

432 AND ABOVE EME NEWS JANUARY-FEBRUARY 2024 VOL 53 #1

EDITOR: AL KATZ, K2UYH; DEPT. ELECTRICAL/COMPUTER ENGINEERING, THE COLLEGE OF NEW JERSEY, PO BOX 7718 EWING, NJ 08628, TEL (W 609-584-8424), (C 609-947-3889), E-MAIL alkatz@tcnj.edu
ASSOCIATE EDITOR AND REFLECTOR/NETNEWS MATEJ PETRZILKA, OK1TEH, SIMUNKOVA 1609/21, 18200, PRAHA 8, CZECH REPUBLIC, TEL (+420 603 489 490), EMAIL ok1teh@seznam.cz
CW INITIAL LIST G4RGK, DAVID DIBLEY, E-MAIL zen70432@zen.co.uk, AT: www.g4rgk.co.uk/Initials
SUN & EXTRATERRESTRIAL NOISE LIST MANAGED BY OK1TEH: http://www.ok2kkw.com/next/nl_k2uyh/sun_table.xls
EME INFORMAL NETS: 14.345, ~1500 SATURDAY AND SUNDAY, NET COORDINATOR: OPEN
ON0EME EME BEACON, 1296.000 [PRESENTLY NOT QRV]. IT IS NORMALLY ON WHEN MOON >10°, SEND RX REPORTS TO WALTER (ON4BCB) on4bcb@gmail.com
DL0SHF 3 & 1.2 CM EME BEACONS, 10368.025, 24048.025, SEND QUESTIONS TO PER (DK7LJ) per@per-dudek.de
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THE NL WEB VERSION IS PRODUCED BY REIN, W6SZ rein0zn@gmail.com, AT: <http://www.nitehawk.com/rasmit/em70cm.html>

INTERNATIONAL EME MEETING 2024 IN TRENTON, NJ: www.EME2024TRENTON.org

CONDITIONS: There were no contests this time, but we now have OK2DL's 1296 ARRL EME Contest Score. Marek made an amazing 221 QSOs, greater than Zdenek's 204, but OK1DFC still keeps the top spot because of his larger number of multiplies! We also have reports on some nice 9 cm EME activity around the New Year and a surprise EME dxpedition to rare Clipperton Island for those on 23 cm EME and a few lucky 70 cm stations. [Our apology for missing this one].

TX5S Dxpediton to Clipperton Island:



On 1296 a 2.4 m HRO dish and 400 W were used

The island is an uninhabited coral atoll in the eastern Pacific Ocean. It is 10,677 km from Paris, 5,400 km from Papeete, Tahiti, and 1,080 km from Mexico. It is an overseas state private property of France under direct authority of the Minister of the Overseas. The weather (WX) used to be tropical with hot temperatures and high humidity. The team just erected tents for radio operations, sleeping and eating. The island is inhabited by various bird species and millions

of crabs. The campsite was sited to avoid disturbance to the wildlife. Establishing the camp site required extensive research, documentation, and permission from several government agencies. The 23 cm EME operation was thanks to N6NU; (Andreas was also on 6 m EME but only on the horizon, which limited 1296 activity to elevations of > 10 degs. There were big pileups at the start. The 1st logged was HB9Q followed by OK1DFC, OK2DL, OK1KIR, OK1IL and then many others. Almost as an afterthought they used their 70 cm satellite system, an 11 el yagi and 70 W from a IC9700 to make QSOs with NC1I and DL7APV. On 1296 they made 57 contacts (55 initials and 17 DXCCs) and 17 EME QSOs on 6 m. Many thanks to Andreas making this rare DXCC available off the Moon!



On 432 EME TX5S used an 11 el yagi with 70 W

SSB FUNTESTs 2024: The 1296 F5SE Memorial SSB Funtest on 11 Feb is now over. Despite the low declination that significantly limited moontime there was a reasonably good turnout. We are going to hold off covering the Funtest reports until the next newsletter (NL). **The 13 cm Funtest is Saturday 13 April and still a bit off.** The full rules were in the last (Dec) NL.

DUBUS 2024 CONTEST: There are some important changes to the EU EME Contest sponsored by DUBUS and the REF. In the future for convenience, we will refer to it as the "EU Contest" rather than "DUBUS". The major change is that most contest legs will last only one day (usually Sunday) rather than the whole WE. The exception will be the 1296 leg (also known as the VK3UN Memorial Contest) that will remain 2 days. The 10 GHz and Up leg will be split into 2 separate parts: one for 10 GHz on Sunday and the other for 24 GHz on Saturday. **The first leg will be for 432 and is coming up on Sunday 18 Feb.** A list of all the dates and rules is shown at the end of this NL. We recommend that the open Saturdays be used for band activity days.

REPORTS:

DU3T: Ron ronbpc@freenet.de (designer of his UFB 10/24 GHz LNAs) is now QRV on 9 besides 23 cm. I am using my HB 4.6 m dish (f/D = 0.45) with 30 W at feed and a 0.6 dB NF DDK LNA. I have OE5JFL's tracking system with 12" and 9" zero backlash slew drives. Sun noise is 14.5 dB and Moon noise 0.6 dB. So far I have logged on 9 cm using Q65C unless noted PE1CKK (13DB/18DB), PA0PLY (17DB/18DB), HB9Q (3DB/9DB), DL3WDG (11DB/15DB), DL3WDG (12DB/ 16DB), PA3DZL (6DB/13DB), OK1KIR (6DB/8DB), KL6M (569/549) CW, OK1KIR (569/539) CW, DL4DTU (18DB/20DB), G4DDK (20DB/19DB), K2UYH (10DB/17DB), OE9ERC (559/O) CW, G4CCH (549/539) CW, G4CCH (14DB/18DB), W5LUA (11DB/13DB), VE6BGT (549/449) CW, SP9VFD (559/559) and OH2DG (9DB/23DB). I am currently working on a 9 cm 200 W SSPA and improved LNA's NF by adding cooling because of the tropical temperatures here. Soon I will also be on 70 cm with a ring-feed and on 13 cm. For more info see https://www.ok2kkw.com/eme/DU3T_9cm-EME_Dec-2023.pdf. [Many thanks to Ron for giving us this new exotic DXCC with such a strong signal!]



DU3T's 4.6 m dish with 9 cm feed

G4FRF & G3YGF: Julian, G3YGF Julian@ygf.org.uk reports on the FRARS club's recent Moon activity -- The moon has been in a poor position for us for the last two months. We have found the problem with the 3.4 GHz system - the PA was "hooting", due to feedback into the transverter, which was only about 8' away from the dish feed, and also down the RX connection to the transverter. We now get echoes at 12 dB S/N in 6 Hz with 50 W. We see 0.6 dB of moonnoise. We had one or two skeds, but they were cancelled due to bad WX. On 10 GHz, at the end of Dec, we worked IW2FZR (18DB/8DB), GW3TKH (20DB/7DB), F5VKQ (11DB/1DB), IZ4BFA (14DB/2DB), IK6CAK (14DB/3DB), I4TTZ (16DB/7DB); and in Jan OZ1LPR (2DB/2DB), IW2FZR (12DB/2DB) and N0OY (13DB/2DB). The Jan session had a few problems. Our PC and one of the keyboards failed, and the cables were nearly pulled out of the TWT when we lost control of the dish tracking! We now have some maintenance to do on the cable routing to the dish, and some mods to the 3.4 GHz system to make the installation quicker and less error prone.

KD2XN: Phil kd2xn@icloud.com is now QRV on 23 cm EME -- I have a 2.3 m Dish f/D = .375, SSPA with 200 W @ feed and <0.30 NF LNA. For tracking I am using and AlfaSpid RAS/HR. I am working on RX Optimization and making very good progress towards increasing my Sun noise Y-factor. I am also getting excellent feedback and guidance from the moon-net community! Look for me off of the Moon.



KD2XN 2.3 m Dish (f/D .375) used on 23 cm with 200 W

KL6M: Mike mike@kl6m.com wrote: I participated in the 9 cm activity last month and worked the following ten stations using only CW: DL3WDG (559/559) for an initial (#), OK1KIR (579/569), PA3DZL (579/579), DU3T (549/569) (#), PA0PLY (O/559), DL4KGC (559/O) (#), DL4DTU (559/579) (#), SP9VFD (559/579) (#), VE6BGT (569/579), OE9ERC (579/599) (#). I was very pleased to add 6 new ones on 9 cm. I was operating with only one Toshiba (DL7YC mod) with about 60 W at the feed. I normally run two in parallel but one failed. I did not participate in the 'Fun Test' since the declination was so low. I was also very

disappointed in the ARRL selection of weekends last year due to low declination. I did get on and worked a few. Always good fun anyway.

OK1JG: Jarda ok1jg@seznam.cz is a new station on 70 cm EME and writes – I am using 4x19 el OK51M yagis and 500 W with an IC910. I finally solved the sequencing problem with my LNA BOX at the mast. The old system included SWR and temperature protect control; however, I had the logic connected wrong. Even with my LNA failures, I logged 17 initials in 4 months. My first QSO was HB9Q on 28 Oct followed by DL7APV, NC1I, DK3WG, PA5Y, W4ZST, SM3LBN, S56P, PA3DZL, DL7APV, VK4EME, OE3JPC, EA6CJ, UT6UG, UR3VKC, PA2V and on 17 Jan S51ZO and W7JW. Also at least 4 QSOs with NC1I!



OK1JG's 500 W SSPA

OK1KIR: Vlada vlada.masek@volny.cz and Tonda after the Christmas holidays were QRV on 9 cm -- We worked on 27 Dec using Q65C at 1618 DL3WDG (10DB/11DB) and repeated with an easy QSO with Q65-30B (9DB/10DB) - Charlie made QSOs directly via new QMAP feature in WSJTX 2.7.0; on 28 Dec using Q65C at 1817 DU3T (8DB/6DB) for our mixed initial #110* in a new PK field and new DXCC and 1st OK-DU 9 cm QSO and 2319 DL4DTU (7DB/7DB), and using CW at 1845 KL6M (569/579), 1905 DU3T (549/569) for initial #94, 2009 SP9VFD (559/579) #95 and 2330 OE9ERC (589/579) #96. However, our No.1 9 cm event was a Q65C QSO on the edge of WSJTX capabilities with OK1TEH on 29 Dec at 2248 (24DB/24DB) with best of (23DB/21DB) #113*. Matej was trying EME with his tropo equipment (1 m dish and 20 W). After QSO we measured Zo/CS of 6.1 dB and moonnoise of 1.0 dB at 48 deg EL. Our EME activity in Jan was only on 23 cm where we QSO'd using Q65C on 17 Jan at 2007 AA5C (11DB/10DB) for mixed initial #854*; and on 24 Jan at 0052 TX5S (14DB/13DB) #855* and a new DXCC.

OK1TEH: Matej ok1tehlist@seznam.cz made his first EME QSO on 9 cm in Jan – I am using a 1 m dish and MKU SSPA giving a stable 20 W and DB6NT transverter on 3400 and QSO'd HB9Q (16DB/22DB) for my first ever 9 cm QSO (and on EME). I used linear horz pol (-3 dB). For RX I use DG0VE 0.8 dB NF LNA and after it special anti-5G interdigital BPF from PE1RKI, which avoids any traffic above 3405 MHz. Elevation was done by hand on the balcony. I next worked OK1KIR and a 3rd initial with OE9ERC (19DB/20DB). Eric has 10 m offset dish. I have copied several other stations, but they could not decode my low power. I am working on a circular feed and possibly higher power to enable more stations to be worked.

OK1USW: Lada ok1usw@gmail.com sends a delayed report on his participation on ARRL EME Contest on 23 cm – My Oct leg operation was quite smooth, and I logged with

my 2.4 m dish 50 QSOs using Q65. I was especially surprised how well Q65B-30 worked; I had a tremendous pileup and worked up to 8 QSOs per hour. I was worried about the Nov leg because of the limited number of workable stations left after my first WE. However, I was surprised again, and finished the contest with 75 QSOs, 9 from US, 3 VE and 25 DXCC. Even the Cabrillo log isn't a problem anymore.



OK1USW's 2.4 m dish used on 1296 EME

OK2DL: Marek ok2dl@seznam.cz report from final leg of ARRL Contest on 23 cm – I had relatively windy and cold WX for the Nov contest WE. The start of the contest surprised me with lots activity. I made 17 contacts in 4 hours. In my 1st moonpass, I was up to 70 contacts! I do not remember such activity on 1296 in the past. On Sunday, I found that I had a little snow in my Septum feed. I guess I need a little bit more power - hi. **Overall, I made 221 valid contacts, 42 using CW, 22 US States, 3 VE provinces and 46 DXCC for a score of 1,370,300 points. [2nd place on 23 cm].** Later in Jan, I added TX5S (17DB) for a new DXCC.



OK1TEH's 1 m dish and equipment used on 9 cm

OK2ULQ: Petr ok2ulq@seznam.cz reports on the final leg of ARRL Contest on 23 cm. I used a 3.7 m dish in the contest and after my problems in the Oct leg was hoping to make up some of the lost QSOs this time around. OK2VJZ helped me with operating and bought another PC for QMAP. We started on Saturday afternoon because of new problems along with the fact that we had to wait for the Moon to clear the roof of my house. This meant that I did not log any of the VKs. But the activity was excellent, so there was still much to work. I couldn't imagine that we could ever accumulate 100 QSOs. But when we ended on Sunday evening, there were 55 stations in the log. The sum for both legs then gave us 102 QSOs! New stations were YB2MDU, F4KLO, 4W8X, OT7K, ZS5Y, CX9BT, GI4DOH, W1PV, W5AFY, VE4SA, RX3DR, K5LA, CT9/EA8DBM, DK3EE, RD9SAC, 9H1BN, PH0V, G0HIK and OE5VRL. It was a great experience. [TNX to OK1TEH for translating].

OM4EX: Ondrej briatkao@gmail.com writes about his recent 70 cm EME activity -- I believe I am the only OM station active on 70 cm EME at the moment. I have 4 x19 el DG7YBN yagis. My first QSO was with NC1I using only a barefoot TRX with 50 W. Later I added an old G17B tube PA with 250 W. With it, I have added 22 more digi QSOs and 9 more during ARRL EME Contest. Currently I'm working on a new 600 W SSPA for the Spring. I am looking for skeds.



OM4XA's 4 x 19 el DG7YBN yagis for 432 EME

PA0PLY: Jan info@pa0ply.nl reports on his recent 3400 activity – On 27 Dec I contacted using Q65C unless noted DL3WDG (14DB/16DB), PA0BAT (6DB/14DB) - Gerard used his new 300 W PA and PA7JB (17DB/17DB); on 28 Dec KL6M (559/O) on CW, DL4DTU (19DB/22DB), G4DDK (19DB/20DB), SP9VFD (16DB/ 19DB) and PE1CKK (17DB/21DB). There were about 15 stations active during this moonpass. Most of them during moonrise. After a nap I was active during my moonset for US based stations as well. I had a sked with VE6BGT in CW. After some troubles I could copy him reasonably well. But, we did not end up with a complete QSO. I concentrate on the reports. It turned out it was OE9ERC calling. I will soon remove the 3400 system from my dish and will install it at the 25 m dish of PI9CAM as soon as the elevator is refurbished to reach the focus box (sometime in April). Here I started to build a 6 cm station. The feed is almost ready and based on the SM6FHZ design, but with a OM6AA choke for my f/D=0.3 dish.

PA3DZL: Jac's pa3dzl@icloud.com report is for Nov to 17 Dec – I am back on 432 again and worked using Q65B

OM4EX for a mixed initial (*), F6GRB, SP2WRH (*), 4W8X (*) and a new DXCC, SM4GGC, DL7APV, UA5Y, K1WHS (*), NC1I, RD3FD, DL1VPL, GMØHBK, OH3AWW, KD2LGX, F6GRB, OK1TEH, UR3VKC (*), W4ZST (*), S57Q, TM1AB (same as F8DO), GW4ZHI, VK2CMP, EA5CJ, G4RGK, DL7URH, OK2AQ, OE3JPC, DL2ALY (*), JF6CTK, DJ8MS, PA2CHR, SV8CS, OK1JG (*), DF3RU, SM3LBN, F8DO, SP2WRH, G4YTL, UD2F (*) my smallest station worked with single 26 el yagi and 50 W, JA4RED (*), IZ2DJP, DL5FN, IU4FKR (*), PJ4MM (*) and new DXCC, R1NW and MØCTP (*). On 1296 I worked using Q65C CT1FGW, 4W8X for a mixed initial (*) and new DXCC, CT9/EA8DBM (*) and new DXCC, RD9SAC, DF7KB (*), IZ2DJP, PAØTBR and PA3JRK (*). On 3400, I found nice activity during evening organized by PA0PLY. I QSO'd using Q65C and CW PAØPLY for mixed initial (*), G4DDK, PE1CKK (*), DL2SUZ, OH2DG, G3LTF, G4RFR (*) and PE1ITR (*). I was also QRV on 5760 and I added using Q65D [? mode not clear] UR3VKE for an initial and PAØBAT.

VE6BGT: Skip macaulay.skip@gmail.com sends news about his recent 9 cm activity -- The WX for the WE of the 9 cm get together was very good here (29, 30 and 31 Dec). Temperatures were actually above 0 degs C at times and there was very little snow if any. So, It was a good time to get the 9 cm feed and associated equipment tested and mounted on the dish. The only issue against me was the real high moon declination. I know this is usually what most of us want, but here a higher than normal Moon causes it to be in a position where I have tree blockage. So it was a tough go for the first couple of nights. Also, the Moon was practically at apogee. My big contact was with DU3T. We knew it was going to be difficult; however, it would be the first VE (Canada) to DU (Philippines) QSO done on 9 cm. I was excited and gave it my best shot. Luckily, Ron is in my west window with not so many bushes. We worked (449/549). I thought he should have been stronger, but later learned he was only running 30 W! I am kind of an easy going operator and if its in the noise my poor CW ears just wont do it, but we got it done. Also on the WE I worked K2UYH (579/579) and OE9ERC (599/589), PA0PLY (339/339) and KL6M (569/579). In Jan, I set up a sked with SP9VFD and had a good contact (579/569). With a few days gone by then the declination had lowered a little and the moonrise was better for clearing the bushes. It was a lot of fun on 9 cm – excitement, hi hi.



VE6BGT's dish during high DEC 9 cm EME tests

W2LPL: Les <llistwa@gmail.com> who has been QRV on 23 cm for some time has completed his first 70 cm EME QSO – I decided to try my Sub-Lunar 2.4 m Hex dish on 432 EME as I had made a simple dipole/reflector feed to use with a satellite (GreenCube IO-177). With it, 75 W and no-preamp I was very pleased to QSO NC1I. Frank, of course did all the heavy lifting. It took us over an hour to complete. My 2.4 m dish does work considerably better on 1296. Hi Hi.

W5ZN: Joel, w5znjoel@gmail.com has been very active on 432 EME from AR (EM45) - I plan to take the current 4 x FO25 array down the first week of Feb in preparation to install 8 x FO25 yagis (as well as reinstalling tmy144 & 222 EME arrays). I expect to have the new 432 array operational by end of Feb. Please email me for skeds.

K2UYH: I (AI) alkatz@tcnj.edu did not have a great results on EME the past month. Besides still discovering new problems from my lightning disaster, my time has been occupied with responsibilities for two conferences (TCF2024 – see www.TCF-NJ.ORG on 16 March and EME2024TRENTON) plus a conference trip. On the Moon, much of my time was on 9 cm. I QSO'd on 29 Dec on 3400 at 0350 PE1CKK (10DB/11DB) Q65C for mixed initial #73* and then on CW (579/579) for initial #57, 0434 VE6BGT (579/579) CW and 1308 DU3T (17DB/10DB) Q65C for #74* and DXCC 36. I switched to 1296 to work the TX5S dpxpedition and discovered that they had already stopped operation, I worked on 27 Jan using Q65C at 0416 OM4XA (8DB/9DB), 0424 9H1BN (13DB/10DB) for mixed initial #764*, 0430 K8ZR (13DB/11DB), 0442 K5DN (3DB/4DB), 0503 N5TM (5DB/9DB), 0507 W1PV (8DB/9DB), 0521 AB6A (19DB/20DB) #765*, 0521 IU0BTM (15DB/9DB) #766*, 0544 PA3DZL (4DB/3DB), 0550 IK7EZN (9DB/11DB) and but on CW 0721 OE9ERC (589/599); and on 28 Jan at 0422 XE1XA (8DB/8DB). I had problems during the SSB Funtest, which will appear in the next NL. I plan to be active in the EU 432 EME Contest.

LOGGER/NET NEWS: **OE9ERC** is back on EME after a long absence. Eric has 10 m offset dish and high power. He has a huge signal on 9 cm. **HB9Q** planned to be QRV on 26 and 27Jan on several different EME bands. **OK2PE** is looking for someone from VK for a 23 cm CW sked to finish off his 23 cm WAC. [Contact VK5MC, VK4CDI...].

FOR SALE: **OZ4MM** is offering for free his 10 m dish including his feeds, mount, counterweight and 6 m tower. He would like to give it to someone who will use it. A crane will likely be need to get it disassemble and down. It originally came from OZ9CR's QTH. The ribs are screwed to the hub and rings with 6 mm stainless screws. If interested contact Stig at gsvestergaard@gmail.com or phone: +45 21632699.



OZ4MM 10 m Dish for sale

OK2AQ has for sell a universal and autonomous antenna position control system (AZ and EL) for 300 EU. OE5JFL boards. See https://www.qsl.net/oe5jfl/EMEcontr_jfl.pdf. All three motherboards are working and tested. Included are two new MAB25 absolute encoders, IBT-2 H Bridge, GPS interface and full documentation.



OK2AQ's OE5JFL tracking boards for sale

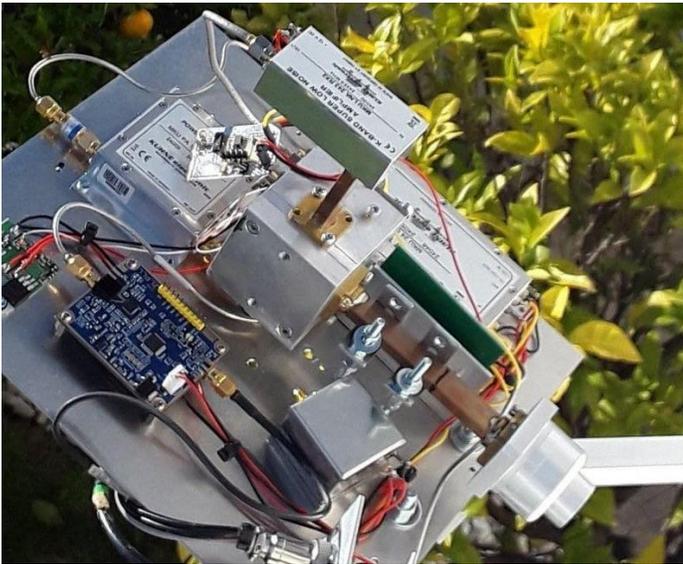
OK1FPC has for sale inexpensive 3, 6 and new 9 cm transverters as well as 4.5 W 3 cm SSPAs and 96x multiplies up to 15 GHz (great for getting GPSDO from Leo Bodnar for LO of 24/47/76G transverters); prices on request. If interested contact ok1fpc@seznam.cz or ok1tehlist@seznam.cz. **OK1TEH** has for free pick up a 3 m AI dish f/D 0.35 good thru 24 GHz. **PA3DZL** has for sale 6 cm 40 W (60 mW in) SSPAs; Ducommun SMA switches DC-26.5 GHz <0.15 dB IL; DC Blockers SMA male/female 10 MHz-18 GHz - usable to 26.5 GHz. If interested or nt more data email Jac pa3dzl@icloud.com. Shipping NO problem. **PA0PLY** reports on 6, 10 and 24 GHz DU3T LNAs. Around Xmas the second batch of 10 CLNAs for 6 cm were shipped. Over the next 2 months the 3rd batch of 10 CLNAs and 10 XLNA's will become available. For 24 GHz, Ron need to investigate the interest in a 10 pcs run. Details are on the PA0PLY website. If you are interested email Jan at <info@pa0ply.nl>.

TECHNICAL CORNER:

OK1TEH Searching for Solid-State Power for 24 GHz

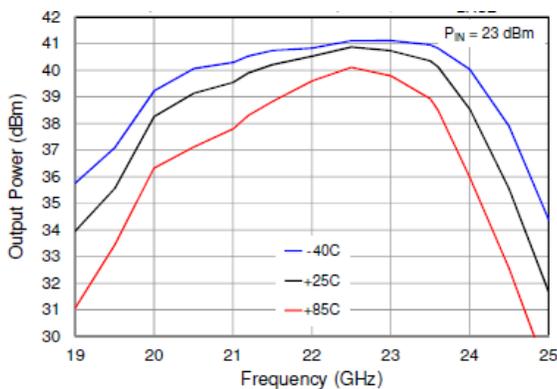
EME - The first ever 24 GHz EME QSO was on 18 Aug 2001 between W5LUA and VE4MA. At that time they had LNAs with NF ~ 2 dB, but very little info on how to predict the Moon's libration and Q65 did not exist. For CW contacts high power was a must. AI had 70 W to a 3 m dish and Barry 60 W to a 2,4 m dish. Both used retuned TWTs from 28 GHz. Since then much has changed. Preamps are below 1 dB NF, LO are stable to 1 Hz thank to GPSDO and mutual Doppler shift can be almost eliminated by dynamically changing of the TX freq. Doppler isn't the big issue any more. And libration can be predicted to select best time for skeds. The result is that high power isn't absolutely necessary anymore (of course more power is always better) and even smaller stations with smaller solid state PAs can be successful on 24 GHz EME. For example example CT1BYM worked several stations using just a 1.8

m dish and 4 W SSPA. Miguel used a TGA4905. These chips were used in an SSPA that DL2AM described in Dubus (4/2007). They were designed for a higher band and didn't work well on 24 GHz; they had to be retuned with flags on the output circuit. Later Philipp described a 5.5 W SSPA using a TGA4915, which could be tweaked for about 7 W output. At the same time Kuhne company had just started selling 10 W SSPAs based on 4 x TGA4905. A TGA4915 PA was then introduced by G3WDG in Dubus and by F5BQP at the EME2014 meeting. Next came combining SSPAs for higher power – see info on improved magic Tee by JA8CMY <http://millimeterwave.free.fr/PA%2024GHz%20JA8CMY%20TGA4915.htm>, and low loss couplers introduced by AD6IW.



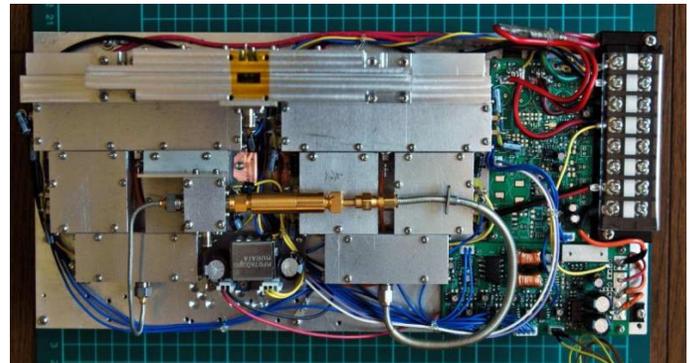
CT1BYM's 24 GHz 4W SSPA from Kuhne electronics

However, TGA4915 are old chips, which aren't manufactured and hard to find. However, the good news is there are better new devices. A very interesting chip was introduced on 1 June 2023 by Quorvo. It's a QPB2040N delivering 50 dBm (100W) between 18 to 40 GHz with 11dBm gain. However, the price will be certainly astronomical and where to get 39 dBm of driving power? An interesting alternative is the TGA4549-SM. This chip delivers 10 W over range between 21.2 to 23.6 GHz - just below 24 GHz. Its gain is ~ 17dB.

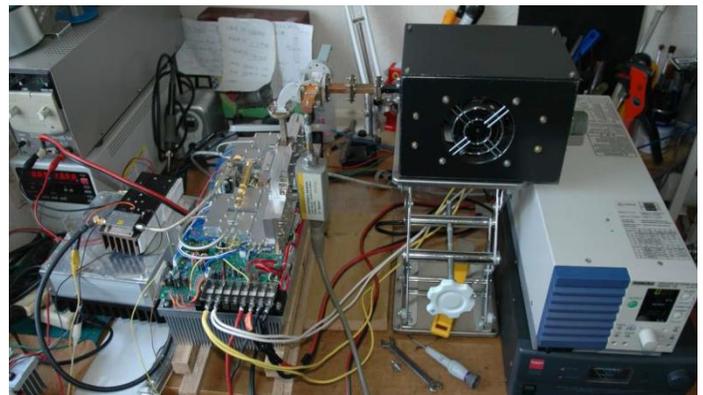


Output power of TGA4549-SM

JA1WQF reports the following: "We decided to test TGA4549 on 24 GHz and found out that the gain was very low as well as the claimed efficiency. When we were moving from 23,6 GHz to 24 GHz, the power was dropping significantly and we got power of about 3.5 W with maximal possible power around 4.5 W. The absolute maximum rating of the drain voltage is 29.5 V, but at 29.5 V, the 8 combined power could not reach 30 W, so I raised it to 32 V. It exceeded about 2.5V, but it did not burn out. When it was cold, It got up to 32.5 W, but it quickly dropped, so I think the normal value is around 26-28W. Since the drain voltage is high, the current is small at about 12 A, but the Peltier current for cooling flows at about 31 A at 11 V, and the power consumption of the entire amplifier exceeds 700 W. Furthermore, combining two units to achieve a 50 W output would be too large and heavy, and the power consumption would be high, making it impractical. Unfortunately, it ranks high in the "not so good" category of our device choices."



24 GHz EME SSPA with 8xTGA4549 by JA1WQF



JA1WQF's experiments with 8xTGA4549 24G SSPA

It's obvious that a much higher chance would be using a chip that is designed for a higher band such as 27-30 GHz. A possible replacement could be the **QPA2212** operating between 27,5 to 31 GHz with 25 W output or a **CMD262** with 38 dBm starting at 26 GHz. An another chip from Eravant is the **SBP-2733134036-KFKF-E3** with 40 dBm and a min freq of 27 GHz. See <https://sftp.eravant.com/content/datasheets/SBP-2733134036-KF28-E3.pdf>. But of course there is price. Please share your experience, we'll be happy to hear them!

PA2V on New reference board for the ICOM IC9700 -

Here is info about a new board for the IC9700. Handy and cheap for the many moonbouncers that use the IC9700, it provides a solution to the bad frequency stability and drift reported by many users. The so called 10 MHz reference on the 9700 is used as a calibrating signal. Software calibrates the IC9700 oscillator now and then and not really lock the local oscillator to the 10 MHz standard. It did not take long to see boards on the market solving this problem. Insertion boards appeared, GPS locked PLL's came on the market. For all solutions one needed an insertion board and a PLL. And often you needed two suppliers to get the most cost effective solution. DF9NP developed together with me a new 49.152 PLL-board for the IC9700. New with this board is that there is no longer a separate insertion board needed. It is an all in one solution. The DF9NP PLL boards are known for their good phase noise performance. I tested the prototype of this new board and during the test period saw better performance of the IC9700 with strong signal behavior. Good performance of DF9NP boards have been earlier reported. The new board will lock on any 10 MHz reference. A 10 MHz GPSDO would be best. Without a 10 MHz reference, the PLL output is muted. No false spikes and noise will be inserted in the IC9700 LO. Another feature of the board is a better and less critical lock of the original local oscillator. Once installed it all goes smooth. The DF9NP package includes: a 49,152 MHz PLL board, 2 spacers, 2 tooth washers and 2 screws. The IC9700 owner needs to install the board, new SMA socket with short coaxial cable and a short piece of wire for the 12 V supply. Anybody having some basic soldering skills can do this job. If not required the IC9700 can simply be brought back to the original state. Price of the new board is around €50,00 excl. of shipment. For more information: info@df9np.de.

DJ3JJ has useful info about using MRF13750h for 23 cm SSPA. See Amplifier online at <https://www.qrz.com/db/dj3jj>.

RADIOASTRONOMY CORNER by OK1TEH -- This NL's focus is on the "Exciting search for dark matter and dark energy." Hi to all readers, from time to time I write a few words about radio astronomy, this time I have decided to write a longer piece on how radio astronomy research relates to a better understanding of World around us. I want to draw your attention to a paper by M.E. Caplan and E.P. Bellinger from the German Max Planck Institute. But, before, I need to give you some background. The biggest contemporary physics mystery is still the so-called dark matter-energy problem. The fact that all the observable matter in the universe are made up of *baryonic* matter where the particles are made up of three quarks. The most important representatives of *baryons* are protons and the neutrons, which are part of the nuclei of atoms. The atomic shells contain electrons whose mass is three orders of magnitude less than that of the neutron or proton. Thus, the total mass of an atom is determined primarily by the mass of the *baryon* nucleus, and hence the atomic substance is referred to as a baryonic substance. Detailed observations of galaxy motion and precise observations of the microwave background and Planck space probes have confirmed that *baryonic* matter make up only about 4.8% of

the mass of the Universe. Most of the universe is made up of 26.8% dark matter and 68.4% dark energy. This distribution is now referred to as the standard cosmological model " Λ CDM". So, it is not only frustrating for scientists to accept that our world, composed of atoms is not the most important part of the universe, and has little influence on its evolution and future fate.

The search for dark matter and dark energy is one of the main topics of cosmology and astronomy, and many people have thought about how to create special traps where such exotic particles could be detected. Some have suggested observing wimps and axions on the surface of pulsars (<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.131.111004>)

- For a long time the relic neutrino (HDM theory) was a promising candidate but this was not confirmed in the end. Others are considering the theory of modified Newtonian dynamics (MOND). More recently Duncan Farrah has come up with the theory that the source of dark energy could be supermassive black holes (SBHM) in the cores of galaxies.

A new theory explaining dark energy studied 9 billion years of supermassive black hole (SMBH) evolution. The focus was on giant elliptical galaxies, immense galactic monsters that date back to very ancient times and are slumbering in today's Universe. There is virtually no new star formation going on in them, and there is almost no material left for their SMBHs to eat. When researchers compared giant elliptical galaxies from the very distant universe to these galaxies in the nearby universe, it turned out that their SMBHs are much larger than they should be if they grew by accreting surrounding matter and merging with other black holes. They are about 7-20 times larger today than they were 9 billion years ago. This growth is consistent with the idea that black holes contain vacuum energy. Analyses have shown that the size of SMBHs is consistent with the size of the universe. According to Farrah's research, it appears that the amount of dark energy in the universe corresponds to the vacuum energy of black holes. This is the first observational evidence that black holes do indeed contain vacuum energy and that they are intertwined with the expansion of the universe. Read more: <https://iopscience.iop.org/article/10.3847/1538-4357/acac2e>.

Primordial black holes (PBHs) – Could black holes be the source of the problem in addition to dark energy and dark matter? This idea is not new, it is called the Cold Dark Matter (CDM) theory and postulates that a large part of matter could be made up of small, so-called PBHs formed at the time of the Big Bang. The problem, of course, is that the smaller the black hole, the faster it evaporates due to the hawking effect, and so PBHs originally having mass lower than 10^{11} kg would have to have disappeared by now. The quantum hawking effect was recently confirmed experimentally in Israel see <https://arxiv.org/ftp/arxiv/papers/1510/1510.00621.pdf>. General relativity predicts that the smallest PBHs would have already evaporated, but if there were another spatial dimension - as predicted by string theory - it would affect the way gravity acts on small scales and "slow down the evaporation quite substantially". This theory assumes that current physics knows of four fundamental forces that can be used to explain all physical phenomena: The Strong Nuclear Force, the Weak Nuclear Force, electromagnetism, and gravity. The gravitational

force is weaker than the other three by more than 10^{25} (!) orders of magnitude. It is this disparity that string theory tries to explain by saying that gravity manifests itself more strongly in another spatial dimension that is rolled up into a variety of extremely small size, making it very difficult to observe directly. The problem, however, is that string theory itself is a very theoretical concept built on mathematical abstractions with many concepts that have not yet been verified by any observations, not even by experiments studying the violation of the so-called Standard Model of particles. If you are interested in string theory problems, I can refer you to my favored book "Not Even Wrong" by Peter Woit.

If PBHs of certain sizes have been found, this could be a truly revolutionary step in our understanding of the Universe. The question, however, is how to find such small black holes? Astronomers have searched for them by looking for gamma-bursts flashes. None of them have been confirmed yet. But if the primordial black hole were small enough, with a mass roughly the size of an asteroid and a diameter as small as a hydrogen atom, the flashes would be too faint to be picked up by such a survey.

In their Sept 2019 paper, J. Unwin and J. Scholtz proposed the possibility of a PBH of 5^{-15} EM (Earth mass), the diameter of a tennis ball, in the extended Kuiper belt to explain the orbital anomalies theorized to result from the existence of a 9th planet in the solar system. The same idea for finding of invisible planet was used in 19th Century for finding of Neptune due to irregularities of Uranus orbit and while Pluto was orbiting irregularly too, many people were expecting some bigger unknown planet with a size of Neptune; however, the IRAS infrared space probe didn't find anything. The PBH would be the perfect explanation. In Sept 2021, the NANOGrav collaboration announced that it had found a low-frequency signal that could be attributed to gravitational waves and could potentially be associated with PBHs. So there are some indications that these small PBHs could really exist.

Hawking's Star - In 1971, the famous physicist Stephen Hawking, in his thoughts on PBHs, concluded that if they existed, they could even be located inside solar-type stars, and their existence would probably not lead to the rapid demise of the star, because the black hole at the center of such a Hawking star would grow only slowly, as the influx of gas that would feed the black hole is hindered by the star's radiation. This intriguing conundrum was again studied in detail in Dec 2023 by an international team led by scientists at the Max Planck Institute see <https://arxiv.org/pdf/2312.07647.pdf>. Their result is surprising: When the mass of the black hole is small, the star is essentially indistinguishable from a normal star. Our Sun could have a black hole the mass of the planet Mercury at its center without us noticing. The main difference between such a Hawking star and a normal star would be the proximity of the core, which would become convective due to accretion onto the black hole. This would not change the properties of the star at its surface, and our current techniques would not detect it. But, it could be detectable using the relatively new field of asteroseismology, where astronomers use acoustic oscillations to probe the interior of a star. We recently published research on asteroseismology in some

pulsars in our 2023/9 EME NL with the hope of finding the mechanism of fast radio bursts (FRBs) origin, see <https://academic.oup.com/mnras/article/526/2/2795/7295484>.

FINAL: EME2024 Trenton is now less than 6 months away! See WWW.EME2024TRENTON.ORG. It's time to register for the conference (\$US125 includes Saturday Banquet), send in your presentation plans (title, abstract and bio) – we now have more than 20 speakers signed up, and complete your travel arrangements. The reservation link is up for the conference and hotel (Marriot Springhill Suites). Mercer Airport (very near to the hotel) offers "cheap" flights all over the USA – see Frontier Airline. **Make EME2024 a family holiday.** There will be 3 local tours: Thursday to Thomas Edison National Historic Park (for all), Friday to the Grounds for Sculpture (spouses), and Saturday a Super Outlet Shopping Extravaganza (spouses). We are also offering a separate one-day (Friday) EME101 Intro to EME (how to get started on EME) course for "Not Yet EMEers" – tell your friends. It is only \$50. Regular conference attendees can sit in on the course, but it is intended to get new people into EME. Info is also available on social media. The conference program will be a combination of talks (PPT) and interactive (poster) social sessions about 50% of the time. Joe Taylor will give banquet keynote on gravity waves. A link is also up for purchasing EME2024 Apparel that will be delivered when you arrive at the conference. Our next planning meeting will be on 14 March at 1700. Email K2UYH for the Zoom link. You are welcome to join in or just listen in, we need more volunteers.



9, 10 & 11 Aug 2024 at TCNJ

► **OK1TEH's** thoughts on changes in EU EME Contest: I have been wanting to write back to you regarding the changes in the Dubus Contest. I feel they are essential to keeping CW alive on EME. My preference would have been to leave them as a full weekend. I can see that reducing the lower activity bands to 1 day might help concentrate the activity. In this regard I would have left 3 cm at 2 days. I also see 13 and 6 cm as growing. But, as you say "we should

give it a go" and there is the possibility that it can be reversed depending on what happens this year. I very much like the idea of turning the open Saturdays into activity days, which might help.

▶ **G4RGK** who records the CW initials has a CHANGE in the address for reporting your standings. It is now www.g4rgk.co.uk/Initials and is updated on the NL masthead.

▶ **W1PV will be writing up the ARRL EME Contest for QST.** Skip asks that you send him your comments and photographs at flathood@rcn.com.

▶ **On 16/17 Feb in Guadarrama there will be an EA and CT Microwave Meeting.** EA3HMJ will demonstrate 3 cm EME and is looking for skeds. Email to ea3hmj@gmail.com.

▶ **The 33rd OK EME and MW Meeting** is being organized by the OK VHF club and is coming up in May. All necessary information and the seminar program can be found on the website in English <https://www.vhf.cz/seminare/item/774-32-eme-a-mw-seminar-2024>. The registration is ready and will start from 25 Feb.

▶ **The First Amateur Radio Station on the Moon: JS1YMG** is transmitting Morse code on 437.41 MHz from surface of the Moon. The Japan Aerospace Exploration Agency (JAXA) successfully landed their Smart Lander for Investigating Moon (SLIM) on 19 Jan. Just before touchdown, SLIM released two small lunar surface probes, LEV-1 and LEV-2. The JAXA Ham Radio Club (JHRC) secured amateur radio license JS1YMG for LEV-1. The probe uses a 1 W and a circular pol antenna to TX "matters related to amateur radio." It's unclear how long signals will be heard. SLIM was not designed to survive a lunar night, which lasts about 14 days.



A rendering of SLIM on the lunar surface. LEV-2 collects data while moving on the lunar surface and LEV-1 receives the data.

▶ Info on decoding JS1YMG's signal is available from EA4GPZ at https://destvez.net/2024/01/trying-to-decode-lev-1/https://robotics.isas.jaxa.jp/lev/LEV_HAM_Club.html.

▶ **This has been a difficult month.** We had planned to get this NL out before the start of Feb. We are holding the reports from the 23 cm F5SE Memorial SSB Funtest for the next NL, which we hope to have out much sooner. **Coming up on Sunday 17 March is the 9 cm leg EU CW EME**

Contest. Based on all the recent 3400 activity, it should be a good one! We both plan to be active in it on 9 cm. Also coming up is the ARI EME Spring Contest on 6/7 April and the 13 cm Funtest on 14 April. We hope you have a wonderful time on the Moon. **73, AI – K2UYH and Matej – OK1TEH**



SP9VFD Winter Scene



K2UYH Winter Scene (this morning)