NEWSLETTER-AMSAT-EA

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Translation by Fernando EC1AME

AMSAT-EA works on the URESAT mission design

AMSAT EA is already working on the mission of URE's first satellite, URESAT-1. At the IberRadio Fair, held in September, the possible functionalities that could implement this satellite were shown Details of the predicted evolutions for URESAT start from the experience of previous GENESIS missions, with satellites GENESIS-N and GENESIS-L, launched into space with Firefly on September 3 (although not achieved orbit due to thruster failure), and EASAT-2 and Hades, which will launch with SpaceX on January 10 from Cape Canaveral.

Although the final functionalities must be approved by URE, it is expected that URESAT-1 sat incorporates a FM voice repeater, transmissions in FSK and some kind of on-board experiment, which could be a camera with SSDV transmissions or some kind of propellant. In case the necessary funding is achieved, this satellite could be sent to space by the end of 2022.

4 New Cubesats deployed from the ISS

JAXA announced the deployment of four ISS CubeSats on 6 October with J-SSOD. The satellites are Binar-1, Maya-3, Maya-4 and CUAVA-1. All satellites operate in the ham bands.

- Binar 1
  - Downlink 437.292 MHz, 435.810 MHz 19k2 GMSK
  - 435.810 Mhz uplink

- Maya-3 y 4
  - .APRS downlink 145.825 MHz, CW on 437.375 MHz, 4k8 GMSK

- CUAVA-1
  - Downlink: 437.075 MHz 9k6 GMSK
  - Uplink: 145.875 MHz

AMSAT EA support for the Europe Space Challenge

The Spanish company in the space sector UARX, with the help of other partners and the support of Government of the Galicia region, has launched the first edition of the Europe to Space challenge to encourage interest for STEM and the space sector between spanish University students. In the future this challenge would be extended to other European and even Latin American universities.

In a YouTube presentation held on October 14, the Project was explained to about 200 students and university professors from all over Spain and they showed lot of interest in the project.

In short, the project consists of providing satellite kits to Universities so that students can assemble them, test them, include own experiments and finally send them into space, with a maximum of 32 planned satellites. The main mission of these satellites would be to provide communications to hams, although, as indicated, each one could carry its own experiments designed by the students. The company in charge of the launch would be UARX.

AMSAT-EA, which is the satellite branch of URE (Spanish Ham Radio Union), has been included in the project to help mainly in the CONOPS phase (Concept of Space Operations), although finally Its list of support activities, if the project goes ahead, will be as follows:

- Advice to teachers and students
- Definition of the satellite mission
- Mission design
- Procedures with the administration and agencies
- Operation of satellites
- Coordination of space operations
- Dissemination of results

The registration period for this first edition, for all students interested , whose only initial requirement is to be enrolled in some Spanish University, ends November 15.

More information about the project in the following link:

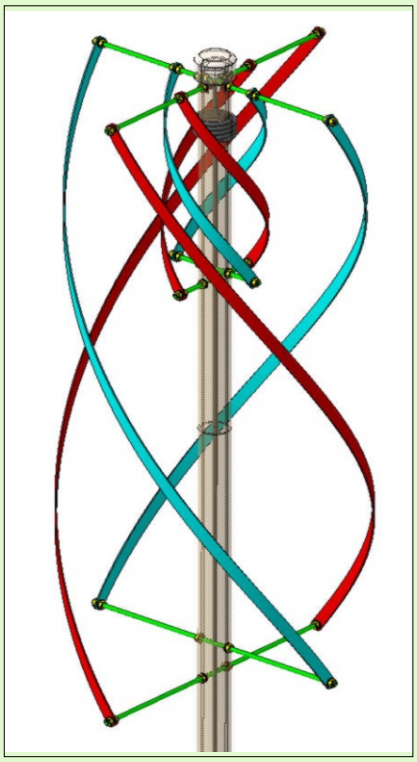
https://www.eu2space.com/index.php

ANTENA QFH DUAL

EA1PA - Salva

1.- Introduction

I write this article to propose, describe and comment on myexperience with a new alternative of omnidirectional dualband QFH ("quadrifilar helical") antenna. This type of antenna has already been analyzed in previous articles published in this bulletin and now I intend to present another version with improved characteristics, or at least, somewhat different, which may be interesting for certain installations. So this text is a complement or continuation to the rest of works already published.

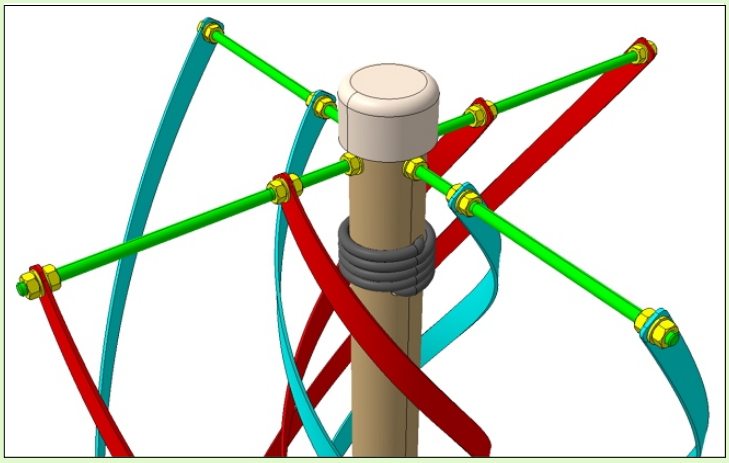


- Articles published in the AMSAT-EA bulletin about QFH antennas:
    - "QFH ANTENA", written by EA5WA - Juan Carlos (November 2020).
    - "DUAL BAND QFH ANTENA", by EA1PA - Salva (December 2020).
- Presentation at IberRadio 2018:
    - "SATELLITE STATION WITH QFH ANTENNAS", by EA4BFK - Alejandro.

A previous reading of the previous works is recommended since they contemplate many interesting details that are omitted here so as not to expand and be more concise.

2.- Description

The antenna concept is simple, just join two QFH antennas together, one resonant in the VHF band and the other in UHF. The upper crosshead, formed by threaded rods, is common and is connected to the coaxial cable, in the same way than if it were a single band QFH. The propellers, manufactured from plates of formed aluminum, they are born in the diameters that correspond to the crosshead upper, and die on the lower threaded rods, as would correspond for single band versions.

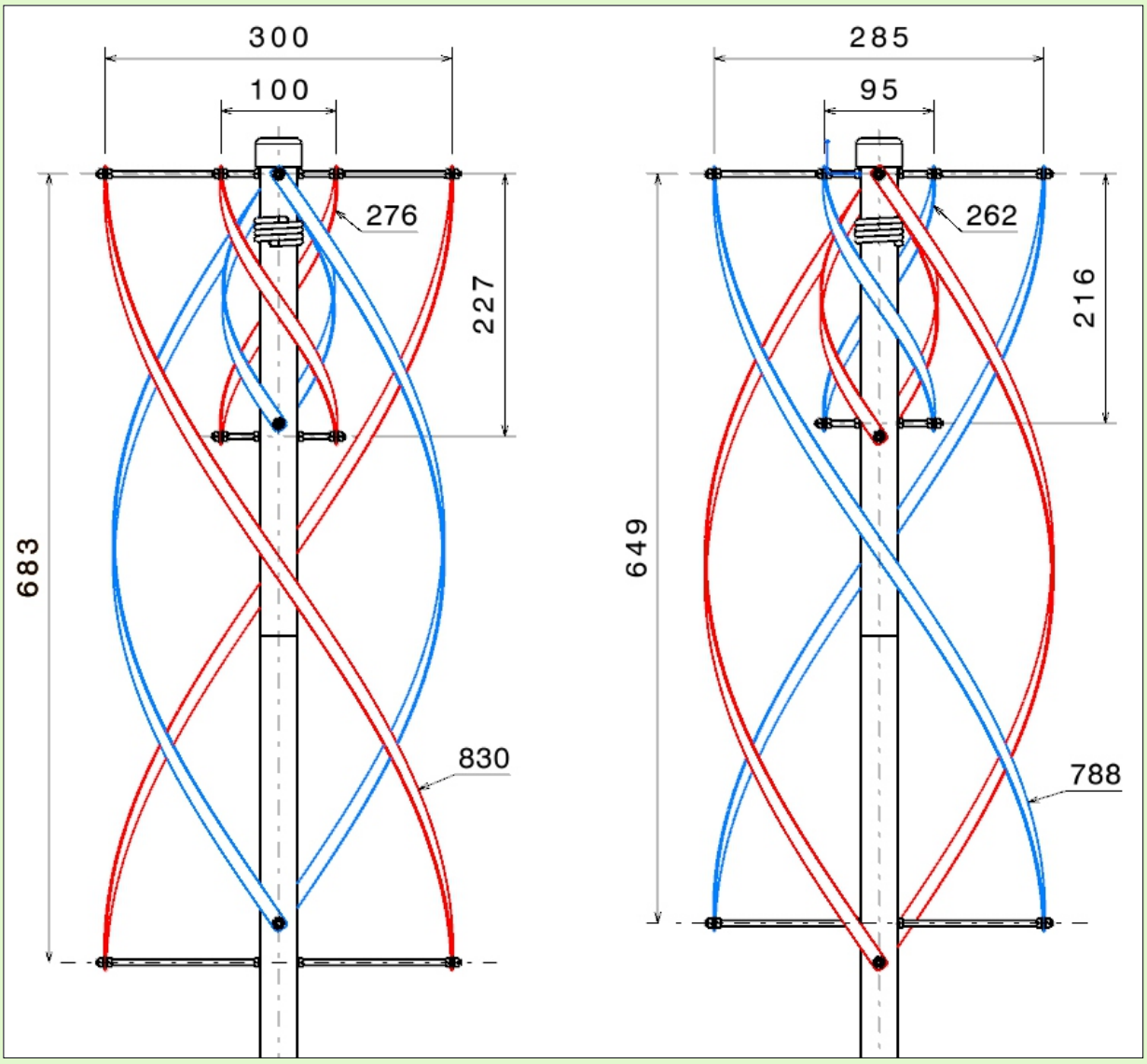


The manufacturing concept, the construction details, the materials employed, the way of connection, the adjustment using the threaded rods, ...It is identical to a single-band QFH and is well described in the Juan Carlos - EA5WA article(November 2020).

The final result is a slim, compact antenna that sometimes “Hypnotizes” with its numerous helical lines, where the UHF part is inside the VHF so its inclusion does not imply an increase of size.

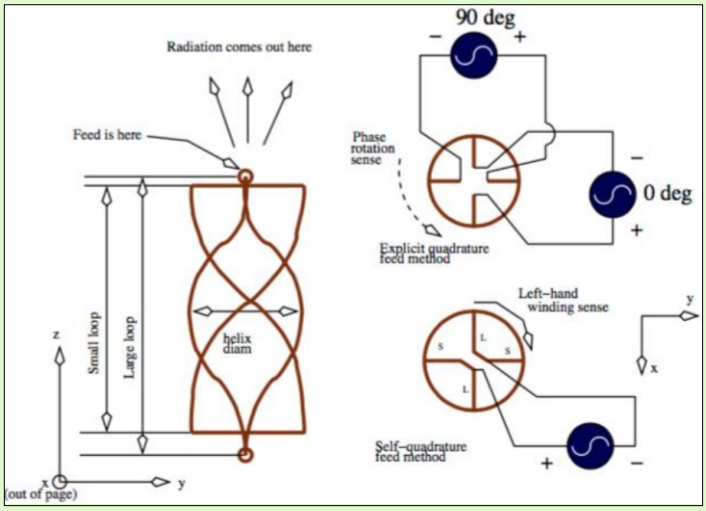
To define the geometry and dimensions of the new design with two QFH antennas I have used the well-known tool "QFH calculator" that can be found at http://jcoppens.com/ant/qfh/calc.php. We have considered for separate a design frequency of 145.700MHz and 435.300MHz with a width / height ratio of 0.44 for both cases (less than the ratio considered by Juan Carlos, I remember that it was around 0.5).

QFH VHF	Larger Loop (Red)	Width	300mm
		Height	683mm
		Helix length	830mm
	Smaller Loop (Blue)	Width	285mm
		Height	649mm
		Helix length	788mm
QFH UHF	Larger Loop (Red)	Width	100mm
		Height	227mm
		Helix length	276mm
	Smaller Loop (Blue)	Width	95mm
		Height	216mm
		Helix length	262mm

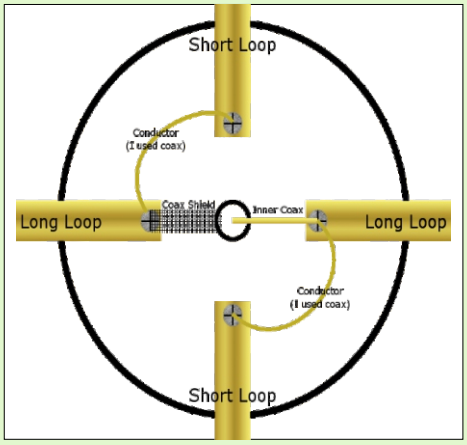


With this configuration we get:

- A dual band resonant antenna in the 145 and 435Mhz bands.
- Circular polarization, which for low elevations becomes practically horizontal.



- A single feed point at the top. In the same way tha tthe single-band version, RHCP or LHCP according to preferences and sense of connection of the upper arms. Crosshead connection higher to obtain circular polarization to the right:



- A coaxial cable drop without the need for a duplexer since the signal of both bands is mixed. A wrapping cable choke is integrated wrapping the coaxial over the mast itself just past the point of Connection.

- Width vs. high ratio of 0.44 that allows better use of the medium and low elevations but not so good on the highest, which is where it has better performance .

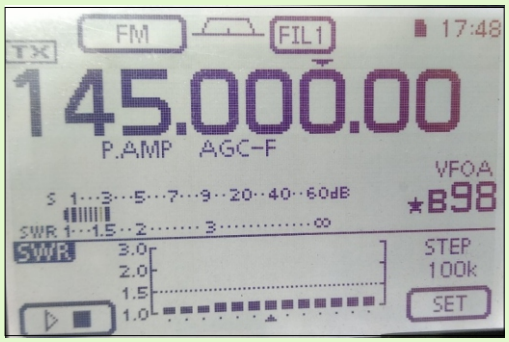
3.- Adjustment, results and conclusions

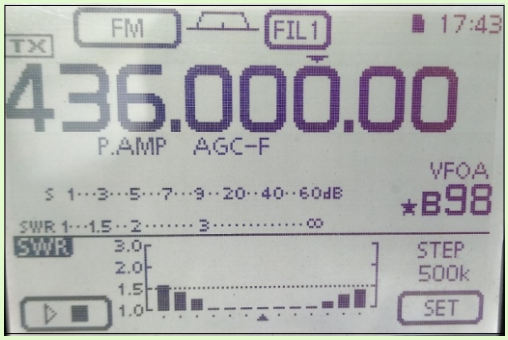
Like any other self-built antenna, it must be adjusted so that resonates roughly where it should. Theoretical measurements are one thing, see table from chapter 2, and another the final real and practical values that we get when obtained with the measuring instrument. Fortunately, this type of antenna has the possibility of adjusting, in both bands, through the threaded rods and nuts of the arms, both superior and inferior.

In my case, starting from the geometry extracted from the calculator "Jcoppens", I had to reduce the dimensions slightly since in the first try the antenna was "long" in both bands. After modifying the diameters, about 10mm less for VHF and 5mm for UHF I reached the following scenario:

Standing wave ratio (SWR):

- ✔ VHF: minimum 1:1.2
- ✔ UHF: mínimum 1:1.0





With the antenna already adjusted, the next step was to start with the field tests under different conditions and over quite a few passes. The overall perceived sensations were quite good:

- VHF performance comparable to the single-band QFH version. Stable signals with reduced QSB. Very satisfied and gives me the impression that the new width / height ratio of 0.44 is betterfor my preferences.

- I think the performance in UHF is a little lower than the single band version. In general, it gives me the feeling that fading is more present and is sometimes very strong reminding me of a linear polarization antenna, but it depends on the pass and the satellite. Perhaps there is some kind of interaction with the VHF, you have to study it better and simulate it on the computer. I think that there is something different regarding the behavior of the single band QFH, however, I am also equally satisfied with the VHF + UHF global behavior, and for both RX and TX.

- I think it is an ideal antenna for general wide range RX for an unattended “SatNogs” type station. Would recommended to pair it with a wideband reception preamp (really effective in low-noise environments away from inhibitors) The reception of telemetry and data is quite good.

- Like any other QFH antenna, it has a signal-to-noise ratio quite favorable and poor performance for low elevations and terrestrial communications.

- It is a compact antenna since with the volume occupied by the monoband VHF version we have a dual band antenna of more range without the need for a duplexer. Something that may be interesting for simple installation in a location with a limited space available.

- If space is not a problem, a configuration with two independent single band QFHs mounted on a double arm with their respective prerequisites, it is a more elegant and optimized version.

I hope that the text will help you and guide you if you are considering this kind of antennas and I strongly encourage you to consult other sources to deepen on the subject and shuffle other options. I am just one more,delighted to share my experiences with all of you, who humbly participates and contributes with the community. This is a part of our hobby that gratifies me personally. I hope and wish that this endeavor will last throughout my years as a ham.

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