LNB Frequency (LO - LOF) Explained (October 22, 2006)

This is an explanation of what the LNB frequency setting of FTA receivers is for and how it affects you.

The actual frequency of the signal that is transmitted from a satellite to a receiving dish on earth is called the FUNDAMENTAL FREQUENCY. In our case this signal is at a very high microwave frequency that isn't affected by the ionosphere like radio waves at lower frequencies. After it is reflected by the dish and amplified, it needs to be sent to a receiver to be demodulated into the separate video and audio signals. In it's microwave form the signal is very difficult to transfer through the coax to a receiver without encountering significant loss. Coax has a property that the higher the frequency of the signal passed through the coax, the more loss per foot is encountered. This means that by the time you passed a microwave signal, say 100 feet to a receiver, there wouldn't be much of the signal left for the receiver to do anything with because of the loss. Lower loss types of coax such as heliax can be used, but this is very expensive. A way was developed to convert the fundamental microwave frequency to a much lower INTERMEDIATE FREQUENCY, or IF. Called Block Downconversion, it uses a LOCAL OSCILLATOR (LO) to mix with the fundamental frequency to create a new intermediate frequency that is much easier to send down the coax to a receiver. The phenomenon that allows this to happen is called...SUMS AND DIFFERENCES. When a signal from a device such as an oscillator is mixed with the fundamental signal, a new set of signals are produced...one above the fundamental and one below. The one above is at a frequency calculated by adding the fundamental frequency with the oscillator frequency, and the one below is calculated by subtracting the lower of the two signals frequencies from the higher. The "sums" signal isn't needed for our purpose so bandpass filters are used to discard this signal. We are interested in the "differences" signal...here is an example.

Lets take the DBS satellite frequency band of 12200 to 12700 Mhz. The local oscillator commonly used in circular LNBF's used for reception of this band is at a frequency of 11250 Mhz. This means the differences in this signal leaves us with an IF signal of 950 Mhz to 1450 Mhz, which has been standardized as an intermediate frequency range for years...

12200 - 11250 = 950
12700 - 11250 = 1450

The receiver actually is able to tune 950 to 1450 Mhz, not the fundamental frequency of 12200 to 12700 Mhz. In a lot of receivers, if the intermediate frequency of the desired signal is known, it can be entered directly and tuned just like the fundamental frequency. In the case of a standard linear LNBF the LO used is at a frequency of 10750 Mhz. The FSS band is at a frequency range of 11700 to 12200 Mhz so this would be...

11700 - 10750 = 950
12200 - 10750 = 1450

This calculates to be the same intermediate frequency range as the first example. C band, which is in the North American frequency range of 3700 - 4200 Mhz is calculated just a bit differently in that the fundamental frequency and the oscillator frequency are reversed, but the overall principle is the same. C band LNB's commonly use an LO frequency of 5150 Mhz....

5150 - 4200 = 950 Mhz.
5150 - 3700 = 1450 Mhz.

Because the oscillator frequency is higher that the fundamental, C band signals are actually tuned backwards from KU. The lower fundamental (3700 Mhz) is at the higher range of the IF (1450 Mhz). This is called HIGH SIDE INJECTION, where the oscillator frequency is higher than the fundamental. Conversely, the KU band example where the oscillator frequency is lower than the fundamental is called LOW SIDE INJECTION. This also means that the phase of the signal is reversed, and the receivers of today take care of this for us.

Receivers are designed to be versatile in the frequency range they can tune. Bandstacking LNBF's take one of the polarities and move it up to it's own 500 Mhz block that is above the original IF, so it's necessary for receivers to be able to tune an IF that usually extends up to about 2150 Mhz. This is also necessary because Universal LNBF's have two oscillators to allow it to tune a wide range of frequencies, and it takes care of the extended C band frequency usage by some satellites outside of our North American belt (3400 - 3700 Mhz).

The LNB frequency setting is determined by the frequency of the oscillator in the LNB. This figure isn't negotiable, it's not adjustable. Changing this receiver setting isn't going to solve a problem, make a quality reading higher, or make a picture better. It is entered solely for you to be able to precisely tune your receiver to the correct fundamental frequency of the signal being sent from the satellite.

I hope this explains why this setting is one of those "set it and forget it" settings that only needs to be set once for the LNB in use.