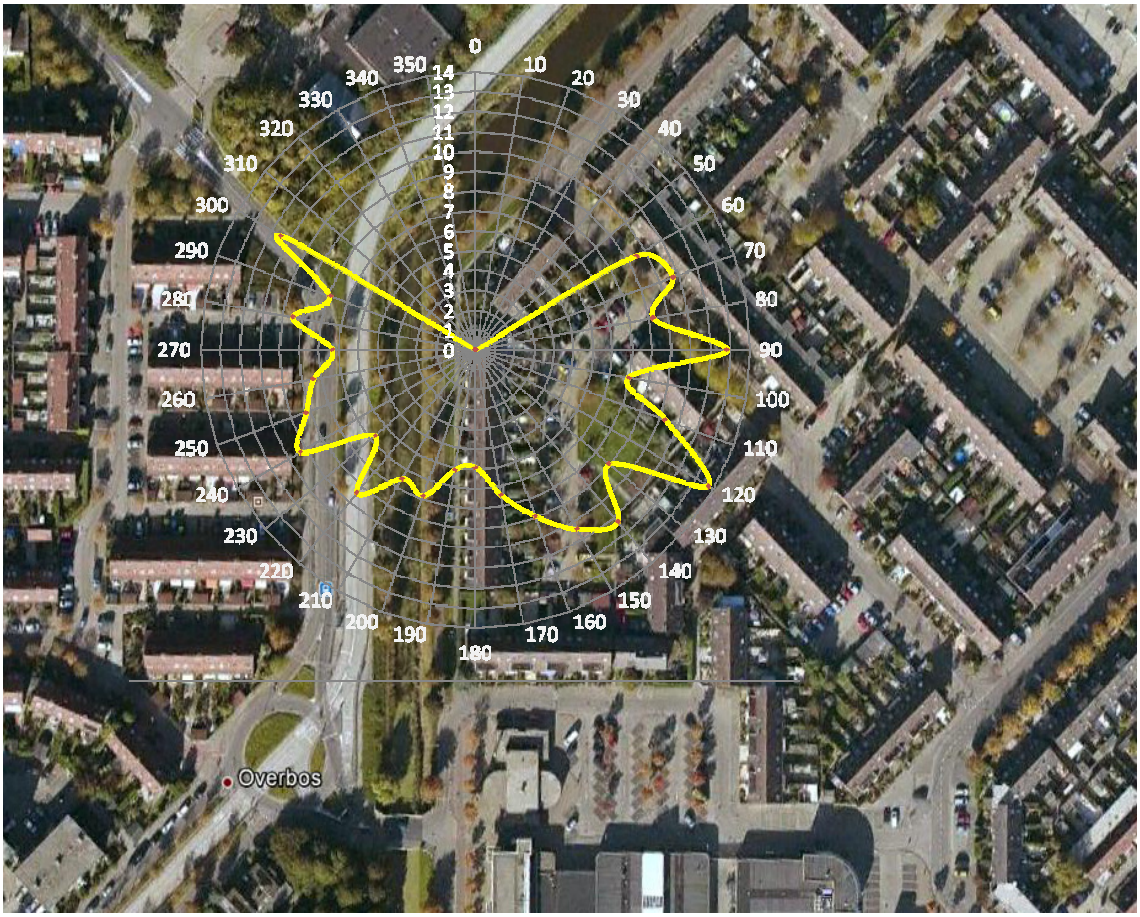
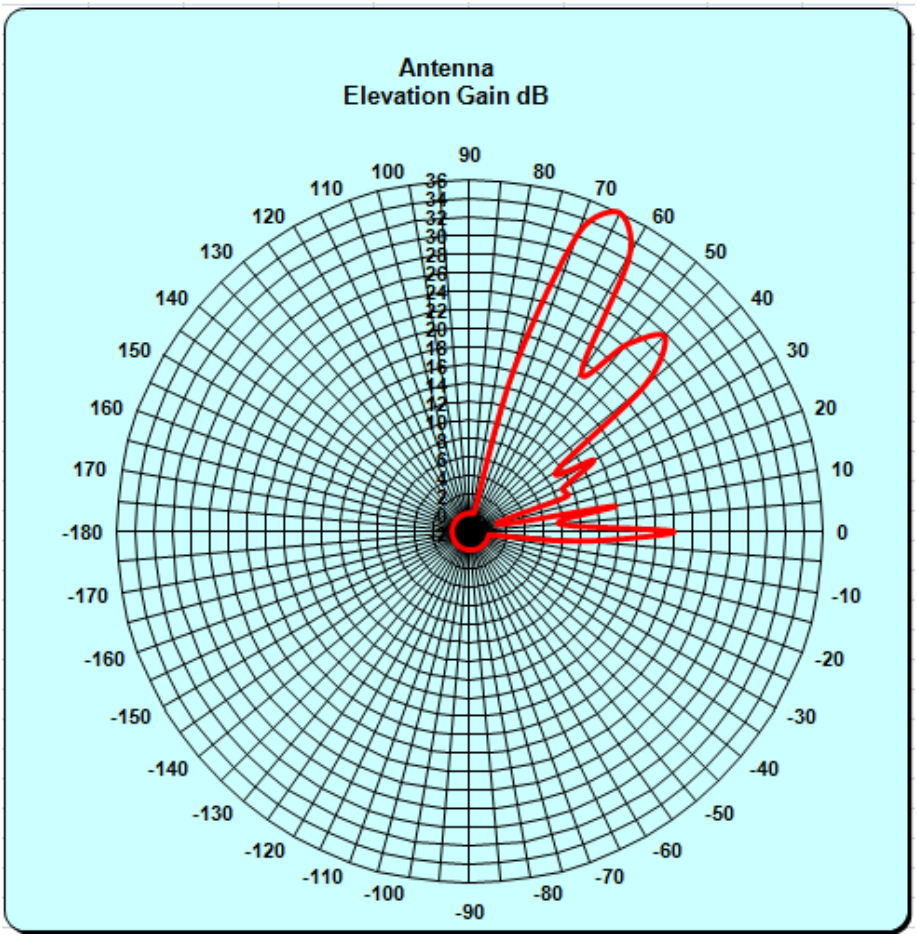
Environmental noise on 432MHz **PA0PLY**

As probably most of the EME'rs we are suffering from an growing amount of environmental signals which may influence our receive capabilities on 432Mhz EME activities.
Myself I got frustrated being not able to work Alex, UY2QQ, although his station performance did not indicate to be a problem to run a QSO. Since Alex was suffering from a preamplifier, while I have a DB6NT masthead unit, it was strange I could not copy Alex, while he did copy me.
Initially I conclude my RX preamp was running bad, but any other check like terrestrial beacons and sun-noise check confirmed all is ok.
Running Sun noise tests, I concluded it was not difficult to find the maximum noise, but finding a cold area around turned out to be a problem. This led me to the understanding that environmental noise might be the problem of my RX performance.
In order to better understand this phenomena I ran noise tests from 60-300degrees in AZ, while the antenna was at 0 degree ELE. The set-up consists of the Kenwood TS2000X, with in-active AGC (function-8) and the audio connected to Spectrum Laboratory V2.7 software.
All the data was collected in an Excel sheet and a radar type of graph was produced.
The next step I performed was downloading my environmental location for Google earth.
Combining those two sets of information, resulted in the next picture.



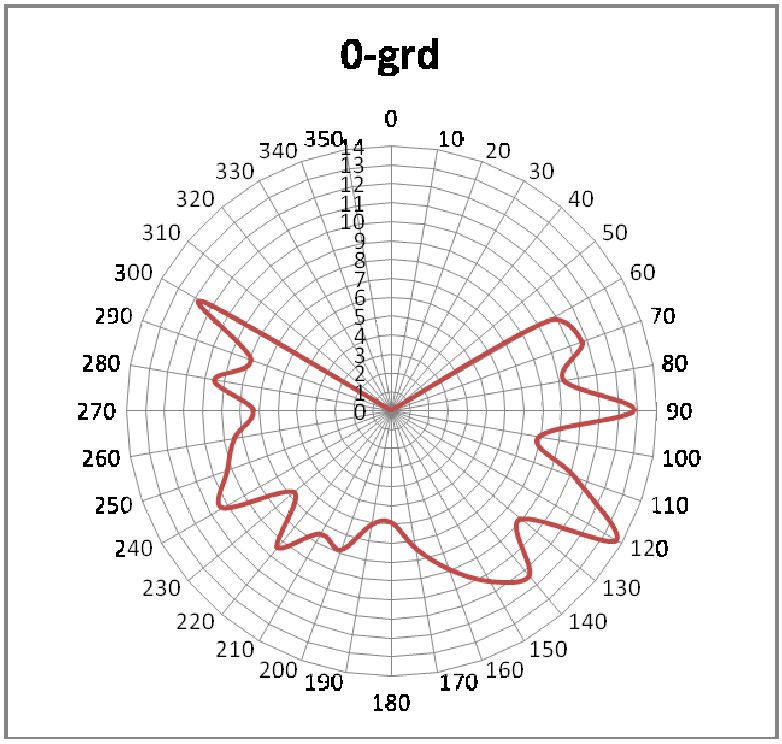
Now at least I concluded that my noise floor does vary depending on the direction of the antenna.
The differences in noise were found in excess of almost 8dB, thus here is a serious reason why a station could not be detected in certain directions!

Overlooking this first test, I realised that we, EME'rs very rarely postion the antenna at 0 degree ELE.
At higher elevations the main lob of the antenne, might not pick up much environmental noise, but sidelobes still may do, depending on the position of the first sidelobe for example, as it is most of the time the strongest lobe of an antenna.
Using a local beacon, I run a test and measured all signalstrengths at intervals of 5 degrees ELE.
The result is shown in below picture. As one can find, the 1st sidelobe is on 20degr from the mainlobe. This would mean that at 20degree ELE, there might be a substantional amount of environmental noise entering the receiver and degrading the receive performance.
The 1st Sidelobe is -10dB from the mainlobe.



Elevation pattern of 8 x 3m Yagi's

Finally I run some noise measurements from 60 degrees to 300 degrees AZ, with different settings for ELE, in order to have some reference information during actual operation of the station.
Those tests were run over various days and different times. It turned out that there was no serious differences in field strengths at each point related to the time of the measurements.
All results were averaged and used to compile below graphs for a total overview.
The results are shown in below sections.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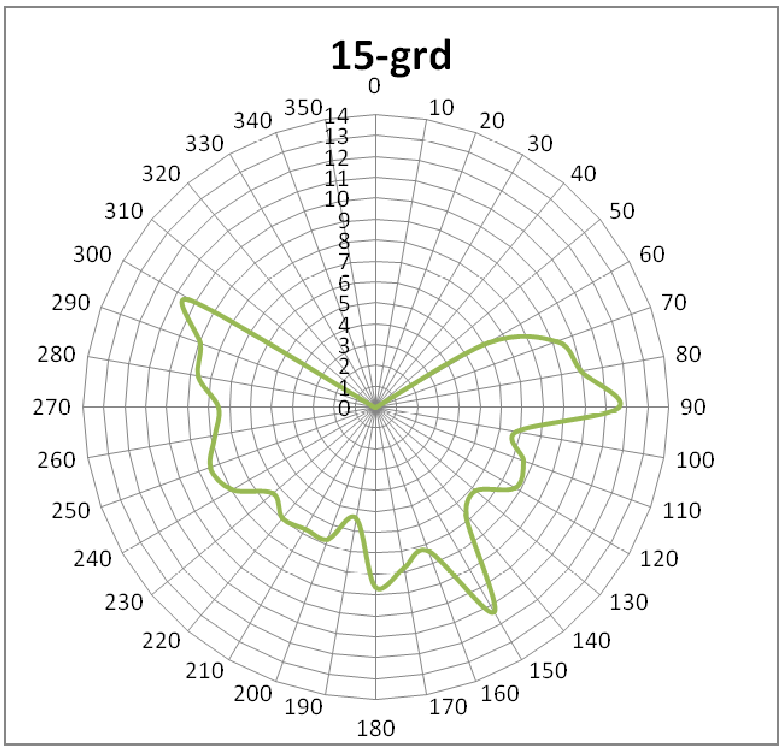
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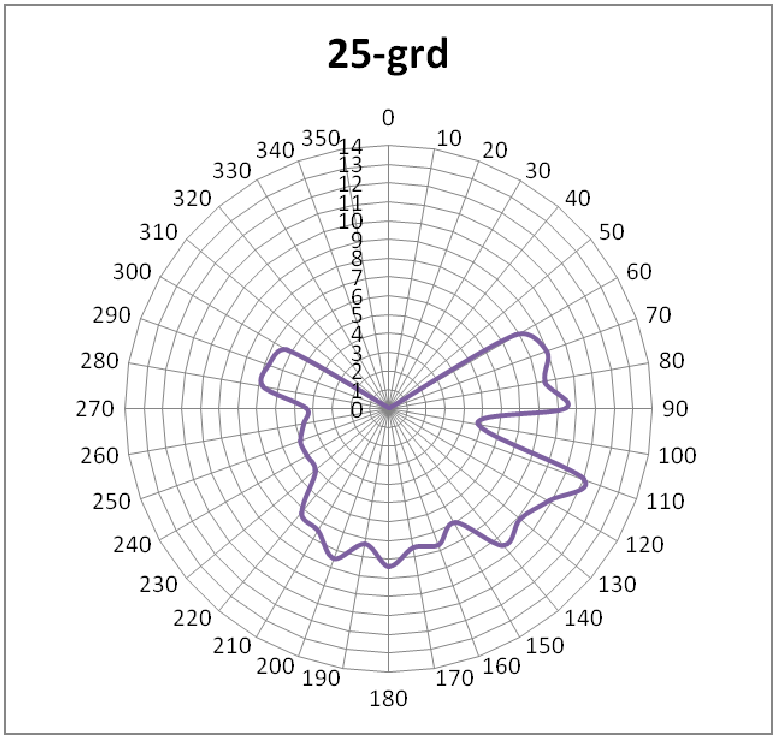
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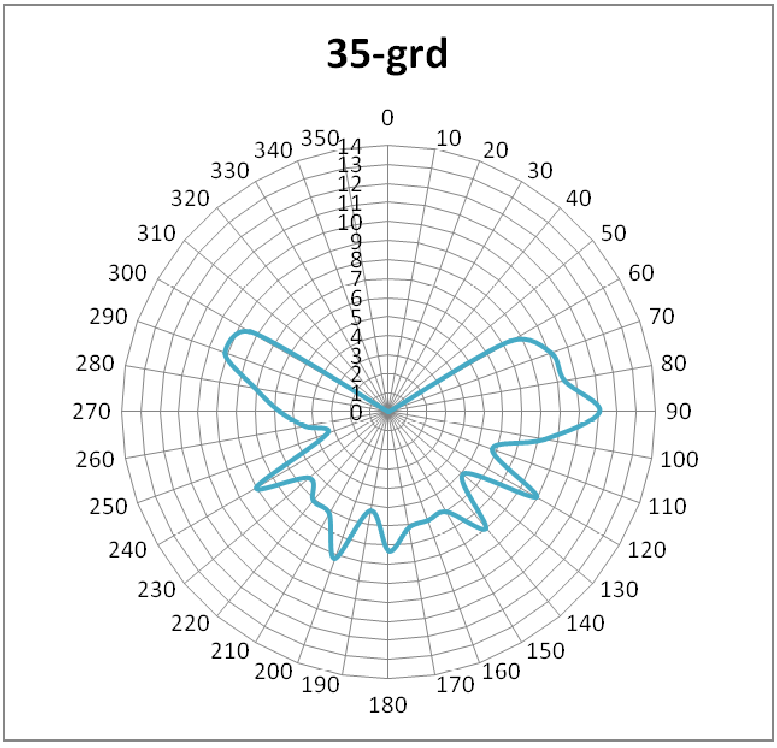
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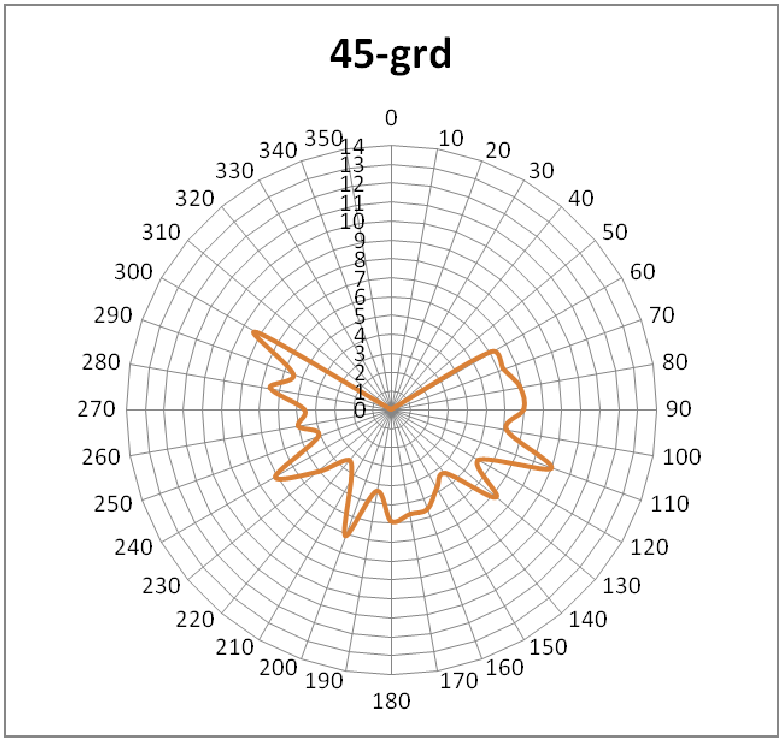

Conclusions.

It was an interesting experiment while it provides some more understanding on what happens in the close environment of the antenna position. Those houses which are situated some 100meters away from the antenna do generate more noise, while pointing the antenna straight over a block of houses, in 180 degree direction, tend to block incoming noise a bit. See also the Google-map.

Elevating the antenna in general shows reduction of the average noise, however at all ELE settings there is a different pattern for the AZ settings.

In case of close to noise level communications, it is worth waiting for a better environmental position, either in AZ or ELE direction. At least at higher elevation setting less environmental noise reaches the antenna.
Measurements as described here do contribute to a better understanding of the circumstances and will help to find the best position for successful weak signal contacts.

Remark.

I did not run tests between 300 to 60degrees for three reasons.

- The front to back ratio of my antenna is good, with >30dB and I do not expect signals from the back to contribute to the total as such.
- This area is not populated with houses and generating noise is not expected.
- The moon will not pass this area, thus antenna will never be pointed there.