NEWSLETTER-AMSAT-EA

12/2021 DECEMBER

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Ten-Koh 2 microsatellite

The IARU has coordinated frequencies for the Ten-Koh 2 satellite, a microsat under development by the Department of Aerospace Engineering, Faculty of Sciences and Technology, Nihon University.

Ten-Koh 2 has dimensions of 366 x 226 x 100 mm and supports various payloads of interest to the amateur radio community, including a linear V / U transponder developed by JAMSAT. The transponder will work continuously for two days a week, and operations will begin two weeks after launch.

Additional payloads include a digi-talk, a camera module, and a microwave communication system. The digi-talk is planned to run one day a week and will be developed in cooperation with the students from the Faculty of Arts at Nihon University. The module camera, developed by Cheng Kung University, will take pictures of the earth about 3MB in size per image. Hams anywhere in the world will be able to copy parts of the image data that can be combined to have the complete image, which will be published on the website, it is expected that the system runs one day a week.

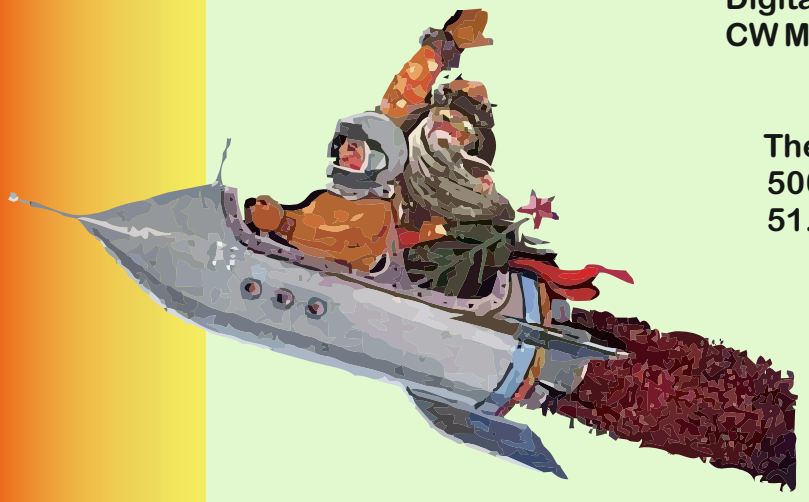
The satellite will also carry a 5.8 GHz experimental microwave transmitter, which will transmit a CW Beacon one day a week. In addition, the satellite will experiment with transmission of high-speed data on the 435 MHz downlink, with speeds data rates of up to 38.4 kbps in 4FSK. High data transmission is expected to operate one day a week.

Coordinated frequencies:

Uplink 145.895 MHz - 145.935 MHz
Downlink 435.875 MHz - 435.915 MHz
Digitalker and sending images 435.895 MHz
CW Microwave Beacon 5289,000 MHz

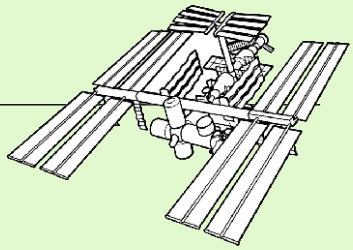
The launch is scheduled for 2023 and will be in a 500 km circular orbit with an inclination of 51.6degrees.

https://okuyamalab.wordpress.com/



HAPPY XMAS AND 2022

ISS SSTV December 26-31 145.800 MHz FM



New period of SSTV communications from the ISS from December 26 to 31. The images will be related to the moon exploration. As usual, images can be received on 145,800 MHz. The planned mode is PD 120.

Some of the images received
in the last SSTV session

ISS FRECUENCIES:

Downlink voice and SSTV - 145.800
Voice uplink: UIT 1 (Europe, Africa and Russia) - 145.200
Voice uplink: ITU 2 and 3 (in any other place)- 144.490
Uplink and downlink for VHF data - 145.825
Uplink and downlink for UHF data - 437.550
Repeater uplink V / u - 145.990 (PL 67.0)
Repeater downlink - 437.800

ARISS School Contacts

Jon, EA2ARD

On November 20, 2021 in the auditorium at the Museum of Human Evolution and following an initiative of the Astronomy Association in the spanish city of Burgos we made a presentation of the ARISS program to the schools in the city.

We thank the educators of different school stages, amateur astronomers , local hams and to the public for their attendance. And specially our thanks to the kids who were seated in the front rows who really enjoyed with interest.

The presentation of the ARISS Program were divided into three parts. You can watch it in this youtube video

https://youtu.be/9Db1kjd87nE

The first part is dedicated to the presentation of our hobby and our participation in space related stuff. The beginnings with the SkyLab, MIR and the current ISS. What is ARISS, how it works and its goals. ARISS programs and especially the promotion of activities in the field of amateur radio, education and general public. Here is where "ARISS School Contacts" are included.

https://www.ariss-eu.org/school-contacts

It is necessary to make a request according to the procedure indicated in the ARISS Europe website and within the established deadlines. The most important parts are: the educational part where educators in their schools will try to promote the interest of Students for Science, Technology, Engineering, Art and Mathematics. This is the main objective of the program.

A second most important thing of this project is the help and collaboration of the Volunteer local hams. Time for the Promotion of Amateur Radio during the period (one or more educational courses) of preparation of the QSO with the astronaut in orbit and during the exciting ten minutes of the unforgettable contact. It´s important the Technical Requirements of the Ground Station for both Direct contact or Telebrigde (remote assisted).

Because scheduled contact is a one-time event involving a large audience, every effort is taken to set up a ground station that offers the maximum during the

QSO time, within the limitations of orbital mechanics and line of sight considerations, and to provide a second option in case unexpected equipment failure.

Once we are on the event day, the QSO, everything must be organized and planned, students ask their questions. And the importance of social media.

And to finish the presentation we commented about different activities. Schools must comply with the training before the contact. Amateur radio may be part of it.

From the young group ARISS EAteam we are at your disposal to Give you more information. Of course you are invited to participate: we have a lot of job .

The intention is that spanish radio amateurs are prepared for the possible consultation of a school about the ARISS program Contacts for children. We can give a satisfactory answer by collaborating with them to enjoy our hobby and inspire STE (A) M careers in students.

We thank you all and encourage you to explore these activities. A mixture of our hobby, education, orbits, radio, research, antennas ...

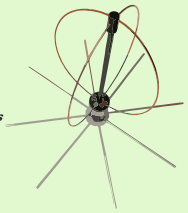
Many thanks to Enrique EA1BHB and Nacho EA1IDU from Burgos (Spain) who already are working on it and heating up the antennas.

Jon, EA2ARD
ea2ard@ure.es

ARISS EAteam is a group of EA radio amateurs. We have enjoyed this activity previously and it has captivated us. We want to offer help to interested educators and give support to radio amateurs. To ease the experience.

Eggbeater V2 antenna for 145 Mhz

EA5WA - Juan Carlos



Based on the excellent articles by Jerry K5OE and Juan Antonio EA4CYQ, I decided to manufacture a UHF Eggbeater, with cheap materials , but I needed something more robust to make a VHF version with easy to find materials. Taking advantage of everything learned during the making of the QFH, I have finally found an easier way to build an Eggbeater V2 for VHF.

All the materials are easy to find in any store of DIY, except for the RG-62 (93 ohm) coaxial cable needed to get the correct 90º phase shift of one of the frames, to obtain the circular polarization. In my case I bought a few meters on the Internet, I do not remember exactly where. A Google search should be enough to find it.

Materials needed

PVC 50 connection sleeve

Reducer from 50 to 40

Reducer from 40 to 32

4 M6 hex bolts

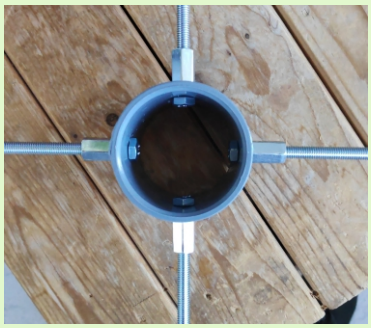
4 Hex socket M6

4 Threaded rod M6 long 200

- 1 meter of PVC pipe of 50 (necessary from the point of feed to the radials).
- 1 meter of PVC pipe of 32 (necessary from the point of feed to the junction of the boxes at the top of the antenna).

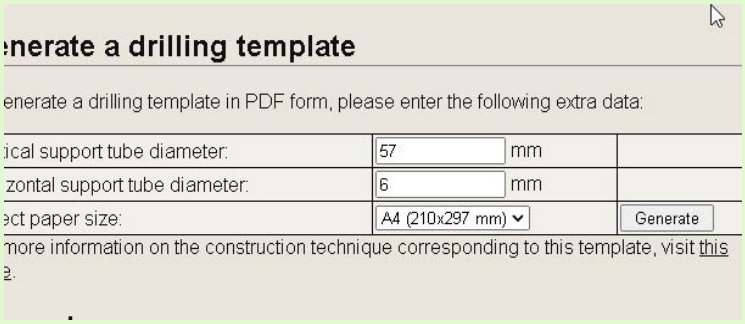
- 1 cap for PVC pipe of 32 (necessary to close the top part).
- 2 aluminum plates (10mm wide) 2 meters long.
- Nuts and Washers for M6
- 2 rods of 1 meter (diameter 4mm) made of aluminum, to be used as radials.
- 1 half-meter piece of RG-62 coaxial cable, required for offset one of the frames and obtain circular polarization.

Preparing the feeding point



The first thing is to make the four holes to put the lower horizontal ends of the two frames (the 4 threaded rods of 200mm). Later we will have to connect in these four points the coaxial and the offset line necessary to achieve horizontal polarization.

To make the holes, I used the template that generates the jcoppens webpage, the same one that is used for QFH drills. To generate the template, we have to enter the outer diameter of the sleeve (57mm) and the diameter of the threaded rods (6mm) and click on the "Generate" button.



enerate a drilling template

enerate a drilling template in PDF form, please enter the following extra data:

ical support tube diameter:	57 mm	
zontal support tube diameter:	6 mm	
ect paper size:	A4 (210x297 mm)	Generate

more information on the construction technique corresponding to this template, visit this e.

After clicking on "Generate" a new browser tab will open with an image of the template. Clicking on this image, the pdf will be downloaded ready to print.

Once printed, from the template we are only going to take advantage of the part "Top", we cut it and discard the rest.

We glue the template around the sleeve and fasten it with a piece of Scotch tape.

To drill, I recommend doing a first drill with a fine bit (2mm for example) trying that is as centered as possible in each of the holes where the threaded rods will be mounted. Then we finish each of the four holes with the 6mm drill bit.

The final result should be the one we see in the picture.

The next thing to do is to prepare the coaxial cables, starting with the 90º phase shift made with 93 Ohms RG-62 coaxial cable.

We cut a piece of 419mm and peel the two ends about 25mm to separate the live from the mesh.

At one end we crimp two lug terminals with 6mm hole. The other end must be tinned to join it to the 50ohms coaxial that we will send to the radio. Once welded, we crimp another two lug terminals (Photo 9).

Once the four terminals have been crimped, we put a screw to each of them and fasten it with a nut. We tighten them with two fixed keys (Photo 10).

We take the end that corresponds to the descent and pass the screws through the holes previously made on the PVC sleeve and fasten them on the outside, with a hexagonal socket. We tighten firmly using the fixed keys (Photo 11).

Now we take the other end still to hold and we repeat the previous procedure. Here we have to take into account the position of the copper mesh and copper wire, to achieve the desired circular polarization.

For Right Circular Polarization (RHCP) looking from above as In the image, the copper wire must go to the hole closest to the copper wire on the down cable line, in counterclockwise (Photo 12).

Photo 9

Photo 10

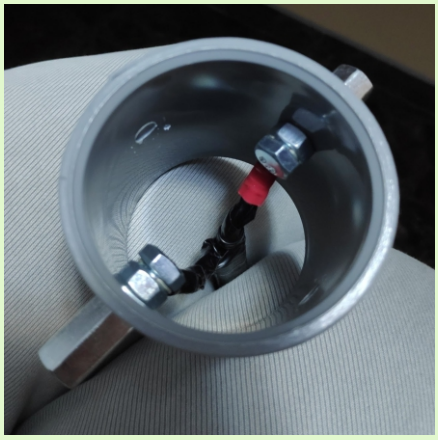


Photo 11

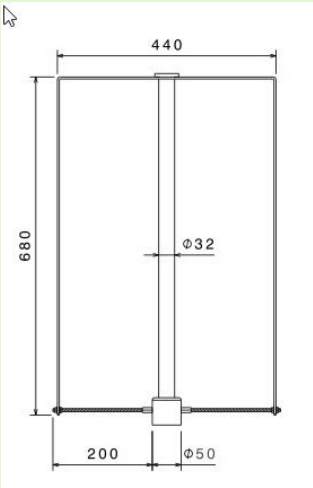
Photo 12

Rest of the antenna

Once the feeding point is ready , the rest is more simple. In the horizontal part in the bottom we will have to screw the rods to the four hex bushings of the feeding point.

At the ends of these rods is where we will screw the "almost-squares" made with the plate, using a pair of nuts for each rod.

Before mounting them we can install the two reducers that we will place on the PVC bushing to reduce it to 32mm, which will be the diameter of the vertical support that gives rigidity to the frames.



We prepare the "almost-squares" with a height of 680mm and a width of 440mm, it should look like a box without bottom part. The square closes till the feeding point with the threaded rods that already we have installed.

Once the two squares are completed, we can install the 32mm tube to give sufficient rigidity to the set without increasing the wind load.

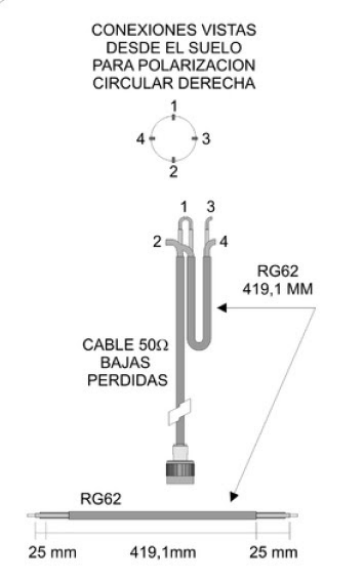
Previously, you have to prepare at the upper end the gaps where the Plates will be fixed. It is best to prepare them with a saw or nail file as requested, since I don´t have the exact measurements of this part.

To avoid contact of the two squares (must be isolated at the top), put some insulating or heat shrink tape.

Once the top is completed, put the cap and seal with silicone or glue for PVC.

Once the main part of the antenna has been prepared, we only need to prepare the radials. To do this, drill two 4mm through holes so that the two rods of 1 meter in length, pass tightly and with about 4mm of vertical separation so they don't collide. I have made these drills a meter away from the feeding point.

To tighten them to avoid displacement, in my case I have held them with terminals of 4, as you can see in the photos. In my case I committed a failure to glue the PVC pieces so the orientation of the radials were not as expected. The correct procedure would be to leave them in the same position as the squares.



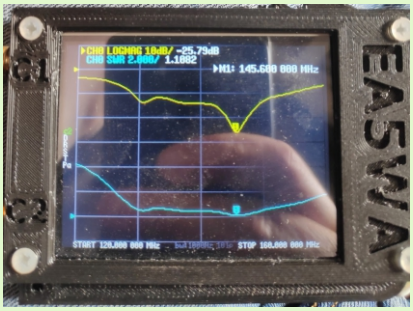
To install it on a mast, I have chosen to hug the PVC pipe directly with two mast flanges. It would be better to use doubles, but in my case, I had nothing else .....

Performance

As I have told you, I have made this antenna to obtain a better version of the first antenna that I did with a rod and clamps.

The performance is very good, to work satellites, although it does not have the QFH gain, below 20 degrees elevation I can do better QSOs than with the QFH. From 20 degrees elevation, I usually have a better signal with the QFH.

As you can see on the NanoVNA screen is quite wide in terms of ROE, with a value of 1.1 in 145 MHz and a Return Loss of 26 dB.

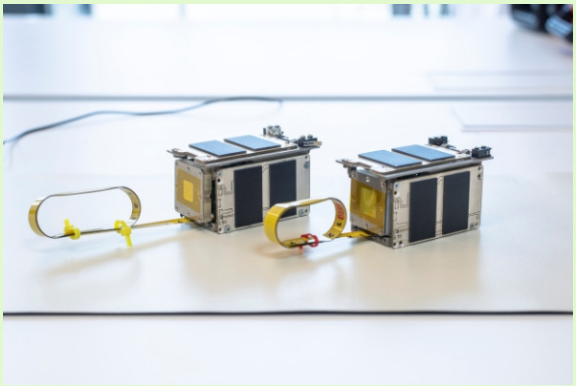


Final thoughts:

- Below 20 degrees: this Eggbeater wins clearly.
- Above 20 degrees: better signals and less QSB with the QFH, although with the Eggbeater QSOs are also made.

If only one satellite antenna can be mounted (and if it has to be omnidirectional) I recommend this antenna.

Juan Carlos
www.ea5wa.com



AMSAT-EA has achieved, with financial and engineering support from the private sector and universities, in just two months, and after a new launch opportunity over the horizon, designing and building new evolved GENESIS satellites with advances derived from HADES one, which will fly together with EASAT-2 in January with SpaceX.

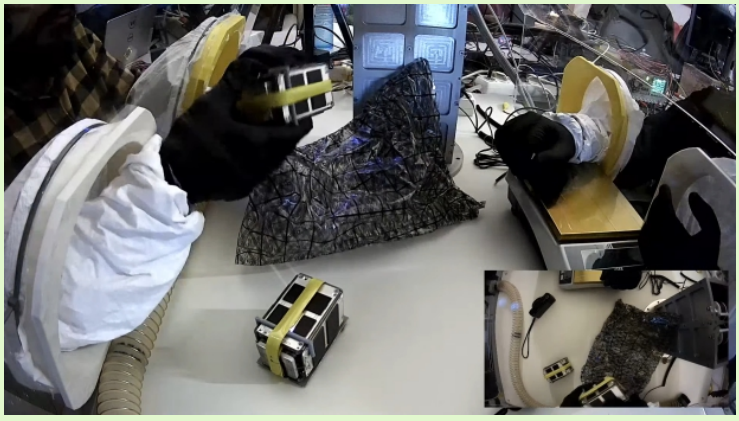
These second-generation GENESIS satellites, named GENESIS-G and GENESIS-J, are much more advanced than their predecessors, which were simple repeaters of CW / ASK although they had a complex operating system and platform management software. These new satellites, which have a more powerful on-board computer and updated software, allow FM voice repeating, AFSK / FSK non-regenerative repeating up to 2400 bps, FSK regenerative repeating up to 50 bps, CW, digitized voice pre-recorded in FM and FSK telemetry at 50 bps.

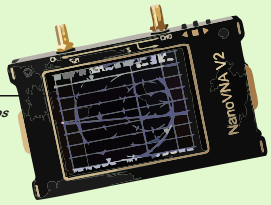
The laboratory has verified the correct retransmission of AX25 / APRS frames over FM up to 2400 bps.

These new satellites will also have the subnames ASTROLAND-1 and ASTROLAND-2 to thank the Astroland Planetary Agency for supporting the project.

Also in this occasion, as in its predecessors, two thrusters are to fly as payloads, although they are not those of the American company AIS, since they couldn't be in time. This time the thrusters are from the company based on Madrid IENAI Space and, and, unlike the previous ones, these use an ionic liquid fuel. Only the one on GENESIS-J is functional. The one on GENESIS-G carries the electronics but without the fuel.

These satellites have been qualified along with the LibreSpace Qubiks, a new Fossa 1P from Fossa Systems and LibreSpace's own Picobus launcher, in the Ignacio Da Riva (IDR) Institute of Microgravity, dependent on the Polytechnic University of Madrid (UPM) at the end of November, proceeding to the final integration in Athens, on 20th December at LibreSpace facilities. The shipping to the United States is planned for the next few days.





The NanoVNA allows in a very comfortable way to see the SWR in our antenna, displaying a graph from the initial frequency (the one that is set to START)up to the final frequency (the one set to STOP).

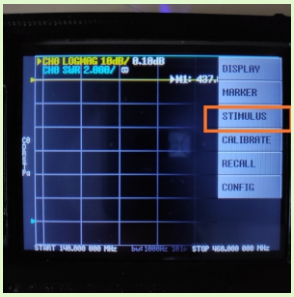
I will explain the process step by step, so you may think it´s a very complicated and long process, but really, it´s not. As soon as you do it a couple of times you will realize that the process is very easy.

Configuration of the NanoVNA to obtain the SWR graph

Frecuency:

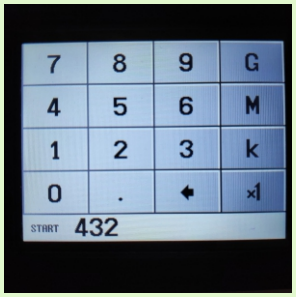
The first thing to do is to define the Start (START) and End (STOP) frequencies. It can also be set as the Center Frequency of the graph (CENTER) and the width to both sides of this center frequency (SPAN). Both ways the width of the graph that we are going to obtain is established.

To do this, we open the Initial menu by pressing on the screen and click on STIMULUS:



Open the Initial menu and press STIMULUS

Click on START to enter the frequency to start from



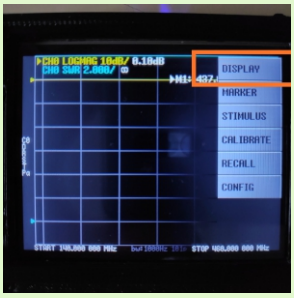
Enter the frequency and we finished with the units kHz, MHz or Ghz

and we repeat the process for STOP frequency or final frequency

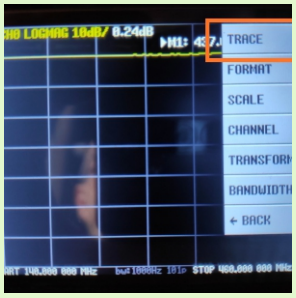
Traces:

To measure the SWR of an antenna it will be necessary to visualize a trace,although I recommend presenting two traces, one for the SWR and one for the Return Loss. In the photos of this tutorial you can see two traces, the yellow represents return loss and blue represents SWR.

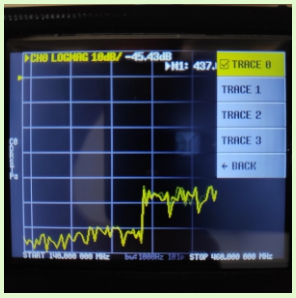
To do this, we open the Initial menu by pressing on the screen and click on DISPLAY, then click on TRACE and in the following menu we choose the traces that we want to visualize.



Open the Initial menu and press DISPLAY



Click on TRACE



Activate the Yellow trace

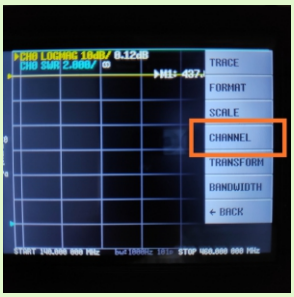
Activate the Blue trace

Connector to be used in the measure:

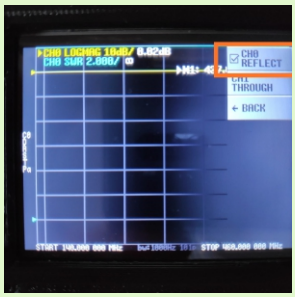
To measure SWR we are going to use the CH0 connector since the measurement is based on the reflection coefficient. Therefore, if we have the trace in CH1 we will have to change it to CH0 through DISPLAY - CHANNEL - Ch0

Pop up the Initial menu

Press on DISPLAY



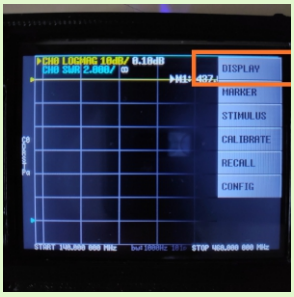
Press on CHANNEL



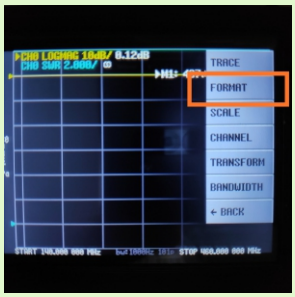
Press on Ch0

Parameter to be measured:

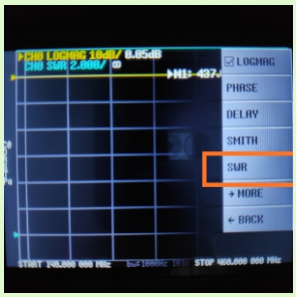
To measure the SWR of our antenna we will have to select SWR in the trace we are using, using DISPLAY - FORMAT - SWR



Open the Initial menu and press DISPLAY



Click on FORMAT



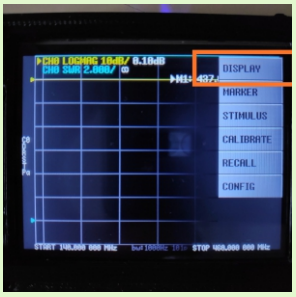
Click on SWR

At the top we can confirm that the trace is ready to measure SWR

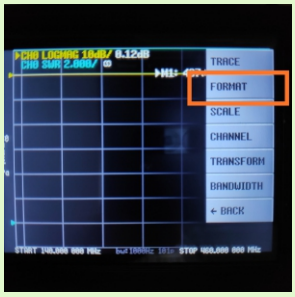
Recommendation for greater precision:

When adjusting the SWR of our antenna, I advise to show not only SWR but also the return loss, since it has a Sharper curve and allows a much better tuning.

To do this, we change to another trace, for example the yellow one, using the DISPLAY - TRACE menus and selecting the trace that we want to visualize.
On this trace we will select DISPLAY - FORMAT - LOGMAG the logarithmic measure (in dB) that will give us the graph of the return loss.

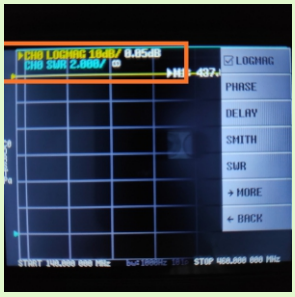


Open the Initial menu and press DISPLAY



Click on FORMAT

Click on LOGMAG



Confirm that we have done it correctly watching the top bar

Return loss provides us with information about the adaptation or maladjustment. Return loss is the negative value of the magnitude of the reflection coefficient in dB, therefore the more you lower the minimum of this graphic, the better the adaptation.

Perform the SWR measurement

Once this NanoVNA preparation process is done, we connect the coaxial cable that goes to our antenna, to the CH0 connector of the NanoVNA to perform the SWR measurement.

In the image we can see the swr graphs and return loss obtained. We can move the MARKER with the buttom of our NanoVNA to get the concrete value on a certain frequency.

In M1: we can see the frequency where the Marker M1 is located, visible with the symbol 1 on the graph curve.

Next to the indication of the traces, we see the concrete SWR value and the return loss (in dB) at the frequency in the Marker.

Juan Carlos
www.ea5wa.com

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