,000	60	0	9	2	19
I1NDP	I1NDP	SO-CW-1.2G	CW	1296	140,000	56	0	2	1	22
IK1FJI	IK1FJI	SO-CW-1.2G	CW	1296	114,400	52	0	5	1	16
F5KUG	F6ABX	SO-CW-1.2G	CW	1296	86,000	43	0	3	1	16
JH1KRC	JH1KRC	SO-CW-1.2G	CW	1296	83,600	38	0	7	2	13
F6ETI	F6ETI	SO-CW-1.2G	CW	1296	70,200	39	0	3	1	14
WK9P	WK9P	SO-CW-1.2G	CW	1296	41,600	26	0	4	1	11
N4PZ	N4PZ	SO-CW-1.2G	CW	1296	36,000	24	0	4	0	11
DJ3JJ	DJ3JJ	SO-CW-1.2G	CW	1296	12,800	16	0	0	0	8
WB2BYP	WB2BYP	SO-CW-1.2G	CW	1296	5,600	8	0	2	1	4
UA3PTW	UA3PTW	SO-ALL	ALL	ALL	6,673,600	86	302	55	6	111
LZ1DX	LZ1DX	SO-ALL	ALL	ALL	1,240,200	31	128	20	2	56
YL2GD	YL2GD	SO-ALL	ALL	ALL	710,400	24	87	13	0	51
JA6AHB	JA6AHB	SO-ALL	ALL	ALL	657,200	11	95	14	4	44
PA2CHR	PA2CHR	SO-ALL	ALL	ALL	591,700	1	96	20	1	40

Call	Operator(s)	Category	Mode	Band	Score	QSOs CW/PH	QSOs Dig	Mults US	Mults VE	Mults DX
ES3RF	ES3RF	SO-ALL	ALL	ALL	550,000	5	95	13	3	39
UA4AQL	UA4AQL	SO-ALL	ALL	ALL	547,200	0	96	16	1	40
NØAKC	NØAKC	SO-ALL	ALL	ALL	489,500	0	89	26	1	28
DL4DTU	DL4DTU	SO-ALL	ALL	ALL	470,400	45	51	9	1	39
KD2LGX	KD2LGX	SO-ALL	ALL	ALL	448,200	0	83	21	1	32
PA3DZL	PA3DZL	SO-ALL	ALL	ALL	423,200	23	69	8	1	37
W1PV	W1PV	SO-ALL	ALL	ALL	421,800	0	74	23	4	30
WA3RGQ	WA3RGQ	SO-ALL	ALL	ALL	347,600	0	79	13	3	28
N1AV	N1AV	SO-ALL	ALL	ALL	277,200	0	66	16	3	23
AI1K	AI1K	SO-ALL	ALL	ALL	258,300	0	63	24	0	17
KNØWS	KNØWS	SO-ALL	ALL	ALL	255,600	4	67	13	4	19
4Z5CP	4Z5CP	SO-ALL	ALL	ALL	225,700	0	61	6	2	29
UB4UAA	UB4UAA	SO-ALL	ALL	ALL	216,600	2	55	7	2	29
K4EME	K4EME	SO-ALL	ALL	ALL	188,700	0	51	14	2	21
DJ3AK	DJ3AK	SO-ALL	ALL	ALL	133,300	0	43	11	0	20
JJ3JHP	JJ3JHP	SO-ALL	ALL	ALL	133,300	0	43	10	1	20
N8AM	N8AM	SO-ALL	ALL	ALL	123,200	0	44	10	0	18
W5LUA	W5LUA	SO-ALL	ALL	ALL	103,600	21	16	9	2	17
PE1LWT	PE1LWT	SO-ALL	ALL	ALL	87,400	20	18	0	0	23
KO4MA	KO4MA	SO-ALL	ALL	ALL	78,200	0	34	10	0	13
W2LPL	W2LPL	SO-ALL	ALL	ALL	60,900	0	29	9	0	12
W3CJK	W3CJK	SO-ALL	ALL	ALL	53,200	0	28	8	0	11
HI8DL	HI8DL	SO-ALL	ALL	ALL	41,400	0	23	7	0	11
KC2HFQ	KC2HFQ	SO-ALL	ALL	ALL	40,000	0	25	2	0	14
W1FKF	W1FKF	SO-ALL	ALL	ALL	26,600	0	19	3	0	11
F1IOZ	F1IOZ	SO-ALL	ALL	ALL	22,400	0	16	2	0	12
UT2EG	UT2EG	SO-ALL	ALL	ALL	22,100	0	17	4	0	9
R6CS	R6CS	SO-ALL	ALL	ALL	19,800	0	18	0	0	11
UA3TCF	UA3TCF	SO-ALL	ALL	ALL	13,000	6	7	0	0	10
YL2FZ	YL2FZ	SO-ALL	ALL	ALL	8,800	0	11	0	0	8
K1DS	K1DS	SO-ALL	ALL	ALL	6,400	0	8	1	0	7
JE1TNL	JE1TNL	SO-ALL	ALL	ALL	4,800	0	8	2	0	4
JA4UMN	JA4UMN	SO-ALL	ALL	ALL	900	0	3	1	0	2
NØTB										
NØTB	NØTB	SO-6M	ALL	50	57,500	0	25	7	0	16
KJ9I	KJ9I	SO-6M	ALL	50	400	0	2	1	0	1
PA5Y										
PA5Y	PA5Y	SO-2M	ALL	144	2,244,000	0	264	32	3	50
RX1AS	RX1AS	SO-2M	ALL	144	2,219,900	0	281	27	3	49
OK1DIX	OK1DIX	SO-2M	ALL	144	1,872,000	2	232	31	2	47
WA1NPZ	WA1NPZ	SO-2M	ALL	144	1,074,400	0	158	26	1	41
IW4ARD	IW4ARD	SO-2M	ALL	144	966,400	0	151	24	0	40

Call	Operator(s)	Category	Mode	Band	Score	QSOs CW/PH	QSOs Dig	Mults US	Mults VE	Mults DX
N7NW	N7NW	SO-2M	ALL	144	851,500	0	131	28	1	36
WB9UWA	WB9UWA	SO-2M	ALL	144	705,600	0	126	20	1	35
OH2LHE	OH2LHE	SO-2M	ALL	144	689,000	0	130	19	1	33
K1DG	K1DG	SO-2M	ALL	144	535,600	0	103	21	1	30
R3PA	R3PA	SO-2M	ALL	144	534,100	0	109	18	1	30
I2FAK	I2FAK	SO-2M	ALL	144	526,400	0	94	23	1	32
G8RWG	G8RWG	SO-2M	ALL	144	420,000	0	100	15	0	27
AB1OC	AB1OC	SO-2M	ALL	144	312,400	0	71	20	1	23
DF2ZC	DF2ZC	SO-2M	ALL	144	301,500	0	67	15	0	30
N1DPM	N1DPM	SO-2M	ALL	144	296,400	0	78	10	0	28
IK2DDR	IK2DDR	SO-2M	ALL	144	272,000	0	68	16	0	24
K6KLY	K6KLY	SO-2M	ALL	144	262,500	0	75	12	0	23
W6TCP	W6TCP	SO-2M	ALL	144	243,600	0	58	22	1	19
AG4W	AG4W	SO-2M	ALL	144	188,800	0	59	15	0	17
HG5BMU	HG5BMU	SO-2M	ALL	144	186,000	0	62	9	0	21
7K3LGC	7K3LGC	SO-2M	ALL	144	179,200	0	56	7	0	25
UA1OEJ	UA1OEJ	SO-2M	ALL	144	166,400	0	52	14	0	18
UT5ST	UT5ST	SO-2M	ALL	144	166,400	0	52	12	0	20
KØTPP	KØTPP	SO-2M	ALL	144	156,400	0	46	16	1	17
JP3EXR	JP3EXR	SO-2M	ALL	144	155,000	0	50	10	0	21
RN6MA	RN6MA	SO-2M	ALL	144	129,600	0	48	11	0	16
LZ1DP	LZ1DP	SO-2M	ALL	144	117,600	0	49	9	0	15
UT9UR	UT9UR	SO-2M	ALL	144	113,400	0	42	12	0	15
K7MAC	K7MAC	SO-2M	ALL	144	106,600	0	41	12	1	13
TI1K	TI2CDA	SO-2M	ALL	144	83,600	0	38	11	0	11
TA1D	TA1D	SO-2M	ALL	144	77,000	0	35	6	0	16
UA9YJM	UA9YJM	SO-2M	ALL	144	73,500	0	35	6	1	14
IU4FKR	IU4FKR	SO-2M	ALL	144	68,200	0	31	5	0	17
UA6ACF	UA6ACF	SO-2M	ALL	144	67,200	0	32	9	0	12
RZ6DD	RZ6DD	SO-2M	ALL	144	48,000	0	30	7	0	9
KA1W	KA1W	SO-2M	ALL	144	40,000	0	25	5	0	11
UA6BAC	UA6BAC	SO-2M	ALL	144	39,000	0	26	2	0	13
ON4KHG	ON4KHG	SO-2M	ALL	144	37,500	0	25	11	0	4
RV3YM	RV3YM	SO-2M	ALL	144	33,600	0	21	6	0	10
WA3QPX	WA3QPX	SO-2M	ALL	144	33,000	0	22	7	0	8
UT5IG	UT5IG	SO-2M	ALL	144	32,200	0	23	4	0	10
R9WL	R9WL	SO-2M	ALL	144	28,600	0	22	4	0	9
BA4SI	BA4SI	SO-2M	ALL	144	26,600	0	19	6	0	8
LZ2FO	LZ2FO	SO-2M	ALL	144	23,400	0	18	0	0	13
NH6Y	NH6Y	SO-2M	ALL	144	22,400	0	16	8	0	6
KD7UO	KD7UO	SO-2M	ALL	144	20,400	0	17	6	0	6
EW7T	EW7T	SO-2M	ALL	144	18,000	0	18	1	0	9

Call	Operator(s)	Category	Mode	Band	Score	QSOs CW/PH	QSOs Dig	Mults US	Mults VE	Mults DX
YU7MS	YU7MS	SO-2M	ALL	144	16,800	0	14	8	0	4
TA2NC	TA2NC	SO-2M	ALL	144	14,400	0	16	1	0	8
ND4X	ND4X	SO-2M	ALL	144	14,300	0	13	5	0	6
JHØWJF	JHØWJF	SO-2M	ALL	144	13,000	0	13	0	0	10
RA6C	RA6C	SO-2M	ALL	144	11,700	0	13	2	0	7
YO6XK	YO6XK	SO-2M	ALL	144	11,700	0	13	2	0	7
WDØE	WDØE	SO-2M	ALL	144	9,900	0	11	2	0	7
G8TTI	G8TTI	SO-2M	ALL	144	9,000	0	10	3	0	6
PA5MS	PA5MS	SO-2M	ALL	144	9,000	0	10	1	0	8
W8TN	W8TN	SO-2M	ALL	144	9,000	0	10	5	0	4
KG7P	KG7P	SO-2M	ALL	144	6,300	0	9	3	0	4
KU8L	KU8L	SO-2M	ALL	144	4,900	0	7	2	0	5
VE2PN	VE2PN	SO-2M	ALL	144	4,900	0	7	2	0	5
UA6LCN	UA6LCN	SO-2M	ALL	144	4,800	0	8	2	0	4
LA3TK	LA3TK	SO-2M	ALL	144	4,200	0	7	1	0	5
PE1ITR	PE1ITR	SO-2M	ALL	144	4,200	0	7	1	0	5
W5GLD	W5GLD	SO-2M	ALL	144	3,600	0	6	0	0	6
R3UG	R3UG	SO-2M	ALL	144	2,000	0	5	1	0	3
JG2TSL	JG2TSL	SO-2M	ALL	144	1,200	0	4	0	0	3
OK1BRT	OK1BRT	SO-2M	ALL	144	900	0	3	1	0	2
VA2WA	VA2WA	SO-2M	ALL	144	600	0	3	0	0	2
RM5P	RM5P	SO-2M	ALL	144	400	0	2	1	0	1
UA9CCL	UA9CCL	SO-2M	ALL	144	400	0	2	1	0	1
DL/HB9HBK	HB9HBK	SO-2M	ALL	144	200	0	2	0	0	1
SP2ERZ	SP2ERZ	SO-2M	ALL	144	200	0	2	0	0	1
BV3UF	BV3UF	SO-2M	ALL	144	100	0	1	0	0	1
JA1DYB	JA1DYB	SO-2M	ALL	144	100	0	1	0	0	1
K7KMR	K7KMR	SO-2M	ALL	144	100	0	1	0	0	1
LU2FGL	LU2FGL	SO-2M	ALL	144	100	0	1	0	0	1
N2AMC	N2AMC	SO-2M	ALL	144	100	0	1	1	0	0
RV1CB	RV1CB	SO-2M	ALL	144	100	0	1	0	0	1
SP2HHX	SP2HHX	SO-2M	ALL	144	100	0	1	0	0	1
VE6XH	VE6XH	SO-2M	ALL	144	100	0	1	0	0	1
YB2MDU	YB2MDU	SO-2M	ALL	144	100	0	1	0	0	1
WA4NJP										
WA4NJP	WA4NJP	SO-222	ALL	222	4,900	0	7	7	0	0
K7ULS	K7ULS	SO-222	ALL	222	2,500	0	5	5	0	0
DL7APV										
DL7APV	DL7APV	SO-432	ALL	432	1,388,800	15	202	25	2	37
UT5DL	UT5DL	SO-432	ALL	432	489,600	10	92	14	2	32
SM7THS	SM7THS	SO-432	ALL	432	217,600	6	58	7	1	26
VK4EME	VK4EME	SO-432	ALL	432	82,500	1	32	6	2	17

Call	Operator(s)	Category	Mode	Band	Score	QSOs CW/PH	QSOs Dig	Mults US	Mults VE	Mults DX
OK1TEH	OK1TEH	SO-432	ALL	432	81,600	2	32	5	1	18
RD3FD	RD3FD	SO-432	ALL	432	62,700	2	31	3	1	15
VK2CMP	VK2CMP	SO-432	ALL	432	24,700	0	19	2	1	10
DK1KW	DK1KW	SO-432	ALL	432	17,000	1	16	1	1	8
YO2NAA	YO2NAA	SO-432	ALL	432	15,000	2	13	1	1	8
GW3TKH	GW3TKH	SO-432	ALL	432	9,900	0	11	1	0	8
SM5EPO	SM5EPO	SO-432	ALL	432	3,500	1	6	1	0	4
MØABA	MØABA	SO-432	ALL	432	3,000	0	6	1	0	4
F4VTP	F4VTP	SO-432	ALL	432	2,500	0	5	1	1	3
N1QG	N1QG	SO-432	ALL	432	2,500	0	5	1	1	3
YO2LSP	YO2LSP	SO-432	ALL	432	2,500	0	5	1	0	4
AE6EQ	AE6EQ	SO-432	ALL	432	1,600	0	4	2	1	1
DG7YBN	DG7YBN	SO-432	ALL	432	400	0	2	1	0	1
JRØWfy	JRØWfy	SO-432	ALL	432	400	0	2	1	0	1
JK1BLA	JK1BLA	SO-432	ALL	432	100	0	1	0	0	1
K9PW	K9PW	SO-432	ALL	432	100	0	1	1	0	0
N5HX	N5HX	SO-432	ALL	432	100	0	1	0	0	1
NY2NY	NY2NY	SO-432	ALL	432	100	0	1	0	0	1
OH3DP	OH3DP	SO-432	ALL	432	100	0	1	0	0	1
UR7IM	UR7IM	SO-432	ALL	432	100	0	1	0	0	1
UR7IMM	UR7IMM	SO-432	ALL	432	100	0	1	0	0	1
W5RZ	W5RZ	SO-432	ALL	432	100	0	1	0	0	1
OK2DL										
OK2DL	OK2DL	SO-1.2G	ALL	1296	974,400	61	107	20	4	34
DF3RU	DF3RU	SO-1.2G	ALL	1296	726,100	43	94	20	3	30
DL3EBJ	DL3EBJ	SO-1.2G	ALL	1296	680,000	59	77	16	2	32
PA3FXB	PA3FXB	SO-1.2G	ALL	1296	655,000	28	103	17	2	31
RA3AUB	RA3AUB	SO-1.2G	ALL	1296	632,100	17	112	16	2	31
DL7UDA	DL7UDA	SO-1.2G	ALL	1296	576,000	32	88	16	3	29
OK1DFC	OK1DFC	SO-1.2G	ALL	1296	541,200	23	100	15	2	27
KA1GT	KA1GT	SO-1.2G	ALL	1296	488,800	14	90	17	4	26
RA4HL	RA4HL	SO-1.2G	ALL	1296	432,600	19	84	11	1	30
N5BF	N5BF	SO-1.2G	ALL	1296	361,200	23	63	17	4	21
PAØPLY	PAØPLY	SO-1.2G	ALL	1296	352,000	17	71	13	2	25
IK2MMB	IK2MMB	SO-1.2G	ALL	1296	347,100	36	53	13	1	25
RD4D	RD4D	SO-1.2G	ALL	1296	311,500	2	87	9	3	23
SP5GDM	SP5GDM	SO-1.2G	ALL	1296	308,000	1	76	15	2	23
SM5DGX	SM5DGX	SO-1.2G	ALL	1296	221,000	4	61	12	2	20
DF2GB	DF2GB	SO-1.2G	ALL	1296	211,200	9	55	10	0	23
I5YDI	I5YDI	SO-1.2G	ALL	1296	195,000	18	47	8	3	19
AA4MD	AA4MD	SO-1.2G	ALL	1296	192,000	16	44	13	0	19
KD3UY	KD3UY	SO-1.2G	ALL	1296	182,900	0	59	10	2	19

Call	Operator(s)	Category	Mode	Band	Score	QSOs CW/PH	QSOs Dig	Mults US	Mults VE	Mults DX
UA9FAD	UA9FAD	SO-1.2G	ALL	1296	151,200	12	42	8	0	20
YO2LEL	YO2LEL	SO-1.2G	ALL	1296	137,800	0	53	8	1	17
UA4LCF	UA4LCF	SO-1.2G	ALL	1296	135,200	0	52	8	1	17
WA3GFZ	WA3GFZ	SO-1.2G	ALL	1296	121,800	0	42	12	3	14
AA6I	AA6I	SO-1.2G	ALL	1296	113,400	0	42	9	3	15
CX2SC	CX2SC	SO-1.2G	ALL	1296	112,800	0	47	8	1	15
RX6AIA	RX6AIA	SO-1.2G	ALL	1296	66,300	0	39	3	0	14
IØNAA	IØNAA	SO-1.2G	ALL	1296	58,800	0	28	7	0	14
FR5DN	FR5DN	SO-1.2G	ALL	1296	57,000	29	9	0	0	15
OK1YK	OK1YK	SO-1.2G	ALL	1296	48,000	0	32	0	0	15
ES6FX	ES6FX	SO-1.2G	ALL	1296	46,800	0	26	7	1	10
LZ4OC	LZ4OC	SO-1.2G	ALL	1296	46,400	0	29	2	0	14
KB7Q	KB7Q	SO-1.2G	ALL	1296	45,900	0	27	9	1	7
RA2FGG	RA2FGG	SO-1.2G	ALL	1296	45,000	11	19	2	0	13
RD9SAC	RD9SAC	SO-1.2G	ALL	1296	43,400	0	31	0	0	14
JA4LJB	JA4LJB	SO-1.2G	ALL	1296	39,000	9	17	3	1	11
DL1SUZ	DL1SUZ	SO-1.2G	ALL	1296	31,200	0	24	3	0	10
CE3VRT	CE3VRT	SO-1.2G	ALL	1296	26,600	0	19	6	0	8
W3HMS	W3HMS	SO-1.2G	ALL	1296	24,700	0	19	7	0	6
WA2FGK	WA2FGK	SO-1.2G	ALL	1296	18,000	0	15	6	1	5
SV1CAL	SV1CAL	SO-1.2G	ALL	1296	13,600	3	14	0	0	8
VK6KCC	VK6KCC	SO-1.2G	ALL	1296	12,800	0	16	1	0	7
OK1USW	OK1USW	SO-1.2G	ALL	1296	12,000	0	15	1	0	7
W6TOD	W6TOD	SO-1.2G	ALL	1296	5,600	0	8	2	0	5
OK1IL	OK1IL	SO-1.2G	ALL	1296	2,500	1	4	1	0	4
UA1CCU	UA1CCU	SO-1.2G	ALL	1296	2,000	0	5	0	0	4
LA2IMA	LA2IMA	SO-1.2G	ALL	1296	1,600	0	4	1	0	3
RW4HW	RW4HW	SO-1.2G	ALL	1296	900	0	3	0	0	3
DL1EMA	DL1EMA	SO-2.3G	ALL	2304	3,000	0	6	0	0	5
K3WM	K3WM	SO-2.3G	ALL	2304	400	0	2	0	0	2
OK2AQ	OK2AQ	SO-10G	ALL	10368	30,400	1	18	3	2	11
OZ1FF	OZ1FF	SO-10G	ALL	10368	26,600	2	17	3	1	10
IW2FZR	IW2FZR	SO-10G	ALL	10368	18,000	4	11	2	2	8

MULTIOPERATOR										
Call	Operator(s)	Category	Mode	Band	Score	QSOs CW/PH	QSOs Dig	Mults US	Mults VE	Mults DX
SP6JLW	SP6JLW SP6OPN	MO-CW-ALL	CW	ALL	724,500	115	0	11	4	48
SP9KDA	SQ9CYD SQ9SBF	MO-CW-432	CW	432	8,400	14	0	0	1	5
9A5AA	9A2WA 9A5AA	MO-CW-1.2G	CW	1296	90,300	43	0	5	0	16
F6KRK	F1MPQ F4BUC	MO-CW-1.2G	CW	1296	15,000	15	0	1	0	9
RA3EME	R3YA RA3Y UA3YY	MO-ALL	ALL	ALL	6,253,000	68	302	43	8	118
K2UYH	K2TXB K2UYH W2HRO	MO-ALL	ALL	ALL	2,406,900	47	166	35	7	71
NC1I	NC1I W1QA	MO-ALL	ALL	ALL	1,178,000	0	155	28	3	45
OH1LRY	OH3LWP OH3MCK	MO-ALL	ALL	ALL	660,800	50	68	17	3	36
OZ9KY	OZ1DLD OZ1GWD OZ1PBS OZ3Z OZ5TG OZ8ZS	MO-ALL	ALL	ALL	436,800	1	83	17	0	35
LU1CGB	LU1AEE LU1CGB LU8ENU LU9DO	MO-ALL	ALL	ALL	380,000	5	71	19	3	28
W4ZST	NX9O W4ZST	MO-ALL	ALL	ALL	135,300	0	41	13	1	19
S51ZO	S51ZO S52EZ	MO-2M	ALL	144	1,102,200	0	167	26	0	40
KG6NUB	KG4UHM KG6NUB	MO-2M	ALL	144	825,300	0	131	28	1	34
W9VW	K9LZJ KA9BFM WB9YCZ	MO-2M	ALL	144	262,200	0	69	12	0	26
F6HEO	FØEUI F6HEO	MO-2M	ALL	144	176,700	0	57	11	0	20
LZ1KU	LZ1KU LZ1MC LZ3DP	MO-2M	ALL	144	37,400	0	22	4	0	13
BY2HIT	BG2BHC BG2DXD	MO-2M	ALL	144	100	0	1	0	0	1
S51LF	S51LF S51YL	MO-432	ALL	432	186,000	5	57	6	2	22
VE3MIS	VA3CW VA3ELE	MO-432	ALL	432	23,800	0	17	2	1	11
W6YX	K6MG KG6NUB N9JIM	MO-1.2G	ALL	1296	576,300	32	81	20	4	27
IK5VLS	IK5AMB IK5VLS	MO-1.2G	ALL	1296	466,200	28	83	12	3	27
VA7MM	VA7MM VE7CNF	MO-1.2G	ALL	1296	316,000	24	55	16	3	21
KØPRT	AAØL KCØFHN KL7YY WA2JQZ	MO-1.2G	ALL	1296	90,000	36	0	9	2	14
UA6AH	RW6ACM UA6AH	MO-1.2G	ALL	1296	74,100	8	31	6	0	13
W3SZ	W3SZ NN3Q	MO-10G	ALL	10368	34,500	5	18	3	2	10
OK1KIR	OK1DAI OK1DAK OK1VAO	MO-24G	ALL	24000	2,800	4	3	1	0	3