NEWSLETTER-AMSAT-EA

08/2021 AUGUST

contacto@amsat-ea.org eb1ao@amsat-ea.org Translation by Fernando EC1AME

GENESIS satellites to launch on September 2

The GENESIS-L satellites and G E N E S I S - N, designed and built by AMSAT-EA in collaboration with students of the European University and of ICAI, will be launched, in a first attempt on september 2, once the American company Firefly has performed the static test of the Alpha launcher, this having been the last step before the launch. The vehicle is ready for take-off in its Vanderberg Air Force Base platform in California and includes, in this first flight, many other satellites from several universities and organizations.

GENESIS are satellites with digital ASK and CW repeaters and also with experimental Ion thrusters , AIS-gPPT3-1C from Applied Ion Systems.

The working frequencies of the satellites are as follows:

GENESIS-L

145.875 MHz uplink, Modos: CW, ASK 50 bps
436.875 MHz downlink CW, ASK 50 bps, callsign AM2SAT

GENESIS-N

145.888 MHz uplink, Modos: CW y ASK 50 bps
436.888 MHz downlink CW ASK 50 bps, callsign AM3SAT

The description of the telemetry and the operating mode of its repeaters can be found in these links:

Link to transmissions description

AMSAT-EA will be in the air on all available satellites with the callsign AM1SAT from September 13 to 19, 2021 to celebrate the third edition of the AM1SAT trophy-contest. AMSAT EA operators will activate the callsign AM1SAT from a minimum of 14 different locations during that period of time, in order to facilitate the maximum number of EA grids via satellite.

As part of this activity and to encourage participation, will have the SILVER and GOLD classifications, as well as a trophy for those that get the largest number of grids and different satellites worked.

RULES TO GET THE CERTIFICATE

1. The diplomas may be requested by any worlwide radio amateur with a valid license.
2. Contacts with AM1SAT are valid if made through any amateur radio satellite, between September 13 at 0h UTC and 19 September 23:59 UTC, in the indicated modes .
3. The locators exchanged will be 4 digits, for example, IN71, IM68, Im77.
4. Diplomas are distinguished for contacts made in LEO satellites and others apart for contacts in GEO
5. Two groups of requirements are defined according to the location of the applicant to obtain LEO diplomas: within Europe (plus EA8 zones and EA9) and the rest of the world.
6. FM and CW / SSB / Digital categories are distinguished for diplomas LEO, there is only one category in GEO.
7. Diplomas will be awarded in silver (easier) and gold (more difficult).
8. A physical trophy sent free of charge will be awarded to the greatest hunter of grids and the biggest satellite hunter.

LEO DIPLOMAS

Participant in EUROPEAN territory plus EA8 and Ea9:

- LEO EUROPA FM SILVER Diploma: To obtain this diploma the Applicant should contact AM1SAT station on FM receiving 5 different locators, being understood by locator, the one composed of 4 digits, for example, IN71, IM68, IM77, etc.

- LEO EUROPA FM GOLD Diploma: To obtain this diploma the Applicant should contact AM1SAT station on FM receiving 10 different locators.

- LEO EUROPE CW / SSB / Digital SILVER Diploma: To obtain This diploma the applicant must contact the AM1SAT station in CW / SSB or digital modes, receiving 3 different locators.

- LEO EUROPE CW / SSB / Digital GOLD Diploma: To obtain this diploma, the applicant should contact the AM1SAT station on CW / SSB or digital modes receiving 7 different locators.

Participants out of europe:

- LEO NO EUROPA FM SILVER Diploma: To obtain this diploma, the requesting station outside Europe should contact the station AM1SAT on FM receiving 2 different locators.

- LEO NO EUROPA FM GOLD Diploma: To obtain this diploma, the station outside of Europe should contact station AM1SAT on FM receiving 4 different locators.

- LEO NO EUROPE CW / SSB / Digital SILVER Diploma: To obtain this diploma, the applicant station outside Europe must contact the AM1SAT station in CW / SSB or digital modes, receiving 2 different locators.

- LEO NO EUROPE CW / SSB / Digital GOLD Diploma: To obtain this diploma, the requesting station outside Europe should contact AM1SAT station in CW / SSB or digital modes, receiving 4 locators different.

DIPLOMAS GEO (Global)

- SILVER GEO Diploma: To obtain the GEO diploma in category SILVER, the applicant must contact the AM1SAT station receiving 5 locators in CW / SSB or any valid digital mode on the QO-100 satellite.

- GEO GOLD Diploma: To obtain the GEO diploma in category GOLD, the applicant must contact the AM1SAT station receiving 10 locators in CW / SSB or any valid digital mode on the QO-100 satellite.

Diploma	Plata	Oro
LEO Europa FM	5 locators	10 locators
LEO Europa CW/SSB/Digitales	3 locators	7 locators
LEO No Europa FM	2 locators	4 locators
LEO No Europa CW/SSB/Digitales	2 locators	4 locators

Diploma	Plata	Oro
GEO Global	5	10

GRID HUNTER TROPHY

The trophy will be awarded to the Grid Hunter, to the participant who receive a greater number of AM1SAT squares during the event. In case of tie, it will be awarded to the participant who has needed less time to contact them.

SATELLITE HUNTER TROPHY

The trophy will be awarded to the Satellite Hunter who has contacted AM1SAT through a greater number of different satellites during the event. In case of satellites with more than one mode or band (For example,AO-7, AO-92 or QO-100), it will only be counted as a single satellite regardless of whether both modes or bands have been worked on. In case tie, it will be awarded to the station that has needed the least time in get the claimed figure.

In case the same station is worthy Of the two trophies, the Satellite Hunter Trophy will go to the second classified.

Sending of logs and receipt of diplomas and trophies

- No physical or electronic QSLs are required. When the Requirements are done, the applicant must send a list with the QSOs in ADIF form,including his callsign, name and the data of the different QSOs (Date, time UTC, frequencies, mode, locator received and satellite used for contact), and the email in which you want to receive the diploma. The diplomas will be sent within a maximum period of 2 months and only in PDF format, free of charge. The trophies will be sent without any cost to the winner to the address indicated.

- The log and any question regarding the rules must be sent to eb1ao@amsat-ea.org

- The deadline for receiving logs is October 1, 2021 at 23:59 UTC. The logs of the AM1SAT operators will be considered valid when checking the QSOs . In case of discrepancy or incidence, this will be solved by AMSAT-EA.

PORTABLE STATION OF THE MONTH (5T5PA - JOHANNES)

EA1PA - SALVA

The object of this article is to compare several omnidirectional antennas designed to work satellites in the UHF band. This comparison is based on the simulations carried out with the free antenna analysis software "MMANA-GAL Basic". Information,help and download at http://gal-ana.de/basicmm/en/ .

In order to get valid conclusions, the studies have been carried out under the same working conditions. That is, external variables such as height, type of soil, material, frequencies, ... have remained constant in all cases:

a. Simulation frequency in UHF: **435MHz**
b. Antenna height: **2m** (approximately is the height of the tests real things that I have carried out in the field).
c. Soil type: **Real** (moderately dry soil, see graphs).
   - Relative permittivity (dielectric constant): **15.**
   - Conductivity (for UHF): **10mS / m**.
d. Material: **Aluminum.**
e. Cross section**: 8.04 mm2** (Ø3.2mm).
f. Polarization: Circular clockwise, **RHCP.**

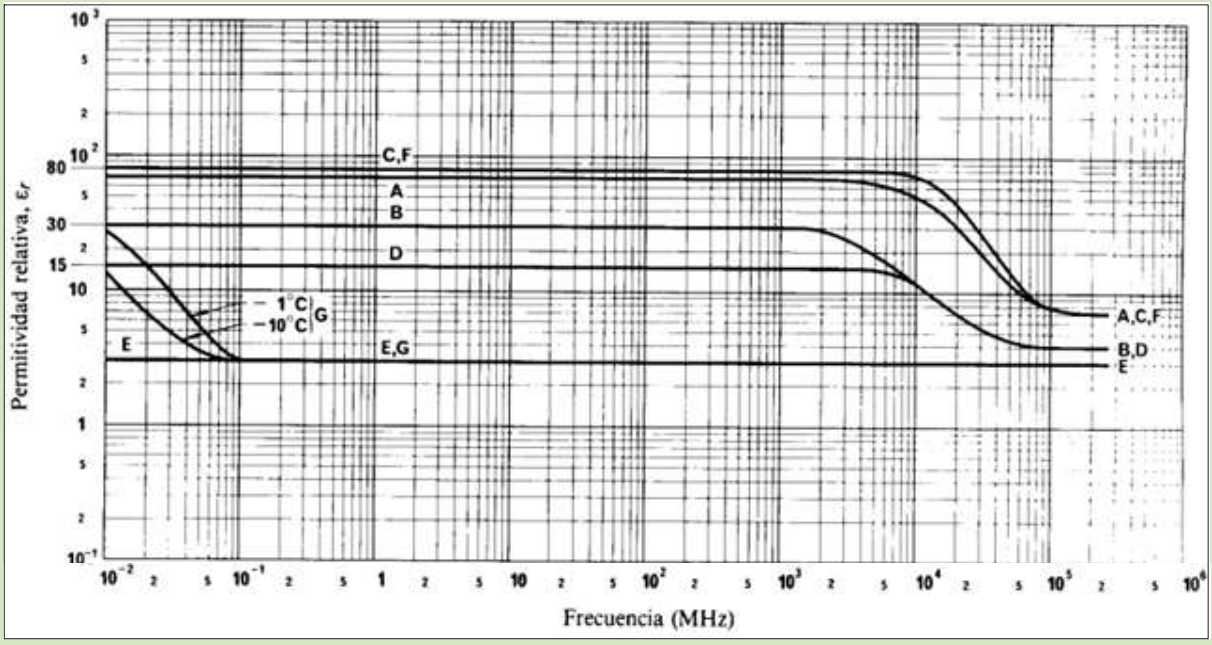


Figure 1. Relative permittivity of the soil.

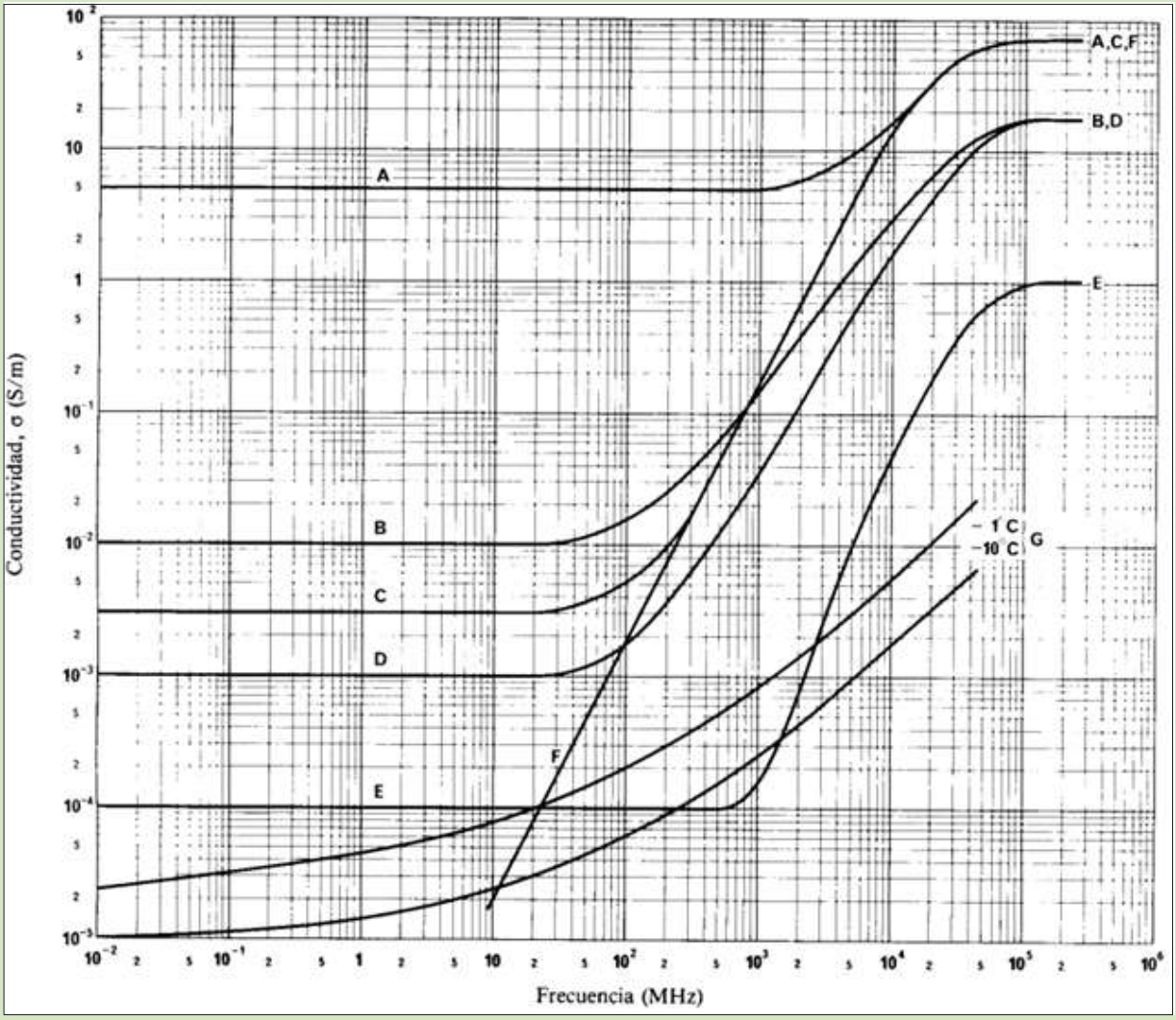


Figure 2. Ground conductivity.

A: Salt water, 20°C.
B: Wet soil.
C: Fresh water, 20°C.
D: Moderately dry soil.
E: Very dry soil.
F: Pure water, 20°C.
G: Ice (fresh water)

Figures 1 and 2 show typical values of conductivity and permittivity for different types of terrain depending on the frequency. These values refer to homogeneous but rare subsurface soil structures , rather it is made up of two or more layers of different thickness and different conductivities and permitivities.

In order to better understand the effect of the soil and show a complete comparison most among all analyzed antennas, the calculation tool allows to consider the simulation in "Free space", which will show the instrinsic nature of each antenna with its unadulterated radiation pattern.

The antennas that we are going to compare are the 5 most common omnidirectional sat antennas. They are also perfect for you to try and built them spending little budget; information is available on the Internet.

1. Eggbeater II antenna (EA-4-CYQ 31-10-2000)
2. QFH antenna (width / height ratio 0.44)
3. TPM2 antenna (EA-4-CYQ 31-10-2000)
4. Double cross Moxon antenna ("Crossed Moxon") ("Crossed Moxon")
5. Turnstile antenna (crossed dipoles + reflectors in a lower plane)

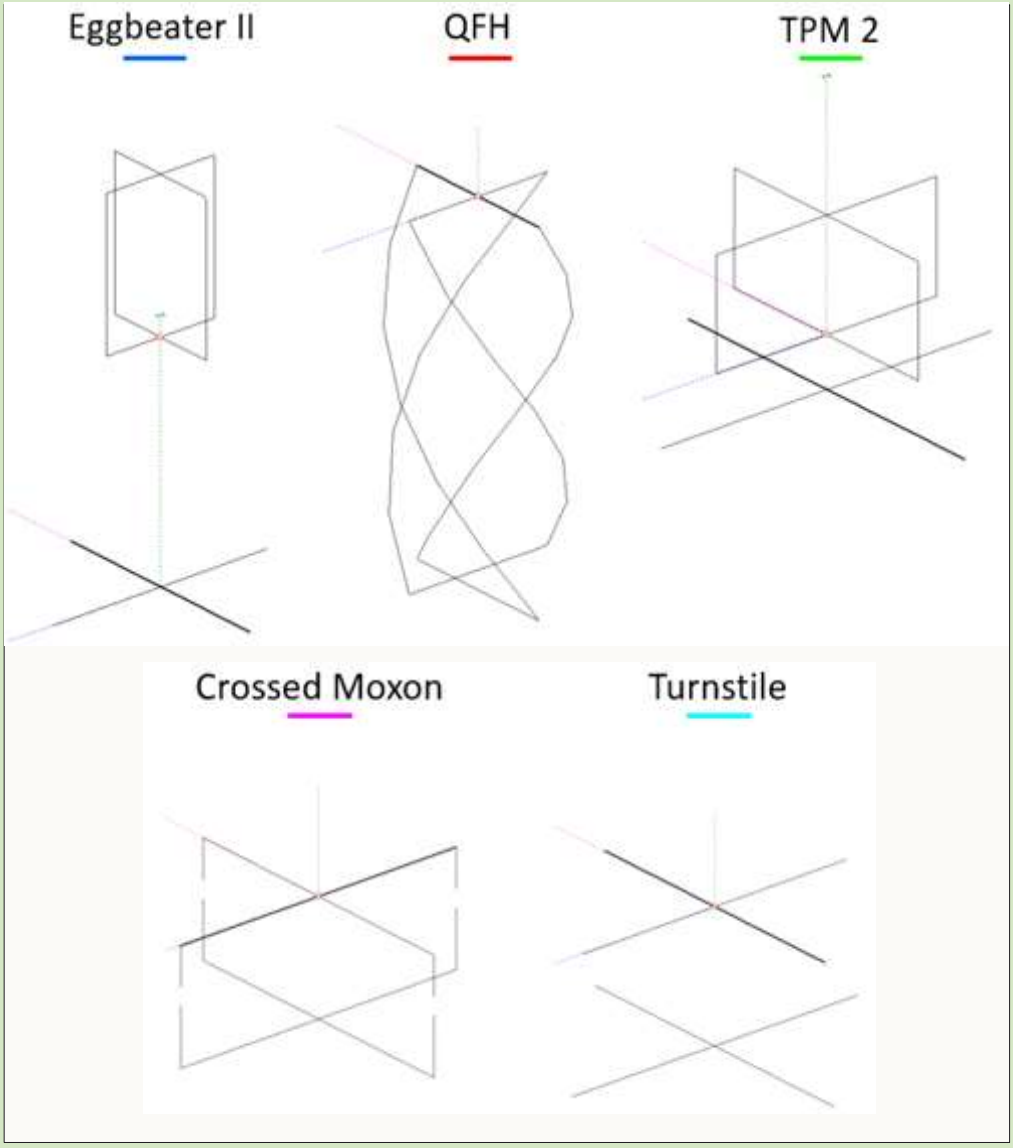
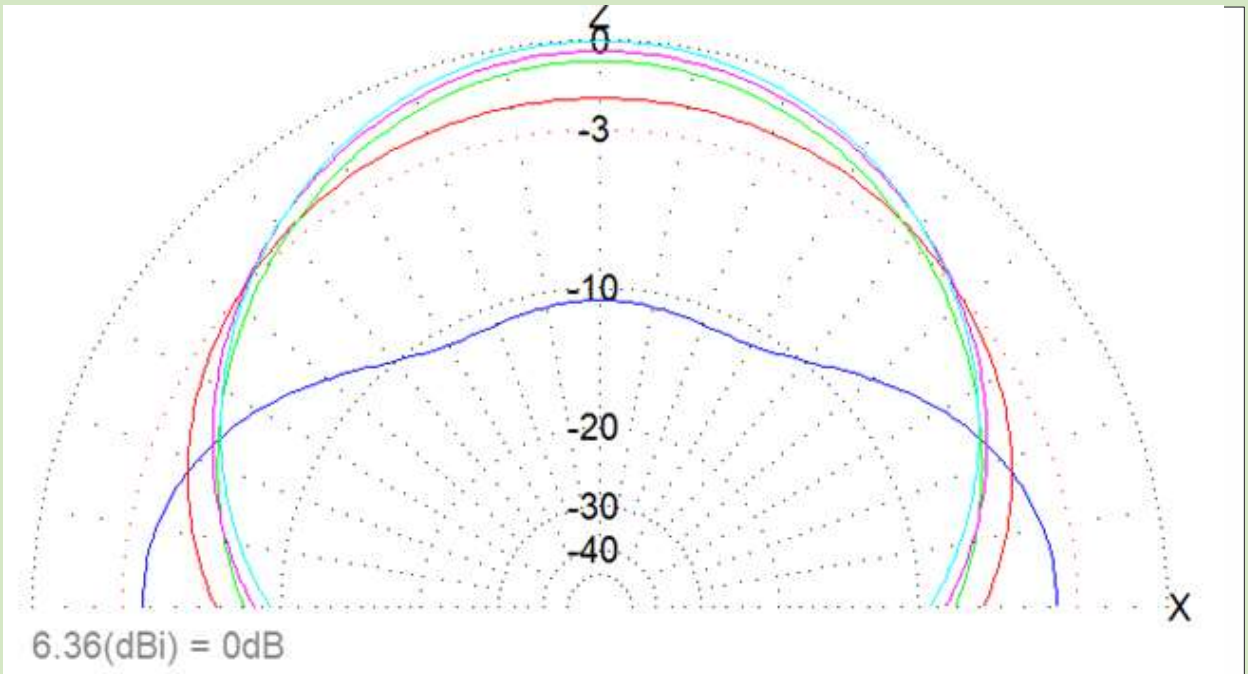
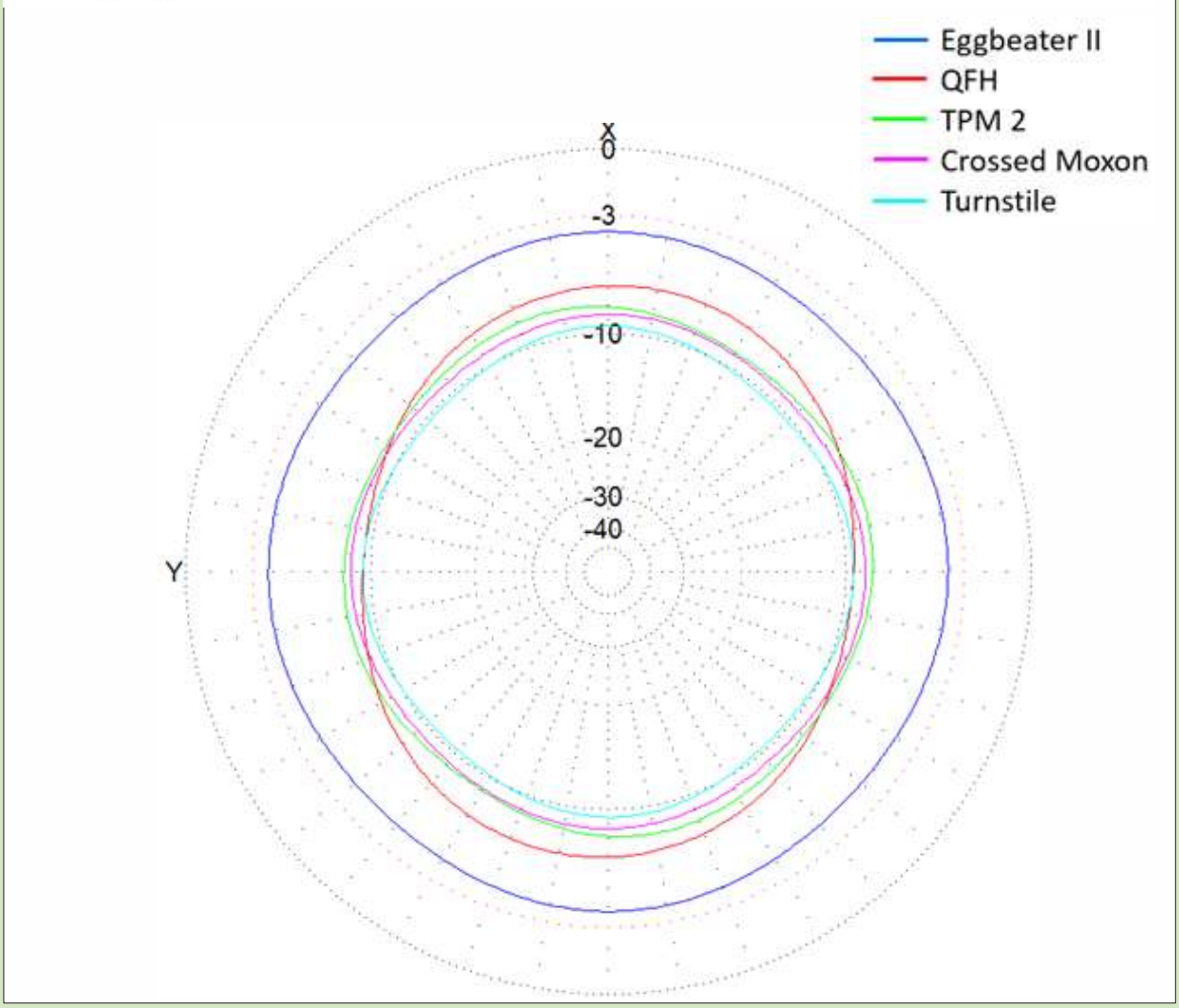


Figure 3. Geometry of the antennas under study.

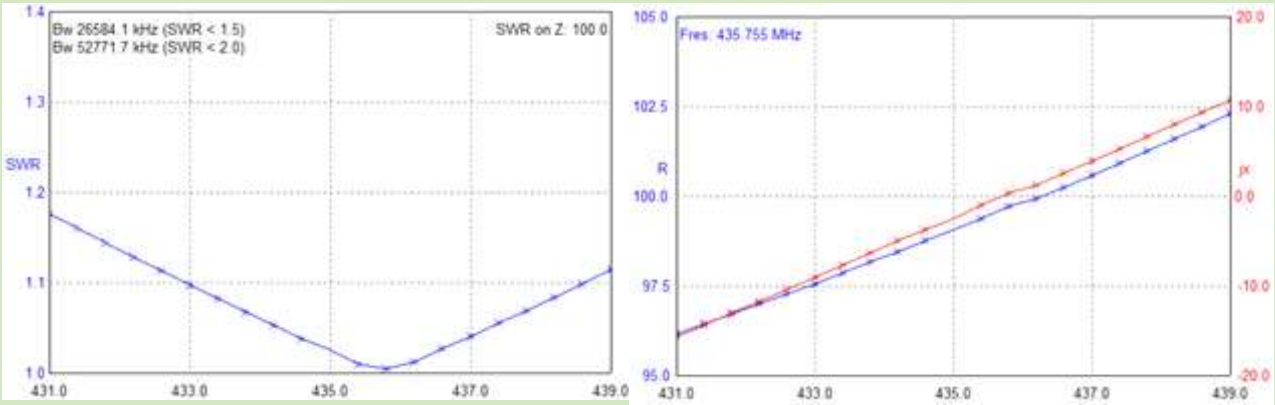
SIMULATION RESULTS AND OVERLAYING RADIATION PATTERNS

I. Free space:

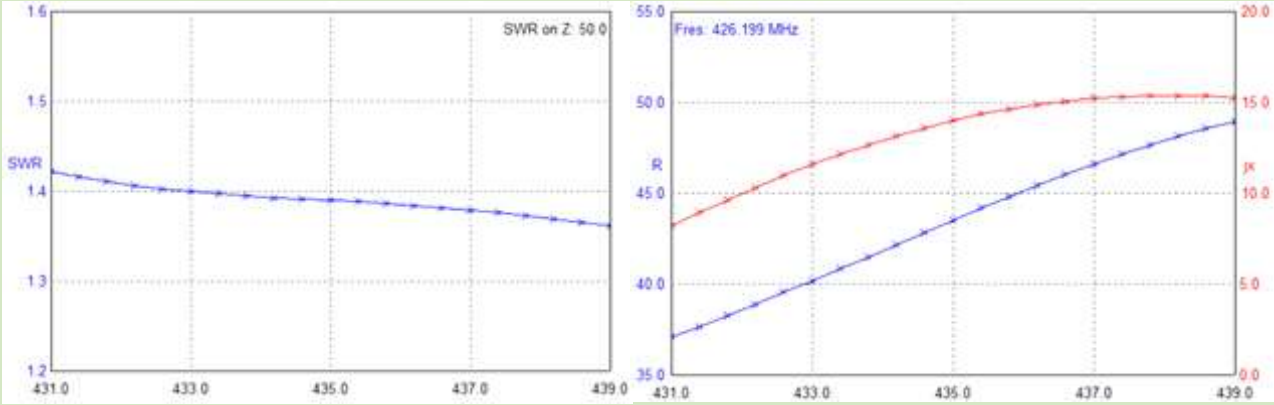




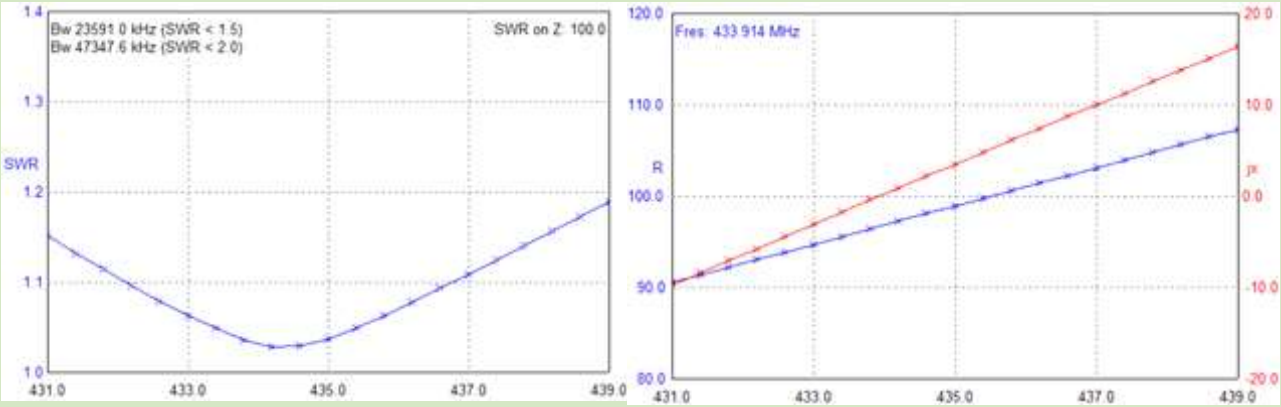
1. **Eggbeater II** antenna (SWR & Z graphs):



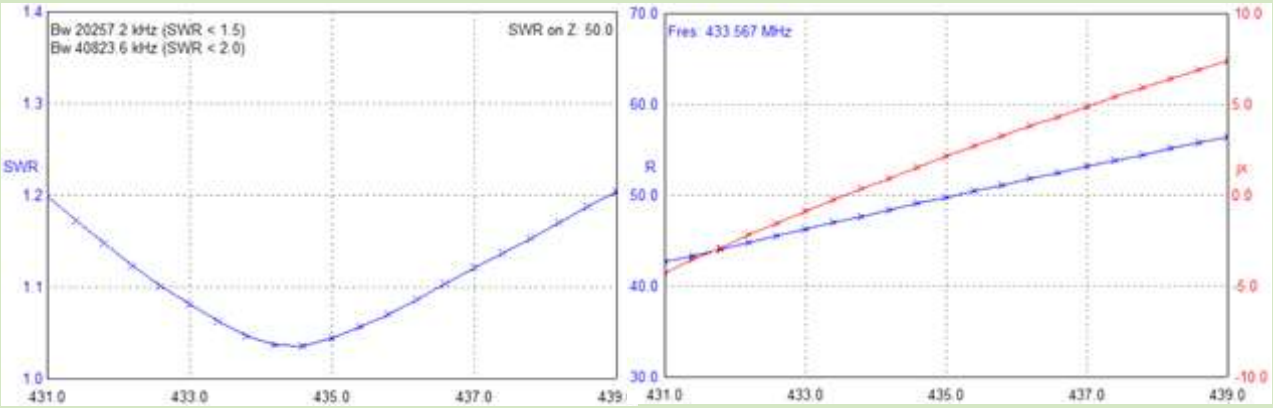
2. **QFH** antenna (*SWR* & Z graphs):



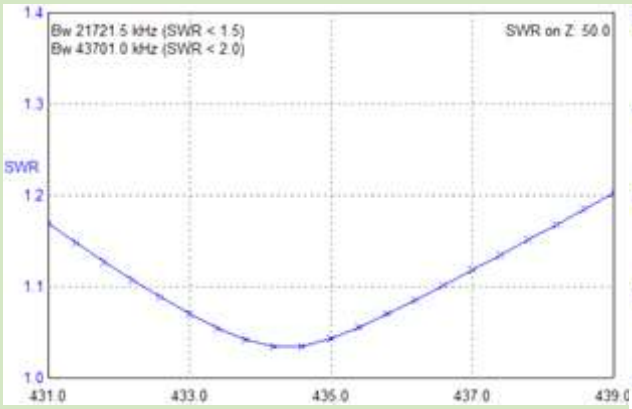
3. **TPM2** antenna (*SWR & Z,* graphs):

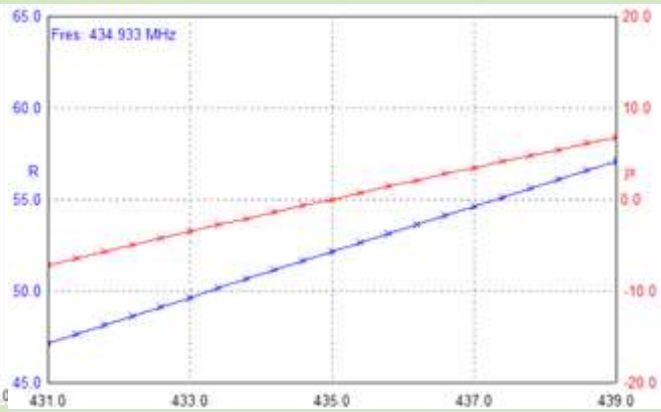


4. **Cross Moxon** antenna (*SWR & Z,* graphs):

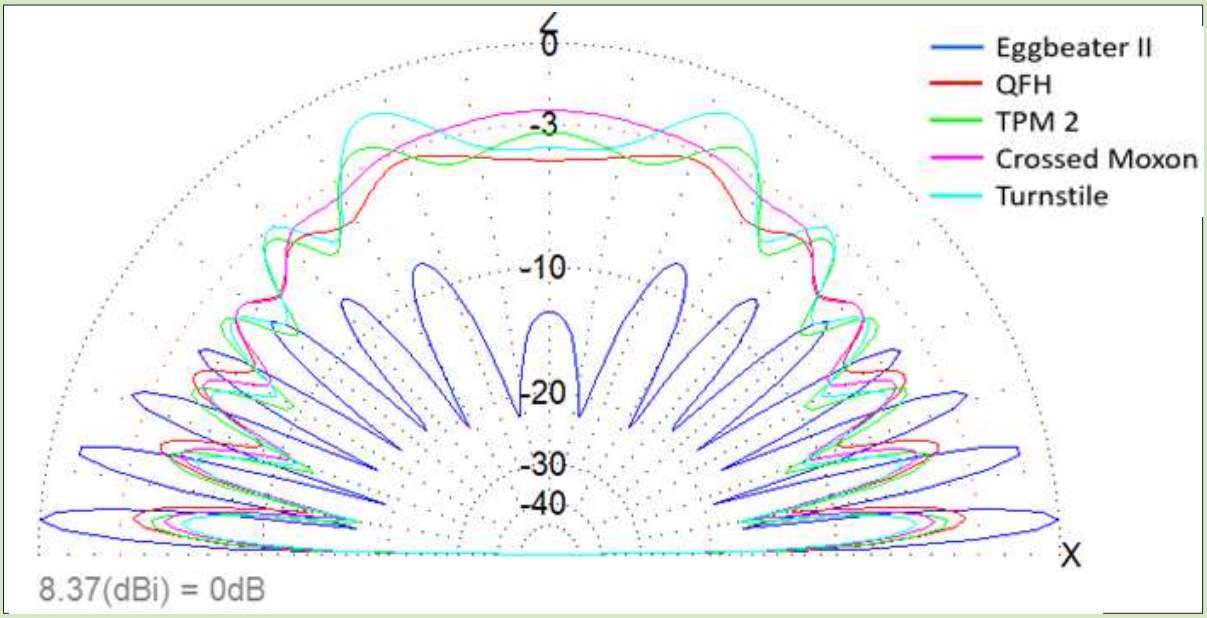


5. **Turnstile** antenna (*SWR & Z*, graphs):





II. Real earth:



SUMMARY TABLE AND CONCLUSIONS

ANTENNA	1		2		3		4		5	
	Eggbeater II		QFH		TPM 2		Crossed Moxon		Turnstile	
Height (cm)	54.5		23.1		15.8		9.3		13.8	
Width (cm)	33.7		10.2		35.4		24.7		33.6	
Band	UHF (435MHz)		UHF (435MHz)		UHF (435MHz)		UHF (435MHz)		UHF (435MHz)	
Polarization	RHCP		RHCP		RHCP		RHCP		RHCP	
Ground	Free	Real	Free	Real	Free	Real	Free	Real	Free	Real
Max. Gain (dB)	2.63	8.38	4.52	4.38	5.74	6.14	6.06	5.97	6.36	7.15
Elev. max.	2	4.1	90	70.3	90	64.6	90	90	90	67.3
Z (Ohm)	99.09 -2.28j	97.77 -2.49j	43.55 14.04	45.60 11.33j	98.99 3.57j	98.63 3.15j	49.85 2.17j	49.85 2.18j	52.19 0.12j	51.86 -0.53j
SWR	1.02	1.03 (100Ω)	1.39 (50Ω)	1.3 (50Ω)	1.03 (100Ω)	1.04 (100Ω)	1.04 (50Ω)	1.04 (50Ω)	1.04 (50Ω)	1.04 (50Ω)

With all the data from the table above, along with the radiation patterns, and in the simulation circumstances considered, already we can get some general conclusions:

- It seems that the Eggbeater II antenna is the bestperformer at low elevations clearly outperforming the others.The maximum gain value is the highest of all. The lower radials or reflectors help not to lose gain , but there still appears to be a significant decrease. The ground effect causes the typical ripple, very pronounced for this antenna,which theoretically leads to significant signal variations along of the pass. In the field tests that I have carried out at a height of 2 meters I have not detected this behavior, on the contrary, the reception has few fading. This point has me clueless and I am afraid he deserves to investigate it better by reviewing the simulations, even with other software.
- The TPM2 type antennas, Moxon and Turnstile are quite similar and its intended behavior is totally contrary to the eggbeater. Vertical passes work much better.
- The QFH antenna has a not so vertical pattern, widening slightly down to better pick up passes with mid elevation. In addition, a certain elongation is observed in the pattern of radiation, it has not a clear omnidirectionality as the rest. So there is a favorable direction that is oriented perpendicular to the “long loop".
- I was surprised by the very similar result between the crossed Moxon and the Turnstile. In other previously consulted publications, showed more substantial differences, being the turnstile with reflector the one more focused upwards and fencing, as a positive point in favor of the moxon, the largest lateral lobe to perform adequately in not so vertical passes reaching both medium and high elevations.

ANTENNA	1	2	3	4	5
	Eggbeater II	QFH	TPM 2	Crossed Moxon	Turnstile
Optimal pass El-direction	Low/Very low	High/Mid	High/Mid-high	High/Mid-high	High/Mid-high
Predominant Az-direction	No (omni)	Yes (slight)	No (omni)	No (omni)	No (omni)
Curly pattern (real ground)	Yes (very high)	Yes	Yes	Yes	Yes
Max. Gain (dB)	Very good	Good	Very good	Very good	Very good
VSWR	Very good	Good	Very good	Very good	Very good

Briefly I make some additional comments taking into account personal experiences with each of the antennas:

- **Eggbeater II:**I am conducting the first field tests. I can confirm good reception especially in flat passes and low and even medium elevations . The feelings to date are quite good. I still haver to verify the behavior in many other circumstances and verify transmission performance. As I commented before,it seems that it does not suffer major fading.
- **QFH:** Very compact antenna that presents a good signal-to-noise ratio and little fading. It is not a wonder, but it defends itself with dignity. The results obtained by Juan Carlos, EA5WA, are being very favorable, even with the dualband version.
- **TPM2:** Pending construction and testing a prototype. I only have references by the photos, the plans and the very positive comments of Juan Antonio, EA4CYQ. With a smart configuration placing several Fixed TPMs along various directions he had great results.
- **Cross Moxon :** Excellent high pass performance in both RX and TX. In the rest of the conditions it is somewhat poor.
- **Turnstile:** Poor overall performance, better at high elevations. I sincerely expected something more, after all it is not very useful. My personal experience is not very satisfactory with this type of antenna, maybe due to a manufacturing fault? Defective lag line? ...

EXPLANATORY NOTES

- We have to keep our feet on the ground and not pretend to compare the omnidirectional antennas with directional antennas. They are not at the same level, the best omni-directional antenna doesn't come close to the worst directional antenna with a real-time tracking system.
- It is recommended and almost mandatory to use a good preamplifier for the reception (effective in low-noise environments and without inhibitors). The UHF signals are not usually very strong being very prone to any type of energy attenuation.
- Do not take the numerical results and conclusions of this article literally as universal truths, I do not consider myself an expert in this kind of simulations, calculations and antennas. It has simply been approached as a qualitative study, not quantitative, to predict general behavior of each antenna. And remember that "each pass is different" and what counts is identify global trends across many countries.

Finally, I encourage anyone who comments, rectifies, contributes, or complete this topic, or others of interest, by posting your experiences in future articles in this AMSAT-EA newsletter.

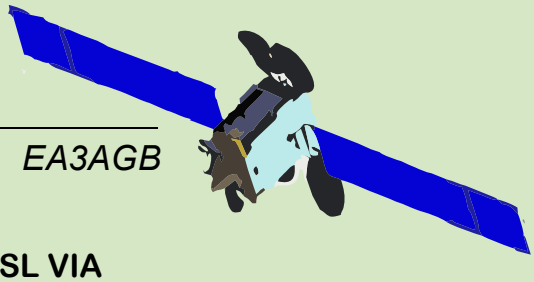
Thank you so much for your attention. Kind regards,

Salva
EA1PA
salvaggff@yahoo.es

N8MR EA4CY RS-44 QSO

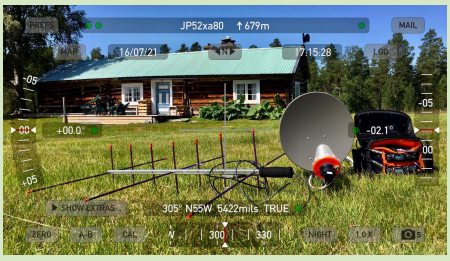
Taking advantage of an outing to the field of N8MR, our colleague Juan Antonio has been able to do a QSO with N8MR from Brockway Mountain in Copper Harbo via RS44.

QO-100



EA3AGB

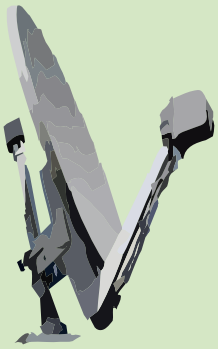
CALL	LOCATOR	MODE	QSL VIA
5T5PA/P	IL20	SSB	LOTW
5T5PA/P	IK17	SSB	LOTW
5T5PA/P	IK18	SSB	LOTW
5T5PA/P	IK19	SSB	LOTW
5T5PA/P	IK27	SSB	LOTW
5T5PA/P	IK28	SSB	LOTW
5T5PA/P	IK29	SSB	LOTW
F4FVI/P	IN86	SSB	F0FVI
LA9XGA/P	JP22	SSB	LOTW
LA9XGA/P	JP31	SSB	LOTW
LA9XGA/P	JP32	SSB	LOTW
LA9XGA/P	JP41	SSB	LOTW
LA9XGA/P	JP42	SSB	LOTW
LA9XGA/P	JP50	SSB	LOTW
LA9XGA/P	JP51	SSB	LOTW
LA9XGA/P	JP52	SSB	LOTW
LA9XGA/P	JP60	SSB	LOTW
LA9XGA/P	JP61	SSB	LOTW
LA9XGA/P	JP62	SSB	LOTW
LA9XGA/P	JO58	SSB	LOTW
LA9XGA/P	JO59	SSB	LOTW
LA9XGA/P	JO69	SSB	LOTW
PY1SAN	GG88	SSB	LOTW
PP2RON/P	GF49	SSB	LOTW
PR8KW/P	GI27	SSB	LOTW
PR8KW/P	GF37	SSB	LOTW
PR8KW/P	GF39	SSB	LOTW
PR8KW/P	GF48	SSB	LOTW
SV8CS	KM07	SSB	LOTW
ZD7GWM	IH74	SSB	DIRECT



Tor, LA9XGA

A71UN/P

4Z1ZV



5T- Mauritania 5T5PA/P Johannes, active in a few hours of operation 7 grids.

LA- Noruega, LA9GXA/P Tor. He has been very active for several grids, delighting hunters.

T7- San Marino DL4EA Antonio, plans to activate this entity via SAT at the end of July.

ZD7- Santa Helena ZD7GWM Garry is active from this new entity in QO-100

AMSAT-EA products in the URE store

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