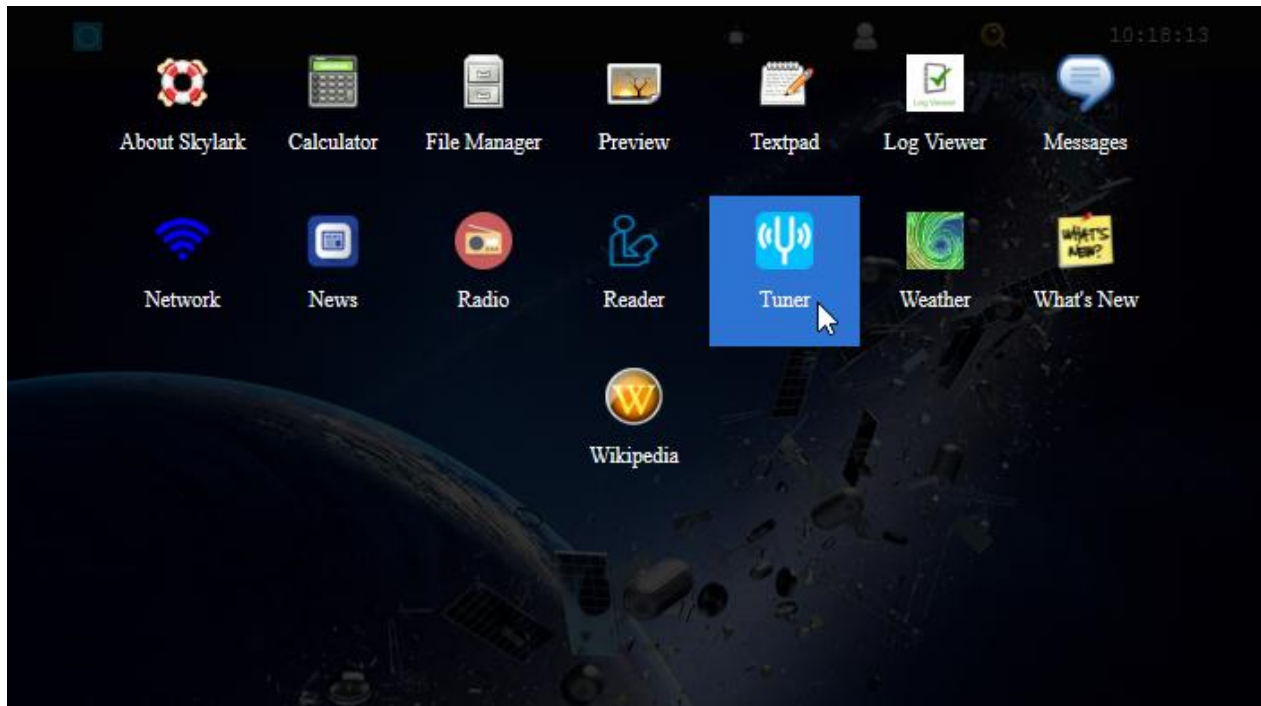


Section III - Acquiring the Satellite

Open the **Tuner Icon** on the Skylark Applications Icons (Fig. 12) to run the **Tuner App** to begin the satellite setup process.



The default tuner screen (Fig. 13) shows *Americas* with a *Frequency* of *12.1032* and *Beam Type* of *164* (*Coverage of SES-2 87W is shown in Fig. 18*). As mentioned, this is not the current Frequency and Beam Type for the Americas satellite (SES-2).

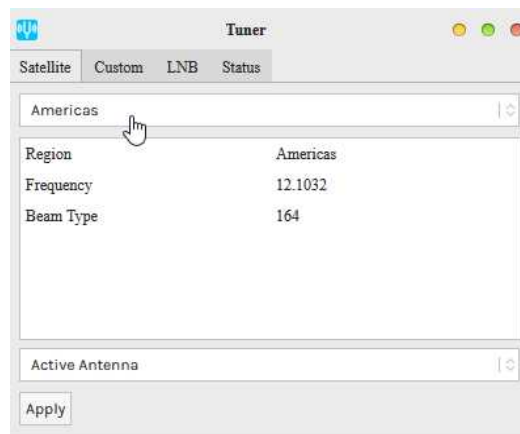


Fig. 13 Default Tuner Screen with 4 Tabs

Make sure your LNB TAB (Fig. 13b) has your installed LNB type selected - - either Single LO or Dual LO. The default LNB (Fig. 13b) is the *Dual LO: 9750/10600 MHz*. The Dreamcatcher v3.05 was shipped with the Dual: LO LNB 9750/10600 MHz. The older Maverick Single: LO 10750 MHz was shipped with the Dreamcatcher v3.03 and would be selected as *Single LO: 10750 MHz*, **however some Forum Members have not been able to achieve lock with the Maverick LNB on the new frequencies**. If you use the new Bullseye Dual: LO LNB (soon to be shipped with a New Dreamcatcher and currently available in the Othernet Store), select it as a Dual LO: 9750/10600. Make sure to use the green F-type connector of the Bullseye on the LNB. See Annex F for more

information on LNBs.

If you change the LNB selection, make sure to go back to the Satellite TAB (Fig. 13) and **click APPLY**.

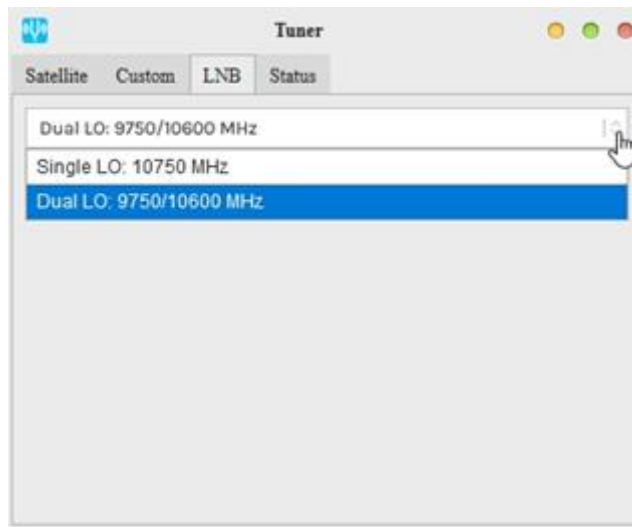


Fig. 13b Tuner LNB Selections

Tuner Status (Fig. 15) will appear blank when you go to the **Status TAB** because the LNB has not been pointed toward the satellite nor tuned to receive a signal.

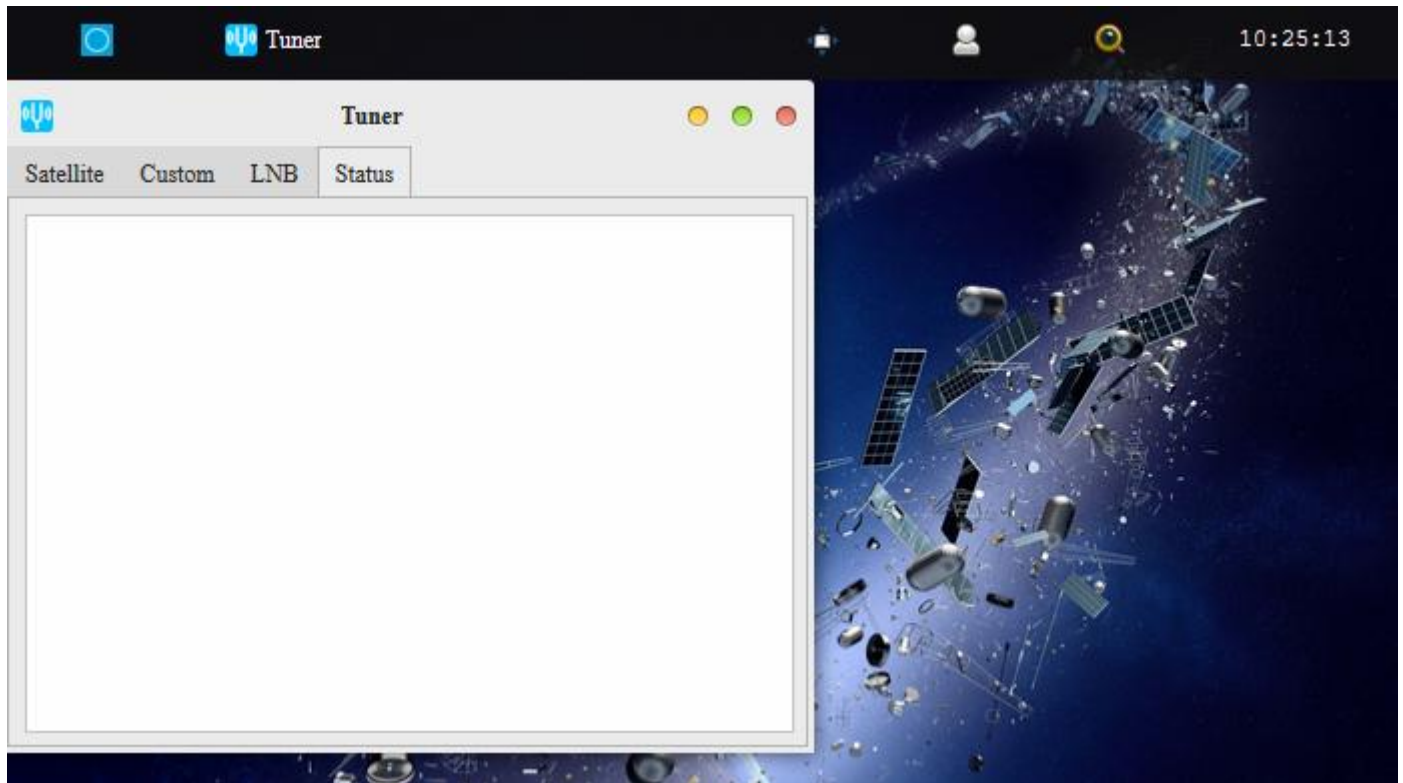


Fig. 15 Tuner Status TAB – Blank with no Signal

However, you can verify that the LNB is electrically connected and working properly. In the **Log Viewer Application** (Fig. 16) there is a TAB called *Diagnostics* which will confirm in (Fig. 17) at the very bottom of the screen the presence of your Bias-T voltage which powers the LNB.

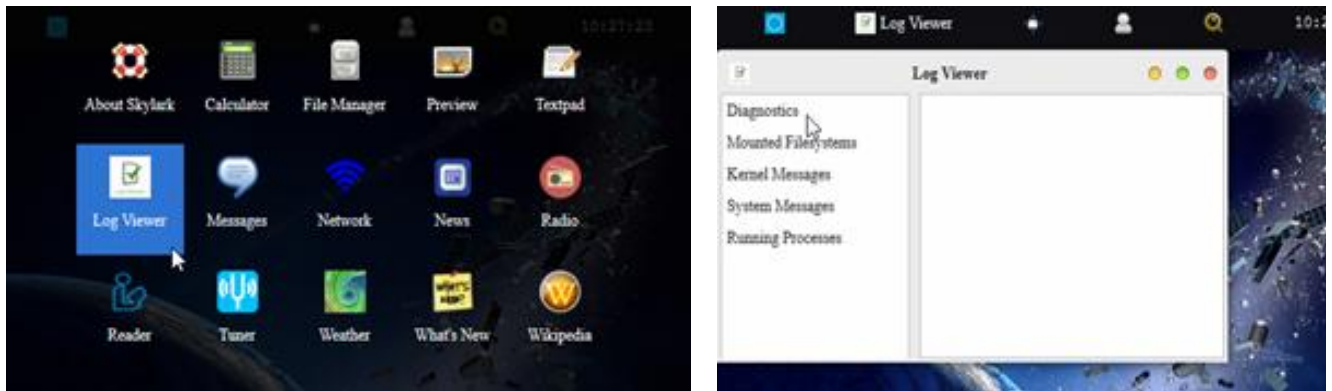


Fig. 16 Applications Screen showing **Log Viewer App-Left (and the Diagnostics TAB-Right)**

If you see any Bias-T error messages at the bottom of the TAB in Fig. 17, you have a power problem to address before going any further. Your most likely problem is too small a USB power cube or too thin a USB to micro USB charging cable. Make sure the thin RF cable connection between the Dreamcatcher Board and the LNB hasn't broken under the black wire wrap (do a continuity check on the connectors). This has been reported by some Forum Members.

If everything looks good, you are now ready to proceed on.

```

=====
Skylark v6.8 / dc (765ca8b)
built at 2020-03-04 11:29:15+00:00

Copyright 2019 Othernet Inc
Some rights reserved.
=====

Wed Mar 4 21:06:38 UTC 2020 up 4:23, load average: 0.34, 0.38, 0.43

Mem:          total      used      free   shared  buffers   cached
-/+ buffers/cache:  35516    215348    251324
Swap:         251324         0    251324

/dev/mmcblk0p4      13.7G    201.2M    12.7G    2% /mnt/downloads

4: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq qlen 1000
    inet 192.168.0.231/24 brd 192.168.0.255 scope global wlan0
        valid_lft forever preferred_lft forever

[ OK ] Tuner is running
[ OK ] Audio service is running
[ OK ] Local audio is running
[ OK ] File service is running

Last few updates from file service:

Mar  4 20:46:13 completed: opaks/306d-messages-2020-03-04_20_45.txt.tbz2
Mar  4 20:53:08 completed: opaks/69e7-news-pack.2020-03-04_2043.tbz2
Mar  4 20:54:31 completed: opaks/Cef8-messages-2020-03-04_20_53.txt.tbz2
Mar  4 21:00:44 completed: opaks/3a8b-messages-2020-03-04_21_00.txt.tbz2
Mar  4 21:05:30 completed: opaks/3001-wikipedia-Open_primaries_in_the_United_States.html.tbz2

[ OK ] Bias-T is configured on: 0x8b
[ OK ] Bias-T voltage is set to 14.2V
[ OK ] LNB power is configured on
[ OK ] LNB detected, normal current flow: 0x23
[ OK ] Bias-T Voltage normal
  
```

Fig. 17 Diagnostics Showing Normal Bias-T Operation

Satellite Footprints

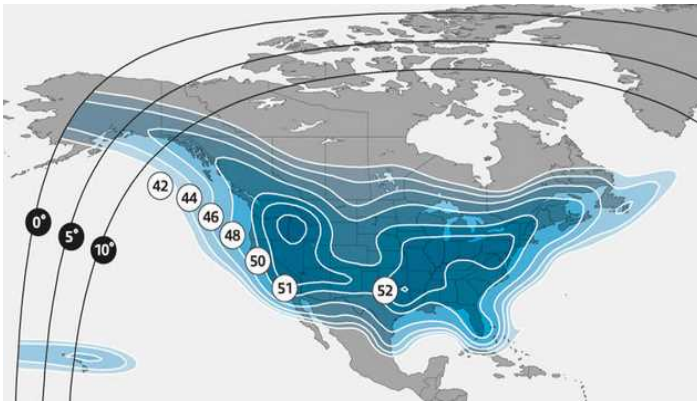


Fig. 18 Americas SES-2 (87W)

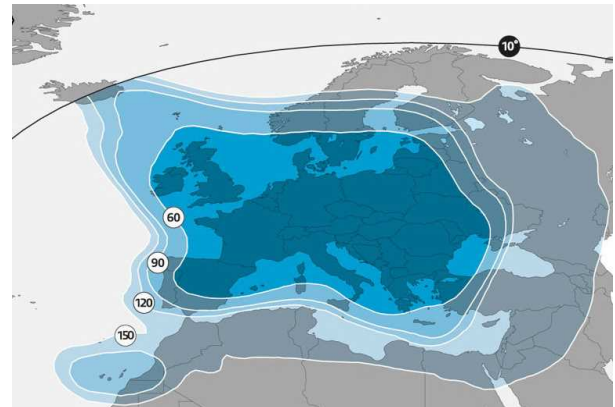


Fig. 19 Astra 3B (23.5E) Pan Europe

As a result of the reduction in downlink bandwidth in March 2021 and a change in the European Satellite, you must set up your satellite differently in both North America and Europe. There is an automated and a manual method for doing this described below in Step 2, but first we need to find the correct aim for the LNB - - **elevation angle, skew, and magnetic azimuth**.

Step 1. Finding elevation angle, skew, and magnetic azimuth. In North America, Othernet is on SES-2 on their Ku-band North America Beam (87W), and in Europe it is on Astra 3B (23.5E) Pan Europe Beam.

Step 1a. Using Dishpointer.com

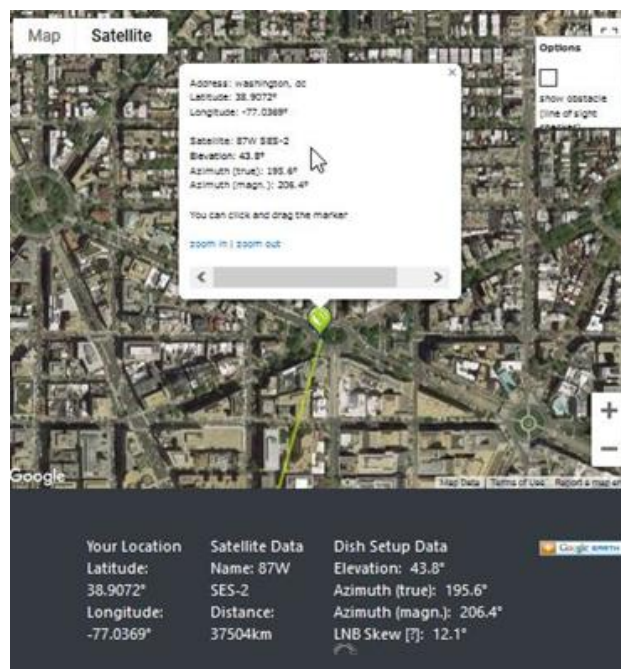


Fig. 20 Locating SES-2 in Washington, DC

Based on where you are, find your **elevation angle, skew, and magnetic azimuth** from a site such as <http://www.dishpointer.com> (Fig. 20). For your first satellite acquisition effort, select a location with a **clear unobstructed view of the equatorial sky**. (Later, once you confirm your system is working, you can try to find a better more permanent location. Many people are able to operate thru windows or off balconies with partially obstructed views.)

Example: For Washington, DC, mount the LNB on a camera tripod with the appropriate skew angle set to 12.1 degrees clockwise (more on skew below). Using a magnetic compass chose the *Azimuth (magnetic.)* to get a sight line on close in objects which you can use to point your LNB towards the satellite at 206.4 degrees magnetic. If you use a cellular phone, you may have to use *Azimuth (true)* to get a sight line.



Tips on Point your LNB Using an Adjustable Sliding Bevel and a carpenter's level to get a precise elevation angle (EA) of 43.8 degrees for Washington, DC, set on the LNB, I do the following: **In the picture, the obtuse angle inside the Adjustable Sliding Bevel is 180 degrees - EA degrees or $180 - 43.8 = 136.2$ degrees with the vertical side of the Adjustable Sliding Bevel**

perfectly perpendicular to the ground. If you were in Churchill, Manitoba, Canada, with an EA of 23 degrees, the obtuse angle would be $180 - 23 = 157$ degrees.

Skew allows you to match your LNB's horizontal/vertical orientation with the satellite's horizontal/vertical orientation to maximize signal strength.

When you set the skew, make sure you rotate the LNB so that skew angle is pointed directly overhead. Skew is given in degrees either clockwise (CW) or counterclockwise (CCW). If the reported LNB Skew direction for your location is shown clockwise, you stand behind the LNB looking at the satellite and rotate the LNB clockwise until you arrive at that number. For Washington, DC, you set the skew to 12.1 degrees by turning the LNB in a clockwise direction. Viewing the same satellite on the same longitude, but from South of the equator, result in an opposite rotation skew angle.

Skews less than 10 degrees CW or CCW don't make much difference, but if you live on the far edge of a satellite beam, skews may approach 30 degrees which is significant. Use the Skew for your location that <http://www.dishpointer.com> provides.

Step 1b. Using Satellite Calculator for Othernet Beams. Forum Member @Tysonpower developed an App called *Satellite Calculator for Othernet Beams* Fig. 21 that is available at @Tysonpower's web site <https://tynet.eu/storage/downloads/Othernet%20Satellitecalc-2021.html>, <https://forums.othernet.is/t/software-downloads/7456> or in the Othernet **downloads:///Uploads** folder Fig. 22 if you had been previously connected to an Othernet satellite. Since you are probably not connected to the satellite yet, you must download the App from the internet and run it on your computer. The app is written as an HTML file and will run in Skylark as a native html program (whether you are connected to a satellite or not), or on with any other Java equipped browser on your computer. You can download it to your computer and run it from there.

After you select the satellite you want to find, you insert your Latitude in **digital degrees** (such as 43.2456 degrees if you are North of the equator, or -43.2456 if you are South of the equator) and your Longitude in **digital degrees** (making sure if you are in a West Longitude you enter a minus sign). It will report back your **magnetic heading**, elevation, and skew. In North America, SES-2 (87W) is set as Americas (SES2 87W), and in Europe Astra 3B (23.5E) **has not been updated in**

the App and still shows Europe (Eutelsat 8W B). The App must be updated to work in Europe.

Satellite Calculator for Othernet Beams

Please Enter your Position in latitude North / longitude East and select a desired Othernet Satellite Beam before you click calculate.

Satellite Beam

Americas (SES2 87W) ▾

Latitude (N)

Americas (SES2 87W)

Europe (Eutelsat 8W B)

Longitude (E)

Note: Use minus to enter W Longitude or S Latitude

Calculate

Point your LNB to the following Position:

Heading(Mag):

Elevation:

Skew:

Made by tynet.eu with the help of a lot of caffeine

Fig. 21 Satellite Calculator for Othernet Beams
The Europe satellite needs to be **UPDATED** in this App for it work correctly

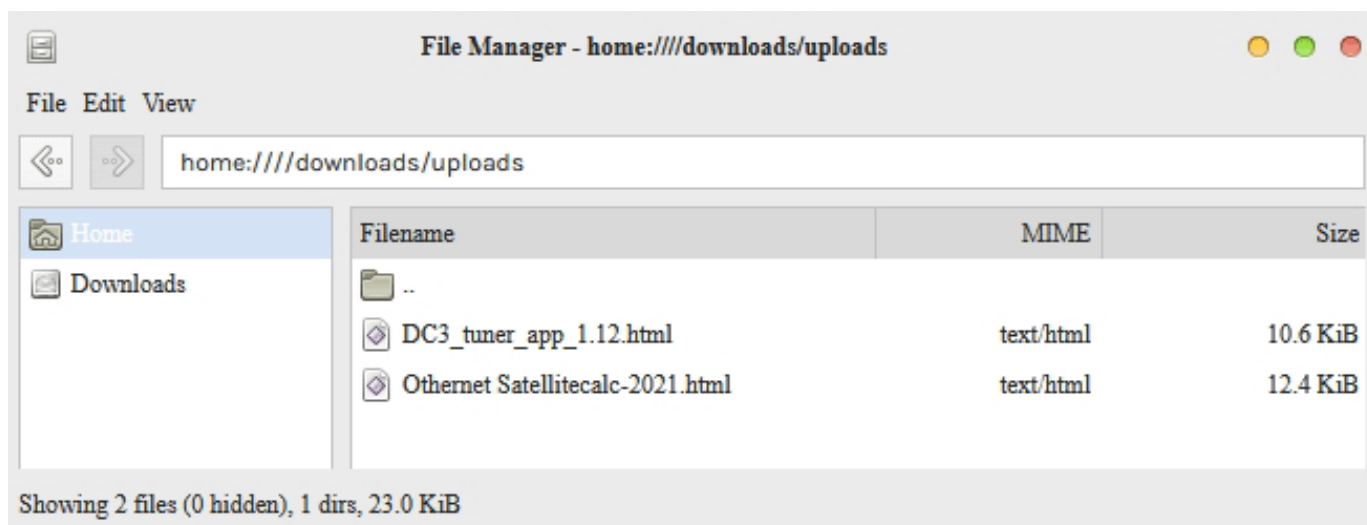


Fig. 22 File Manager Location to find **DC3 Tuner App** and the **Satellite Calculator for Othernet Beams App** (when you select one of these files, open it with the Reader APP choice)

These files will be at the **bottom** of the uploads folder

Step 2. Selecting the Correct Satellite and Tuning To It

Forum member @Tysonpower has developed an App for Skylark to Automatically Tune and Find the Correct Operating Frequency for your LNB shown in Fig. 21a. You can download it from his site at https://tynet.eu/storage/downloads/DC3_tuner_app_1.12.html, <https://forums.othernet.is/t/software-downloads/7456> or if you had been connected to an Othernet satellite before find it in the **downloads:////uploads** Folder Fig. 22. You must use log on **Othernet** (Guest won't work) to continue.

Tuner App & Frequency Finder

Manual Tuning

This little App allows you to set the Custom Beam Frequency and Beamtype to find the correct Settings fast. You can update the EU and US Beam Settings of your DC3 with the ones that are delivered by this Software as well by using the "Save to DC" Button.

Frequency: 12.0894 Beam type: 36

Other Beams

Americas: 12.0894 Ghz - Type 36

Europe: 12.6231 Ghz - Type 36

Save to DC3

Save +5khz -5khz

Autotune

Enter how many 10khz steps you want to search over and under the center Frequency of your Custom Beam to find a initial Lock.

If a initial Lock is found the Frequency Compensation of the SX1280 is used to calculate the right Frequency. Click the Start Autotune Button to let the Software search for a Frequency, it will stop if it got a Lock on the Satellite.

Autotune Status

Steps: 10 State: Standby Frequency: 12.0000 Ghz Lock: 0 - 0%

Start AutoTune

Tuner Status

Waiting for Status...

status packets Read: 0

Current Settings

Below are the Beam Settings that the DC3 has currently saved, use the Button to refresh and query the infos again.

Used Settings

US Beam

EU Beam

Custom

Refresh

Version 1.11 - Made by tynet.eu with the help of a lot of caffeine

Fig. 21a Tuner App & Frequency Finder Version 1.12

In North America on SES-2 Freq is 12.0894 GHz & Beam Type is 36
In Europe on Astra 3B (23.5E) Freq is 11.6823 GHz & Beam Type is 36

If you chose not to run the APP from **downloads:////uploads** Folder or have **never been connected** to an Othernet satellite, install the APP in your Skylark program. You must use log on **Othernet** (Guest won't work) and upload the APP from your computer to your Skylark Program micro SD card as a one time upload keeping in mind the uploaded file in the **home:////directory** on your Skylark Program micro SD card gets deleted when you reboot your Dreamcatcher so you would have to reinstall it - - Fig. 21b shows the initial File Manager TAB before ever being connected to an Othernet satellite - - the **downloads:////uploads** is not present.

For a more permanent solution (if you have installed an external micro SD card as described in **Section V - Additional Storage**), an external SD card is the best solution.

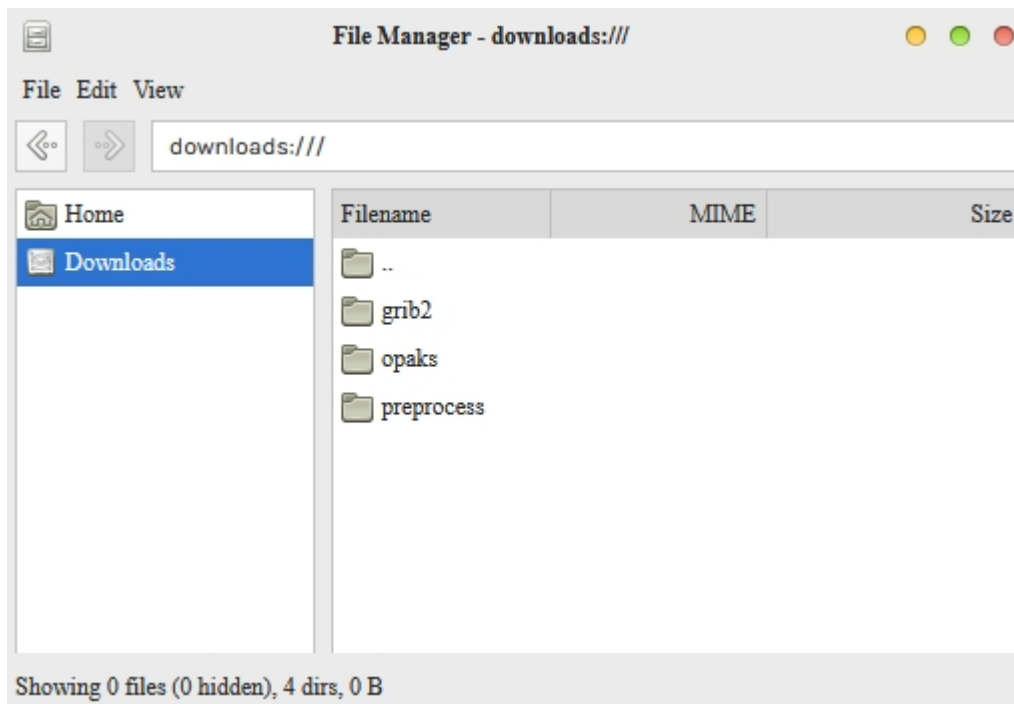
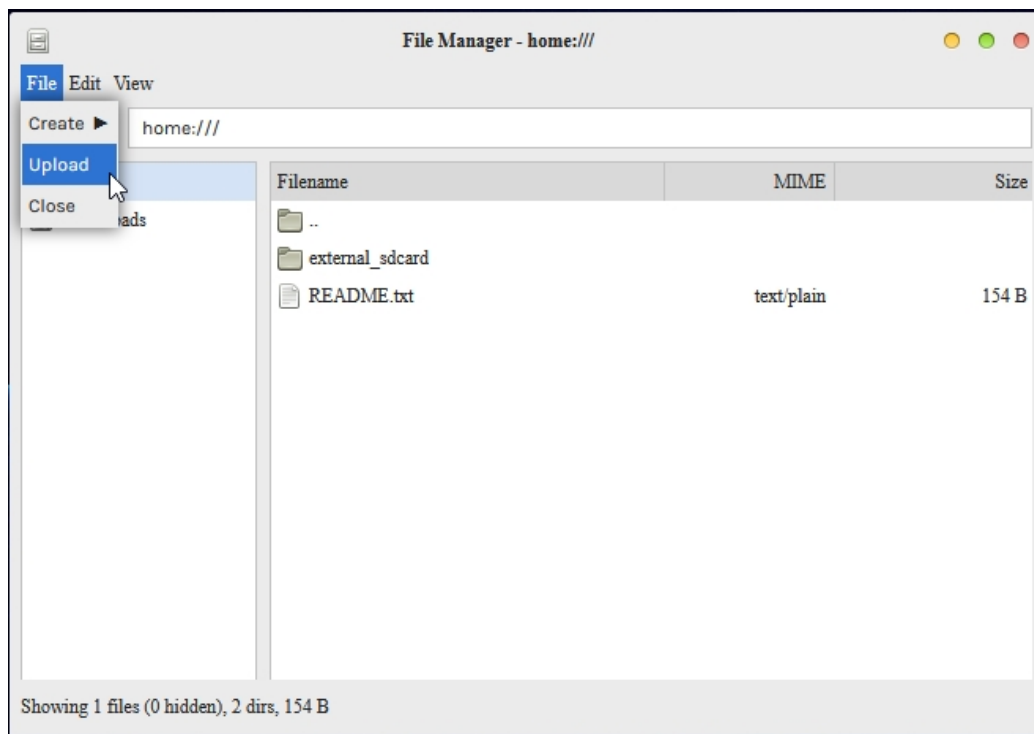


Fig. 21b Initial File Manger TAB before ever being connected to an Othernet Satellite



Note: You will need to find the file to upload on your computer after you click the Upload TAB

Step 2a - Automatic Frequency and Beam Type Selection. Before you do anything else, go back to Fig. 13a, in the satellite list and - - **select Custom then click Apply.** You must start this process with a Custom Satellite selected. You can no longer select the Americas or EU satellite settings because after a reboot, they **revert** to the old default values and retune to those values when rebooting.

In Panel 1 of Fig. 21a, **type in** your Frequency and Beam Type as shown for Americas or Europe.

Save the frequency and beam values by clicking the **Orange Save button** on the bottom left of Panel 1. Because you started in the Custom Satellite mode, this new Frequency and Beam Type get automatically saved in the Custom TAB. If you get a signal (Fig. 23 showing a good connection), you are done. All the settings are automatically saved and will continue work after a reboot so long as you selected **Custom then click Apply** above.

Manual Tuning

This little App allows you to set the Custom Beam Frequency and Beamtype to find the correct Settings fast. You can update the EU and US Beam Settings of your DC3 with the ones that are delivered by this Software as well by using the "Save to DC" Button.

Frequency: 12.0894 Beam type: 36

Other Beams

Americas: 12.0894 Ghz - Type 36

Europe: 12.6231 Ghz - Type 36

Save to DC3

Save + 5khz - 5khz

Panel 1 of Fig. 21a Manual Tuning

In North America on SES-2 Freq is 12.0894 GHz & Beam Type is 36
 In Europe on Astra 3B (23.5E) Freq is 11.6823 GHz & Beam Type is 36
 (Disregard Other Beams on right side of panel)

Tuner

Satellite Custom LNB Status

Custom

Americas

EU

Custom

Beam type

Active Antenna

Apply

Tuner

Satellite Custom LNB Status

Frequency (GHz)

12.0894

Beam Type

36

Fig. 13a **Reset** Satellite Frequency and Beam Type Illustrated for North America

If you get no signal in the Status TAB Fig. 23, proceed to the **Autotune** setup in Panel 2.

Step 2b - The Autotune Setup

Here's **where it might get a bit difficult** if the Bias-T voltage is OK, you sited your LNB correctly, and you selected the Custom Satellite with the correct Frequency and Beam Type. Because Othernet is now using a narrower bandwidth (reduced from 800 kHz to 200 kHz), it is more difficult

to select the **correct operating frequency** for each LNB since they all have different local oscillator (LO) frequency stabilities. Even if you correctly site your antenna, you may not be able to receive until you fine tune the Dreamcatcher's operating frequency. (It is also possible that you have not sited your LNB correctly, so check that again.)

*Even on paper, the packets won't appear with a frequency offset greater than 25% (50 kHz). So far we've noticed that 25 kHz of offset is a pretty reliable window. It is said the Maverick will work - - **but some Forum Members have been unable to achieve lock with it.** The offset is probably just much farther out. Please keep in mind that most commercially available DTH LNBs are specified to a 1,000,000 Hz offset (aka +/- 1000 kHz). See Annex F for more information on LNBs.*

The Maverick Single LO: 10750 MHz was shipped with Dreamcatcher 3.02Q - - one of the first units we were using on the KU band. It has a stability of ± 1 Mhz. With the Dual LO 9750/10600 MHz LNB, shipped with Dreamcatcher 3.05, it has a stability of ± 200 Khz. The Bullseye Dual LO LNB (soon to be released with a new Dreamcatcher Version and currently available in the Othernet Store), has a stability of ± 10 Khz and operates as a Dual LO: 9750/106000 MHz in Skylark.

Rechecking the Panel 1 of Fig. 21a settings to make sure you have set the correct values for Frequency and Beam Type for your location, and have clicked the **Orange Save button** on the bottom left of Panel 1 which puts those values into your Custom Satellite TAB. Go to Panel 2 of Fig. 21a - - you should see either 12.0894 GHz in North America or 11.6823 GHz in Europe and Beam Type 36. Select the orange button **Start Auto Tune** which will start to tune to whatever frequency you set. When you run it, it takes some time to complete, so watch its Autotune Status timer. When successfully completed on the **North America satellite**, it will say **Got a Lock at 12.08931 GHz, new Frequency set: 12.08931 GHz** as in this example. If you don't get a lock, increase the steps button to 20, and retune as this widens the tuning range. The **new Frequency set:** will be **automatically saved** to your Skylark program as a Custom Satellite setting, so even if you reboot your Dreamcatcher, it will remain in effect.

Autotune

Enter how many 10khz steps you want to search over and under the center Frequency of your Custom Beam to find a initial Lock.
If a initial Lock is found the Frequency Compensation of the SX1280 is used to calculate the right Frequency. Click the Start Autotune Button to let the Software search for a Freuquency, it will stop if it got a Lock on the Satellite.

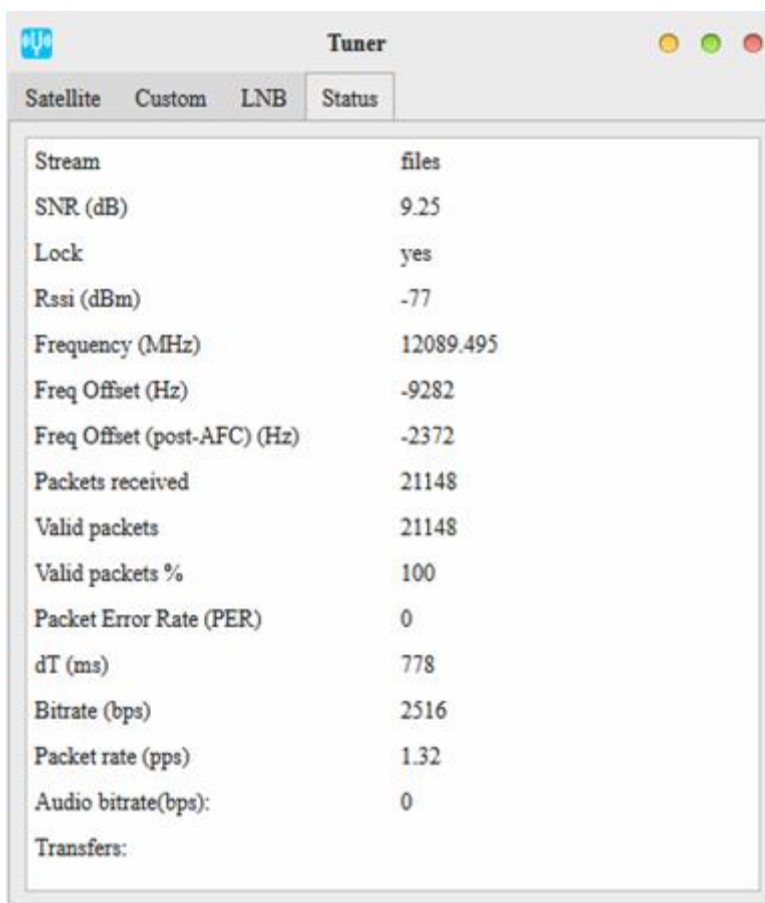
Autotune Status		
Steps	State:	Standby
<input type="text" value="10"/>	Frequency:	12.0000 Ghz
	Lock:	0 - 0%

Start AutoTune

Panel 2 from Fig. 21a **Autotune**

Step 3. Once you have set the Dreamcatcher's Tuner App & Frequency correctly, **slowly physically move your LNB horizontally and vertically to maximize the SNR (dB) making it as large (less negative) as possible.**

The Tuner Status screen in Fig. 23 will show the *SNR (dB)* line fluctuating at a value **above -14 dB** (sometimes as high as + 10 dB), the Lock line saying **yes**, and the *Rssi (dBm)* line fluctuating at a value between **-60 and -95 dBm**. Lower Rssi levels such as -100 dBm may carry signal, but the Dreamcatcher is not sensitive enough below -95 dBm. On the top of the Tuner Status Screen, you will see what type file is being downloaded at that moment - - either *audio* or *files*. At the very bottom of the screen you will see what file is being downloaded or just finished downloading at any time. This picture represents a successful connection at latitude 39 deg N longitude 76 deg W in mid afternoon with an accurately pointed LNB, and a fine tuned LNB. Additionally, LED 6 will be **fast blinking dim green if data packets are detected**.



Stream	files
SNR (dB)	9.25
Lock	yes
Rssi (dBm)	-77
Frequency (MHz)	12089.495
Freq Offset (Hz)	-9282
Freq Offset (post-AFC) (Hz)	-2372
Packets received	21148
Valid packets	21148
Valid packets %	100
Packet Error Rate (PER)	0
dT (ms)	778
Bitrate (bps)	2516
Packet rate (pps)	1.32
Audio bitrate(bps):	0
Transfers:	

Fig. 23 Tuner Running Correctly on SES-2 at Latitude 39 degrees N

Step 4. Dreamcatcher Placement

In your final setup, it is recommended to place your Dreamcatcher a few feet away from any RF generating sources (good example being a WiFi Access Point). Degraded download performance and system lock-ups have been reported when the Dreamcatcher was located too close to a WiFi Access Point. In some situations, AC power pick-up on the charging cable has caused problems. AC pick up problems can be reduced by using a ferrous choke around your power cord. One method of determining interference problems after you have acquired satellite access, is to look at the % valid packets and packet rate shown in Fig. 23. It should show close to 100% *Valid packets*, with a *Bitrate (bps)* approximately 2,500 in North America on SES-2 (87W), and in Europe on Astra 3B (23.5E) Pan Europe Beam.

Valid packets	118828
Valid packets %	100
Packet Error Rate (PER)	0
dT (ms)	759
Bitrate (bps)	2512
Packet rate (pps)	1.33

Optional Step 5. Cones and Horns to Improve SNR

Several users living on the fringe of SES-2's and Astra 3B's ERIP area have discovered using a cone or horn around the LNB improves SNR by as much as 6 dB in some cases being the only way to close the link. The cones and horns being used are 8 inches tall with an upper diameter of 4 inches (either in diameter, or 4 inches by 4 inches square), and a lower diameter of 2 inches (either in diameter, or 2 inches by 2 inches square). Both martini shakers, collapsible stainless steel drinking cups, and solid aluminum or garden mesh wires are being effectively used. *Pringles potato chips tubes (which are aluminum lined) also work well and allow you a snack while sighting your LNB.* Check Annex C by @wbrown for more detailed design information.



Optional Step 6 - Free-to-Air Antennas. Connect your Dreamcatcher to an outside **free-to-air (FTA) Ku-Band LNB/dish antenna** using the Othernet Dual LO LNB. The Dreamcatcher Board is powerful enough to operate at least to 400 feet of RG6 cable - maybe more! The only caveat is you **cannot use** a DiSEqC switch in series with your outside LNB/dish. Depending on the length of your cable, you may not be able to use a standard FTA antenna motor such as a STAB-HH90 or Sadoun DG-280. Some Forum Members have successfully used the STAB-HH90 at 125 feet.

If you chose to use the **Maverick** Single: LO LNB as your FTA LNB, your FTA must be tuned to 9750 - 10750. If you chose to use the **Universal Single** - Dual LO or the **Bullseye** LNB as your FTA LNB, your FTA must be tuned to 9750 - 10600. Many other stock FTA LNBs work with Skylark using the Tuner Setting for the Maverick LNB, but Forum Members have experienced some difficulties achieving lock with them.

There is a comprehensive discussion in Will Brown's paper (Annex C) discussing the use of old Dish and Direct TV LNBs/parabolic dishes, and Circularly Polarized LNBs.

Optional Step 7 - Inline Satellite Amplifier Many use a **Pico Digital LA-2150D Series Satellite IF Inline Amplifier** which adds 20 dB of additional signal gain and a significantly improves SNR and Rssi. If you are running longer stretches of 75 ohm cable, this is a way of accommodating loss.