432 AND ABOVE EME NEWS
AUGUST 2011 VOL 39 #8

EDITOR: AL KATZ, K2UYH; DEPT. ELECTRICAL/COMPUTER ENGINEERING, THE COLLEGE OF NEW JERSEY, PO BOX 7718 EWING, NJ 08628, TEL (W 609-584-8424) OR (H 609-443-3184), FAX (609-631-0177), E-MAIL a.katz(x)ieee.org
NETNEWS EDITOR & INITIAL LISTS: G4RGK, DAVID DIBLEY, E-MAIL g4rgk(x)btinternet.com.uk (based Netnotes & Reflector News)
EME NETS: 14.345, 10 AM ET SATURDAY AND SUNDAY, NET CONTROL: TBD [JOE, K1RQG, SILENT KEY]
NL EMAIL DISTRIBUTION and EMAIL LIST CORD: WARREN, W2WD wbutler(x)ieee.org [TXT OR PDF OR "ON WEB" NOTICE]
THE NL WEB VERSION IS PRODUCED BY REIN, W6SZ AND AVAILABLE AT http://www.nitehawk.com/rasmit/em70cm.html

CONDITIONS: It may seem like the doldrums now, but this will all change in Sept. The first leg of the ARRL EME Contest for Microwave EME (13 cm and above) is 24/25 Sept. 50-1296 weekends are on 22/23 Oct and 19/20 Nov. There is also an EME dxpedition, 7P8EME to Lesotho (KG30uc) scheduled for 16-26 Sept. On 432 they will have 4 x 22 el FO yagis and a BEKO 550 W PA, and on 1296 a 59 el yagi and a BEKO 350 W PA. DL2NUD is one of the dxpedition team. I hope to have more info for the Sept Newsletter (NL). The big news worthy event in July was the SK6OSO 6 cm EME operation using the Onsala Space Observatory 25 m dish during the 2/3 July weekend. There was a good turnout on 6 cm for this event – see the report below. Unfortunately, it pretty much killed the 9 cm Activity Weekend (AW) scheduled for the same date. The 70 cm CW Activity Time Period (ATP) was also the same weekend and seemed to have a lower than usual turnout but still produced some good QSOs. The next 70 cm ATP will be on 20 Aug between 0700 and 0900. There was also some limited EME activity on 432 by CU/DM1CG on JT from the Azores – see my report. Don't forget the 6 cm ATP on the weekend of 30/31 July. Let's try to turn around the summertime activity trend this Aug!

SK6OSO 6 CM EME TESTS: Ingolf (SM6FHZ) ingolf.fhz(x)gmail.com reports on the 2/3 July 25.6 m dish Onsala Space Observatory (OSO) 6 cm EME tests -- The VMG (Västkustens Mikrovågs Grupp) group obtained permission to use the dish for operating EME on relatively short notice. We are most grateful to the observatory for letting us have this opportunity. The two dishes at OSO have a tight schedule for scientific measurements, and if any transmissions are allowed, no measurements can be scheduled on the 20 m mm-wave dish either due to the risk of interference. The preparations had taken place for some time including obtaining the proper permissions and installing the control software for tracking the Moon (TNX - Ulf, SM6GXV), preparing the transverter and pre-amp (TNX – Hannes, SM6PGP). During the week before the event, we arranged (TNX – Tord, SM6GWA) to use a commercial 100 W SSPA. It was decided to run the amplifier cool at 40 W RF output. All the equipment was installed in the dish on Friday afternoon and night by SM6GXV, SM6PGP, SM6GWA and SM6CKU. The equipment was situated at the vertex of the dish, 14 m above ground in a small compartment by the feed. All equipment has to be hand carried up steep ladders, through very narrow passages and finally in free air at the top of the dish mount before reaching the compartment. Unfortunately the Moon had already set before everything was in place, so no testing could be done in advance. Operation started on Saturday 2 July at 0615. At first no echoes were heard, but soon it was discovered that there was an off-set of 1 degree in the control program. When this error was corrected, nice returns from the Moon showed up. We could hear a distinct chirp on the echo. The chirp characteristic was dependant on the length of the carrier sent (time constant). After a few CQs, the first callers were heard, JA4BLC and JA8ERE. Yoshiro reported on the HB9Q logger that we had the chirp sound on our TX signal. Checking it out, we found a way to eliminate the chirp by reducing the TX power to 25 W. It seemed to be an EMC problem with having the equipment in the strong RF-field in the middle of the dish. We continuously called CQs and monitoring the band with an SDR panoramic receiver. We logged the following stations: 2 July at 0630 JA4BLC (559/559), 0637 JA8ERE (559/579), 0641 OH2DG (569/579), 0645 VK3NX (569/359), 0715 SM4DHN (559/579), 0825 DL5MEA (559/559), 0839 LX1DB (579/599), 0845 LX1DB (57/58) on SSB, 0848 G3LTF (559/569), 0853 PA0BAT (559/559), 0931 G3LTF (55/35) on SSB, 1005 PA7JB (549/559), 1047 SM4DHN (569/559), 1153 DF9QX (559/579), 1318 SV3AAF (559/569), 1407 W5LUA (569/579), 1414 W5LUA (55/55) on SSB, 1419 OK1KIR (569/569), 1540 WA6PY (559/579), 1545 F1PYR (O/O) and 1600 WD5AGO (O/O), and 3 July 0822 JA6CZD (569/589), 0825 JA4BLC (559/559), 0913 G3LTF (559/569), 0925 SM4DHN (559/579), 1111 PA0EHG (559/579), 1125 G3LQR (559/559), 1200 F2CT (M/O) and 1215 ON5TA (O/O). We received a report from SM0DFP that he was ably to see our signal using his SDR with a 60 cm dish and linear polarization. WW2R reported copying us with a 1.2 m dish. WD5AGO worked us using only 7 W at the feed. We measured 2.1 dB of Moon and 18 dB of Sun noise using a spectrum analyzer. These levels were lower than expected and can only be explained by the receiver not being optimized with the dish feed. The ordinary 5 GHz equipment of the observatory saw 5 dB of moon noise at an earlier test. We think we still were very much Moon noise limited and lost only about 1 dB of sensitivity. We do not think we missed any QSOs due to our receiver sensitivity. We certainly saw the "Big Dish Syndrome" effects on the signals. Looking at the display of a Soft Rock SDR display the echoes peaked 30 dB above the noise (~50 Hz BW). Calculations of the returns give a figure 6 to 7 dB higher. The 26.5 m dish on 5760 MHz is very similar to the Arecibo (KP4AO) on 432 MHz. Both have about 0.15 deg BW, illuminating only a small part of the Moon. Other examples have been seen historically of big dishes not giving as big signals as predicted by calculations. We noticed that the echoes were very clean with marginal Doppler smear. We received many confirming reports. This is a part of the "Big Dish Syndrome" as well. We would appreciate reports from anyone that heard us, but has not yet let us know. Please QSL via SM6CMU. A big TNX to all stations that worked us. We had a very good time!

25 m Onsala Observatory dish was on 6 cm EME on 2/3 July

F5SE/p: Franck kozton(x)free.fr sends a short report about his EME activity before leaving for a holiday trip -- Between 5 June and 4 July I randomly worked I5MPK, SM2CEW, OZ6OL, K2DH for initial #97 and F5KUG. I also heard a few other stations echo-testing without giving any callsign. On 10 June around 1820, I heard a strong and strange sounding signal around 1296.035. It sounded more or less like SSTV modulation, rather than JT format. Does any station operate SSTV off the Moon? [Sure, PI9CAM, G4CCH, PY2BS among others have had success on 23 cm – April 2010 NL]. I also carried out some noise tests with the Sun, radio-sources and cold sky. It appears that my antenna temperature is about 90°K, which seems too high. I think this is due to corrosion inside my feed horn (it is completely black after 35 years). Also I have some dish spillover because the horn is a little bit too broad for the dish. In the future I will switch to a modified septum feed (for F/D 0.5~0.6). I hope to have it in place for the next ARRL EME Contest.

G3LTF: Peter g3ltf(x)btinternet.com was able to be QRV on 6 cm in July -- I was extremely pleased to be able to be operational for the SK6OSO 6 cm EME tests on 2/3 July. TNX G4NNS, who very kindly fitted and later removed the 6 cm feed assembly to get my dish into operation. At present I can't lift very much and am not allowed to climb ladders. I was able to work the SK6OSO team on 2 July on SSB and CW for initial #22 and again on 3 July on CW. The signal was excellent, and as the 25 m dish only illuminated the centre of the Moon, the signal was T8-9 for most of the time. I also worked SM4DHN #23 on 2 July and on 3 July PA0HG #24. I heard LX1DB, W5LUA, and SV3AAF. I tried with PA7JB, but although he was (M) copy, I couldn't resolve a report from him. We will have to wait for that next one. Our thanks to the SK6OSO gang for an excellent operation. It was a real boost to 6 cm activity. I measured 12.9 dB of Sun noise (SF85) and 0.7 dB of Moon noise. I seem to still be down a bit on receive capability. I hope to improve this before the 6 cm AW at the end of the month. I'm able to work on "low effort" projects, like a new, lighter, SM PSU for 9 cm and a GPS controlled 10 MHz standard. Many thanks to all who have

sent good wishes for my recovery. I'm doing well according to my surgeon and the X rays. It just takes time... and patience.

G3LTF's 6 cm system at his feed

IK1PIK: Pietro i1pik(x)libero.it writes about his EME activity -- I owe an explanation for my long silence. I had big problems with my neighbors (two lawsuits) over my hobby and almost stopped my activity. Six months ago, I built a new 432 array. I now have 6 x 18 el very light yagis. I also built a 2x300 W MOSFET PA mounted outside in a box under the array. The system seems to work quite well. I have been in operation for a couple of months. In July, I found conditions to be extremely variable. I have only H pol, to keep things simple, but I observed that others were having problems with H and V. I saw K2UYH's signal go from -17 dB to -30 dB and then back to -17 dB in a few minutes. [It seems likely that I was rotating polarization at the time].

JA4BLC: Yoshiro ja4blc(x)web-sanin.co.jp reports on his microwave EME activities. He is now licensed for 24 GHz – On 25 June I worked SM3BYA (M/O) on 2320/2424. My east window to Gudmund was blocked by a tall Oak tree and as result failed 3 times before we finally made it on the 4th attempt. On 29/30 June we easily worked again (449/539). Thanks to Gudmund for his perseverance in maintaining skeds everyday at midnight for almost a week. This was my initial #50 on 13 cm EME. I want to thank my friends who prepared the 2424 receiver used by SM3BYA. I worked on 2/3 July on 5760 SK6OSO (559/559) for initial #15 using my 3 m solid dish and a 30 W SSPA. My window to SK6 is very limited as it is blocked by my 6 m dish. On 28 June, I received a 24 GHz 20 W license. This was the first ever issued in Japan. The operating frequency for EME is 24.048 to 24.050 GHz. As I am still working on 3 cm solid dish and PA, it will take more months before I am QRV on 24 GHz EME.

JA6CZD: Shichiro ja6czd(x)mx35.tiki.ne.jp has also received a license for EME operation on 24 GHz with a 30 W TX. His license was the second (on 21 July). He has an SSPA and 2.7 x 2.4 m offset dish on a new tower, but still needs to complete his feed. Shichiro also worked on 13 cm SM3BYA on June 29, and on 6 cm on 3 July SK6OSO.

JA8ERE: Mikio sgl01011(x)nifty.ne.jp has passed the final inspection to receive a license for 10 GHz EME. He has permission to run a 30 W SSPA. He will be listening for echoes on 10.45 GHz with his 3 m TVRO dish very soon. He can also listen on 10,368 MHz too.

K6CLS: Cliff cls(x)employees.org has expanded his array for 70 cm EME to 4 yagis -- I was happy with my QSO rate in June/July. The 3 additional antennas really help. I was getting good reports, many dB better than I would have received with the one antenna. Now I want to get some more watts. Thanks to I1NDP, DL7APV and K2UYH for QSOs.

OH6KTL: Lasse oh6ktl(x)gmail.com is a new station on 70 cm EME, who has move up from 2 m where he has been active for some time. He uses 4 x 432 yagis nested in the middle of his 144 MHz array.

OK1KIR: Tonda and Vlada EME vladimir.masek(x)volny.cz report on their clubs June-July EME activity –- We worked on 13 cm on 29 May at 0149 LY/DL1YMK (O/O) for initial #109, 0538 SM4IVE (559/559) #110 and 0945 SM3BYA (O/O) #111, on 02 June at 1328 LY/DL1YMK (559/559) and 1527 WW2R (549/559), and then with a new 300 W SSPA using JT at 1028 G4BAO (25DB/19DB) for digital initial {#4}, 1217 LY/DL1YMK (18DB/O) {#5}, 1313 PA3DZL (20DB/15DB){#6} and 1455 W5LUA (10DB/10DB {#7}. We also copied WW2R (14DB), but we did not get his attention. We QSOed on 23 cm on 28 May at 0142 LY/DL1YMK (549/549) for initial #309 and 0157 HB9BBD (599/599). During DUBUS 23 cm EME Contest weekend we QSO'd 9A5AA, DF3RU, DJ3FI #310, DJ8FR #311, DL0SHF, DL6SH, ES5PC, F2TU, F5JWF, F5KUG #312, F5SE/P, F5VHX, G4CCH, G4DDK, G4RGK, GW3XYW, HB9BBD, HB9BCD #313, I5MPK, IK2MMB, IK5QLO, IW2FZR, JA4BLC, JA4LJB #314, JA6AHB, JA6CZD, JA8IAD, JA8ERE, K1RQG, K2UYH, LA8LF, LY/DL1YMK, LZ1DX, LZ2US, N0OY, N2UO, N4PZ, NA4N, OE5JFL, OH2DG, OK1CA, OK1DFC, OK2DL, OK2ULQ, ON4BCB, ON7UN, OZ4MM, OZ6OL, PA3DZL, PA3FXB #315, PE1LWT #316, PI9CAM, PY2BS, PY5ZBU, RA3AUB, S59DCD, SD3F, SM2CEW, SM3JQU #317, SM7FWZ #318, SP3XBO #319, SP6GWN, SP6JLW, SP7DCS, SV1BTR, SV3AAF, UA3PTW, UR5LX, VA7MM, VE4MA, VE4SA, VE6TA, VK3NX, VK3UM, W5LUA, W9IIX, WA6PY, WB2BYP #320 and YO8BCF for a total 79 QSO and 11 initials. Heard were G3LQR, IK3COJ, JA1WQF, LX1DB, PA7JB and probably WA8RJF. On 4 June we added on JT at 1713 LU1CGB (27DB/18DB) {#90} and on 5 June at 0910 PE1HNG (20DB/O). On 70 cm TNX to the M&M team we picked up on 6 June at 0856 LY/DL1YMK (25DB/20DB) on JT65B. On 24 GHz we worked on 9 June at 1726 in sked PA0EHG (O/O) for initial #8 and the 1st 24 GHz PA-OK QSO. We used our new bigger feedhorn with a 21 x 16 mm opening to decrease the illumination of our 4.5 m dish to about 2.5 m to extend beamwidth to about 0.35 deg. Later we changed feedhorn for another one with a smaller 14.4 x 10.9 mm opening to get back a narrow beam and repeated our QSO with Hans at 1828 (O/O). PA0EHG signal was weaker but with a smaller spread and better readable than the earlier wider one. At a humidity of about 60%, the Moon noise measured was 1.9 dB and G/CS 3.1 dB. PA0EHG used 3 m prime focus dish and 10 W at the feed. These QSOs were easier than with F2CT. Guy was using a 2.4 m offset dish and reportedly 12 W at the feed. So, there is a real chance for others with about 10 W of power. Pictures and details can be found at www.ok1kir.cz. On 6 cm on 2 June, we worked at 1418 SK6OSO (569/569) for initial #47, 1432 W5LUA (569/569) and 1459 PA7JB (O/O) #48. It was a pity that this AW was not changed from the originally announced 9 cm to 6 cm, to more fully utilize the chance to work the SK6OSO 25 m dish. Many TNX to all for the nice QSOs, and especially to M&M for another great 3-band dxpedition.

ON5TA: Eric eric.vanoffelen(x)skynet.be is now on 13 cm EME -- I received from a friend an old 3.65 m mesh dish, and decided to give it a try on 13 cm with only 20 W at feed. I was delighted to make some nice QSOs. The first was with F2TU, who has a huge signal. I also worked CT1DMK for the first CT/ON QSO on 13 cm. Later, SK6OSO was contacted with the same dish on 6 cm with a less than optimum feed and only 15 W. It seems the old dish works!

PA2V: Peter peter(x)pa2v.com is planning on becoming QRV on 432. He has experience on 2, and on 6 m where he made the very first EME QSO. He has most of the equipment to setup 4 long yagis and 1 kW on 432 and would like to hear from others about activity on 70 cm.

OH6KTL's 70 cm array is in the center of his 2 m antennas

PY1KK: Bruce (PY2BS) bruce(x)zirok.net is now QRV on 9 cm from his coastal QTH -- As announced in the last NL, PY1KK was active again on 9cm during two Moon passes only, on 24/25 June. 11 initials were added to those worked during my first tests in May with OK1KIR. QSO'd were OK1CA, OH2DG, PA0BAT, ES5PC, LZ1DX, DF9QX, OZ6OL, DL4MEA, W5LUA,

WA6PY and VE6TA. Doing so many 9cm QSOs on so short a time vastly exceeded my best expectations. I was particularly surprised when learned that WA6PY was running only 15 W at the feed of his 3.6 m dish. Had he said it before, I would deemed it impossible to be done - quite interesting this microwave band! My next operation on 9 cm is planned for at least one of the Moon passes during ARRL's MW EME contest in Sept. It will likely be my last AW on 9 cm this year as afterwards the 70 cm feed will be installed, and hopefully later this year a new 6 cm setup will be tested using the same 4 m dish. Thanks to all for this very welcomed microwave fun.

SM3BYA: Gudmund sm2bya(x)telia.com discusses his interest in 13 cm -- I first got interested in the 13 cm band back in the mid 1970s, while at university after reading about the NASA Deep Space Network that operated on 2280 MHz in those days. Ever since, I have been planning to get on the band in earnest, but getting there has been a long, drawn-out process. I'm going to retire next year and will move down to my SM3 QTH in JP81nx full time. I was planning to use last winter to build up the rig methodically and then put in a decent dish as soon as I'd moved down. But instead, nearly all my spare time went into helping the Swedish Amateur Association, SSA, fight the recent plan by our P&T to put up the 2.3-2.4 GHz band for sale. For the past decade, the general power limit for the 2.3-2.4 GHz band in Sweden has been, believe it or not, 100 mW! Amateur radio in this band has been treated on an equal footing with computer wireless networks and other license exempt applications. During this time, some 20-30 amateurs have held high power permits that had to be renewed on a yearly basis. Last year, the P&T suddenly turned down all applications for renewal with the argument that "the band was under consideration for re-allocation...". After a while, it became clear that this sudden change of attitude was the result of an initiative that was being pushed forward quite aggressively by the telecom industry. The 2.3-2.45 band is apparently already widely used for 4G services in Southeast Asia, and the industry now wanted to develop it into the next worldwide allocation. What happened between early 2010 and now is a very long story. I can't go into here, but after several rounds of negotiations some of us were again issued high power permits. An improvement from earlier was that we were now permitted to transmit both in the 2304 and the 2320 segments. However, the new permits were time-limited and valid only until June 30, 2011. So as soon as I had my permit in hand in early April, I mounted a crash effort to finally become QRV, if possible in time for the DUBUS 13 cm contest. I already had most of the necessary equipment ready to go, but no decent preamp and no working elevation sensor. Over Easter I assembled and tested a G4DDK preamp and threw together a heap of TTL logic to handle a Lucas capacitive bridge inclinometer. Then I took two weeks off from work, drove down to JP81nx and proceeded to put an old, solid-surface 3 m dish on the triple-A gun mount that I finally got mounted last October and which will eventually take a 7.5 m dish. The Friday before the DUBUS 13cm contest everything was in place, but I hadn't yet given the rig a good shakedown. This proved to be a serious mistake. After hearing my very first 13 cm signal, ES5PC (559), I called him and immediately blew out the preamp. I replaced the HEMT in great haste, confirmed that sun noise was back at 12.5 dB and tried to call another station - and the preamp blew again. At this point I resigned myself to SWLing for the rest of the contest. This was not too bad - I managed to copy some 25 stations and got a feeling for the band. After the contest, I took the preamp box and the sequencer back home to Kiruna for a systematic checkout. The armature of the TR relay, a very low loss HP latching relay from a VNA, turned out to be sticking after the coil had warmed up, letting a couple of watts into the preamp. No wonder it burned out. Luckily I had another identical one that switched reliably, so the relay was replaced. The sequencer was also slowed down to the point where the RX-TX switchover took a full second. I returned to SM3 just in time for the M&M expedition and now made good use of the fact that many stations had left their 13 cm feeds in place waiting for Michael to turn up. Between 24 May and 30 June I managed to work a total of 26 QSOs, about half on sked and half on random by calling or tailending others for 22 initials (all on CW). QSO'd were G3LTF, OH2DG, VK3NX, OK1CA, F2TU, ES5PC, G4CCH, LZ1DX, PY2BS, K2UYH, WA6PY, OZ4MM, CT1DMK, W5LUA, WD5AGO, JA4BLC, DL4MEA, DL1YMK/A, SM3AKW, VE4MA, JA6CZD and SM2CEW. I also had a partial with OK1KIR. Working the JAs was possible only thanks to the great help of JA4BLC, who offered to ship me his spare 2424 converter - thanks Yoshiro! I ran several 2320/2424 skeds with the Sapporo gang; copied JA8ERE and JA8IAD with excellent signals every time, but for some reason they were unable to find my signals. 2424 is absolutely quiet here as long as I remember to switch off the wireless adapter in my laptop. When I forget to, I'm reminded by S9+ noise bursts every few seconds. All in all, this has been a very challenging and rewarding exercise. I've managed to assemble an EME-capable 13 cm rig in about two months' time, I've made my first-ever QSOs on 13 cm, I've worked all continents except Africa, and I've proven to myself that even with the present non-optimized setup I am already fairly competitive. What remains now is to continue working on the P&T to secure at least a narrow slot somewhere in the 2.3-2.4 GHz range where we could be allowed the continued use of high power. We probably won't know the outcome of this process for several months. But even if we get a slot somewhere, the real danger to continued EME in this band will be the powerful pseudo-white noise emitted by hundreds of terrestrial cell phone base stations, if the industry manages to have things its way - a situation akin to the Sirius interference in the 2320 segment experienced by US amateurs, but probably much, much worse. However, for that to happen the band would probably have to be allocated for mobile phone use over the whole of Europe, or it won't be commercially attractive. So if you have any connections to frequency management professionals and authorities elsewhere in Europe, please put the amateur radio case to them and help us fight against this development! The rig at SM3BYA is 3.0 m solid dish, f/d = 0.34, choked OK1DFC septum feed, 0.5 dB total RX NF measured at input to T/R relay and Ericsson SSPA, 240 W out, 210 W at feed. I have no azimuth readout at operating position - had to go by marks on the az turntable, which made for a lot of running back and forth. [Why don't you use a small video camera]? The operating position in an unheated, unfinished tractor garage with no windows in the window holes - shades of M&M.

SM3BYA setup on 13 cm: top 3 m dish, bottom luxury shack

SV1DNU: Filip filip_sv1dnu(x)yahoo.gr is QRV again on 23 cm and available for skeds with a modest station consisting of a 3 m solid dish, VE4MA feed and a 60 W SSPA -- I participated in this year's DUBUS 23 cm EME Contest on 4/5 June. This was my first ever EME contest, and I had great fun. I was QRV on both Saturday and Sunday, but only for a couple of hours each day. I managed to work PI9CAM, OK2DL, DL0SHF and OZ4MM. I also tried several times to work HB9BBD, OK1DFC, SV1BTR and F2TU without success, although I

know I got their attention since they were replying to my calls with QRZs. I have now improved both my RX and TX and I hope make more QSOs in the coming months.

W3HMS: John W3HMS(x)aol.com writes -- Joe, K1RQG, was indeed the difference between me being active on EME or being "retired in anger" after QSO #1. I was often on in the evening for the 3646 KHz net, and Joe's comments and guidance. He steered me on to many key courses of action and away from some bad ideas advocated by others. He was also my CW QSOs #2, 4 and others. He was a real confidence builder. At the time, I had a 3 m dish and only 100 W. His enthusiasm was super critical to my perseverance and ultimate success. Some months later, he spent hours on the phone talking me through the set up of a popular tracking program with my hardware. In all the years that I have been licensed (since 1951) no one has even come close to being the World Class Elmer that was Joe, in EME or in any other facet of ham radio. He was indeed Mr. EME and Mr. EME Elmer without an equal!!! May he Rest in Peace.

WA8RJF: Tony TEmanuele(x)kentdisplays.com report on recent activity -- I had started on this report just prior to the shocking news of Joe's (K1RQG) death. My report then just did not seem to be all that important. I had chatted with Joe on 20 m the week before, and had worked him on 23 cm during the DUBUS contest. I am truly sadden by his passing. Unlike my prior two attempts to be QRV in recent months (on 13 cm - blew the preamp and on 9 cm - TX problems), Murphy stayed away for the DUBUS 23 cm event. I worked DL0SHF, G4CCH, K2UYH, F2TU, W5LUA, OK1CA for an initial, K1RQG, N2UO, OK2DL, OK1DFC and KL6M #. CWNR were WB2BYP, N0OY, SV1BTR, LA8LF, LX1DB, ON7UN and PI9CAM. In mid-June we made a trip to Anchorage to visit my daughter and her family. I was able to spend a couple of hours at KL6M's QTH. Mike's has a first class station and it was more of a treat since we had worked just a few weeks before for the first time on 23 cm. More recently I have been working on a 1.8 m offset fed dish for use on 10 GHz and 24 GHz. With my work travel greatly reduced for the rest of the year, I'm hopeful that I will be QRV on 10 GHz before too long.

WB7QBS: Glenn glennwb7qbs(x)hotmail.com is QRV on 432 and looking for CW skeds. During the past month he QSO'd on 5 July VK3UM, 25 July I1NDP, and on 26 July KL6M. Glenn is very interested in skeds.

K2UYH: I was not particularly active this month. I did work on 26 June on 432 JT65B at 1220 OK2POI (20DB/18DB), 1300 DL8GP (21DB/O) for mixed initial #819* and 1314 OH6KTL (22DB/28DB) #820*. I was on 3400 on 2 July only to discover that I had messed up again. Just about everyone was on 6 cm for the SK6OSO tests. I was about to give up on 9 cm when I worked at 1555 VE6TA (559/559) and 1627 LX1DB (569/569) who was also copied (55) on SSB – TNX fellows. The next day, 3 July I was on for the 432 CW ATP and QSO'd at 1520 SM2CEW (569/559) - very sharp pol, 1530 I1NDP (579/559), 1541 K0RZ (569/569) and 1554 N4GJV (559/549) - no echoes at this time, and later on 1296 at 1832 I5MPK (559/589) for a demo of EME to guests. Piero really seems to keep the 1296 CW band alive – many TNX. On 4 July on 432, I contacted at 1604 DL7APV (589/559), 1610 nil from RX6DT on JT65B sked, 1626 I1PIK (21DB/O) JT65B and 1804 K6CLS (21DB/O) JT65B. I also tried at 1920 to tailend DL7APV's QSO with CU/DM1CG (24DB), but was never able to get their attention before they quite. K5QE was also calling them at the same time.

NETNEWS: **4L1FP** has relocated from Georgia to the USA (Los Angeles, CA) and has a new callsign is KJ6JNC. Hopefully Alex will be back on 70 cm EME soon. **JA8ERE** QSO'd on 2 July on 6 cm the SK6OSO during their big dish tests. **JA1WQF** has applied for a license for 24 GHz EME.

FOR SALE: **K2UYH** is still looking for a PA (SSPA or TWTA) of 20 W or more for 6 cm EME.

TECHNICAL: K0CQ sends the following advice on Attacking intermod in the EME station: There are multiple contributors to intermod in the EME receiver. All come from strong signals in the area that are made stronger by very high antenna gains especially when at the horizon. Most of these contributors can be helped to reduce intermod. Intermod comes from overdriven RF and mixer stages. That can come from excess RF gain, insufficient selectivity, and from reciprocal mixing from the phase noise of the various oscillators. Often increased RF selectivity can reduce the signal strengths of the unwanted signal, though this hard to achieve at 2.3 or 2.4 GHz. Cleaner local oscillator phase noise can reduce reciprocal mixing. Reciprocal mixing is a bit insidious, in that it raises the background noise without necessarily showing any modulation good for identifying the source. Setting front end gain: Typical ham procedures involve turning up the front end gain (when adjustable) until the receiver noise rises 10 dB or noise shows on the S-meter. Sometimes the added gain is in added stages. Mixers can be had that will have low intermod with half a watt of signal, of course they require 2 or 3 watts of local oscillator power. But the problem is overdriven mixers and RF stages, not only in the converter or transverter, but in the IF receiver. Setting the front end gain for a significant rise in speaker noise or showing on the S-meter in my experience is way too much gain and every dB you can drop the RF gain you can drop intermod products by three or 5 dB or more depending on the intermod order. Way back, in North Texas in about 1965, I was on 2 m (not EME) with a nuvistor converter into a new Collins 75S-3B. Once I got the converter working well (decent NF), I had intermod problems with W5WXV who lived about 16 miles away running high power (650 watts) to a quad array of Telrex yagis; adequate power and antenna to hold a nightly sked with Quincy Illinois on CW. But when he was looking north and I was looking south (pair of Hygain 14 element IIRC) I found his signal some 23 times in the lower 200 kHz of the band (he was on 144.085 in the days before the CW subband rule). With manual NF measuring apparatus on my work bench (and that Collins receiver spent much of its first year or two on the bench up on edge so I could easily access circuits), I found that I could reduce the converter gain with attenuation between the converter and the receiver and reduce the gain in the receiver once I reduced the second mixer noise. I changed the 2nd mixer from the pentode of a 6AU8A to an Amperex 6688 or 7788, going from a Gm of 4000, to a Gm of 50,000 which meant a whole lot better noise performance. Then I was able to move the second mixer grid to a tap on the broad IF coil to cut signal even more. As a stand along receiver it's a little deaf, but with the selected attenuator and the 2 m converter, it was still sensitive (same system NF as with excess gain). Al's signals were cut to three, and pegging the S-meter on .085 and two other places at the noise level. The key to the adjustments was in measuring the SYSTEM NF, not just that of the converter. And with the typical 2+/- kHz IF bandwidth of SSB or CW receivers, there is no handy automatic NF meter to make the test. So even today or especially today, such a measurement has to be done manually. Actually there are two schemes possible. I used NF, but also measuring MDS is practical today. The scheme is to measure NF or MDS with all the gain you have, then starting at the IF receiver introduce attenuation or cut out RF stages until the NF or MDS rises, then take out a dB of attenuation to preserve the NF or MDS. Work towards the antenna and at each separable stage. This approach will work best with single stage preamps, so the excess gain can be controlled. Manual NF measurement: When measuring receiver sensitivity with noise, one depends on the noise source having good amplitude stability with time and a small variation of noise level over a wide bandwidth. One injects noise at a known level and looks at the change in receiver output with the AGC off. Then you compute the NF from the known noise level and the change. Since the noise source bandwidth is much greater than the receiver IF and audio bandwidth, NF measurements are independent of receiver bandwidth. This fundamental is used in the automatic NF meter with a 4 MHz bandwidth for much easier measuring because with the wide bandwidth, noise power shows little time variation. EMEers use the GR IF to measure sun noise for the same reason; a couple MHz bandwidth makes for a much steadier meter. But the IF receiver usually has no broadband IF taps for that happy result. So we hang an audio meter (perhaps VTVM like an HP400E) on the speaker wires and watch the meter bounce. One can modify the meter by increasing the filter (and integrating capacitor) across the meter movement. Otherwise, I've spent hours turning noise source on and off and trying the decide the average noise for each condition and the difference between them. I think that an analog true RMS meter like a Keithley which uses a 4 MHz bandwidth amplifier to heat a resistor and then displays voltage as a function of that heat sensed by a thermocouple will do better. Its possible that some computer audio noise analysis function exists or could be created to do a long integration time true RMS. I'll have to think about this further. In the old days of the 5722 diode noise generators (considered inaccurate above 400 MHz though R&S offered one rated as flat to 1200 MHz with the same tube), we simple adjusted the filament voltage to set the noise diode plate current and all references said the noise ENR is proportional to the DC plate current. Then when the output noise power was doubled, the noise source ENR was the NF of the system. With fixed level noise sources we have to use the Y factor and a formula. Y is the ratio of noise with noise source on to noise with noise source off and the formula is NF = ENR(dB) - 10 * log10 (Y -1) and at one time AIL gave out a NF computing slide rule that would handle either scheme. This computation presumes that the system gain is the same for noise source on or noise source off. Most modern solid state noise sources have much better bandwidth, but are not adjustable for amplitude other than by tacking on external attenuators. Indeed the solid state sources are not all that well predictable for noise power, but with regulated current have decent long term amplitude stability. It was asked in a recent EME NL, whether 5 dB and 15 dB ENR noise sources are an adequate selection. Typically the precision of the measurement of fractional dB NF is bad when done with a 15 dB ENR source, or if it is comparing one device to another or one test setup to another produces random results with more than a dB error. It sometimes even shows a negative NF. The changes in gain caused by changes in SWR of the noise source introduce errors into the computation. Fortunately the 5 dB noise source is essentially the 15 dB noise source with a built in precision 10 dB attenuator,

which cuts the noise level while it reduces impedance changes immensely. Recently I did some spread sheet calculations of the Y factor and worked out why the strong NF source is poor with a good EME preamp. If the actual NF is 0.5 dB, and the noise source is 0.5 dB (not commercially available), the Y factor is 2, or 3 dB. If the actual NF is 0.5 dB, and the noise source is 5 dB, the Y factor is 3.82 or 5.82 dB, and if the ENR is 15 dB, Y is 29.18, or 14.65 dB. For the 0.5 dB ENR source, the DUT is supplying ½ the noise power when the source is on. For the 5 dB ENR source, the DUT is supplying 26.7% of the noise power, and for the 15 dB ENR source the DUT is supplying only 3.8% of the noise power. So the noise swings with the loud noise source are much greater than the contribution of the DUT and large changes in the DUT NF essentially aren't detectable. Did I say that measuring noise level to a few percent was a pain, difficult and all that? It is. And measuring MDS is different in that the signal is a carrier and that makes the absolute measurement dependent on the true integrated system IF and audio bandwidth. We still have the noise level to measure with no signal, exactly the same as measuring NF, but the signal tends to make the measurement of signal plus noise a little easier. Noise, especially narrow band noise tends to be filled with spikes that drive the standard meters batty because they are peak reading calibrated in RMS, whether Simpson 260, or HP400E. Noise power is actually a more steady value, so I'm thinking the true RMS meter like my Keithley should do better. I haven't yet tried it but I intend to. It might even be that a moving vane AC voltmeter despised by all because of is lack of damping may work better than the peak reading calibrated in RMS meter. At least with a distorted 60 Hz waveform those two meters agreed on the current in the circuit last time I was looking. How to make a 0.5 dB ENR source? Add a 4.5 dB attenuation to a 5 dB source. Or try the hot and cold resistor method described by Ben Lowe in QST, Sept. 1976. With the modern LNA so touchy about mismatch for low NF, the biggest source of error with hot and cold resistors is getting the resistors to have the same return loss at both temperatures. I have noticed some 0.02% resistors in the Mouser catalog, surface mount with a 5 PPM temperature coefficient. Perhaps they would be close enough in value while hot and cold. Measuring MDS requires a frequency stabile signal generator that is well shielded. That leaves out the HP608 family, though the E and F are getting close. They still leak signal and don't have enough internal attenuator to get down to -150 dBm or so needed to be below the threshold of the EME receiver with CW passband. For VHF and UHF, the HP8640B works well. For any band one can make a crystal marker with a common crystal oscillator in an IC case or even a 3 x 5 mm SMT case, and generate harmonics out through 10 GHz. That's not hard. What is important is to build it in a completely shielded box with internal power (battery), then mount it in a second shielded box, where only the coax connector connects the two shields. Use a teflon rod to operate the power switch. Don't use BNC connectors, the bayonet doesn't hold the ground connection well and they will leak inconsistently. TNC, SMA, or N are fine. For many bands that assembly can put out a milliwatt, so the external attenuation accounts for the output level in dBm. For VHF and UHF a fixed attenuator and a couple HP 355 family switch attenuators work well, and for our relative measurement returning to the same value they can work higher in frequency. Even a gang of individual SMA or N connector attenuators work well, just they are slower to change. The output attenuator of the 608 family could be extracted to make a very useful stand along wide range attenuator. Standard MDS schemes vary the signal to make the S+N precisely 3 dB over the noise with no signal. That's handy with a generator fancy enough to have a reliably controlled variable output and a DC controlled PIN diode switch attenuates nicely with a lower DC drive. I haven't put much thought to it, but it seems to me that the EXACT SAME Y factor can be used with a generator adjustable on steps to detect the effects of tuning or attenuation. LNA input selectivity: The antenna to LNA matching circuit is the most important circuit in the EME station. It sets the NF of nearly all LNAs; the circuit loss is greater than the NF of the devices used these days. So for LNA measuring contests, the simplest circuit, which has quite low loss is almost always used. A series variable and a shunt inductor that also serves to supply bias to the device gate. Unfortunately this has a broad bandwidth (which makes for easy adjustment) and with the stage adjusted for best NF is often resonant somewhere above the signal frequency. One preamp I had for 2 m, input circuit was resonant about 200 MHz, which emphasized the channel 13 signal from 20 miles away. It should be possible to improve on the selectivity of the LNA input section without introducing additional losses, by going to multiple tuned circuits using low loss components. Surface mount inductors need not apply. Chunks of coax can make lower loss inductors, the fatter the better. After the LNA, there could be a helical resonator filter or two to limit the bandwidth to less than 1 MHz (at least at VHF/UHF and maybe 10 or 20 MHz at 2.3 GHz) to reject out of pass band signals and to reduce their intermod and reciprocal mixing effects. If the LNA input and output bandpass filtering gets the pass band below 4 MHz, the automatic NF meter will show low gain and higher HF because its expecting its 4 MHz IF bandwidth to set the bandwidth, and doesn't see the noise power it expects through the narrow DUT. There is no practical way to correct for this. But the LNA optimized with the automatic NF meter will be optimum on the antenna; it just won't win any LNA NF contests. The effect has different amounts of change depending on whether the selectivity is before the LNA active device or after. I've left out sun noise, moon noise, or quiet sky vs. earth noise as a measuring tool because they can be affected by the intermod. Without intermod they are valid test methods. Anyway for optimizing (reducing) the gain, absolute NF or MDS measurements are not necessary, just so long as the added attenuation and filters don't change the NF or MDS at the frequency of interest, the process is successful. So gather up those assorted attenuators and start sticking in while measuring NF or MDS and watch the intermod go away. Bits of small diameter coax also make excellent attenuators though the attenuation varies with frequency. They are easily customized for attenuation, and tend to be reliable and inexpensive.

FINAL: NETNOTES help is still needed – G4RGK has been providing summary material from various Internet EME reflectors and K1RQG's [RIP – it is not the same] Netnotes for many years to supplement the reports that I receive directly. Dave's help has been invaluable. Unfortunately, Dave work load and family commitments has been growing. Is there anyone who would be willing to take over this task from Dave?

If you did not submit your logs for the REF/DUBUS EU CW EME Contest 2011, unfortunately the deadline has past (16 July). But you might still consider submitting your logs late as they may still get listed as a check log. Every log helps promote EME. Send to Joe, DL8HCZ/CT1HZE at funk-telegramm(x)t-online.de.

Lance, W7GJ asked me to announce his 6 m EME web site http://www.bigskyspaces.com/w7gj/. He also maintains a Magic Band EME e-mail group – see his site.

If you have not done so already, now is the time to start making plans to attend the 15th International EME Conference, Cambridge 2012. The Conference Web site is at http://www.eme2012.com/.

You might want to consider attending the 2011 Microwave Update, which will be taking place on 13-16 Oct in Enfield, CT. It does not conflict with any EME contest this year and will probably attract a good number of EMEers. I am planning to attend. W1GHZ is handling the technical papers and still looking for submissions. See http://www.microwaveupdate.org/.

You can see a You Tube clip of the 6 cm SK6OSO operation at http://www.youtube.com/user/SM6CKU?feature=mhee.

The reports and technical are greatly appreciated. PSE keep them coming. This means being QRV on the Moon and well as reports on your activity. Activity breads activity! I know the summer is a busy time and Moon conditions (alignment of perigee, declination, etc.) are some of the poorest this summer, but let's try to keep the activity going. I will not be QRV for the 6 cm ATP on the weekend of 30/31 July (sorry away traveling), but plan to be active for the 20 Aug 70 cm CW ATP, and on 70 and 23 cm random at other times. Hope to find you off the Moon. 73, Al – K2UYH

WA6PY is setting up for 24 GHz EME