NEWSLETTER-AMSAT-EA

10/2020 OCTOBER

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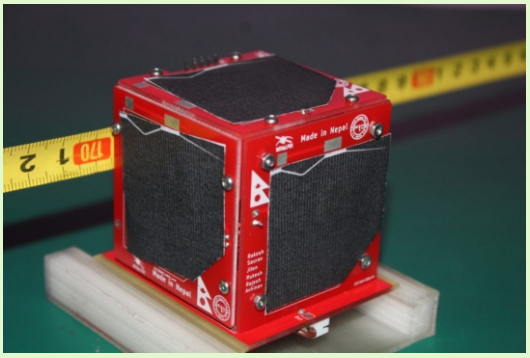
SANOSAT-1 (Nepal-PQ1)



SANOSAT-1 is a pico satellite based on the PocketQube form factor. A PocketQube is a common picosatellite standard with dimensions of 5 * 5 * 5 cm 3 and weighs less than 250 g. It was first proposed in 2009, as of an idea from Professor Robert J. Twiggs, as a result of the collaboration between Morehead State University (MSU) and Kentucky Space.

SANOSAT-1 is being developed currently by ORION Space in Nepal in collaboration with AMSAT-Nepal and AMSAT-EA. ORION Space is a Nepal-based satellite company founded in 2017 with the aim of promoting space education in Nepal and also develop pico / nano satellites in Nepal.

The main mission of SANOSAT-1 is to measure the radiation dose rate in the orbit. Since Nepal is new to space technology and involving students / engineers within the country to provide space education is also one of the objectives of SANOSAT-1. Also, encourage students / engineers to work in the field of space technology, making the satellite open source and involving hobbyists is also the goal of SANOSAT-1.

The on-board computer (OBC) is based on the ATMEGA328 microcontroller. It performs the tasks of managing and controlling the PocketQube data. It also consists of Watchdog to monitor the flow of the program and restart the satellite if they find corruptions in the flow of the program. The board is protected by a current limiter for Latch-Up protections.

The communication subsystem is responsible for transmitting the data available to the ground station and receive data from the ground station. The Data transmission and reception is performed in half duplex mode. Chip Communication is based on Silicon Labs Si4463. Transmits data thru a CW Morse Beacon, Radio Tele-Type (RTTY) and GFSK Modulations, while the Uplink is done only in GFSK Modulation. The power downlink transmission maximum is +20 dBm. The data is sent via CW Morse / RTTY.

SANOSAT-1 has two types of ground stations. The main station based on SatNOGS, which is a network of open source ground stations

EASAT-2 and Hades Delivered to Alba Orbital

EA4GQS, AMSAT-EA chairman

Hello everyone, from this newsletter we want to inform you that at the beginning of This week our satellites EASAT-2 and Hades were delivered in the UK, specifically at Alba Orbital's facilities in Glasgow, Scotland, and that these days its integration into the AlbaPOD ejector is expected. We attach here the link to the presentation that we have made in the Virtual Workshop of PocketQubes 2020 PocketQube Workshop that it could not be celebrated physically last year.

https://www.amsat-ea.org/app/download/12435049/AMSAT+EA+-+HADES+and+EASAT-2+A+versatile+pocketQube+platform.pdf

As you can see, finally the configuration implemented for the satellites is for FM and FSK repeaters and not as linear transponders. Both also carry a digitized voice beacon (in the transparency of the Transmissions is listed as VOCODER) and various telemetry. The beacon can be received in FM.

Regarding the on-board experiments, EASAT-2 finally transports a basalt rock about which you have more information on the web and which has as purpose to check how it behaves in space, being susceptible to be used for the construction of infrastructures on the Moon, since its features are similar to what can be found there. This rock was supplied to us by the research group on meteorites and CSIC planetary geosciences at the Institute of Geosciences, IGEO (CSICUCM)

Hades carries the SSTV camera from the University of Brno . You have more information on the web .The camera is configured to take and send photos every 15 minutes, although they can also be requested using remote control commands.

It has been several years of work since the EASAT-2 project was defined and, as we have pointed out many times, it would not have been possible without the help from many people. The last few weeks have been particularly tough, working 7 days a week to make sure everything goes delivered with the necessary quality. You will see that the structure of EASAT-2 is the same as that of GENESIS. This is so because the new one was given to us very late and we only had time to make the necessary adjustments to one of them,and Hades was chosen.

On the other hand, the energy balance is very fair and slightly negative in the EASAT-2 transmissions, so both satellites have been configured to be operational only when in sunlight. The FM transponders are initially off and will be activated once it is verified that the satellites are working properly in orbit.
Estimated release date is December 16 from Cabo Canaveral on the east coast of the United States.

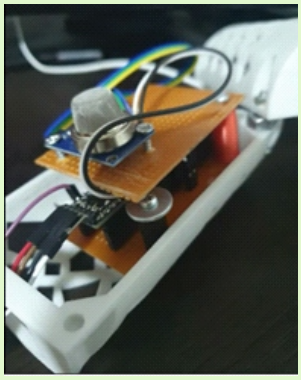
CANSAT COLOMBIA 2020

The Colombo-Japanese Chamber of Commerce and Industry, the Latin American and Caribbean Federation Of japanese scholars join the innovation challenge CANSAT COLOMBIA 2020. And also the Colombian Association for the Advancement of Science, the Colombian League of Radio-amateurs, the Industry Corporation Aeroespacial de Colombia and 30 other organizations have joined the CANSAT innovation challenge COLOMBIA 2020.

The audience from the academic and aeronautics sectors will be following this event from several Latin American countries, including Japan,thanks to an important alliance of the Chamber Colombo Japan Trade and Industry (CCJCI) that provides the videoconference room communication platform and the IEEE Student Branches of Colombia, including National University, District University, Military University, which have structured a screen viewer friendly video special to be viewed online (Zoom, Youtube, Facebook) and through the pages of the IEEE student branches. From Santa Cruz de la Sierra, Bolivia, they join this event hosting one of the video conference rooms.

Important members of the Robotics Working Group of the Latin American and Caribbean Federation of Japanese scholars (FELACBEJA) will be present at the innovation challenge within the group of juries in each of the categories listening and exchanging opinions with Colombians, including several members of the Colombian League of Radio-amateurs and officials of the Corporation of Colombian Aerospace Industry (CIAC).

RETO CAMSAT



There are 83 challengers from 23 groups from 9 cities in Colombia who will be competing with their skills to build a mini canned satellite, CANSAT, from the combination of the English words "can" and "satellite", in the CANSAT COLOMBIA 2020 Innovation Challenge, on October 15th, 16 and 17, within the celebration of the World Space Week.

This challenge looks for the best teams that demonstrate how to apply theoretical knowledge of telemetry, meteorology, radiocommunications, electronics, mechanics, information and communications in a practical project with the CANSAT International Standards from ESA (European Space Agency). The ceremony installation in person, in the CEA Auditorium with special guests, will

be transmitted by virtual means. Then,the contestants will make their presentations through teleconferencing platforms via internet before juries and previously registered people in aesscolombia.blogspot.com.

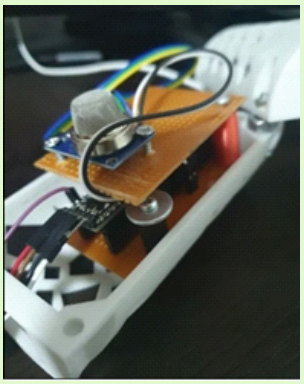
Aerospace and Electronic Systems Society AESSIEEE Colombia Chapter, organization of volunteer engineers , will award a Badge of Innovative Merit to four winners in each of the Challenge of Innovation categories, like this: Parrots, Parrots, Condors and Eagles, according to the different levels of training.

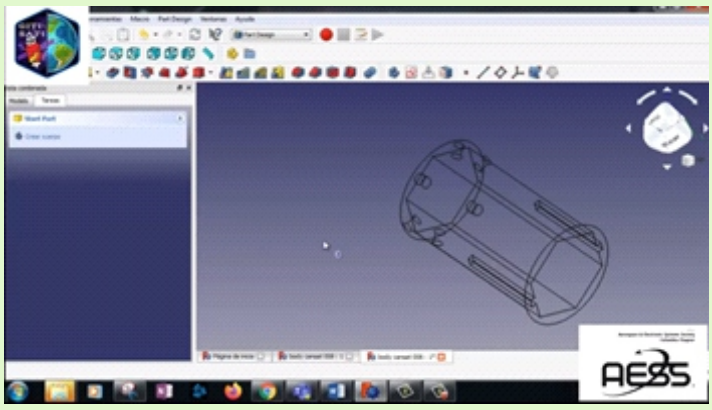
The objective of the CANSAT COLOMBIA 2020 challenge is to discover the top talents in the design and construction of a mini satellite that measures the pressure, temperature , height and position, similar to a radiosonde. This microsatellite should have capabilities similar to radiosondes with electronic components, sensors, transmitters and power. Must be able to fly 1000 meters high (minimum) and then free fall and landing with the help of a parachute which should also be part of the design and construction. On the ground, a RF receiver will be connected to the CANSAT.

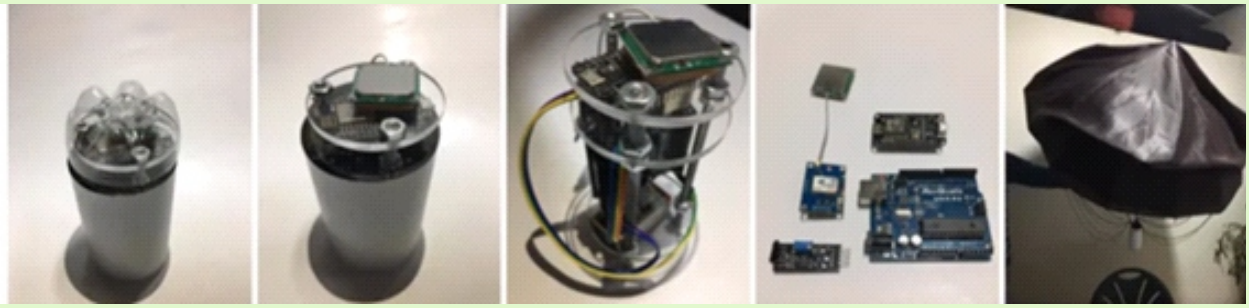
Each challenging team, in the Parrots and Papagayos categories, must Complete a mandatory basic mission called Mission Sabio Caldas. Each challenging team, in the Condors and Eagles categories, must meet in addition to the previous one, an advanced mission called Mission Nicola Tesla. Among the special guests are the Vice President of the Republic of Colombia, The Director of Civil Aeronautics, Senior Officials rank of the FAC and academic directors of the country.

The main conferences will be given by astronauts from the ROSCOSMOS Space Corporation of Russia, the National Space Agency NASA of the USA, officials of the National Space Agency and Speakers from AESS Colombia. The leaders of the 23 challenging teams will be in four virtual rooms and will present each of the projects in 9 minutes, with the jury and public paying attention to it.

AGENDA RETO DE INNOVACION CANSAT 2020 & STEM DAY			
Hora	Reto de Innovación DIA 1	Reto de Innovación DIA 2	STEM Day
	Jueves 15 octubre	Viernes 16 octubre	DIA 3 Sábado 17 octubre
8:30	Ingreso	Ingreso	Ingreso
9:00	Apertura (Vicepresidencia de la República; FAC, Aeronáutica, AESS)	Apertura (Comisión Colombiana del Espacio, FAC, Aeronáutica, AESS)	Apertura (ED STEAM; AESS)
9:20	Show aeroespacial	Show aeroespacial	Show aeroespacial
9:30	Conferencia inaugural Agencia Nacional del Espectro ANE-Colombia	Conferencia de Cosmonáuta Roscosmos-RUSIA	Conferencia México
10:30	Introducción a CANSAT de AESS Colombia	Conferencia de Astronauta de NASA-EEUU	STEM Challenge
11:00	Competencias CANSAT (Loros-Papagayos)	Finalistas CANSAT (Loros-Papagayos)	STEM Challenge
12:00	Competencias CANSAT (Loros-Papagayos)	Finalistas CANSAT (Cóndores-Aguilas)	Conferencia Nasa
13:00	Sesión de Jurados	Premiación	Cierre Show Aeroespacial







ANNOUNCED ACTIVATIONS

F4DXV, Jerome plans to operate from a 1500 meter summit at JN15jo on Monday 19 October. It will be on RS-44 from 2000utc specifically for North America. The footprint covers much of eastern NA. This is a difficult operation after dusk and Jerome hopes that many will have the opportunity to work this rare grid. The RS-44 will be around 1,430 km.

KI7UNJ, plans to be in DN13 / 23 and Dn22 from October 16 to 19. For now he has no list of available passes, more information on his twitter. (Day 16 in DN13 / 23; day 17 and 18 in Dn22 and on the 19th on line DN13 / 23).

KQ2RP will be available again from FN44 / 54, on FM satellites from FN54 with a possibility of FN44 / 54. FN53. October 11-16. He will use KQ2RP/1

Madrileñan Arrow ((10 ele. UHF 4 ele. VHF)

EA4M - Rick

To build this "extension" of the Arrow II 3/7 is It is necessary to have one to be able to use the elements and thus with very little investment to have a cheap 4-element antenna in VHF and 10 elements in UHF , after the initial investment.

The cost of the material does not exceed € 15 compared to the € 50 extra cost of the Alaskan arrow compared to the Arrow II.

What you will need:

2 meters of round aluminum tube 8 mm 1 mm wall
8 M4 rivet nuts with countersunk flange and knurled shank
(http://www.wurth.es/media/pdf_infos/04%2006%200050.pdf)
2 meters square aluminum tube 20 x 20 mm
50 cm of zinc, copper or aluminum tube of 16 mm diameter to join the boom
8 element plugs
2 square caps for tube 20 x 20
50 cm. M4 Threaded rod

VHF element	UHF element
D1 = 46,36 cm (x2) (position 3)	D3 = 13,18 cm (x2) (position 5)
	D4 = 13,02 cm (x2) (Position 6)
	D5 = 12,86 cm (x2) (Position 7)

THE BOOM

The boom splits at the height of UHF element # 6 at approximately 5 cm from element 6 between 5 and 6. (Photo 1)

Foto 1

The part of the boom that doesn't have the housing for UHF element will be riveted with the copper tube, zinc or aluminum as seen in the photo (Photo 2)

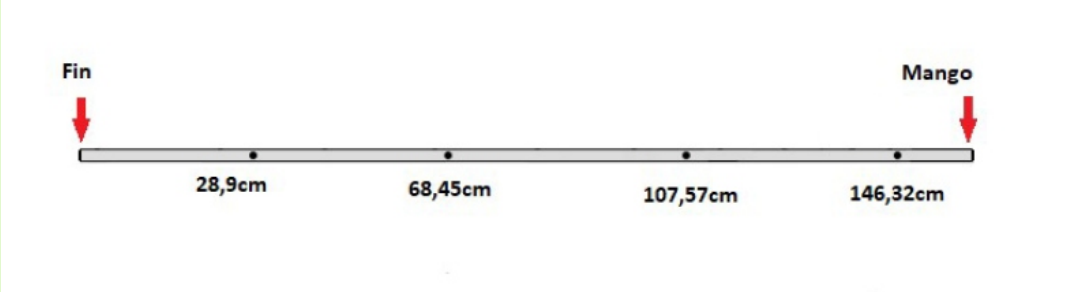
The hole in the tube made of copper, zinc or aluminum must match that of the element number 6 to make a fixed hook up.

Foto 2

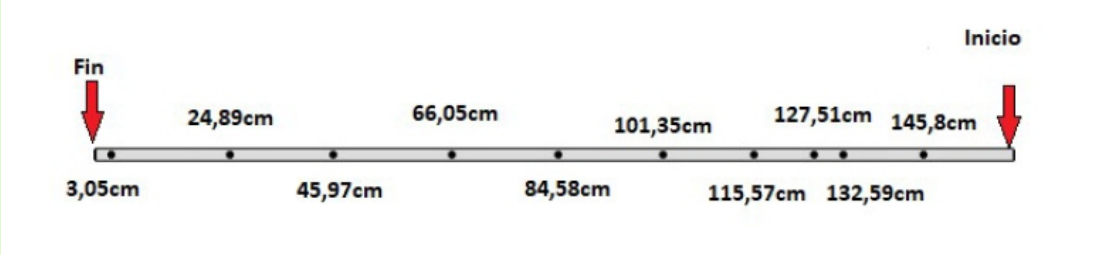
Detail of the rivet threads in the element

Detail of the union of the elements with the threaded rod

Separation of VHF elements measured from the tip of the tube



Separation of UHF elements measured from the tip of the tube



73's Ricardo “Rick” EA4M

ea4m@ure.es

Add a new satellite to SatPC32

EA5WA - Juan Carlos

I will try to explain in a simple way, how we can add a new satellite to our SatPc32. To start, you have to distinguish between two terms,the kepler (keplerian data) and the doppler.

Keplerian data are necessary for the calculation of the satellite orbit, and therefore, it´s what we need to allow drawing the passes of a given satellite in any software. In our case, we need to add the Keplerian data from the satellite that we want to add to a txt file (either one that already includes SatPC32 or to a new .txt, whatever you want).

Keplerian data has a three-line format, where the first is just the name of the satellite. As an example, this would be the keps for satellite DOSAAF-85 (RS-44):

```
DOSAAF-85
1 44909U 19096E 20120.96346743 +.00000010 +00000-0 +00000-0 0 9999
2 44909 082.5239 027.5343 0217449 340.2089 019.0669 12.79706663015985
```

On the other hand, when we talk about Doppler, we talk about frequencies and in our case, the satellite frequency data, we will have to include them in the file "doppler.sqf" in which, the information is distributed in lines with the name from the satellite to the beginning of the line. As an example, the line for the frequencies of the RS-44 would be this:

```
DOSAAF-85,435640,145966.4,USB,LSB,REV,0,0,SSB Transponder
```

Therefore, I want to make this concept clear, that is, to draw the satellite passes the keplers are needed but for the satpc32 to present the uplink and downlink frequencies (and calculate the Doppler correction) you need the corresponding line in the doppler.sqf file (which is unique).

Once this is understood, we need to get (usually from the Internet) first the 3 kepler data lines of the satellite in question, and then, generate the line corresponding to our new satellite in the file doppler.sqf which will include frequencies and modes (both downlink and uplink).

Normally making these modifications are not necessary since in some days the new satellites will be added in the source files (nasa.all for example).

One important thing is that the satellite name must be the same in both files.

Once you have the data, we will have to search for the files we have to edit in our hard disk.

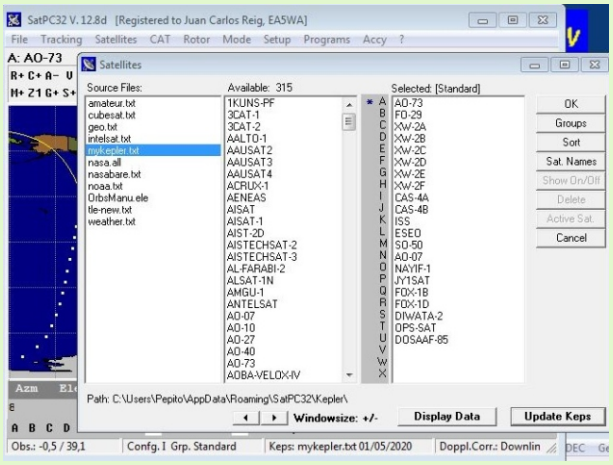
Where do I write the keps of the new satellite?

You have to put the keplers in the txt file that we are using in satPC32 as the data source.

In my case I use the file "mykepler.txt" that you can find on PE0SAT´s website:

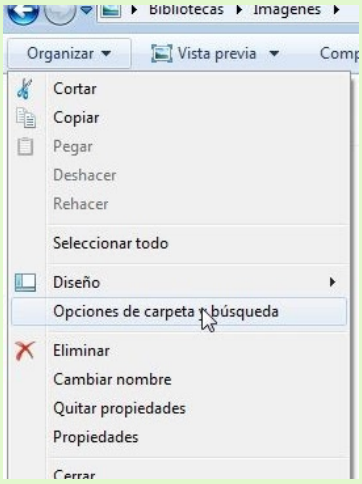
www.pe0sat.vgnet.nl/satellite/tle/

What I usually do first is click on "Update Keps" and this will update the file from the web. If after updating the new satellite does not appear on the list, I include it by hand (editing with Notepad) the file mykepler.txt.



But where is that file in the computer?.... Here:

C:\Users\yourusername\AppData\Roaming\SatPC32 \Kepler



The problem is that many times the folder "AppData" is hidden since in Windows by default it comes hidden. To get to see it, we have to modify the "Folder Options" from the file explorer,clicking on the "Organize" menu at the top:

Once we have access to the folder, we open the txt file that we are using in SatPC32 and We add the 3 lines (Name of the sat + Keplerian data).

They can be added wherever we want, at the beginning, at the end, in the middle .... Doesn't matter. The final appearance of the file should be like this example on the image on the right:

Once saved, if we restart the program, we can now select the satellite and we will get the passes, but we still need to include the needed line in the doppler.sqf file in order to get the frequencies.

```
DOSAAF-85
1 44909U 19096E   20120.96346743 +.00000010 +00000-0 +00000-0 0  9999
2 44909 082.5239 027.5343 0217449 340.2089 019.0669 12.79706663015985
LES-1
1  1002U 65008C   20119.89488711 +.00000008 +00000-0 -58465-4 0  9992
2  1002 032.1461 311.8680 0013781 095.8879 264.3190 09.88353326994537
LES-5
1  2866U 67066E   20120.16423028 -.00000056 +00000-0 +00000-0 0  9990
2  2866 002.9610 274.9454 0053968 356.8546 345.4220 01.09425066106511
PROSPERO
1  5580U 71093A   20120.45991613  .00000194  00000-0  37307-4 0  9999
2  5580  82.0406  81.8248 0529811 123.1024 242.2162 13.94526352436901
AO-07
1  7530U 74089B   20120.49289031 -.00000023  00000-0  13846-3 0  9995
2  7530 101.7958  90.5156 0012590  97.7863  17.2687 12.53643151 80090
```

When the satellite frequencies do not appear in SatPC32 it may be for two reasons:

- That we do not have the line corresponding to the satellite in doppler.sqf
- That the name of the satellite is not the same in both files (kepler.txt and doppler.sqf)

Well now we edit the doppler.sqf file which is located at C: \ Users \ your user \ AppData \ Roaming \ SatPC32 with the Notepad (any text editor is fine) and add the corresponding line to the new satellite. I usually add it at the end:

```
SWIATOWID,435500,0,FM,FM,NOR,0,0,1200 AFSK
SPOOQY-1,437500,0,FM,FM,NOR,0,0,4800 GMSK
JAISAT,435700,0,FM,FM,NOR,0,0,4800 GMSK
2019-084F,436700,0,USB,USB,NOR,0,0,RTTY 45/180
2019-089C,436400,0,FM,FM,NOR,0,0,9600 GMSK
2019-089C,436400,145970,FM,FM,NOR,0,0,trasponder
OPS-SAT,437200,0,FM,FM,NOR,0,0,9600 GMSK
DOSAAF-85,435640,145966.4,USB,LSB,REV,0,0,SSB Transponder
RS-44,435640,145966.4,USB,LSB,REV,0,0,SSB Transponder
;
; Hints
; This file contains all data required for the CAT tuning to operate. CAT tuning
; only works for satellites whose frequencies are contained in the file.
; To use the program's tuning functions during Vfo operation, these data are also
; needed.
; It is essential not to modify the file format, when you edit the file.
; Be careful not to add blanks or blank lines. For decimal markers, the point
; has to be used.
```

The format of the line is:

satellite name, downlink frequency , uplink frequency, mode down, mode up, 0, 0, comment

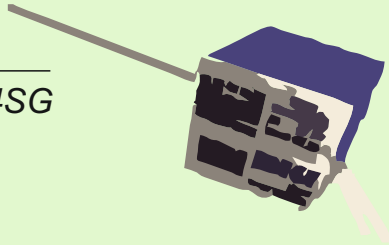
Juan Carlos, EA5WA
www.ea5wa.com

Do You want to collaborate with our newsletter, you cansend us your articles, photos, curious things.

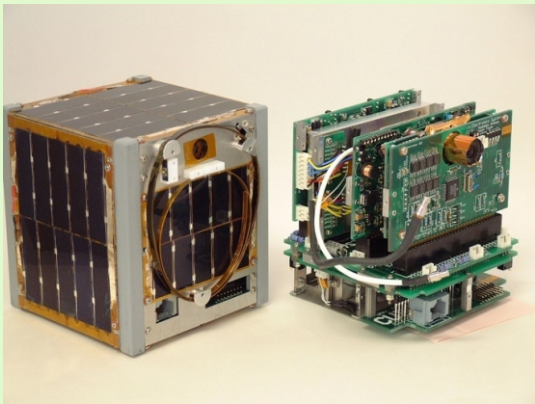
It is at your disposal, share your concerns and experiences.

The Other Satellites

EA4SG



Today, The CO Family: The first cubesats



CO-58 (IX-V Sat)

We continue with presentations and mentions of other amateur radio satellites we could hear and with a history behind.

But before you start you have to explain What is a CUBESAT and what it meant for our hobby the appearance of this kind of satellites.

At the beginning of the century, technology satellite sought to minimize size, lower the price of launcher sites and normalize components and satellite designs, with the objective on the horizon of popularizing its manufacture. This sum of factors allowed the planning of mounting and launching satellites to be a dream that could be, economically speaking, within the reach of universities and training schools. The appearance of the CUBESAT concept meant that the number of amateur and educatgional satellites would increase dramatically in just a few years. For that reason since 2003 the vast majority of satellites in our bands are of this shape.

A very brief summary of the cubesat concept is that each module is a 10x10x10cm cube (Fits in your hand) and has a maximum mass of 1.3Kgs. The cubesats (1U cubes) are scalable and can be put together to make larger satellites (2U, 3U or 6U in 2x3cube or 1x6cube formats).

Standardizing size also allowed the launchers to be standardized. The size is popularized and gave the possibility of designing "birds" of a reduced size but with a generous surface of solar panels (minimum 600cm2). As a result, good power generation capacity = attractive power for payload, components and radios. When you hear that such a satellite is a "cubesat" keep in mind that it will be of a normalized size as mentioned.

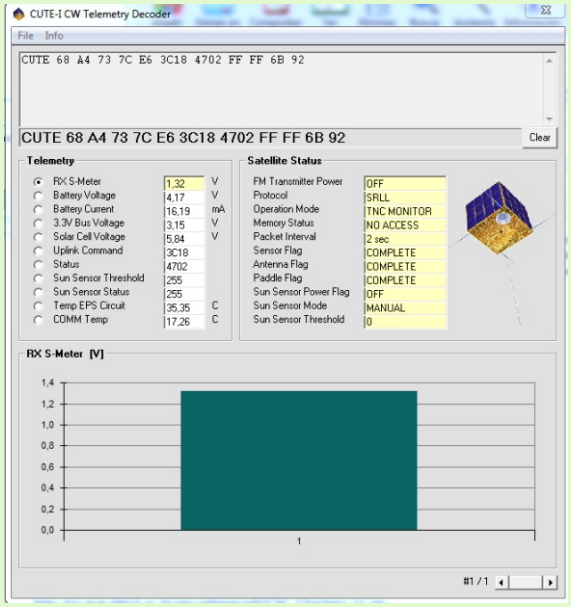
Today we will present, not an individual satellite, but a family of satellites. The CO. Specifically, I want to talk about the CO-55 (Cute-I), the CO-56 (Cute 1.7-APD), CO-57 (XI-IV), CO-58 (XI-V). The prefix CO comes from Cubesat Oscar.Let's go with its technical data:

Designacion AMSAT	Identificador NORAD	Indicativo	Modo baliza	Frecuencia baliza	Potencia baliza	N.º orbita actual	Altura orbita media actual
CO-55	27844	JQ1YCW	CW 13wpm	436.837 Khz	100mw	89338	835 kms
CO-56	28941	JQ1YPC	CW 50wpm	437.385 Khz	100mw	----	----
CO-57	27848	JQ1YCW	CW 50ppm	436.847 Khz	100mw	89326	835 kms
CO-58	28895	JQ1YGW	CW 50ppm	437.465 Khz	80mw	79452	682 kms

These satellites were the first cubesats with AMSAT designation to be launched into space and even when their missions started with a period of 2 years life, except for CO-56 which failed a few months after its launch and re-entered the atmosphere, all are still operational and transmitting. The four satellites were projects from universities and educational centers in Tokyo (Japan) and their Releases were between 2003 and 2006.

Last month we talked about a satellite whose reception is currently not a mystery because it was a simple tone. Well, this family of satellites transmit their beacons in CW. Neither puts up big signals but if you know telegraphy you will not need any software or hardware to receive the Morse code that they transmit and with the use of the decoder programs of DK3WN, their telemetry and the health status of each of them can be obtained. Let's look at an example of a CO-55 emission:

Transmitted CW Morse sequence = **CUTE 68 A4 73 7C E6 3C18 4702 FF FF 6B 92**
Meaning:
S Meter = 1.321 68
Battery voltage = 4.168 [V] A4
Battery current = 0.016 [A] 73
Bus voltage 3.3V = 3.151 [V] 7C
Solar cell voltage = 5.845 [V] E6
<CUTE-I Status> 4702
FM radio = OFF
Protocol = SRLL
Operating mode = TNC Monitor
Memory status = No access
Packet interval = 2
Sensor check = Completed
Antenna check = Completed
Pedal check = Completed
Solar sensor check power = OFF
Solar sensor mode = Manual
Solar sensor threshold value = 200
Solar sensor status = Off 255, 255
EPS module temperature = 35.4 [C] 6B
Radio temperature = 17.3 [C] 92



Telemetry decoder is here:

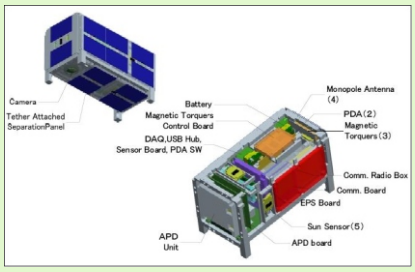
http://lss.mes.titech.ac.jp/ssp/cubesat/soft/CW_Checker1.51.zip
http://www.dk3wn.info/files/cute1.zip

To get a QSL read instructions here

http://lss.mes.titech.ac.jp/ssp/cubesat/operation/qsl.html

These methods of reception and decoding of telemetry using Morse code are undoubtedly the simplest and most basic that we can find in the amateur radio satellites if we want to start in this field. Although while browsing the internet you will read that these satellites also transmit in packet AX25 1200bd,but they only did it when they flew over their hqs in Japan.

As a curiosity, let´s say that the failed CO-56 took revenge and later the Cute 1.7-APD II was launched, improved brother of the CO-56 registered with the name AMSAT CO-65 and is still operational.



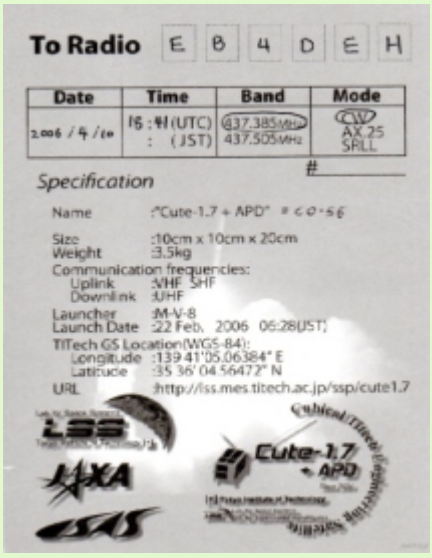
CO-65 (Cute 1.7 – APD II)

Finally, let me comment that the control equipment of these sats (often universities and educational centers) appreciate and encourage listening to them. Sometimes with rankings on pages of internet, sometimes with interactions in RRSS and other times offering the possibility of sending QSL to confirm reception reports. In this section we will inform when these possibilities are available through the "Links of interest" section.

It should be noted that in satellites as old as those named it is possible that after so much time and with their missions completed, there is no one on the other side to answer our listening reports. Regarding this, also comment that the AMSAT-NA Status website still maintains in its list these CO satellites, so we can report our capture or any anomaly on that website (https://www.amsat.org/status/).

MORE INTERESTING LINKS:

https://directory.eoportal.org/web/eoportal/satellite-missions/c-missions/cute-i
http://lss.mes.titech.ac.jp/ssp/cute1.7/amateur_service_e.html
http://lss.mes.titech.ac.jp/ssp/cubesat/index_e.html
http://lss.mes.titech.ac.jp/ssp/cute1.7/blog/index.html
https://www.nanosats.eu/sat/xi-v
https://www.pe0sat.vgnet.nl/satellite/cube-nano-picosats/co-57/
http://www.dk3wn.info/files/xiiv.zip
http://www.dk3wn.info/files/xiv.zip


To Radio E B 4 D E H

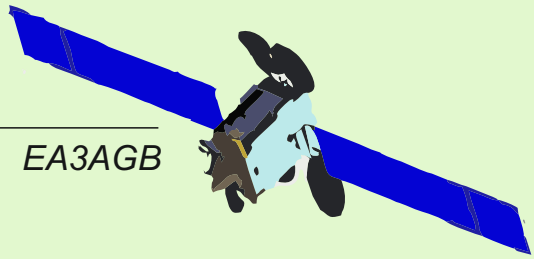
Date	Time	Band	Mode
2006 / 4 / 20	16 : 41 (UTC) : (JST)	437.385MHz 437.505MHz	CW AX.25 SPLL

Specification

Name :"Cute-1.7 + APD" #CO-56
Size :10cm x 10cm x 20cm
Weight :3.5kg
Communication frequencies:
Uplink :VHF SHF
Downlink :UHF
Launcher :M-V-8
Launch Date :22 Feb. 2006 06:28(JST)
TITech GS Location(WGS-84):
Longitude :139 41'05.06384" E
Latitude :35 36' 04.56472" N
URL :http://lss.mes.titech.ac.jp/ssp/cute1.7

73s and good reception
David EA4SG
Email:at746david@gmail.com
Twitter: @EA4SG

QO-100

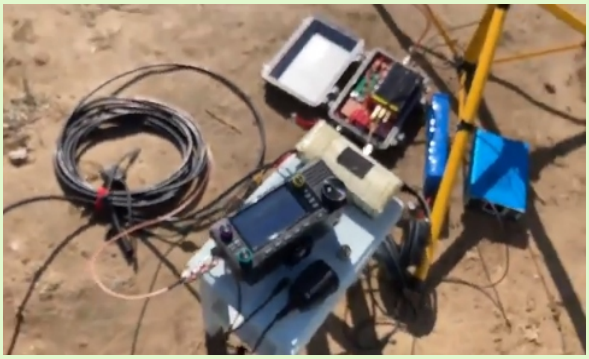


EA3AGB

3A/DL4EA	JN33RR	CW/SSB	LOTW-BURO
CN8JQ	IM63NX	SSB	QRZ.COM
9H3SAT	JM75CB	SSB	QRZ.COM
CT1BQH	IM59SL	CW	LOTW/EQSL
DB0OM	JO44ER	SSB	QRZ.COM
DL35SDR	JN57NN	SSB	QRZ.COM
EI8KF	IO63MF	SSB	LOTW/EQSL
EP4HR	LL69GP	SSB	EQSL
G1IKV	JO00GV	SSB	QRZ.COM
ID9OSC	JM78MP	SSB	QRZ.COM
LA4IR	JO48HI	SSB	BURO-DIREC
OE8XDX	JN76JV	SSB	DIRECT
OL1KOTA	JN89IJ	SSB	QRZ.COM
OM1OW	JN98HS	SSB	QRZ.COM
OY/DL4APJ	IP61OX	SSB	LOTW
OZ1CT	JO75IC	SSB	QRZ.COM
PA/DL9DAN	JO23VK	SSB	QRZ.COM
TR8CA	JJ40QL	CW	LOTW
UA1ALD	KO49KO	SSB	QRZ.COM
VU2OW	NK03TV	SSB	LOTW
VU2RCY	ML80MS	SSB	EQSL
YO9FLD	KN34BK	SSB	LOTW/BURO
ZS6CNC	KG43AV	CW	LOTW/EQSL

3A/DL4EA, Antonio

In this last month two new entities valid for the DXCC have been activated on the QO-100, it is 3A / DL4EA Principality of Monaco, activated by Antonio and the qsl via bureau and lotw and OY / DL2AQI - OY / DL4APJ, Faroe Islands, qsl via HC, Bureau and lotw.



BG0AUB/P

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