3B8GL - EWS-G1 (GOES 13) FULL DISK SATELITTE IMAGERY RECEPTION

STATION : 3B8GL

OPERATOR : ISHWAR.S.MANDARY (ASHWIN)

GRID LOCATOR : LG 89RR

WHAT IS EWS-G1?

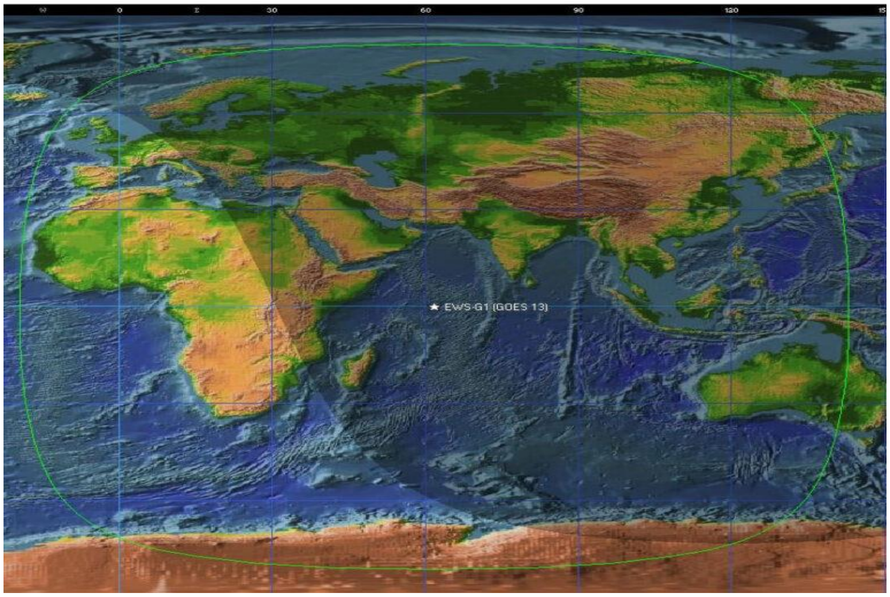
EWS-G1 (Electro-optical Infrared Weather System Geostationary)[1] is a weather satellite of the U.S. Space Force, formerly **GOES-13** (also known as **GOES-N** before becoming operational) and part of the National Oceanic and Atmospheric Administration's Geostationary Operational Environmental Satellite system. On 14 April 2010, GOES-13 became the operational weather satellite for GOES-East.[2] It was replaced by GOES-16 on 18 December 2017[3] and on 8 January 2018 its instruments were shut off and it began its three-week drift to an on-orbit storage location at 60.0° West longitude, arriving on 31 January 2018. It remained there as a backup satellite in case one of the operational GOES satellites had a problem until early July 2019, when it started to drift westward and was being transferred to the U.S. Air Force, and then the U.S. Space Force.[4][5][6]

GOES-13 arrived at 61.5° East longitude in mid-February 2020.[7] The satellite is renamed **EWS-G1** and fully operational for the Indian Ocean since September 8, 2020.

INFORMATION ABOUT RECEIVING THE GOES-13 WEATHER SATELLITE (EUROPE COVERAGE WITH 1.8M DISH)

For some time now many weather satellite enthusiasts have enjoyed the ability to relatively easily receive live high resolution images directly from the GOES-16, GOES-17 and GK-2A geostationary satellites (tutorial here). However, while much of the world can see at least one of these satellites, European's have been left out.
What may be of some interest to Europeans is that the older GOES-13 (aka EWS-G1) satellite was repositioned in February 2020, and it can now be received in Europe (as well as Africa, the Middle East, Asia, Russia and West Australia) until at least 2024 when it will be replaced.

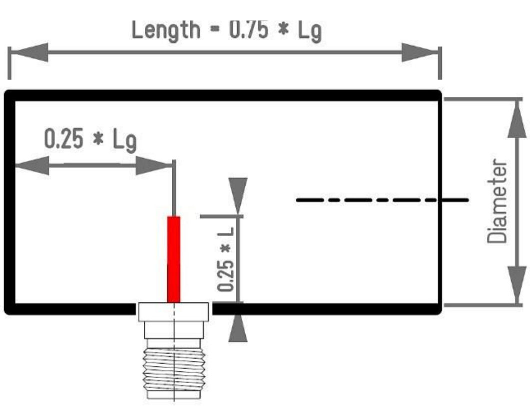
The important catch however is that GOES-13 is not broadcasting the same easy to receive LRIT/HRIT signals that the other satellites use. The signal is still in the L-Band at 1685.7 MHz, however it is called "GVAR" and it is much weaker and uses 5 MHz of bandwidth. For GOES 16/17 and GK-2A a 1m WiFi grid dish, LNA and RTL-SDR was sufficient, but for GOES-13 you'll need a much larger 1.8m dish, and a wider band SDR like an Airspy. The big dish requirement significantly increases the reception challenge.



More info : https://usradioguy.com/decoding-ews-g1-or-goes-13/

Hardware Used :

1. Prime Focus Dish 185cm (Full Dish Not Meshed) – I have replaced all the original Bolts, Nuts and Washers with same size but material Stainless Steel.
2. Custom cantenna (150mm diameter) – Rs 400 – I made this in Port Louis with a (Tinsmith / Ferblantier) – Only the can.
3. I fixed the connector and the monopole
   Calculation of the cantenna , I have used the online calculator
   https://www.changpuak.ch/electronics/cantenna.php



Freq. of operation [MHz]	1685
Can Diameter [mm]	150.0
Cut-Off Freq. for TE11 Mode [MHz]	1171.32
Cut-Off Freq. for TM01 Mode [MHz]	1529.90
Waveguide Wavelength Lg = λg [mm]	247.5
0.25 * λg [mm]	61.9
0.75 * λg [mm]	185.6
Free space Wavelength λ [mm]	177.9
Length of Monopole λ/4 [mm]	44.5
Diameter of Monopole [mm]	2.2

CALCULATE

Cantenna viewed from bottom with Monopole inside

Cable: ASLR600 equivalent to LMR 600 with the N-Type connectors already fitted (Low Loss Cable) ordered from Alibaba
Note the lesser the distance from the Cantenna to the computer the better it is.
Avoid using multiple connectors to avoid loss of signal
I have used 75ohms Coaxial cable and 50Ohms Coaxial Cable, Signal received was zero.

LNA : SAWBIRD + GOES

LNA connected to Cantenna with least No of connectors

SDR : AIRSPY MINI

Software : https://github.com/SatDump/SatDump

Computer : Am using a stand alone Windows 10 PC with the following specs

1. Intel Core i7 860@2.8Ghz
2. RAM: 16GB
3. Graphic card: Ge Force 2500
4. HDD SSD 1TB
5. I have added one additional fan for cooling.

The pic decoded is in PNG format and size of one picture is approx. 240MB – 300MB, You need to have a good PC power supply as it requires a lot of power (am using a 600W PSU, I will be upgrading to a 1000W or 1200W).

And that’s all that you need, the tricky thing is first to calculate the focal length

Determining the focal length of a parabolic dish (axi-symmetric, circular)

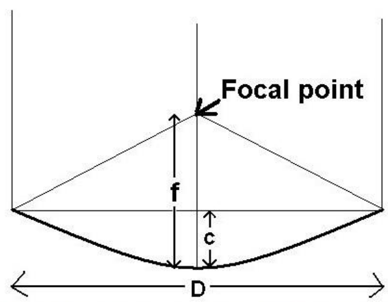
Focal length = f

Depth = c

Diameter = D

f = (D * D) / (16 * c)

Measure the depth using a tight fishing line across the dish and a rule to measure depth c.



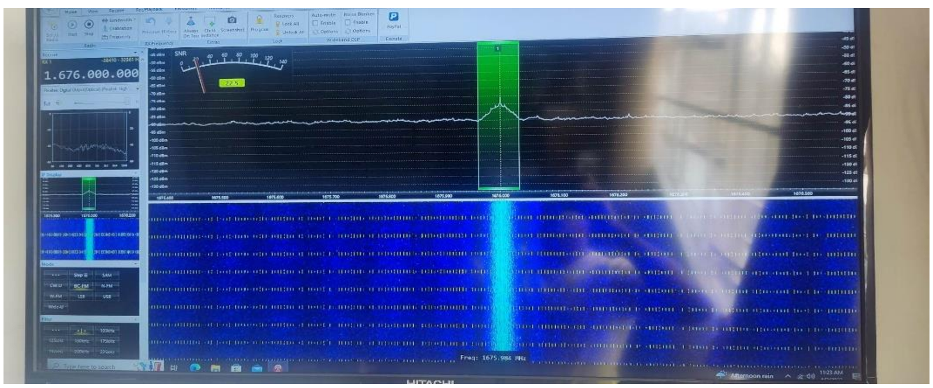
Parabolic dish showing measurements needed to determine focal length.>/p>

In my case it is 72cm or 720mm.

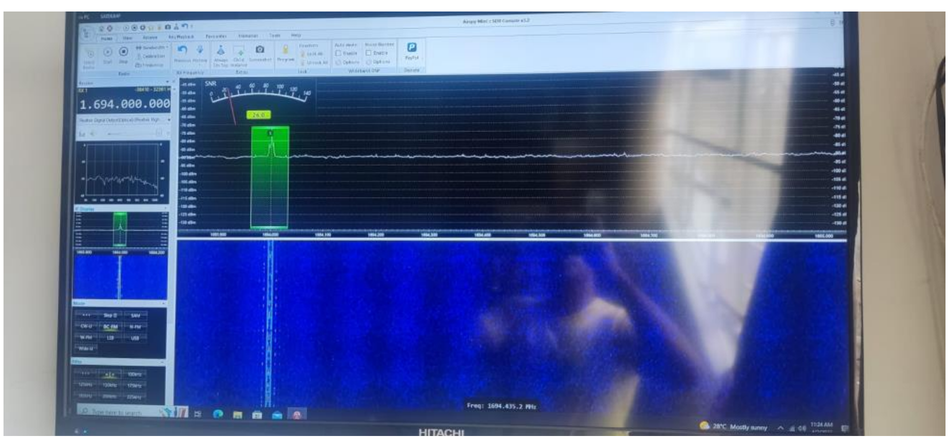
Next is to point the dish in the right postion.. I have used Satelitte Dish Pointer on my Android Phone where the results was 95%.

Now for fine tuning , launch SDR Console and set the frequency to

1st -SD - 1676 MHz - check signal and adjust the dish

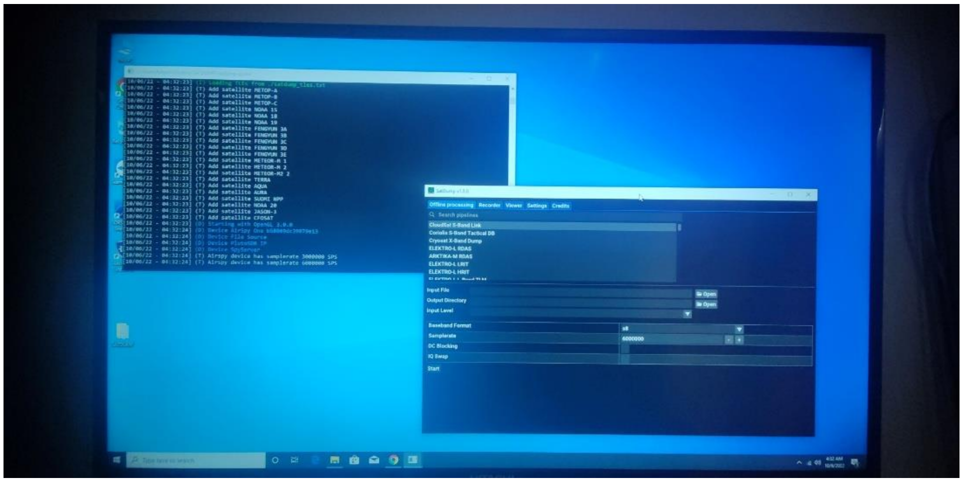


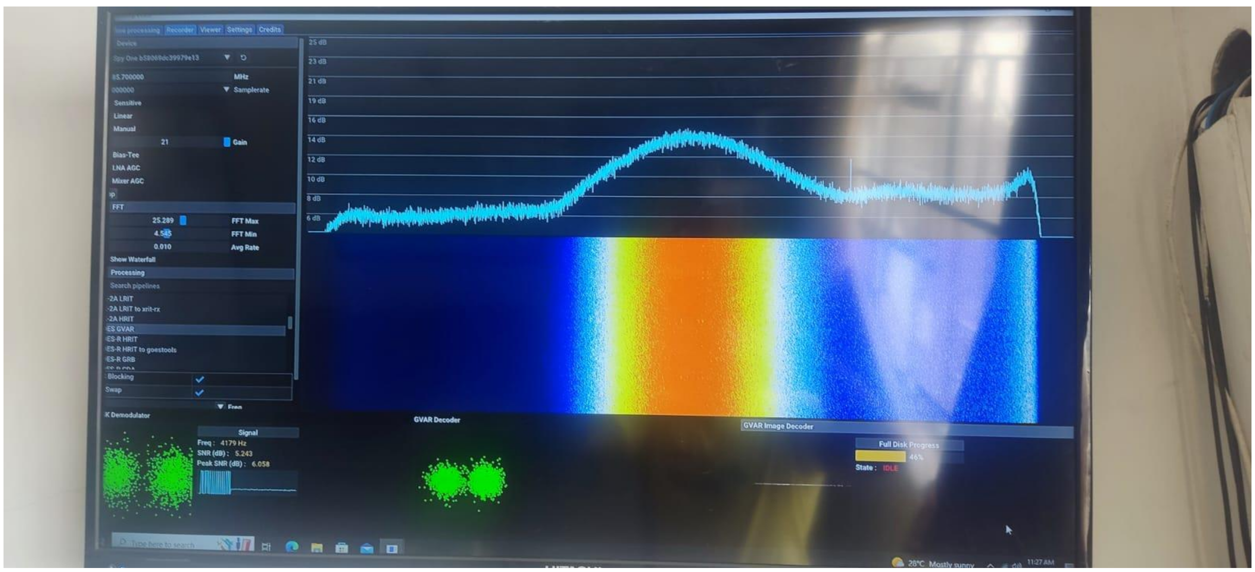
2nd - GVAR 1694MHz – check signal and adjust dish



You need 2 persons for this operation, one watching the signal level and the other doing the fine tuning.

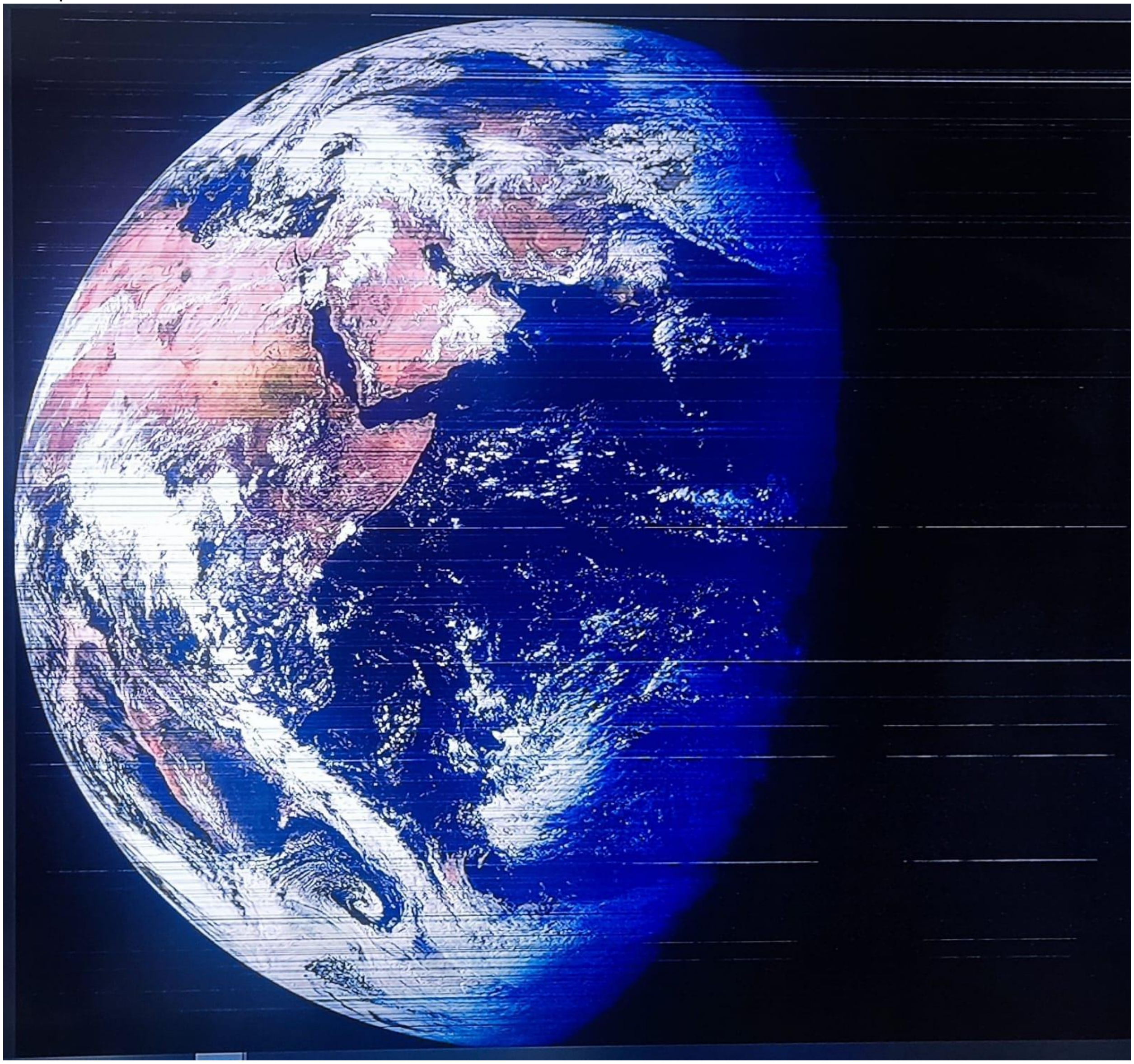
Once all is done…Just launch SatDump and enjoy the show…





To get a full disk visible image the best time is between 0730Z to 0900z.

This pic was taken at 1215Z



This pic was taken at 0845Z