

# Monoblock Reception Problems

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**A Monoblock is made up** of two LNBs that are offset from each other by a fixed amount, typically 6°. This can lead you to believe that you should be able to receive satellites that are separated by that same 6° such as Astra1 and Hotbird or Astra 3A and Astra2/Eurobird without any difficulties whatsoever. But this idea doesn't really hold water. This article will try to explain why and will also provide insight into whether an acceptable fine-tuning adjustment of the antenna is possible and how to go about actually doing it so that the best possible reception of both satellites can be obtained.



Monoblock LNB

## The Problem

Something unusual happens when you try to align to a satellite pair, especially the Astra1/Hotbird combination: after installing a monoblock on an antenna and aligning it with Astra1, the signal strength from Hotbird is either very weak or absent entirely. If you adjust the antenna to Hotbird, reception of Astra1 pays a price.

The general rule has always been to align the weaker satellite to the centrally located LNB. Sometimes this helps, but this more or less just covers up the problem. And if you happen to live near the outer edges of Europe, you might say it's your geographical location that's at fault when the real reason is still being overlooked.

## The Real Cause

As it turns out, the design of the monoblock does not take the Earth's physical characteristics into account. Monoblocks have a fixed LNB offset of 6°. Unfortunately, there is a problem with this amount: the actual separation between the two satellites as seen from the ground is more than 6°.

So, what's going on? The satellite belt is measured geocentrically – they orbit the center of the Earth at a distance of 42156 km (altitude plus the Earth's radius). Every location on Earth, with the exception of the poles, is closer to the satellites. So, the satellites are actually more than 6° apart as seen from where you are standing.

If you are on the equator, you are actually

6366 km closer (the Earth's radius) to the satellites resulting in an increase in the actual satellite offset of more than 1°. In the middle latitudes this offset is still fairly significant with an average of 0.8°. Satellites that are 6° apart in their orbital slot (such as Astra3A and Eurobird) are actually closer to 6.8° apart as seen from the ground.

This expanded offset does have its consequences. When the first satellite is perfectly aligned with the antenna, the alignment of the second satellite could be off by as much as 1°. An antenna with a beamwidth of 1° would only have weak reception at best. The situation could be even worse if the alignment of the

first satellite is off by  $0.3^\circ$  in the wrong direction (away from the second satellite). This won't be too much of a problem with reception of the first satellite but this would push the second LNB as much as  $1.3^\circ$  out of alignment with the second satellite resulting in no reception at all.

## A Solution

The only possible way to receive both satellites at the same time would be to adjust the antenna such that both satellites are not providing maximum signal.

As an example, we will discuss the Astra1/Hotbird pair. With these two satellites it is

especially critical since their orbital separation is actually more than  $6^\circ$ , namely  $6.2^\circ$ . This corresponds to a  $7^\circ$  offset from where you might be standing.

1. Align the LNB to Hotbird ( $13^\circ$  east) for maximum signal.

2. Turn the antenna in the direction of Astra1 (to the east) just far enough so that the Hotbird signal has not begun to fall off.

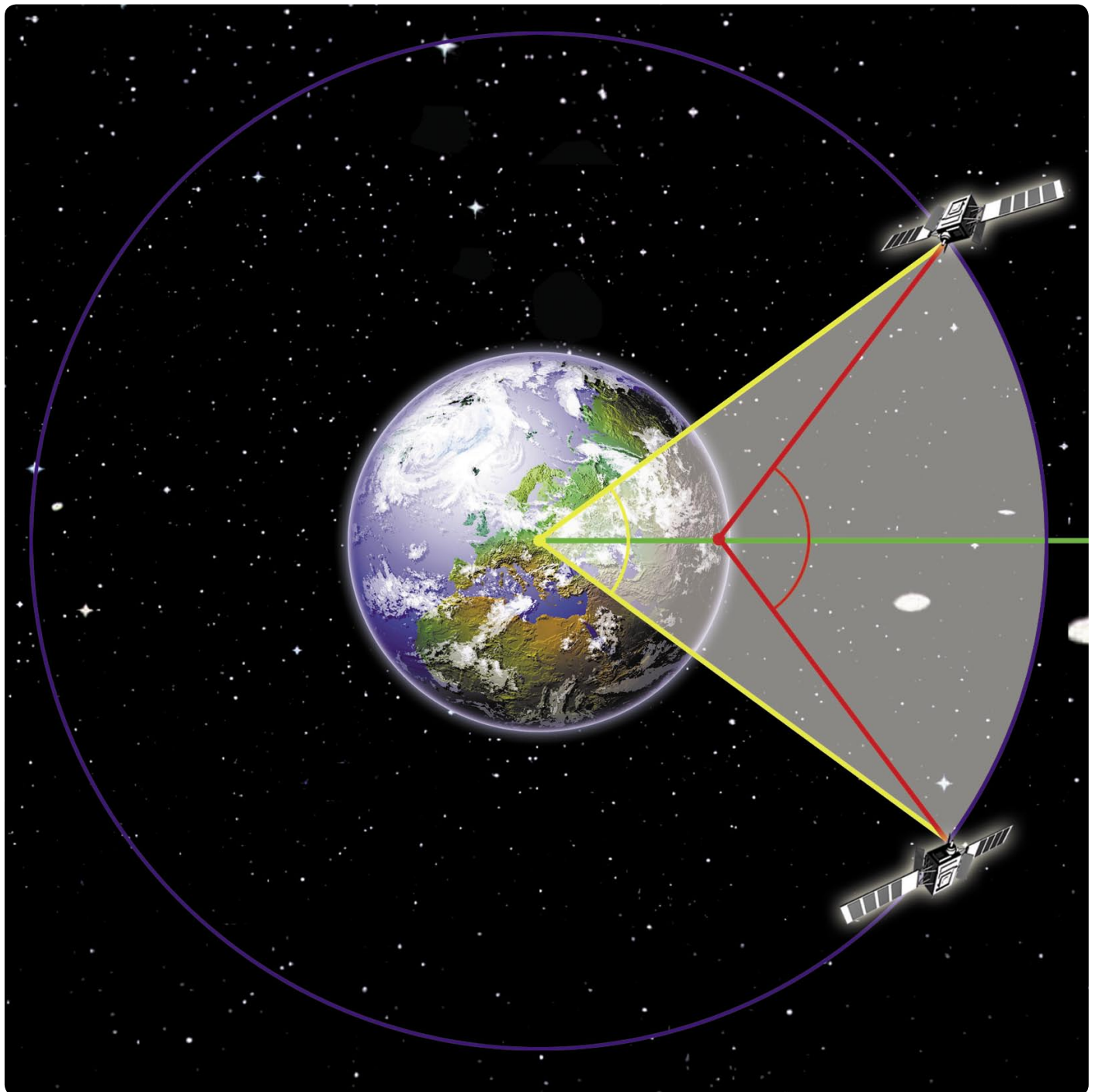
3. Use the Astra1 LNB to control the reception of Astra1 ( $19.2^\circ$  east).

4. Adjust the antenna as necessary until both satellites are providing equally good signals.

## Putting It All Together

Monoblocks do not permit optimal adjustment of satellite pairs. The adjustment procedure presented here is really only when there is no other choice. It provides lower signal levels and is only usable when both satellites provide adequate signal – such as when the antenna is in the hot zone of both satellites. But even then, the bad weather reserve is greatly reduced.

Monoblocks should be avoided altogether if you are on the edge of the satellites footprint. A multifeed antenna, that allows you to adjust the position of each individual LNB, would be a much better idea.



As you can see, the offset angle from the Earth's surface is larger than from the Earth's center.