NEWSLETTER-AMSAT-EA

03/2021 MARCH

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

FM UVSQ-SAT TRANSPONDER

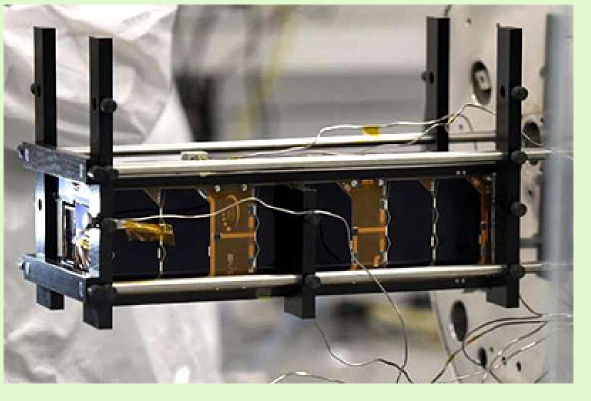
At the beginning of this month of March it has already been satisfactorily activated in some orbit the satellite FM transponder. We hope that as the satellite operation progresses it will be more operational.

Remember that the satellite identifier is LATMOS-01 and is coordinated by the IARU on the frequencies:

Downlink: 437.020 Mhz
Uplink: 145.905 Mhz

NEW SATELLITES DEPLOYMENT

On March 14,8 new satellites were deployed from the International Space Station , coordinated by the IARU.



All satellites deployed are Cubesats :

- STAR-CE
- GUARANISAT-1 (BIRDS-4)
- MAYA-2 (BIRDS-4)
- OPUSAT-II
- TSP-01
- TAUSAT-1
- TSURU (BIRDS-4)
- WARP-01

Birds sats carry a digipeater while TAUSAT-1 has a FM transponder

EASAT-2 - HADES

AMSAT-EA´s EASAT-2 and Hades launch with Space X was postponed to June , and instead of taking place from Cape Canaveral, it will perform, if all goes according to plan, from the Vanderberg Air Base in California.

EASAT-2 AND HADES TRANSMISSION PATTERN

EA4GQS - FELIX

The following is the pattern followed by the transmissions of the AMSAT-EA's EASAT-2 and Hades satellites, whose launch with SpaceX has been delayed until June, and that instead of being carried out from Cape Canaveral,will be done, if all goes according to plan, from the Vanderberg Air Base in California.

The frequencies and modes are as follows:

EASAT-2

- 145.875 MHz uplink, Modes: FM Voice (with no CTSS) and FSK 50 bps
- 436.666 MHz downlink, Modes: FM Voice, CW, FSK 50 bps, FM voice beacon with the call AM5SAT

HADES

- 145.925 MHz uplink, Modes: FM Voice (with no CTSS) and FSK 50 bps
- 436.888 MHz downlink, Modes: FM Voice, CW FSK 50 bps, SSTV Robot36, FM voice beacon with the call AM6SAT

There are 9 types of transmissions made:

- Fast FSK telemetry (every 60 seconds)
- Slow FSK telemetry (2 times every 14 minutes)
- Statistics FSK Telemetry (every 14 minutes)
- CW beacon (every 14 minutes)
- Vocoder FM (digitized voice) (every 2 minutes)
- SSTV Robot36 (every 14 minutes, HADES only)
- FSK data spin experiment (every 14 minutes)
- FSK radiometer experiment data (every 14 minutes)
- FSK data lunar basaltic experiment (every 14 minutes, only EASAT-2)

Apart from these satellite-generated transmissions, two types of Retransmissions are available as a service to station users in the planet

:

- FM voice broadcasts
- FSK data retransmissions at 50 bits per second
-

Telemetry, CW, SSTV and transponder timing pattern

The transmissions follow a cyclical pattern of 14 minutes. At the beginning of every minute a fast telemetry packet is always sent under any circumstance. In the second 30, if the squelch level has not been broken before that Activate the transponder and the minute is first, a slow telemetry packet is sent too.

If the minute is the second, a vocoder transmission with the callsign, etc. And so on. Comparison of lengths between different types of transmissions and the time available for the FM voice transponder and FSK data is shown below:

TRANSPONDER OPERATION

The transponder can be used just immediately after the fast telemetry package. You have 22 seconds to break the level of squelch. The level should break for at least about 2 seconds. If not, the corresponding telemetry will be generated in second 30 and it will be necessary to wait for the next minute (for the next QUICK telemetry transmission) to try to activate it again.

In case the squelch level was broken , the transponder is immediately active from that moment until the end of the minute, not generating the telemetry / VOCODER of the second 30.

Therefore, each minute, approximately 54 seconds in a row are available to use the transponder, which can be renewed as long as the squelch is broken after each fast telemetry transmission. This applies to both FM voice transponders and FSK data, although only one of the two modes is active at the time. To know the mode in which is configured, the latest slow telemetry packet can be queried.

The maximum speed of the repeater in FSK mode is 50 bps.

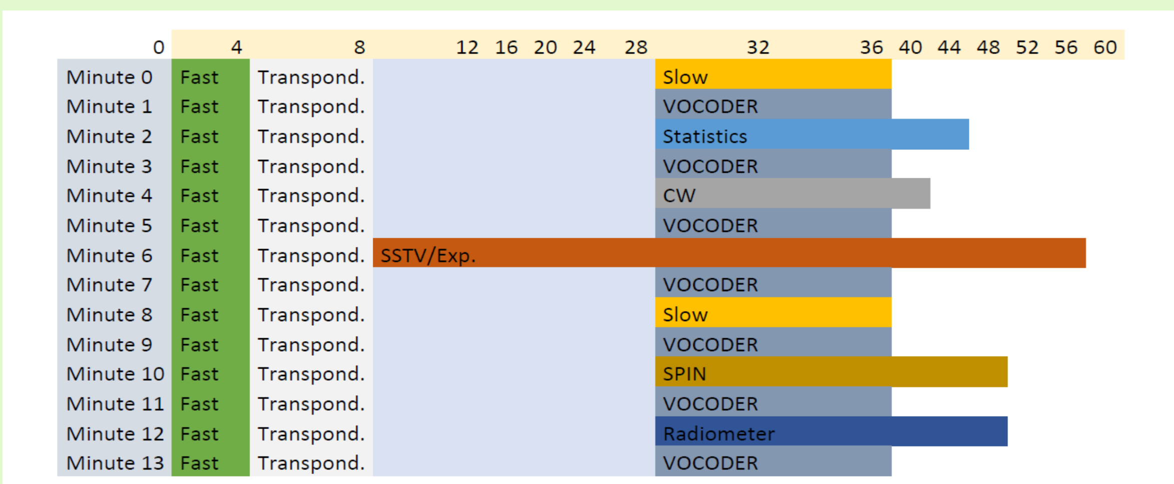
More information

More information, updates and implementation of the ground station can be found on the AMSAT EA website, in the projects section: https://www.amsat-ea.org/proyectos/

QSLs

The reception of the telemetry will be confirmed with a printed QSL. Please, send your reception reports to genesis@amsat-ea.org or to this postal address:

AMSAT EA
Apartado de correos 74001
28080 MADRID
ESPAÑA



3D MODELING OF A SATELLITE TRACKING SYSTEM

EA1PA - SALVA

I.Introduction

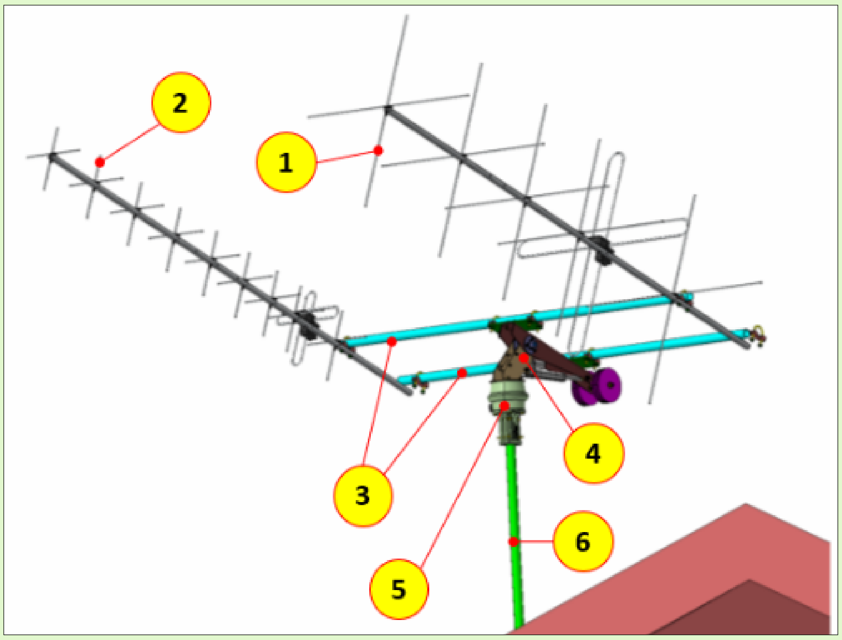
With certain periodicity I like to participate with content in the excellent AMSAT-EA newsletter contributing my grain of sand. Between all of us we can go enriching it and I encourage anyone to express their experiences, knowledge and concerns through this format that is increasingly being disseminated among the ham radio community.

This time I decided to share an idea of a satellite tracking system for a fixed antenna station. First of all I want to make it clear that I know It is about something at a conceptual level that has not been tested or proven, it is just an approach that has not advanced beyond the pre-design stage and 3D modeling on the computer.

The ultimate goal is to plant a seed, provide a good starting point for anyone who is attracted to this idea and wants to develop it in depth improving it and / or adapting it to the personal circumstances, capacities and possibilities .

II Description.

As you can see in the image we find an installation with the following components:



1. -> Yagi antenna crossed 2x6 elements for the VHF band.
2. -> Yagi antenna crossed 2x10 elements for the UHF band.
3. -> Fiberglass crossbars 2m long and Ø40.
4. -> Elevation system (will be described in detail in several chapters).

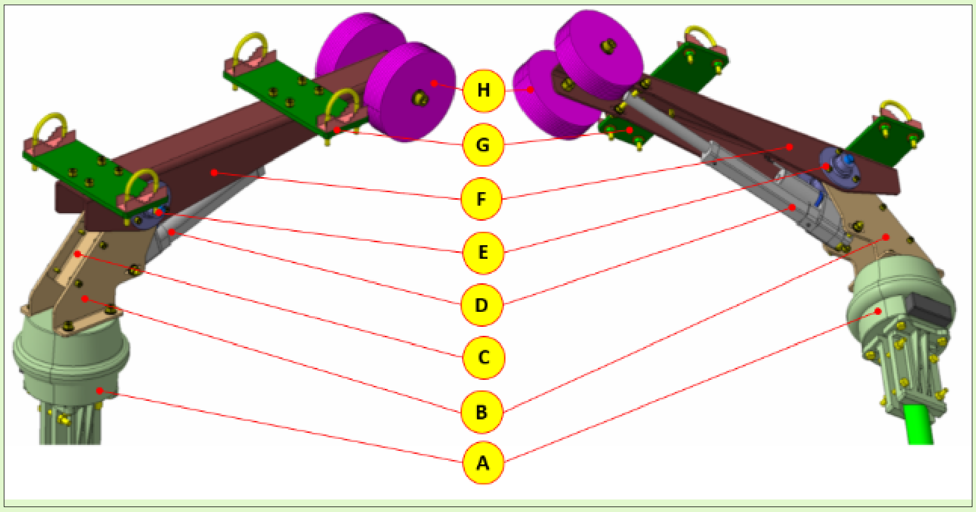
5. -> Yaesu type azimuth rotor (in this case the G-600RC model).
6. -> Ø45mm steel mast on the roof of our QTH.

The general configuration shown is well known but perhaps the most interesting is the elevation system that adapts to the drilling matrix of any Yaesu mid-size azimuth rotor, type 450 or 600.

Precisely that aspect, that of elevation, is what I want to highlight in this article. Commercially, new elevation rotors can be expensive and in the second-hand market are not easy to find . The following proposal, or its possible variants, would be alternatives to
consider after a feasibility study.

III - Elevation System

Below, in more detail, we can identify several elements:

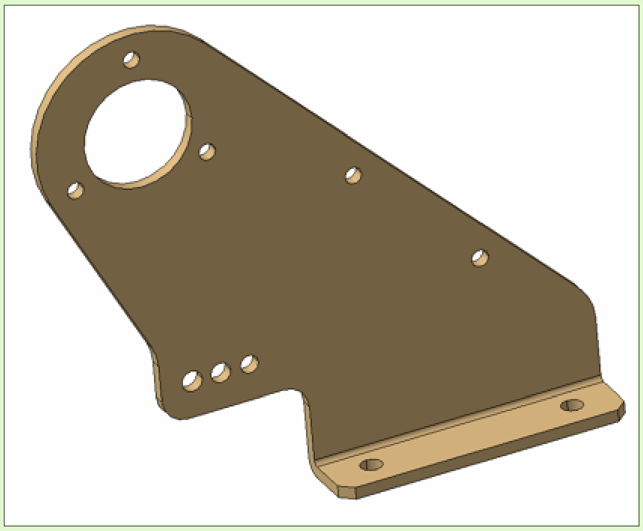


A. -> Yaesu rotor (x1).
B. -> Base or support fixed to the azimuth rotor (x2).
C. -> Piece of reinforcement and union (x1).
D. -> Electric actuator (x1).
E. -> Bearing unit (x2).
F. -> Tilting piece (x1).
G. -> Clamp plate for crossbars (x2).
H. -> Counterweight (x16 discs).

III.1. Base or fixed support to the azimuth rotor.

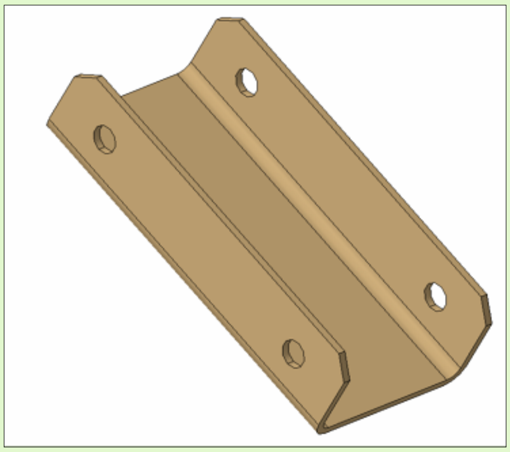
Composed of two 5mm thick folded plates in which they have been made several holes for the different elements that are mounted on it. They have a flap to screw to the azimuth rotor compatible with the matrix of drilling its flanges.

The idea is to remove the standard rotor flanges and place them in the bottom part to tie the set to the small mast that comes out of the roof.



II.2. Reinforcement and union piece.

Another 2mm thick folded piece whose mission is to join the side plates of the base or support giving more stability and rigidity to the set



III.3. Electric actuator.

It is the heart of the elevation system. Around it the rest of the system has been designed.

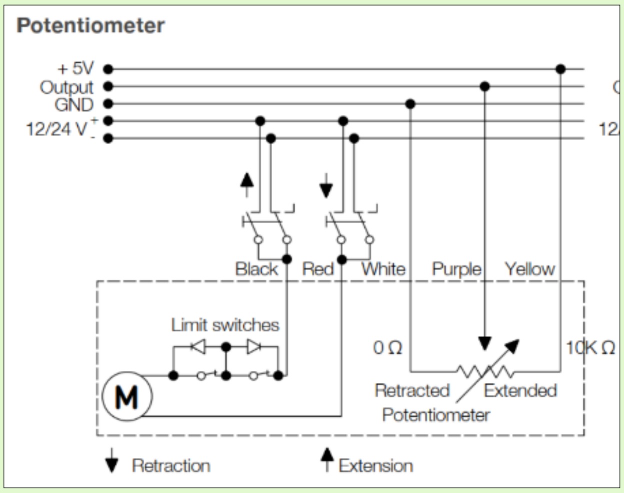
Manufacturer: SKF Motion
Reference: CAHB-10-A5A-150294-ABBAPA-000
Distributor: EWELLIX

The actuator has been selected based on certain characteristics such as:

Extension / Retract Force: 1000N.
Extended actuator length: 444mm
Working stroke: 150mm
Speed: 8-10mm / s
Voltage: 12 or 24V DC
Protection type: Ip66
Ambient temperature: -40 / 85ºC

Weight: 1.5kg
10kΩ potentiometer resolution: 50Ω / mm

The factory-integrated potentiometer option is very interesting and recommended to be able to control the elevation at all times. It can connect to a K3NG type interface by reading the voltage drop value in variable electrical resistance. This will facilitate automatic tracking via PC using specialized software such as SatPC32, Orbitron, ...



It also has two integrated switches that act as mechanical stroke limit switches to open the circuit when the extremes of stem displacement.

III.4. Flange type bearing unit.

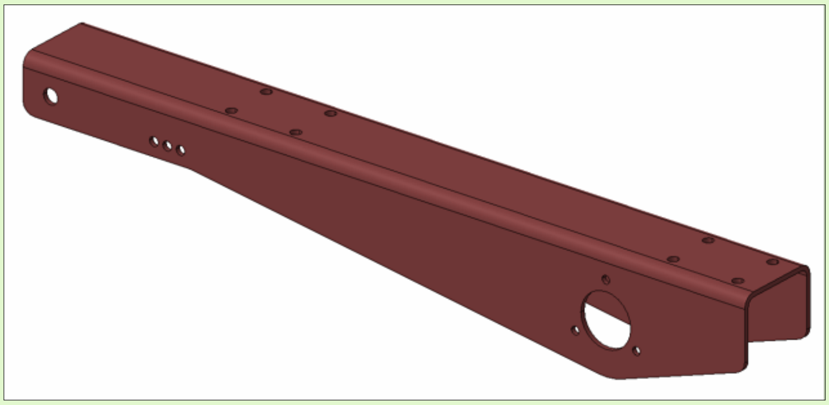
Allows the arm to swing with respect to the lower support. Joint planned on a Ø15mm shaft

FManufacturer: INA-FAG
Reference: RA15-XL
Hole diameter: 15mm
Flange diameter: 81mm
Static load capacity (radial): 4.750N
Dynamic load capacity (dynamic): 10.100N
Weight: 0.36kg

III.5. Tilting piece.

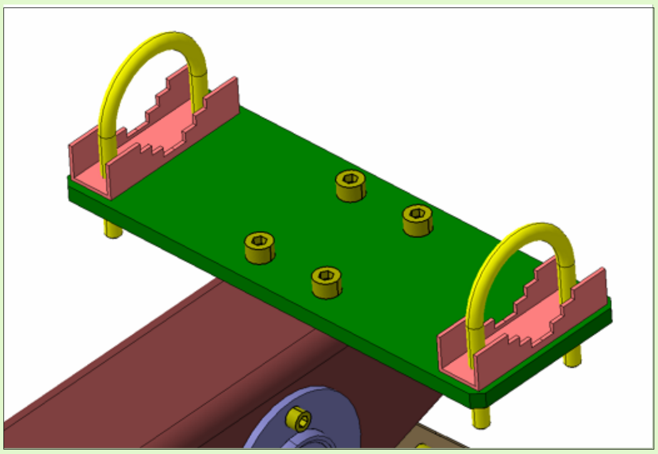
Folded piece with a U-shape and 4mm thickness that swings over the bearings. The elevation angle will depend on the length of the actuator.

The geometry has been specially designed so that the actuator is as protected as possible while remaining highly integrated into the system.



III.6. Clamp plate for crossbars.

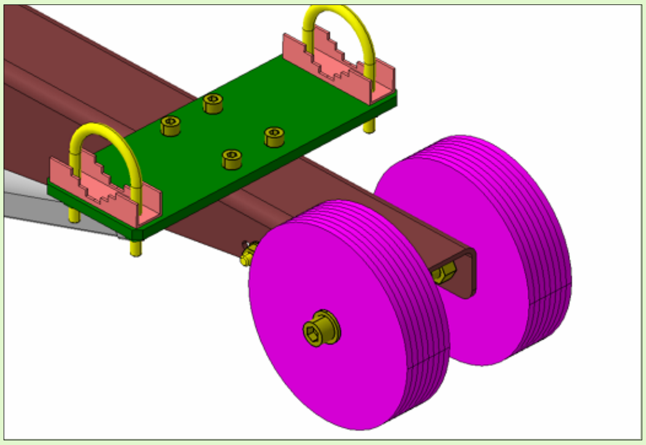
They are a pair of pieces that serve to hold a pair of crossbars that will fulfill the function of supporting the antennas by securing them from the back.



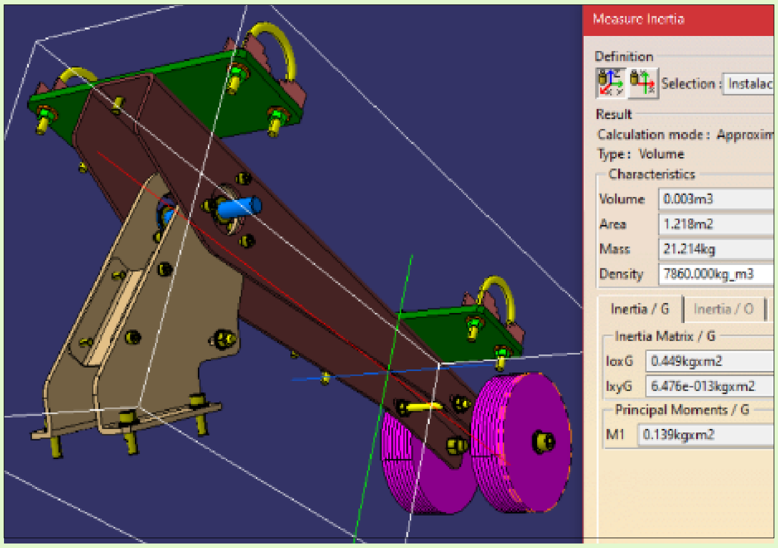
III.7. Counterweight.

It is a series of discs made of Ø150 steel and 5mm thick. Each of them weighs around 0.68kg and are arranged in two groups of 8 that add up to 2 x 5.44 ≈ 10.9kg.

These elements allow "Unload" the actuator and improve the balanced kinematics of the mechanism. Depending on the type of antennas, weight and length, disks can be added or unmounted .



III.8. Approximate weight of the system.



If we consider as a material steel, density 7860kg / m3, we have 21.2kg of mass for everything visualized in the previous figure, including the hardware. According to the previous chapter 10.9kg correspond to the counterweights. Additionally you have to add 1.5kg of the actuator and the weight of the bearings.

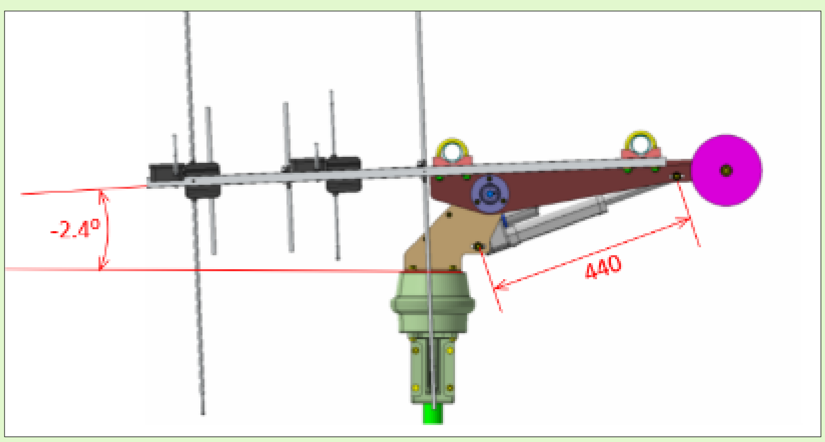
As a final result 21.2 + 1.5 + (2x0.36) = 23.42kg without antennas or crossbars.

IV. Study of the elevation movement.

This chapter deals with the study and analysis of the elevation movement to check the absence of collisions between parts that allows free rotation along throughout the actuator stroke. We will also obtain the limiting angles of elevation.

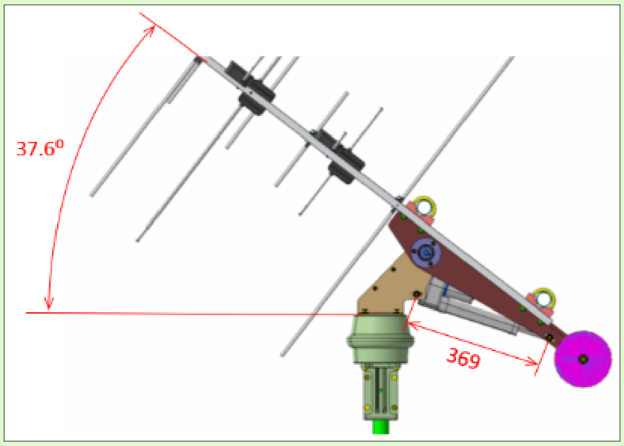
IV.1. Fully extended actuator.

Resulting length: 294 + 150 = 444mm
Minimum elevation angle: -2.4°



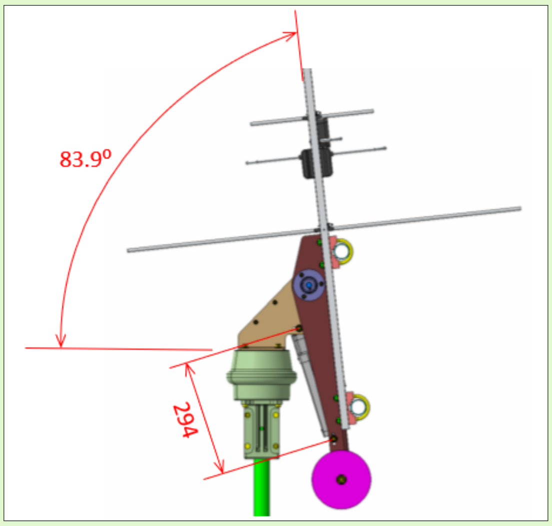
IV.2. Actuator in intermediate position.

Resulting length: 294 + 75 = 369mm
Minimum elevation angle: + 37.6º



IV.3. Fully retracted actuator.

Resulting length: 294mm
Maximum elevation angle: + 83.9º



V. Links of interest.

Linear Ewelix actuators

Hole flange supports

CG-600 rotors

If you need 3D models in neutral format "STEP" you can contact me in this email : salvaggff@yahoo.es . Sorry if I'm take tine to answer.

Warm regards to all readers.

Good health and good radio!

Salva
EA1PA
salvaggff@yahoo.es

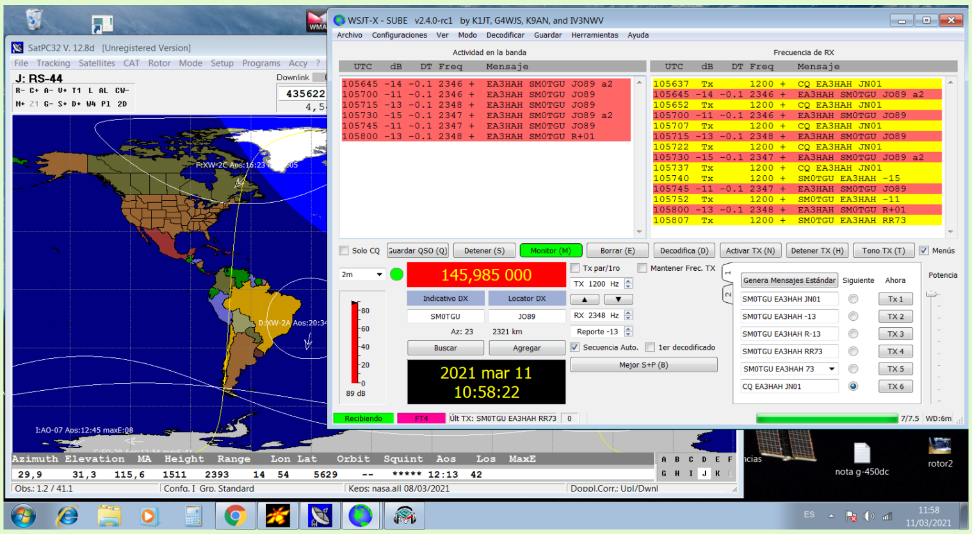
FIRST CONTACT EA-SM ON FT4 VIA SATELLITES

EA3HAH - Carlos Tomás

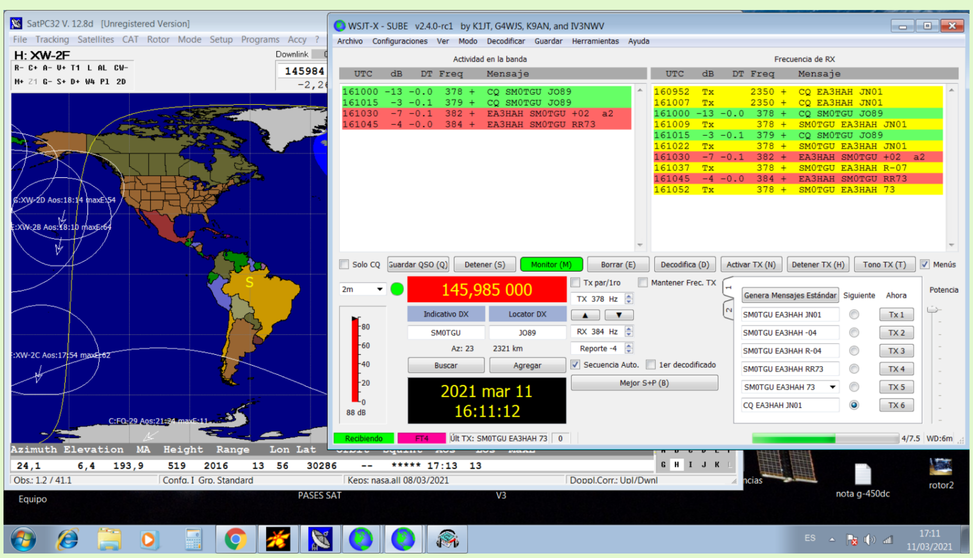
Following the publication in January of tests and experiences with FT4 in the birds, a Swedish colleague, Lars SM0TGU; contacted me to ask for some info and see how to do a QSO. He was rehearsing, testing and commenting on the progress. But we had to do the QSO.

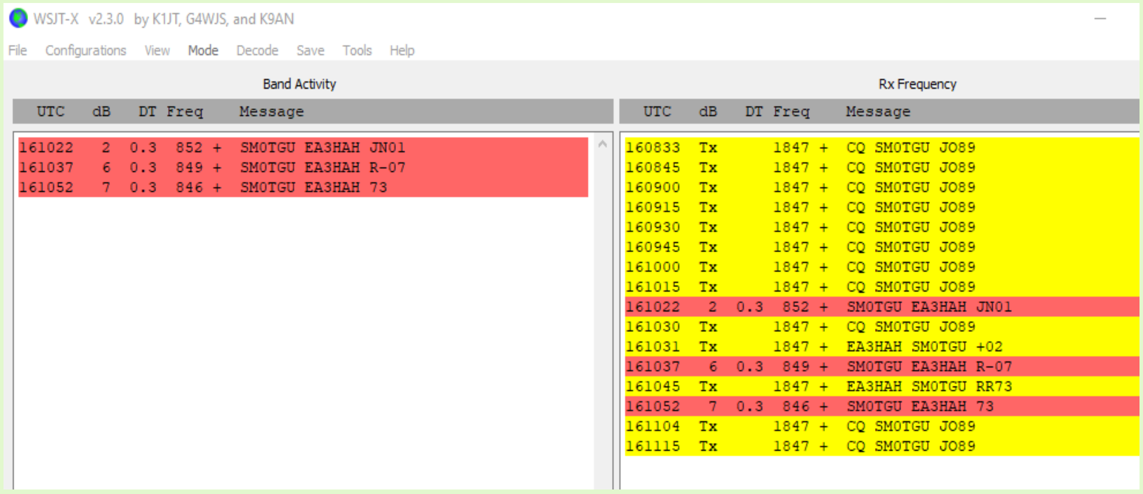
And we did it! On March 10, 2021 at 12:26 UTC we did the first QSO via RS-44. At first with the nerves and others there were some small errors but we made the contact. However, it was necessary to polish the operational and the next day we decided to test again.

On March 11 at 10:58 utc we contacted again on FT4 via RS-44 and this is a screenshot of the QSO:



I used about 20 W and Laes only 2.5 W. Then later we wanted to repeat on a chinese sat, specifically in the XW-2F. At 16:10 utc we contacted again and it was a complete success. I put my capture and the one that Lars has sent me:





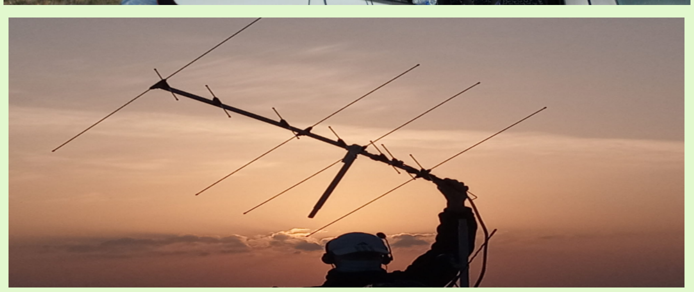
Here the powers were even smaller. Me between 5-10 W and Lars, 1W or less.

Conclusions: the FT4 digital mode is valid, practical and easy to use in the SSB sats. It allows quick contacts without the stress of language, it is even robust if there are voice and / or cw signals. And having directive antennas requires little or very little power.

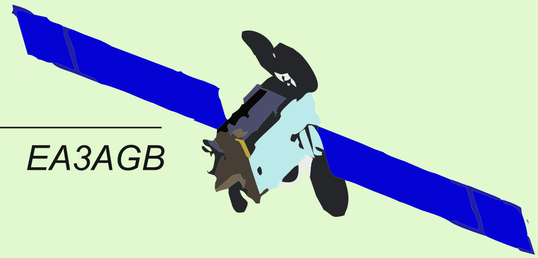
I'm sure it could be used on FM's without causing discomfort to voice users, however without corresponding authorization I refrain from doing tests.

Again, I encourage operators to use this mode. For any question and / or help you can write to me: ea3hah@yahoo.es

PORTABLE STATON OF MONTH - (EA1PA - SALVA)



QO-100



EA3AGB

CALLSIGN	GRID	MODE	QSL VIA
5VDE	JJ06OD	SSB	LOTW/EQSL
5VDE	JJ09NC	SSB	LOTW/EQSL
8Q7AO	MJ63	SSB	LOTW/EQSL
8Q7QC	MJ65	SSB	QRZ.COM
9G5FI	IJ95	SSB/CW	LOTW
9K60OK	LL49	SSB	QRZ.COM
AP2AUM	MM63	SSB	LOTW
BG0AUB	NN34	SSB	LOTW
DP0GVN	IB59	SSB	LOTW
EP4HR	LL69	SSB	LOTW/EQSL
EU1VA	KO33	SSB	LOTW
EU2AA	KO34	CW	QRZ.COM
FR4OO	LG79	SSB	QRZ.COM
FR4OZ	LG79	SSB	DIRECT
OH6KTL	KP02	SSB	QRZ.COM
OG0D	JP90	SSB	LOTW/EQSL
ZY1A	GG87	SSB	QRZ.COM
PY4HGM	GH80	CW	LOTW
S0S	IL56	SSB	LOTW
SM3NRY	JP82	SSB/CW	LOTW/EQSL
ST2NH	KK65	SSB	QRZ.COM
V51HZ	JG77	SSB	QRZ.COM
V51MA	JG87	SSB	LOTW/EQSL
VU2OW	NK03	SSB	QRZ.COM
VU2JFA	NL42	SSB	EMAIL
VU2RAJ	MK81	SSB	QRZ.COM
AT2WRD	NL42	SSB	EQSL
YC1HVZ	OI33	SSB	IK2DUW
YT7IM	JN96	CW	BURO/DIRE
ZS1RBT	JF95	SSB	QRZ.COM
ZS4A	KG41	SSB	QRZ.COM
ZS6JV	KG33	SSB	QRZ.COM
ZP/PY5ZUE/P	GG25	SSB	QRZ.COM

OG0O

5VDE

3V8SS - TUNIS, Copied him calling station ZP / PY5ZUE, too a new entity would result in QO-100.

OH0 - ALAND ISL, New DXCC entity activated by AD7D Joseph

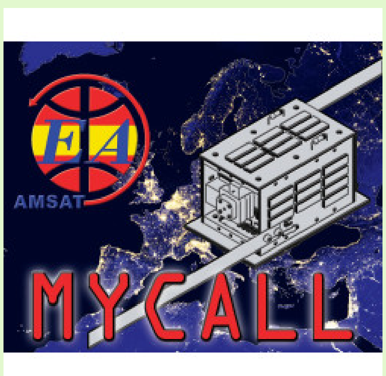
YB - INDONESIA, YC1HVZ Farid, will be active from this new entity in QO -100.

ZP / PY5ZUE / P - PARAGUAY, Conrad activated this new entity and they were very few stations that could make qsos with this entity, We hope in the future it will be activated again.

Faith of errors, they say to rectify is wise, 8Q7AO was not the first active station in MALDIVES for the QO-100

AMSAT-EA products in the URE store

For several weeks you have at your disposal several products of AMSAT-EA personalized with your callsign on the URE website.



Don´t hesitate

Support AMSAT-EA