432 AND ABOVE EME NEWS
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CONDITIONS: Oct was very much a microwave (MW) month with the 13 cm and above part of the ARRL EME taking place. Disappointingly, many of the reports are not particularly good. We should know that when contests are scheduled for the wee hours of the night, the turnout is always down. The fact that the Moon was at apogee and libration high did not help either. However, there were many bright spots. Activity on 3 cm seemed to be particularly good. OK2AQ with a modest system reports a 3 cm mixed score of 26x18! W6YX follows closely (US west coast) with a 3 cm mixed score of 25x18. Both are higher than the best 3 cm score last year. Shrinking 13 cm activity also seems to have turned upward again! OK1KIR's 13 cm mixed mode score was 31x21, the highest for 2021 and better than any 13 cm score last year. The top mixed mode overall QSO count by UA5Y was 61; also better than last year. The top reported CW mode score was 38x28 by the SP6JLW team who operated 13, 6 and 3 cm. OK1CA also did well with an overall CW total of 26x22. So there is still hope for CW! The WE1 State dxpedition to CT on 30/31 Oct kept activity alive on 432 and completed 48 QSO. Coming up, N1E will put NH on 432 EME on 27/28 Nov – see details in this newsletter (NL). **The is nothing else on the horizon for dxpeditions, but the 432 and 1296 bands will be HOT during the ARRL EME Contest weekends for 50 thru 23 cm on 20/21 Nov and 18/19 Dec.** Do not forget that the CW mode is a separate contest competition. Only CW contacts count for stations operating in this class. **This is the EME Contest to not miss!**

OK2AQ's 1.8 m offset dish and 50 W SSPA – 26 QSOs on 3 cm in the MW part of the ARRL EME Contest

REPORTS:

DL1SUZ: Uwe dl1suz@darc.de in JO53un was QRV on 13 cm in the MW part of the ARRL EME Contest – Just before the contest, I finished setting up for 13 cm with my new 3.2 m mesh dish. It was the first time I was on 13 cm via Moon.

F2CT: Guy f2ct@wanadoo.fr was QRV on 10 GHz during the MW leg of the ARRL EME Contest – I used my 4 m solid Cassegrain dish with 60 W and a 0.6 dB NF LNA to work using CW W6YX (559/559), UA5Y (559/559), K2UYH (559/559), W3SZ (559/559), HB9BBD (559/559), OZ1LPR (569/549), OK2AQ (559/559), UR5LX (559/559), SP6JLW (569/569), F5JWF (559/559), IW2FZR (559/559), HB9Q (559/529), DL4DTU (559/559), DL7YC (559/569) and IK2RTI (559/559); then using Q65C CX2SC (18DB/10DB) for the first France – Uruguay 3 cm QSO and new DXCC, G4RFR (10DB/10DB) and KN0WS (15DB/13DB); back on CW 9A5AA (559/559) just before my SSPA burned out! I ended with a score of 19x16. I will be on 1296 for the next leg in Nov.

G3LTF: Peter's g3ltf@btinternet.com Oct EME report mainly involves the ARRL MW EME Contest and operation on CW -- I was on 13 cm the evening before the contest (22 Oct) and worked F5FEN for initial #153, DL1SUZ #154 and OM1TF. However, the contest turned out to be the most disappointing microwave contest yet; even including those with bad weather. This was partly my fault as I didn't get on until 0100 at the start; and then took a break, but miss-set my alarm so that by the time I got on again it was 0500 and any US stations were gone to bed. I started and worked on 13 cm UA5Y, OK1KIR, OH2DG, DF3RU, OM1TF, DG5CST and F5FEN. For the next pass I changed my feed to 6 cm and worked UA5Y, DF3RU, UA3PTW, OK1CA and ES5PC; (IK2RTI was heard). The next morning, 24 Oct, still on 6 cm, I added SM6FHZ, DB6NT, VE4MA and W5LUA. For the final pass (MR to 2400 Sunday), I put the 9 cm system in the dish. I heard VK4AFL at good strength, crossband (XB), but he couldn't find me and later worked DL4DTU. Thus, a total of 17 QSOs (7x6 on 13 cm, 9x7 on 6 cm and 1 on 9 cm) with a large amount of effort involved in changing feeds up and down steps and carrying gear to and from the dish. I'm really not sure it was worth it. Now that there is significant activity on 3 cm, it means that we

are squashing activity on 4 bands into 30 hours of moon time. It means that a newcomer has no idea when to look for activity. For years we have talked about trying to get one of the two other weekends of the contest changed to take some of the microwave bands. That isn't going to happen folks! It would be unreasonable to take up another month in the autumn. My suggestion is that we take TWO ADJACENT weekends for the microwave contest and split the four bands between them. This will not be ideal as one weekend is likely to be a low declination; but in my view, it will be better than what happens now. I would be interested to hear other's views on this suggestion. Bad weather prevented me from being on for the W1E dxpedition to CT on 70 cm.

G3WDG: Charles g3wdg1@gmail.com was active on active in Oct on 3 cm -- Good weather permitted some more operation on 10 GHz during the past month. I worked using Q65D on 8 Oct CT1BYM, F6BKB and WA3RGQ, on 23 Oct W3SZ and OZ1LPR, and on 28 Oct PA0PLY and G4YTL. The QSO with OZ1LPR was completed with the Moon fully behind a tree, with an estimated S/N loss of at least 10 dB. I am now using autotracking, which is proving especially useful when operating with the Moon somewhat obstructed, when peaking on moonnoise no longer works! I have been looking at the latest release of WSJT-X (2.5.2), comparing performance with compound callsigns to standard callsigns. Tests with KA1GT using his 85 cm dish showed that with the new release, there is now no penalty in using a compound callsign - good news for dxpeditions!

G3WDG prime focus 1.2 m dish with feed mounted WG switch, PA and LNA

G4RFR: Julian (G3YGF) Julian@ygf.org.uk sends info his group's first ARRL MW EME Contest – We were on 3 cm and had 200 W to a 3.4 m dish with a 0.6 deg beamwidth, Octagon LNB; with 13.5 dB Sun, 1.3 dB Moon and 3 dB ground noise. There was a visible moon for the majority of the time. (After a month of suffering from the loud whine of the 400 Hz blower in our PSU, we switched to a new 50 Hz one. It is barely audible and a great improvement)! We worked 16 stations using Q65D and one on CW in 14 countries/States. QSO'd were UA5Y, IW2FZR, PA0PLY, OZ1LPR, SP6JLW (CW), DL4DTU, DL6ABC, W3SZ, F6BKB, DL7YC, UR5LX, W6YX, WA3RGQ, IK0HWJ, OK2AQ, G4YTL, F2CT (Partial) and OH1LRY. Many of our signal reports were around (3DB or 4DB). F6BKB gave us strength of 0 dB SNR in 2500 Hz. Frequencies got a bit confused later on, probably because the operator G3YGF was getting tired, having been up for 24 hours; but it was an enjoyable event. It was a pity it was not given more publicity - the emphasis seems on the lower bands, but 10 GHz is quite popular.

IK1FJI: Valter valter_dls@yahoo.it reports on his 1296 activity missed in the last NL and contacts made since – I worked using CW on 9 Sept N1AV (559/569) for initial #131, DL4DTU (569/569) #132, CT1BYM (549/559) #133 and DL4DTU (55/55) on SSB; in the ARI Contest on 25/26 Sept 23 more QSOs were made, all on CW; and on 30 Sept SM5DGX (579/579) and RA3EC (559/559) were added. I also worked KB7Q in WY (DN74) using JT65C and in NE (DN82) using Q65C, and SV5/HB9COG using Q65C. I plan to be QRV in the ARRL Contest in Nov.

JJ1NNJ: Koichi jj1nnj@extra.ocn.ne.jp sends his ARRL MW EME Contest results -- I participated on 13 cm and worked using CW on 23 Oct JA8ERE (559/439) on 2400, OK1CA (569/569) XB2320, DG5CST (559/559) XB2320, OK1KIR (579/569) 2400, F5FEN (569/549) for initial #28 2400, OK2ULQ (559/559) XB2320 and SP6OPN (569/559) XB2320; CWNR were OK1KKD and HB9Q, and heard were SP3XBO and UA5Y; and on 24 Oct CWNR were OK1KKD, UA5Y and DL3RU. In total my score was 7x5 all on CW. Unfortunately, the second day was zero QSOs. No activity in North America was heard. Thank you to those listening for the Japanese stations on 2400.

K5QE: Marshall k5qe@k5qe.com is planning a major effort in the ARRL EME Contest – At the urging of KA6U, we are going to run the ARRL Contest from my shack. Peter is bringing his portable 1296 station over here to add to my 144, 222, and 432 stations. I normally don't run the EME Contest, and I don't have any 1296 for the (tropo) contests during which I operate EME. This time is the exception. **I am interested in skeds during the contest and can be reached at my email.**

KA6U: Peter petervanh143@gmail.com is now QRV on 23 cm with a 1.8 m folding dish and 500 W. You can expect a lot of 1296 roving EME activity from Peter in 2022. His activity can be followed at https://ka6u.blogspot.com/2021/11/23cm-roving-station-works-nov-6-2021-i.html. [TNX to W2HRO for sending this info].

KB7Q: Gene geneshea@gmail.com sends news on his recent operation -- Late Oct was very good for working new stations from my Montana home QTH. Six initials were added to the log bringing my mixed total to #81* on 23 cm

in exactly a year of activity. New stations worked via Q65C were YO2LAM (20DB), DK5AI (24DB), IQ2DB (18DB), DJ2DY (21DB), IK7EZN (24DB), DL1SUZ (24DB), and W2LPL (29DB). I'm looking forward to the ARRL EME contest. I'll be chasing stations on both CW and digital.

KN0WS: Carl carlhasbargen@q.com reports on his efforts during the ARRL MW Contest weekend -- On Friday (22 Oct) I left home at 8 am (LT) to go to my northern EME site where my 16' dish is located. My intent was to focus on 13 cm, which I have had great troubles with in recent years. I arrived at 10 am, finished setting up camp and gear by 2 pm and began testing. I had a variety of problems, but the fatal one was that my radio was not working on 144. This is the IF of my transverter. I was unable to find a work around for this failure, which may have been the cause of some of my recurrent troubles on this band. I began tearing down camp at 4 pm and was home by 8 pm. I then setup my 3 cm gear to use with the1.8 m dish located at my home QTH. Unfortunately, I had neither RX, nor TX despite changing pre-amps, relay, connectors and cables. I was sad and frustrated when I went to bed and decided to take a breather from EME. I spent Saturday at my high power rocket club launch. I have missed almost all their launches this year because of EME weekend conflicts, but figured God was using my Friday EME failures to get me to see my club friends for the last launch of the summer. It was a great launch event and I came home happy after 10 hours and ready to try 3 cm again. I had sent my transverter to Kuhne this summer for repair and decided to open it up. There I discovered a jumper block was missing, so the transverter was expecting a 144 IF instead of 432 that I was using! Once that was fixed, I was able to see numerous 3 cm signals. Using Q65D, I worked DL4DTU (12DB), OZ1LPR (5DB), OK2AQ (17DB) and had initials with F6BKB (17DB) and W6XY (8DB) for a total of score of 5x5. I decoded DL0SHF at (+1DB) and decoded G4RFR (4DB), W3SZ (12DB), UA5Y (12DB), IK0HWJ (13DB) and F2CT (13DB). After, I took my kids to see Mick Jagger and the Rolling Stones in concert Sunday evening; so my weekend ended up happier than it started!

KN0WS has extended his 1.8 m home dish to 2.4 m and maybe QRV with it on 1296 in Nov

N1H: Frank (NC1I) frank@NC1I.COM reports on his group's upcoming 70 cm EME dxpedition to New Hampshire -- We are planning on activating NH (FN33sa) on 70 cm EME at the end of Nov. We'll be back at the location that we had operated 23 cm from in 2017 (and around the same time of year, none the less) and will be using the N1H callsign again. Our plan is as follows: Friday (26 Nov) arrive on-site, setup the station, and do tracking and Sun noise tests. Unfortunately, the Moon will set before we would be able to be on the air. Saturday (27 Nov) 0400 at moonrise, the fun begins to 1720 at moonset and off to get some sleep. Sunday (28 Nov) 0500 at moonrise to 1600 at moonset QRT. Important for Asia/Pacific stations is that our only real window with you will be on the Saturday moonpass – please take note of our operating schedule. The station will be the same as we used in CT at the end of Oct with 4 x M2 12 el rear mounted yagis with polarity rotation and BEKO HLV-1470 amp. We'll operate Q65B and will switch to CW upon request. We will announce frequency and other details once we are on-site. We will QSL all initials direct to your QRZ address and 100% via LotW. We will need to print some new cards; so it will take some time before they will arrive in your postbox. Also note that we will be on the cusp of the winter season here, and if we have snow or ice it will likely be difficult to impossible for us to make it up the hill to the operating location. We will post updates on *moon-net* as we get closer to the date.

N5BF: Courtney courtney.duncan.n5bf@gmail.com is doing very well with his upgraded system on 1296 -- New initials since my last report are IQ2DB (14DB/18DB) for mixed initial #241*, YO2LAM (17DB/16DB) #242*, VE7ZD (22DB/25DB) #243* and EA1IW (22DB/19DB) #244* with all on Q65C. VE7ZD is one of the smallest stations I've worked. Kevin is using 2 x 45 el yagis and 300 W. On 1 Nov, I upgraded my IF rig from an FT-817 to a new IC-705. The Icom Spectrum Scope in its various modes and spans, in concert with the WSJT Wide Graph are helpful in evaluating both general band conditions and occupancy, and particular QSO issues. I have not yet tried CW with the new setup, but expect some operator confusion surrounding the different sideband and BFO location until I get used to it. I also tested the IC-705 with my 3 cm terrestrial station and expect to be able to join W6DL, N6RMJ, WB6CWN, and other locals in using our small terrestrial rigs to look for the European 3 cm EME beacon when moonrise conditions are right.

NC1I: Frank frank@NC1I.COM reports about his recent activity -- Since my last report I have spent very little time operating from my home station. Most of my time has been spent preparing for and executing our W1E 432 dxpedition to CT (see separate report) and preparing for our upcoming N1H dxpedition to NH (also see separate report on plans). Since my last report I have only logged a total of about twenty QSO's between 432 & 1296. On 432, I added an initial with DL1VPL and on 1296 I added initials with RD4D and YO2LAM. I hope to be QRV on both 432 and 1296 for the ARRL EME Contest. At this point, I don't know how serious an effort it will be. If I can find one or two guest

operators, we will try and keep both stations active for a significant number of hours. If I do find guest operators, they will likely be inexperienced, so there will be a learning curve. If it's just me the focus will likely be on 432, especially for Nov. As of early Nov, we are 100% up to date with both paper QSLs and LOTW. If anyone is still awaiting an NC1I QSL card or LOTW confirmation, please send me an email.

OK1CA: Franta fr.strihavka@seznam.cz sends his Oct/Nov NL report -- In this year's MW part of the ARRL EME Contest, I was QRV only for my second moonpass from Saturday evening thru Sunday morning and only on the 13 and 6 cm bands. I used a dual band feed, so the transition from one band to another took me about 2 minutes. On 13 cm, I made 16 QSOs on CW and 6 using Q65C. Initials on CW were with F5FEN #162 and CT1BYM #163. On Q65C, I worked OK1KIR, JA6AHB, DL4DTU, CT1BYM, DL1SUZ and WA3RGQ for a digital initial {# 28}. I missed a few stations that were QRV at 13 cm only in the first moonpass. At 6 cm, I worked early UA5Y, DF3RU, G3LTF, ES5PC and UA3PTW; the spreading was quite big. Later, in the morning, the signals were better and I added SM6FHZ, IK3COJ, DB6NT, W5LUA and VE4MA. All QSOs were on CW. No new initial, but it was nice work old friends who prefer CW. On Sunday morning, there was fog and frost at my EME QTH, and all parts of the antennas had icing, otherwise it was clear and sunny. I ended with a total of 26 CW QSOs on both bands and 6 on JT.

OK1IL: Ivan ivaknn@gmail.com sent us the following info -- Since my last contribution in May, I worked initials on 23 cm with N6NU, OK1UGA, ZS5Y, EA1IW, RA9FLW, IQ2DB, TX7EME for DXCC 66, SV5/HB9COG DXCC 67 and FG8OJ DXCC 68. Additionally, I QSO'd KB7Q in NE for WAS State 33. (I asked KB7Q if he is interest in a road trip to Missouri next spring. I told him that during my 5 years on 23 cm, no one has been QRV not only there, or in IA, KS and OK. All these states are nicely on the way. Gene replied that these were excellent ideas for additional States to put on, and that he would start thinking about how to find good spots to operate). **[It should be noted that there are stations who have been active from most of these States on 23 cm in recent years. WD5AGO has been regularly on 1296 from OK. N0OY is QRV from KN with a 28' dish].**

OK1KIR: Vlada vlada.masek@volny.cz and Tonda write on their club's late Oct EME in the ARRL MW part of the EME Contest and the W1E dxpedition -- In the MW part we were only on 13 cm band. Prior to contest on Friday, 22 Oct we worked using CW at 2220 CT1BYM (559/559) for initial #189 and 2247 OM1TF (549/559); then using SSB at 2253 and 2310 CT1BYM (44/59); and in-between with Q65C at 2238 CT1BYM (4DB/6DB) for digital initial {#82} and 2304 DL1SUZ (16DB/9DB) {#83}. In the contest we worked on 23 Oct using CW at 0008 DF3RU (569/569), 0017 OK1KKD (569/569), 0021 DL4DTU (559/569), 0048 UA5Y (589/589), 0116 OM1TF (549/559), 0123 G3LTF (579/579), 0142 OH2DG (589/589), 0244 WA9FWD (569/559), 0342 K3WM (569/579), 0353 VE6BGT (569/579), 0418 WA6PY (569/579), 0458 SP6OPN (579/579), 1803 OK1CA (579/579), 1901 PA3DZL (579/579), 1916 DG5CST (569/589), 1946 JJ1NNJ (569/579), 2007 F5FEN (579/589) #190, 2022 OK2ULQ (569/599), 2137 HB9Q (589/569) and 2223 SP3XBO (569/579); and with Q65C at 0217 UA5Y (3DB/3DB), 0234 UA3TCF (15DB/11DB), 0410 DL1EMA (14DB/8DB), 0447 VE4MA (5DB/3DB) {#84}, 1840 OK1CA (1DB/1DB) {#85}, 1847 4X1AJ (27DB/15DB), 1931 JA6AHB (8DB/5DB), 2051 DL1SUZ (16DB/5DB) and 2149 CT1BYM (7DB/8DB); and on 24 Oct with Q65C at 0244 WA3RGQ (9DB/5DB) and 0321 K2UYH (8DB/5DB); and with CW at 0509 W5LUA (579/569) and 0556 VE6TA (569/579). Our total count was 31x21 in all modes. We QSO'd on Saturday, 30 Oct on 70 cm using Q65B at 0947 W1E (11DB/10DB) for digital initial {#295} in CT as new digi State, 1014 AA5C (12DB/14DB) {#296}, 10:32 WC8RK (14DB/20DB) {#297}, 1056 repeated with W1E (15DB/13DB) just to test actual polarization W-EU, 1109 YO8RHI (17DB/17DB), 1117 YU7C (17DB/14DB) {#298}, 1127 VE6TA (9DB/8DB), 1133 PA2V (9DB/11DB), 1141 DK7FB (10DB/18DB), 1206 K5QE (14DB/18DB), 1214 S51LF (15DB/15DB), 1220 KD5LGX (9DB/17DB) {#299}, 1231 PA3HDG (8DB/12DB), 1239 PA9R (11DB/20DB) {#300} and 1247 PA4VHF (13DB/9DB). SN was measured at only 12.4 dB indicating actual system NF about 2.4 dB (≈215K) due to local conditions. A CW QSO with W1E was postponed to Sunday, 31 Oct at 0958 with easy (O/O) for initial #401 - actual reports were (549/529).

OK1UGA: Martin ok1uga@volny.cz continues to be very active on 23 cm EME with his 6 m mesh dish – I have been operating using only in digital modes. From 10 Oct, 2020 to now (16 Nov), I have made 91 EME contacts and am up to digital initial {#81} and DXCC 32. The last 3 DXCCs were SV5/HB9COG, CT1BYM and FG8OJ. My log can be seen at http://ok1uga.nagano.cz/eme23.htm and photo of his 6m dish at: http://ok1uga.nagano.cz/emeqth23.htm. I am currently finishing a new QRO SSPA. [TNX to OK1TEH for translating this report].

OK2AQ: Mirek mirek@kasals.com sends news on his 3 cm activity and thoughts on the 2.3 GHz & Up part of the ARRL EME Contest – The contest weekend was certainly chosen because of the Moon's high declination. However, the Moon was also near apogee (point of greatest loss). This together with a libration induced large frequency spreading, the EME conditions were far from ideal. The weather was quite good, without rain, but the strong wind in Europe made it difficult, especially for stations with large antennas. I started the preparation of my 10 GHz gear on 20 Oct. A higher than usual Sun noise of 12.7 dB alerted me to a higher SFU = 76.7. QSOs with 3 Italian stations verified that my EME equipment was working well. Due to my maximum elevation limit of 50 degs, I started the contest on Saturday morning to connect using Q65D with F6BKB (16DB/11DB), UA5Y (12DB/15DB), W3SZ (9DB/12DB), WA3RGQ (16DB/18DB) and IK0HWJ (12DB/16DB); then using CW with HB9BBD (539/429) and HB9BHU (559/539); with Q65D K2UYH (14DB/14DB), W6YX (5DB/11DB) and IK6CAK (17DB/15DB); using CW F2CT (559/559); with

Q65D OZ1LPR (5DB/13DB), UR5LX (16DB/14DB) and IW2FZR (18DB/18DB); again with CW SP6JLW (589/549), HB9Q (539/O) and F5JWF (569/559) for mixed initial #115*; back to Q65D DL4DTU (15DB/12DB), DL7YC (21DB/11DB), G4YTL (22DB/15DB) #116*, PA0PLY (12DB/12DB), G4RFR (4DB/13DB), KN0WS (20DB/17DB) and CX2SC (20DB/15DB); and finally using CW OH2DG (550/559) and 9A5AA (O/O). It was gratifying to see more US stations and also contact CX2SC who still has only 10 W. I made a total of 8 CW QSOs and 18 Q65 QSOs with 18 multipliers in the contest. The final score is then based on 26x100x18 = 46800 points. The fun was great again. Still during the contest, I had repeat QSOs with UR5LX (13DB/11DB) and DL7YC (9DB/12DB). After the contest, I worked on 29 Oct with Q65-120E IU0BTM (24DB/19DB) #117* and on Q65D DF2GB (20DB/14DB); and on 30 Oct on Q65D F6BKB (21DB/11DB) and DF2GB (18DB/9DB) again.

OK2DL: Marek *ok2dl@seznam.cz* is getting ready for the ARRL EME Contest and recently replaced his 11 years old rusty 23 cm Septum feed for new one -- I also install a new VLNA from G4DDK. Pictures can be seen at: http://www.ok2dl.eu/2021/10/vymena-feedu.html. [TNX to OK1TEH for translating this report].

OK2ULQ: Peter ok2ulq@seznam.cz reports on his 13 cm operation in the ARRL MW EME Contest – At the contest start, the wind slowed down and conditions were excellent. I had nothing to complain about. I started on Saturday night. The first stations that appeared on my waterfall after moonrise were OK1KKD, OK1KIR and OK1CA. Fortunately other stations appeared soon after. In total I made 12 QSOs by Sunday morning. All using CW. Unfortunately, I couldn't get WSJT-X to successfully decode Q65, which was a big pity because I missed many contacts. Nevertheless, I worked for the first time F5FEN, UA5Y, VE6BGT and K3WM. Otherwise, I had the feeling that the activity was low. [TNX to OK1TEH for translating this report].

PA3DZL: Jac's pa3dzl@icloud.com Oct activity report -- I was QRV during the ARRL MW Contest only a few hours on 23 Oct. On 13 cm I made 12 QSOs and 8 mults using my 3.7 m solid Andrew dish. All on CW I worked OK1KIR, SP6OPN, OM1TF for mixed initial #139* and DXCC 54, SP3XBO, F5FEN #140* and DG5CST; and using Q65C JA6AHB XB, UA5Y, DL1SUZ #141*, CT1BYM #142* and UA3TCF. On CW on 31 of Oct, I worked on 70 cm with my new extended Andrew dish (now 4.5 m) using Q65B W1E – the CT dxpedition station for mixed initial #293*, DC2TH #294* with an amazing signal from a single 11 el yagi and 250 W, WC8RK #295*, DF7KB #296*, KD2LGX #297*, N1QG #298*, AA5C #299* and W7JW **for #300*** - very happy to reach this number!, PA5Y #301*, S51LF, W7MEM, K5DOG and PA2V. My extended Andrew dish is giving a nice improvement on 13 cm. Measurements on 30 Oct show moonnoise at 0.25 dB with the 3.7 m vs 0.45 dB with the 4.5 m - really nice. I would like to thank PA7JB who helped me with hardware, and PE1CKK and OE5JFL who helped me with the calculations. I hope to be QRV during the final parts of the ARRL EME contest on 144 and 432.

PA4VHF: Dick pa4vhf@gmail.com (JO32je) sends his latest activity report for the NL – I am using 4 x 27 el YU1CF yagis and about 250 W at the feedpoint. After the summer break, I am back on 70 cm EME, and have added several initials. I am now at 128 different stations worked. Amongst them are several 2 yagi stations as well as some single yagi stations. I was able to set a new personal record by working DC2TH using a single 11 el DG7YBN yagi (15 dBi) and 250 W. His signal was (23 DB); so even smaller stations should be possible. My power seems to be the limiting factor; so there is some work to do. I am happy to see what looks like an increase in activity on 70 cm EME with several new stations showing up. Initials worked in Sept and Oct were RU4AN (2 yagis), PA5Y, K2UYH, 9A5M (2 yagis), HA1YA, SQ2SAT (2 yagis), RA9CHL (1 yagis), DL1VPL, JH7BAY, JR7PJS, JF6CTK, F4VTP (2 yagis), W1E, DC2TH (1 yagis), KD2LGX, N1QG (2 yagis), W7JW and WC8RK.

SP8OPN/SQ6OPG/SP6JLW/: Andrzej (SP6JLW) and team members Jacek (SP8OPN) and Pawel (SQ6OPG) sp6jlw@wp.pl wrote about their participation in ARRL MW EME Contest -- We will be in the CW multi-operator category. This time, we were QRV on three bands. The night hours of the Moon made it practically impossible to change equipment at the antennas. We were only on 6 cm during the first Moon pass. The turnout was almost zero, and only 3 QSOs were made. The next day, on the other bands, it activity was similar to last year. On 13 cm, we used the call SP8OPN and had a score of 16x12. We QSO'd UA5Y, OK1KKD, OK1KIR, K3WM, VE6BGT, DG5CST, PA3DZL, F5FEN, OK2ULQ, OK1CA, SP3XBO, OM1TF, JJ1NNJ, K2UYH, VE4MA and VE6TA. On 6 cm, we used the call SQ6OPG for a score of 3x3. We worked UA3PTW, UR7D and SM6FHZ. On 3 cm we used SP6JLW for a score of 19x13. Contacted were HB9BBD, F5JWF, IW2FZR, OK2AQ, F2CT, UR5LX, OZ1LPR, UA5Y, DL6ABC, DL4DTU, G4RFR, DL7YC, PA0PLY, IZ2DJP, 9A5AA, W3SZ, HB9BHU, IK0HWJ and W6YX. Our overall score was 38x28. We hope to see you in the next rounds of the ARRL EME Contest. [TNX to OK1TEH for translatting].

UA5Y: Alex (RA3EME) ra3eme@mail.ru joined with RA3EC, R3YA and others friends to unite resources to compete in the ARRL MW EME Contest from a Bryansk QTH under the common club callsign UA5Y -- For the MW part of the contest we used on 13 cm a 5 m dish and 250 W, on 6 cm a 3 m dish and 200 W, and on 3 cm a 2.2 m dish and 90 W; as well as for 1.25 cm, we had a 2.2 m dish and 22 W. We logged on 13 cm 24 QSOs; on 6 cm 14 QSOs; and on 3 cm 23 QSOs; for a MW total of 61QSOs. There were no QSOs on 1.25 cm due to the high libration and apogee conditions. The 24 GHz spectrum-spread was around 200-300 Hz. **On Sunday morning, we observed an interesting effect. At an elevation of 8 degs, signals increased by about 3-4 dB on all three bands! Signals were audible in the shack even with the headphones**

on. We have never experienced such a phenomena in all our many years of EME. [How long did it last?] Our 13 cm operation was made very difficult by cellular telephone (LTE) interference, which was especially bad in the 2304 part of the band. We were unable to make a 3 cm contact with UA3TCF, who apparently had bad weather. We are going to send a special QSL card for all established contacts. Look for us on the lower bands in the next legs of the contest. [TNX to OK1TEH for compiling and translating this report from several sources].

Dishes used by UA5Y during the MW contest. The 5 m dish at top was used on 13 cm

UA3TCF: Alexander ua3tcf@mail.ru was QRV in the ARRL MW Contest -- I operated on only 13 and 3 cm. I logged 6 QSOs on 2320 and 2 QSOs on 10368. Conditions were not the best due to the apogee of the Moon and high libration. I saw my echoes, but weaker than normal on both bands. The EME window at my QTH is small; at 3 cm only +/- 40 degs from due south; at 13 cm it goes from about 120 to 250 degs in azimuth. On the eve of the contest, I measured at 3 cm a Sun noise of 11.5 dB, and a Moon noise of 1 dB. My open waveguide to cold sky noise is 4.8 dB. On Saturday I had clear weather; so it was possible to point the antenna precisely to the Moon. On Sunday there was wet snow and increased wind, so I couldn't "find" the Moon at 3 cm. Unfortunately, the DL0SHF beacon was running with low power and couldn't be used for "navigation". I was sorry that I wasn't able to connect with UA5Y on 3 cm because of the difference in our power. I received them up to (11DB) in Q65D. On Saturday, I had some problems with my CAT control while working in CFOM. On the positive side, I logged initials with PA0PLY on 3 cm and with DL1SUZ on 13 cm. [TNX to OK1TEH for translating this report].

UR5LX: Sergey ur5lx@ukr.net had only limited time to operate in the MW EME Contest because of a conflict with work both days – I was able to be QRV on 6 and 3 cm for a short time. I completed 5 QSOs on 6 cm and 17 QSOs on 3 cm.

VE6BGT: Skip macaulay.skip@gmail.com comments on the MW Contest -- I did make it on for the ARRL Contest on 13 cm. There was more activity than I had expected, although overall the contest was not up to standards. I worked a few new stations. I was going to put in my 9 cm feed for the 2nd night, but after having been really dry here for days, it rained like crazy and operation was not possible. I worked on 2304 unless noted OK1KIR, OK1KKD, K3WM, WA6PY, SP6OPN, OH2DG (on 2320), OK1CA, K2UYH, VE4MA, OK2ULQ and VE6TA. In ended with a score of 11x9. All QSOs were on CW. In the last NL, I had mentioned my Slew Gear upgrade. I have uploaded a video on it to UTube plus others on my EME station. The link for the Slew drive is at https://youtu.be/QrB1TQHEdgY, and on my *Old School Amplifier* is at https://www.youtube.com/watch?v=p1xGb3q3w3M.

W1E: Frank frank@NC1I.COM here reports on his recent dxpedition to CT – It was a great success. The weather was good for set up and break down, but it rained almost the entire time we were active on the Moon. At times, the rain was very heavy. Set up went well but unfortunately the polarity readout problem we experienced a couple of weeks earlier returned. We thought the issue was resolved, but unfortunately this was not the case. After setting the station up we spent close to 10-hours on Friday troubleshooting and resolving the problem. This prevented us from getting any sleep and we ended up staying awake for the first 34-hours that we were on site. The time was well spent though as the majority of our QSO's were cross polarized. All were using on digital unless noted. We completed three QSO's before moonset on the 29 Oct with W2HRO, VE6TA, and K5DOG. Our site has a negative horizon from the northeast to the southeast

WE1 portable rotatable 4 yagi array on trailer

and at moonrise on 30 Oct, we had OH2DG in the log with the Moon at only 0.6 degs elevation! QSOs followed with PA3HDG, UT6UG, PA5Y, UA3PTW, UX5UL, UA4AQL, DL4ZAG, PA2V, DK3WG, ON4AOI, PA4VHF, DL1VPL, IW4ARD, KU4XO, SM7THS, DL7APV, DL8FBD, 4Z5CP, DL8DAU, DL9KR (CW), AA5C, OZ1SKY, YO8RHI, ZS4TX, OK1KIR, DF7KB, WC8RK, KD2LGX, K5QE, PF6IK, DF2VJ, W2HRO (dupe) and JF6CTK (our only Asia QSO). On 31 Oct we added RD3FD, PA2CHR, PA3DZL, EA5CJ, RU4AN, G4YTL, OK1KIR (CW), W7JW, DF3RU, S51LF, W7MEM, N1QG, and OH2DG (CW). When we planned on activating CT, we figured we could work 40-50 different stations; we ended up with 48, so we were pleased with the results. We completed three CW QSO's. We completed with everyone that asked us to switch to CW. 46 stations were worked using Q65B and two stations using JT65. Our log included four 2 yagi stations, one on the horizon only station, and one 50 W station. Our equipment was described in our announcement in the last NL. QSL cards will all be mailed by the first weekend of Nov. Our next dxpedition is planned for the last weekend of Nov. If the weather cooperates, we will activate NH on 432. See N1H announcement in this NL.

W2LPL: Les *llistwa@mail.com* is active again with a W2HRO's 2.8 m folding dish, patch feed and a new IC-9700 with Bodner board and GPS – I corrected a problem with my feed that had been plaguing me for close to a year, causing weak receive signals and lower than expected Sun noise. It was a bad metallic jumper between patch and hybrid. I am now all operational. Over a few days of testing, I worked and heard at least two dozen stations including FG8OG (23DB) with his 1.9 m dish. The IC-9700 with GPS lock is a welcome addition when used with WSJT-X's Doppler tracking I no longer needing to do the hard math. I note that on 1296 everyone using digital modes has switched to Q65, but on 2 m EME the majority are still sticking to JT65, which seems a real shame. I sure miss the ON0EME beacon. I hope to see you all in the contest.

W2LPL's new folding dish stowed between activity

W6YX: Gary (K6MG) ad6fp@lbachs.com reports on his group's efforts on 3 cm during the ARRL MW Contest weekend -- K6TJ, N9JIM and I spent the month before the MW Contest weekend repairing and upgrading the 3 cm station at W6YX (Stanford University Amateur Radio Club). A new Pickett-Potter feedhorn was designed, constructed and installed on our 4.6 m 1.8 f/d Cassegrain dish. The new feedhorn produced a 3 dB improvement in Sun noise. I and N9JIM operated and accumulated 25 QSOs in 17 mults during the weekend. Worked using Q65D unless noted were W3SZ, HB9BBD (CW), F2CT (CW), UA5Y (CW), HB9BHU (CW), K2UYH, F6BKB, WA3RGQ, OK2AQ, IW2FZR, G4YTL, OZ1LPR, IK6CAK, VK7MO, G4RFR, UR5LX, DL4DTU, IK0HWJ, DL7YC, 9A5AA (CW), KN0WS, CX2SC, F5JWF (CW), OH2DG (CW) and SP6JLW (CW). The activity level seemed quite good and along with the station improvements resulted in our best 3 cm showing to date. W6YX will be on 23 cm during the Nov and Dec contest weekends.

WA6PY: Paul pchominski@maxlinear.com> was QRV in the ARRL EME MW Contest – I worked on 23 Oct on 13 cm OK1KKD, VE4MA, K3WM, OH2DG, OK1KIR, VE6BGT and DF3RU. The next day I switched to 6 cm. At the beginning, digital transmission QRM was terrible, even my echoes were often very weak buried in this QRM. I was able to QSO SM6FHZ and UA3PTW. On my spectrum analyzer the it was centered exactly on 5760.000 and 5 MHz wide with a bell shape spectrum. This is not WiFi and it was coming from a hill with several antennas almost in the direction of moonrise. After 1.5 hours, I changed to 9 cm. This switch during the night takes about 1 hour. On 9 cm, I called CQ for over 2 hours, but I heard only my very strong echoes. I thus ended with 7 QSOs on 13 cm and 2 on 6 cm for a total of 9x8. One day prior to the contest, I checked 24 GHz. Due to the higher humidity and maybe also apogee, Moon noise was only 1.8 dB, while in good condition it is up to 2.2 dB. Spreading was about 500 Hz; as expected I didn't hear CW echoes. I didn't make an effort to change to 10 GHz, and I wasn't QRV on these bands. On 1 Nov I checked again conditions on 24 GHz, path loss was predicted to be 0.8 dB with spreading about 100 Hz. I heard very nice CW echoes although Moon noise was still lower at 1.8 dB. The Moon was visible through the fog and condensed water dropped from the dish. Unfortunately, rainy weather didn't allow other station to participate in this test. I plan to be in the Nov part of the ARRL EME contest. Based on my experience from two previous years, I will probably stay only on 1296.

WC8RK: Richard gkreute@gmail.com and Joe (WA8OGS) report on their recent 432 activity – Our equipment consists of 4 x 15 el 15LFA-JT horiz yagis, TAJFUN 1000 PA running 450-500 W, antenna mounted LNA and IC-9700 with mini GPSDO and Leo Bodner signal injection board. Our previous operations had numerous frequency drift reports. We replaced the GPSDO to radio cable with a 4" RG400 and moved the amp farther away from the radio. On 29 Oct we set up our portable H-frame in light rain at WC8RK's QTH for operation the next day.

The array SWR and all looked good. We were QRO on 30 Oct when Moon was at 20 degs; but had a high SWR. We found a bad relay at ant and replaced it. The SWR was now good; still no decodes. We replaced the preamp with our spare. Success! We were getting decodes and worked PA2V, PA5Y, VE6TA, KU4XO, OK1KIR, W1E, DL7APV and K5DOG. We also tried with OZ1SKY, but propagation was one way. Brian reported hearing us every period, but we had no decodes. We noted similar propagation with other stations. On 31 Oct added SM7THS, PA3DZL, PA2CHR, OZ1SKY, DL8FDB, S51LF, PA4VHF, DL8DAU and W7MEM. We had no reports of frequency drift; so changes made corrected this issue. It was a good weekend!

K2UYH: I (Al) alkatz@tcnj.edu was QRV in the MW contest but had unexpected problems. I have been working on a better way of feeding my big dish on 6 and 3 cm using higher f/D, 3D printed, horns from KN0WS – see last NL. I decided to try new sharper feeds on 3 and 6 cm. Based on post contest measurements, I had my 3 cm feed in the wrong position, and thus had less than optimal performance. I am still not sure what when wrong on 6 cm. There was a noise level, that made copy near impossible. It was not present when I tested after the contest. I need understand better what went wrong, but have not yet had time for more testing. In the contest, I started on 3 cm on 23 Oct and worked using Q65D unless noted at 0242 F6BKB (16DB/14DB), 0346 W3SZ (13DB/16DB), 0430 F2CT (O/559) CW, 0452 W6YX (5DB/11DB), 0503 UA5Y (5DB/-) - called many times and replied once but disappeared, 0521 OZ1LPR (4DB/13DB), 0532 IK6CAK (16DB/13DB) for mixed initial #72* and 0540 OK2AQ (14DB/14DB). Signals were not as good as I had expected; and when EU activity was slowing down, I decided to switch to 6 cm while there were stations still on. There seemed to be a very high noise level present on 6 cm and I could not find the Moon. I never heard a signal and decide to switch to 13 cm. All seemed OK, but by then no one was around. I stayed on 13 cm thru my JA/VK window. I could copy both 2304 and 2400, but never heard a signal and finally gave up near moonset. The next day, 24 Oct, I started on 2304 and QSO'd at 0316 OK1KIR (4DB/8DB) using Q65C, then switched to CW at 0342 OK1CA (589/579), 0349 OK1KKD (579/569), 0356 VE6BGT (569/569), 0400 SP6OPN (579/569), 0405 UA5Y (569/569) for initial #111, 0416 OM1TF (559/559) #112 and DXCC 36, 0424 VE4MA (559/559), 0430 K3WM (569/569) #113, 0547 W5LUA (569/569) and 0557 DG5CST (579/569) #114. I was also listening XB and tried to work DL1SUZ on Q65C XB, but could not find his signal. Uwe copied me OK. I decided to try 6 cm again but had the same problem as the previous night. I did hear G3LTF but could not quite complete with Peter. Frustrated, I switched back to 13 cm hoping to hear some JAs; no other stations were copied there. Finally, just before my moonset, I switch to 9 cm to work at 1308 WA3RGQ (13DB/9DB) with Q65C. Overall I worked 7x6 on 3 cm, 9x7 on 13 cm and 1x1 on 9 cm for a total score of 17x14. Not a great contest. NE2U and K2YY stopped by for a while to participate. I'll be back on 70 and 23 cm for the final legs of the ARRL Contest and hope for better luck.

NET/CHAT/LOGGER NEWS: **PY2BS** has been testing a new setup for 13 cm. Bruce is QRV on both 2304 and 2320 and is looking for skeds at py2bs@me.com. **VK4CDI** hopes to be QRV from his new QTH by Christmas. Phil will have a new 3.6 m dish for 1296 up and 4 x 28 el yagis on 432.

FOR SALE: **DK7LJ** (DL0SHF) knows of a 10368 300 W TWTA for sale. If interested visit: http://filmserver.dummyhost.de/MoonEME/equipment-for-sale/2020-06-15%2010GHz%20300W%20TWTA%20Nortel-DASA/. **DF6NA** urgently needs 2 x 2SK2595. If you can help contact Rainer at df6na@df6na.de. **PA3DZL** has for sale 3 x N type DowKey 60 "G" option relays for transmit-receive applications. they are high power coaxial relays, >1 kW to 144, usable at lower power on 432 and 1296 with very high Isolation. Also have other nice VHF-UHF and SHF items: directional couplers up to 12.4 and 18 GHz, power splitters up to 18 GHz, SMA 2 W attenuators, different values, high Quality up to 18 GHz. SMA multi-switches: 5, 8 and 10 positions. DC to 18 GHz Signal Samplers to 12 GHz, 500 W for power indication and more. Email for more info contact Jac at pa3dzl@icloud.com. **WA2FGK** has a mount that he used for a 12' dish available to someone who will put it to good use. It needs a little work but no major repairs. It must be picked up. If interested contact Herb at 570 829-2695. **OK1TEH** still has for sale his 3 m solid dish. If interested contact Matej at ok1teh@seznam.cz.

TECH – Running CW with WSJT-X: There have been a lot of questions on how to quickly switch between CW and WSJT-X. If you try to switch your rig from SSB to CW, many time WSJT will lock up and you will have to reboot your computer. I run a TS2000X with WSJT-X; however, my experiences should apply to many other rigs. I have no problem with switching, just as long as I keep under Setting, the Radio set as "none". When I run Q65C on 1296 [and B on 432], I cannot run CFOM or use automatic Doppler correct. I do not see the need on 1296 and below. The same pretty much applies to 13 and 9 cm where Q65C is also used. The Doppler does not change that fast and manual works well. On 6 cm and above where CFOM is used. I set the Radio to "TS2000" for digital operation. [For the TS2000, you need to set the frequency control to "Fake it"; I find it works OK]. Turn off RIT and make sure the TS2000 is in SSB mode. When I run CW, I must be careful to change the Radio setting back to none. I then set the Doppler offset manually with the RIT for CW operation. I use the WSJT Doppler info and the waterfall display to see CW signals. Before I return to digital operation, I must be careful to turn off my computer CW keyer software, put the TS2000 is in SSB mode and turn off the RIT. If I forget, WSJT locks up and I need to turn off WSJT-X and restart it.

FINAL: See special OK1TEH ASTRO CORNER on SK W1OUN and Arecibo at the end of this NL.

► How can we solve the MW EME Contest problem of the too many bands to operate on in one weekend? G3LTF proposes using two adjacent weekends and split the four

bands between them – see Peter's report. I [K2UYH] suggest extending the weekend hours into Friday and Monday. (We do not have to start or stop at 0000 Z). We can also do better scheduling of band activity times. At present there is none. 9 cm for sure should have a time when everyone will try to be QRV. Coordination between JA/VK and NA is needed. There was none this year. In the past it has worked very well. No matter what the rules are next year, let's plan better. What are your thoughts?

► I5WBE sends 432 and above results for ARI 2021 EME Contests. In summary for the ARI Autumn Contest top awards were f**or 432** – Mix PA5Y, **for 1296** -- Mix Cat. AM PA3FXB, Cat. BM OK1KIR; CW Cat. A IK1FJI, Cat. B IK3MAC, and **for (MW) 10368** -- OK1CA. Top awards for the Trophy ARI Autumn EME Contest were **for 432** – Mix DL7APV, **For 1296** -- Mix Cat. AM PA3FXB, Cat. BM SM5DGX; CW Cat. A IK1FJI, Cat. B DG5CST, and **for (MW) 10369** -- OK1CA. More detailed comparisons between Spring and Autumn 2021 results and total scores follow:

Band 432 MHz.					
Pl.	CALL	Spring Points	Autumn Points	Total Score	Antenna
1	DL7APV	368	104	472	128x11el.
2	PA2V	240	108	348	4x27 el.
3	IW8RRF	6	2	8	X QUAD 9 el
Band 1,2 GHz. MIX					
Category A-mix <3,2m (10,498') & Yagi					
Pl.	CALL	Spring Points	Autumn Points	Total Score	Antenna
1	PA3FXB	996	1092	2088	2,91 m Dish
2	OM4XA	871	520	1391	3 m Dish
3	IK7EZN	245	156	401	2,4 m Dish
Category B-mix >3,2m (10,498') & Yagi					
Pl.	CALL	Spring Points	Autumn Points	Total Score	Antenna
1	SM5DGX	936	1456	2392	8 mt. Dish
2	IK5VLS	960	832	1792	4 m Dish
3	I7FNW	30	72	102	4,5 m Dish
4	I0NAA	69	27	96	5 m Dish
5	LU1CGB	32	30	62	3,6m Dish
Band 1,2 GHz. CW-SSB					
Category A-CW <3,2m (10,498') & Yagi					
Pl.	CALL	Spring Points	Autumn Points	Total Score	Antenna
1	IK1FJI	1400	1404	2804	3,2 m Dish
Category B-CW >3,2m (10,498') & Yagi					
Pl.	CALL	Spring Points	Autumn Points	Total Score	Antenna
1	DG5CST	3220	720	3940	10 m Dish
2	IK3MAC	2052	1512	3564	6 m Dish
3	LZ2US	1280	952	2232	3,60 m Dish
Band MW					
		10 GHz.			
Pl.	CALL	Spring Points	Autumn Points	Total Score	Antenna
1	OK2AQ	3402	399	3801	1,8 mt Offset D
2	F2CT	1456	672	2128	4m Dish

Full result list can be seen at http://www.ari.it/_images/stories/VHF2021/resultsemetrophy2021.pdf. TNX to I5WBE for sending this info. Enrico wants to remind you that the 2022 contests are on 9/10 April and 24/25 Sept.

► Beacons: DK7LJ reports the 10 GHz EME beacon has been switched off for two reasons. First, the backlash new AZ drive installed last year is too high. It must be changed again. Second, the 40 W SSPA after repair by G3WDG, now needs to be reinstalled. I cannot say long these changes will take because the situation with the AZ gear is complicated (high weight, special parts, possible bad weather…). The 24 GHz beacon is now working normal. (4.5 W in operation. 120 W available on demand by email). There is no news on the 1296 beacon. It remains off the air.

► The dates for the 2022 DUBUS/REF Contests are a little later this year: 12/13 March for 2 m/70 cm, 9/10 April for VK3UM Memorial 23 cm, 7/8 May for 9 cm, 28/29 May for 3 cm, 25/26 June for 13 cm and 23/24 July for 6 cm. The SSB Funtest will be on the 5/6 Jan with 13 cm Saturday and 23 cm Sunday.

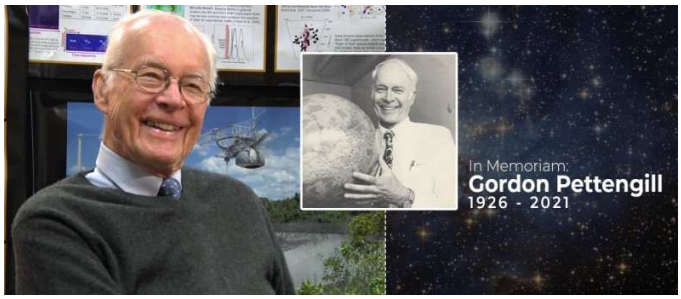
► Correction: F5HRY notes that the picture of his offset dish shown near the end of the last NL is of a 28 W SSPA for 3 cm.

► Don't forget EME2022 Prague, which will take place in Aug 2022. It is less than a year away!

► Good luck in the ARRL EME Contest on 20/21 Nov. Look for OK1TEH and K2UYH. We will be looking for you off the Moon. 73, Al – K2UYH and Matej – OK1TEH.

ASTRO CORNER LED BY OK1TEH:

Hi guys, this time I dedicate the end this NL issue to some history of Arecibo and a remembrance of Gorden Pettengill, W1OUN, who became Silent Key on 8 May 2021 at his home in Concord, Massachusetts at the age of 95.



Dr. Gordon H. Pettengill, W1OUN

I think almost everybody has heard about the famous Sam Harris, W1FZJ, who made the first ever EME QSO on 23 cm in 1960. Less is known about W1OUN, Dr. Pettengill, who was a key member of the Rhododendron Swamp VHF Society (W1BU). He was later the Director of Arecibo and made possible the operation of KP4BPZ in 1965 http://www.ok2kkw.com/eme1960/eme1960eng.htm. He was also member of the MIT team at the then new Millstone Hill radar, which received the first radar echoes from Venus during 1958-1961. These first radio observations yielded important astronomical information that has stood the test of time; and had an accuracy 3 orders of magnitude greater than had been possible with classical optical astronomy. This knowledge was critical for the successful navigation of Mariner 2 to Venus. Pettengill successfully completed a

two-dimensional radar mapping of the Moon in 1960, a key step in the U.S. preparations for the Apollo program. At Arecibo, Pettengill with Rolf Dyce, used radar pulses to measure the spin rate of Mercury and found that Mercury's 'day' was 59 Earth days, not 88 as had been previously thought. Pettengill also played a leading role in the first radar studies of an asteroid (Icarus, in 1968), a comet (Encke, in 1980), moons of other planets (the Galilean satellites, starting in 1976) and the rings of Saturn in S-band. In all of this work, Pettengill made use of radar systems at MIT's Haystack Observatory and Cornell's Arecibo Observatory; systems whose development he had guided for astronomical applications. Also in the 1970s, he was involved in several unmanned missions to Mars (including the Viking program).

For over two decades, beginning in 1977, he concentrated most heavily on Venus; this time utilizing radars aboard spacecraft, first the Pioneer Venus orbiter and later, Magellan. For many years, he pursued the idea for using a radar altimeter to map Venus and contributed key technical ideas. The results, in part, were detailed reflectivity and topographic maps of virtually the entire planet of Venus, providing geologists and geophysicists with lifetimes of work to understand the development of Venus' crust and the history of its interior. Many planetary scientists feel he was one of the individuals most responsible for our present knowledge of Venus (aside from its atmosphere).

If you would like to know more details about the very interesting first radar bounces off the surface of the Moon and Venus, I'd point you to seek an excellent book called: **Venus Alive!** By Frederick Suppe (if you are interested in more details, please contact me at ok1tehlist@seznam.cz) Additional details about Arecibo's early days and Dr. Pettengill can be found at https://history.nasa.gov/SP-4218/ch4.htm. An interesting interview with W1OUN, which was made in 2010 can be found at https://ecommons.cornell.edu/handle/1813/40321.

The following remembrance to his ham radio story was written for his local Winn Brook High School in Belmont, MA (TNX to KB1LWY):

Story of W1OUN:

W1OUN (from https://www.qrz.com/db/W1OUN)

All through my childhood in the early 1930's I thought I wanted to study electrical engineering when I got older. Even at the age of six, I was attempting to build radios -- none of which actually worked, of course -- out of old parts donated by the local radio repairman, parts pulled from junk radio sets built in the 1920's. I remember showing some of these to a doctor who attended my father in 1935, and asking him if he knew why they weren't receiving radio signals. He looked at one old vacuum tube, and saw the letters CX stamped on its base. Remembering his Roman numerals, he suggested maybe I should be sending 110 volts to it, instead of the battery's six volts I was using. I certainly hope he had a better knowledge of medicine! And I definitely had my share of electrical jolts from the old power supplies -- called "battery eliminators" in those days. It is a miracle I survived!

By the age of 10, I had an elementary grasp of how radio sets worked, taken from old books I found in the local public library, but it wasn't till I was 11 or 12 that I first built a working radio - a simple crystal set. But it was in high school that I began to meet others interested in radio, and get turned on to ham radio. I owe particular gratitude to Henry Cross, who became W1OOP, an active two-meter ham in the Boston area.

Later, in college, I joined the MIT Radio Club, and studied for my amateur license in 1943 (test taken in the top floor of the old Custom House tower). Although amateur radio activity and call-sign licensing were shut down during the war, the town of Dedham where I lived had a War Emergency Radio Service that permitted a group of us to set up very-short-range transmitters at a two-and-a-half-meter wavelength, for communication in emergencies. My receiver was an acorn tube in a super-regenerative circuit (ugh!). I wonder whether the output from the receiver wasn't stronger than from the transmitter! We never did have an emergency, but we were allowed to run test transmissions on a regular basis from our homes, and this provided a pale substitute for normal peacetime ham activity.

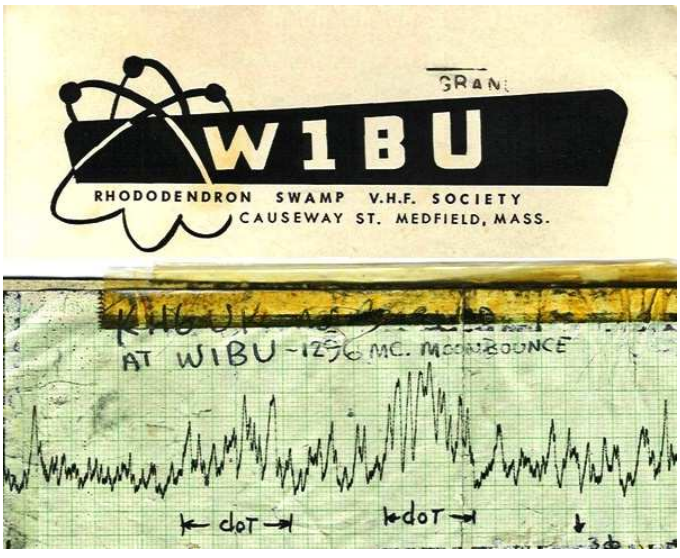
In 1944 I was drafted into the army as an infantryman, but after the war I ended up in Austria, where I was transferred to the Signal Corps, and the unit I was in had a couple of unused Hallicrafters kilowatt radio transmitters. Since one of my buddies was also a radio ham, we quickly converted one of these to a radio amateur station using the call sign: OE1NX - an Austrian prefix. We worked a lot of stations on CW throughout Europe on 40 meters, and took advantage of 10-meter openings to talk back to the States.

After I was discharged from the army in 1946, I moved to Portland, ME, where my mother had remarried and set up my new ham station (W1OUN) there, including a 24-element rotating beam antenna for 2-meters, along with a decent transmitter (300 watts). I was quite interested in radio propagation at these short, line-of-sight wavelengths, and over the summers of 1946, 1947 and 1948 arranged a nightly schedule with W1PRZ, in East Bridgewater, Mass.,

a distance of well over a hundred miles. At that extreme distance, his signal was usually weak, but I could still recognize it, and we traded reports. Once in a while, atmospheric conditions would bend the transmissions around the Earth's curvature, and we would hear each other loudly. By keeping regular records, we actually began to find patterns in the propagation. I was also interested in the occasional auroral-enhanced propagation, and in the use of meteor trails to hear very brief echoes from distant stations.

After finishing college in 1948, I took a job at Los Alamos, NM, and got a new call: W5PGY. In those days you had to get a new assignment each time you moved into a new call area. A couple of years later, I decided to go for an advanced degree, and moved out to Berkeley, CA - with another new call: W6JWA! When I finally came back to live in New England in 1955, I was lucky to get my old call back, and have held it ever since.

Except for W1OOP, most of my former friends in the Boston area were gone by 1955, but one of the more interesting new ones, met through W1OOP and his radio circle, was Sam Harris, W1FZJ, an engineer with Microwave Associates Corporation. Sam (and his wife, Helen) lived in an extraordinary spread in Medfield, MA, where he had a number of isolated wooded acres over which to spread large antenna systems, surrounded by a square mile or more of marshland. Thus there were no neighbors to complain of radio interference on their TV! A group of us formed a radio club called (after a nearby conservation preserve) the Rhododendron Swamp VHF Society, with the call: W1BU. Yes, we later incurred the ire of the Boston University Radio Club, who wanted those same letters!



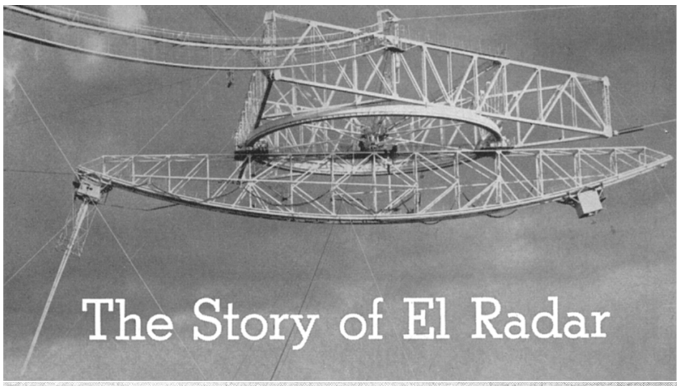
Sam, with help from our group, managed to construct a 64-element beam antenna and high-power transmitting system, that could just detect radio echoes from the moon at a two-meter wavelength. At this extremely short wavelength, signals do not reflect from the earth's high-altitude ionosphere (as does traditional short-wave radio), and are thus normally received only over a line-of-sight distance of a few dozen to perhaps a hundred miles. But, by bouncing from the moon's surface as it was viewed simultaneously by two separated stations, two-meter radio signals could be sent halfway around the world. Since it takes 2.5 seconds to travel to the moon and back at the speed of light, we could easily test our equipment by transmitting a one-second burst, and then listening for our own echo. Using this system, we managed to communicate with a number of other amateurs located in Europe and South America.

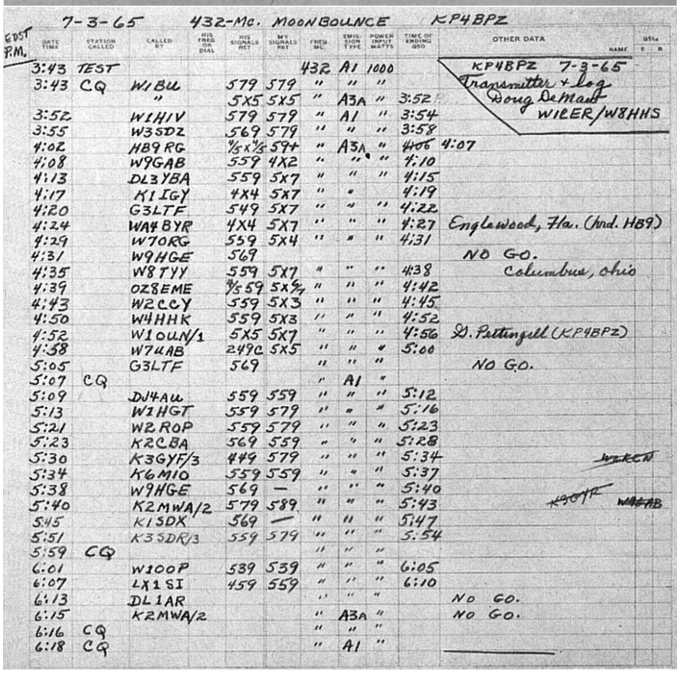
In early 1962, I left the States for a scientific meeting in Varna, Bulgaria. After five days of meetings there (by the Black Sea), it was time to head home, but I thought it would be interesting to try and take the famous Orient Express, which crossed southern Bulgaria into Turkey. On the day of my departure, I flew out of Varna on the local domestic airline, and landed in Burgos. It was not a city on the usual tourist circuit, and I stood out like a sore thumb! Burgos is a port city, and had the slightly rough look so often seen near docks, so I was a little apprehensive as I walked towards what looked like the downtown district. As I waited for the light at a crossing, carrying my suitcase, I recognized a pin on the lapel of the man standing next to me: it was the internationally recognized emblem of the American Radio Relay League, with its logo of antenna and coil. I pointed to it and identified myself as a fellow ham (in halting Russian, which is pretty close to Bulgarian, and widely understood in the region). Without a word, he picked up my suitcase and motioned me to follow him!

We ended up in a small cafe, where I joined a group of young people over a jug of local wine and a waxed paper full of oily black olives. For several hours, I described my American life as well as I could - it's amazing how much one can communicate in a halting mixture of Russian and English, when an eagerness to do so prevails! The rest of that trip is another story, one that does not involve ham radio.

A year or so later, my work took me to live in Arecibo, Puerto Rico, for a couple of years, at the big 1000-ft radio astronomy antenna operated by Cornell University there. Thus, another new call: KP4BPZ. I set up a simple shortwave system from my house; I also used equipment at the site (see my QSL card below), and on several occasions was able to commandeer the big dish for a few hours of operation at both two meters (using a simple Yagi feed) and on the 420-450 MHz amateur band (in the middle of which Arecibo had its U.S. Government license to operate a megawatt radar!). With the huge antenna behind me, it was possible to use reflections from the Moon to contact

amateurs in Europe and South America, at 70 cm wavelength. Because the sky coverage of the antenna is limited to only about three hours each day, we recorded a bandwidth of several hundred kHz after each transmission, and could thus patiently dig out weak signals coming back to us at our leisure over several days of replaying. Everyone got a QSL!





7-3-65 432-Mc. MOONBOUNCE KP4BPZ

EDST P.M.

Date Time	Station Called	Called By	His Freq or Dial	His Signals RST	My Signals RST	Freq. Mc.	Emission Type	Power Input Watts	Time of Ending QSO	Other Data	QSLs
3:43	TEST					432	A1	1000		KP4BPZ 7-3-65 Transmitter + log Doug DeMaw W1CER/W8HHS	
3:43	CQ	W1BU		579	579	"	"	"			
		"		5X5	5X5	"	A3A	"	3:52		
3:52		W1HIV		579	579	"	A1	"	3:54		
3:55		W3SDZ		569	579	"	"	"	3:58		
4:02		HB9RG		4/5X4/5	59+	"	A3A	"	~~4:06~~	4:07	
4:08		W9GAB		559	4X2	"	"	"	4:10		
4:13		DL3YBA		559	5X7	"	"	"	4:15		
4:17		K1IGY		4X4	5X7	"	"		4:19		
4:20		G3LTF		549	5X7	"	"	"	4:22		
4:24		WA4BYR		4X4	5X7	"	"	"	4:27	Englewood, Fla. (hrd. HB9)	
4:29		W7ORG		559	5X4	"	"	"	4:31		
4:31		W9HGE		569						NO GO.	
4:35		W8TYY		559	5X7	"	"	"	4:38	Columbus, Ohio	
4:39		OZ8EME		4/5 59	5X6/7	"	"	"	4:42		
4:43		W2CCY		559	5X3	"	"	"	4:45		
4:50		W4HHK		559	5X3	"	"	"	4:52		
4:52		W1OUN/1		5X5	5X7	"	"	"	4:56	D. Pettingell (KP4BPZ)	
4:58		W7UAB		249C	5X5	"	"	"	5:00		
5:05		G3LTF		569		"	"	"		NO GO.	
5:07	CQ					"	A1	"			
5:09		DJ4AU		559	559	"	"	"	5:12		
5:13		W1HGT		559	579	"	"	"	5:16		
5:21		W2ROP		559	579	"	"	"	5:23		
5:23		K2CBA		569	559	"	"	"	5:28		
5:30		K3GYF/3		449	579	"	"	"	5:34	~~W1KCN~~	
5:34		K6MIO		559	559	"	"	"	5:37		
5:38		W9HGE		569	—	"	"	"	5:40		
5:40		K2MWA/2		579	589	"	"	"	5:43	~~K9GYR~~ ~~WA4AB~~	
5:45		K1SDX		569	—	"	"	"	5:47		
5:51		K3SDR/3		559	579	"	"	"	5:54		
5:59	CQ					"	"	"			
6:01		W1OOP		539	539	"	"	"	6:05		
6:07		LX1SI		459	559	"	"	"	6:10		
6:13		DL1AR				"	"	"		NO GO.	
6:15		K2MWA/2				"	A3A	"		NO GO.	
6:16	CQ					"	"	"			
6:18	CQ					"	A1	"			

When I returned to Arecibo for a second stint a few years later I was assigned a fresh call: KP4DFX (actually my favorite!), which I used intensively on 15 meters. I managed a Captain Cook award for working 50 VK's as well as 50 ZL's in that bicentenary year. There's nothing like a tropical location for good DX'ing!

Since returning to Massachusetts, I haven't been very active till recently, when I got back on two meters, and shortly hope to revisit some of my old HF bands!

[source: http://www.belmont.k12.ma.us/class_pages/laroche/ham_radio/profiles/index_files/Page927.htm]