Genesis™

Digital Lens

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Through a combination of technical advances, unique to the Digital Lens the full potential of digital audio replay can finally be realized.

It is commonly accepted that by separating the CD Transport from the D/A Converter, the level of performance of each of those components can be maximized. Additionally, it is understood that the full advantage of the increase in accuracy is certainly limited, and even obscurred, by the problems which are associated with the usual interfacing of those two components with each other.

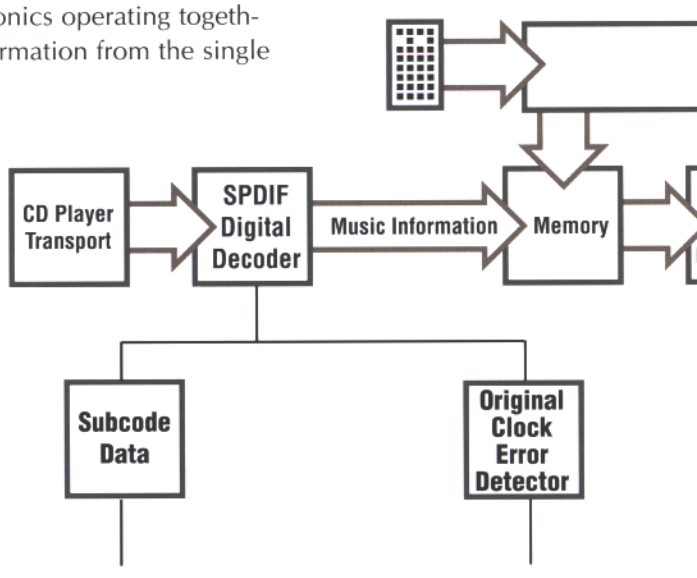
The Genesis Digital Lens is placed between the output of a digital source and the input of a D/A Converter or Digital Recorder. The Digital Lens has the revolutionary capability to eliminate the jitter inherent in all digital sources, to correct for transport speed anomalies, and to be programmed to increase the perceived resolution of the digital signal.

Using the Digital Lens in your system, you will realize an increase in the speed of transients, achieve a more powerful and defined bass, improve the front to back depth, and while the overall sound will become more spacious, individual instruments and voices within that space will simultaneously become more specific in their location.

Digital Source. The Digital Lens will accept the digital output from any CD Transport, Laser Disc player, DAT machines and digital satellite broadcasts. Digital inputs on the Lens include AES/EBU (XLR), Coax (RCA), Coax (BNC), Toslink and ST (glass).

SPDIF Decoder. The SPDIF format (Sony-Phillips-Digital-Inter-Face) is the standard by which all data are transmitted from one component to another. Encoded in a single stream of data are many separate pieces of information including music, timing data (the elapsed time of each track), and the master clock signal which, just like a musical metronome, keeps all of the electronics operating together. The decoder's function is to separate the many pieces of information from the single SPDIF data stream.

Memory. The Digital Lens has the same type of memory as your home computer. The Lens employs half a megabyte of a type of memory referred to as RAM (Random-Access-Memory). Once separated from all the other information necessary to run a digital audio system, the music is stored in the memory of the Lens in pure form. The memory is necessary for several reasons.



First, because all CD Transports run a little fast or a little slow, the music must first be stored so that it can later be released at a correct speed. If a transport is too slow, the Digital Lens' master clock will wait for enough data to accumulate in the memory until it can be synchronized with the Digital Lens' master clock. Conversely, if the transport is too fast, the memory will output the first information immediately and will continue to hold the overflow until it can be synchronized with the Digital Lens' master clock.

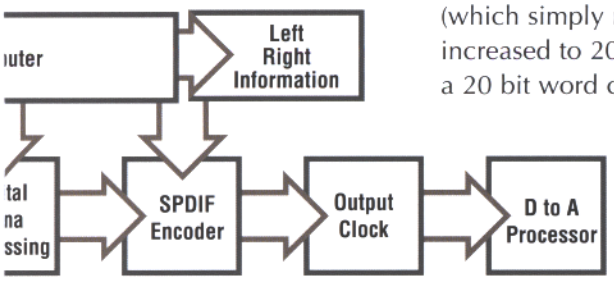
The Digital Lens is capable of correcting for all transport speed anomolies which are likely to occur in a system into which it is placed.

DSP decision making. Once the musical information has been stored in the memory, the computer has enough time to examine each "word" or piece of the music and decide where and when the DSP circuit should add the extra "bits" or information to extend the digital word from 16 bits to 20 bits.

Computers. The logic that control all the complex operations necessary to operate the Digital Lens are shared by two computers where over two thousand instructions are necessary to perform all the tasks demanded by the various functions that make up the Lens.

Left / Right Information Generator. In digital audio, the left channel information is first presented to your D/A Converter and then the right channel information is presented. The two channels never co-exist simultaneously. Switching back and forth between left and right happens so quickly that it sounds like they are present at the same time. Because the Lens discards the original left and right channel status information in order to eliminate jitter, it must ultimately replace them in proper order.

DSP. Once in memory, there is enough time to make decisions about how to proceed with digital signal processing. The Digital Signal Processing section is a complex circuit. Here, the standard 16 bit word (which simply means that the music's signal is divided by a number equal to 2^{16}) is increased to 20 bits (2^{20}, a larger number and hence a finer division). The choice of a 16 or a 20 bit word can be made by the user via the remote control. The word length can be increased (16 to 20 bits) by the addition of triangulated dither, which is a mathematical function. Without DSP processing, similar to that provided by the Digital Lens, the sounds shuts off completely when the musical signal drops below a certain volume level, and the D/A Converter ceases operation. This is very unnatural to the human ear and the DSP circuitry of the Digital Lens solves this audible problem.



Jitter is a problem common to all digital systems. Digital is a time-based format requiring that timing information be kept within very strict limits if the system is to operate as well as it can. Jitter, in most simple terms, is any disturbance to that timing information.

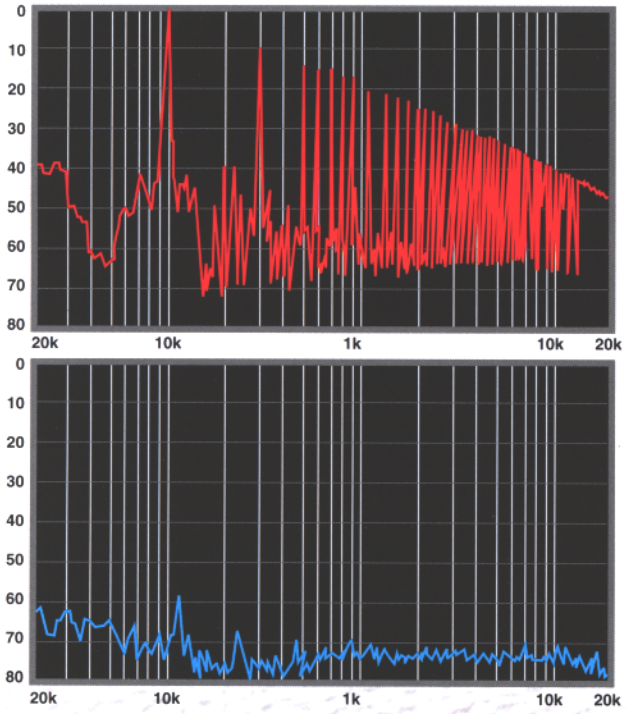
Jitter is both inherent in the process of extracting information from the disc as it plays and in the transmission of that information to the D/A Converter.

Further, jitter is induced through the very process of extracting the master clock information from the digital bit stream.

A number of D/A Converters and Jitter Reduction devices reduce certain forms of jitter. While they sound different from the same signal not being so processed, they do not always sound more realistic, and they are far from completely successful at eliminating jitter and its sonic degradation.

In the Digital Lens, Genesis has taken a completely different approach to jitter reduction which virtually eliminates both the problems of jitter and the inevitable errors of the process of extracting the clock from the digital data stream.

Through the use of an ultra-precise Temperature Compensated Oscillator (TCO), the Genesis Digital Lens generates the primary master clock frequency itself. All of the jitter inherent in the digital bit stream prior to its entrance into the Digital Lens is thereby eliminated. Further, since the Digital Lens does not extract the information from the digital bit stream, the errors inherent in this process do not occur. As a result, the most musically damaging effects of jitter are reduced to a level never previously possible.



Jitter measurement without the benefit of the Digital Lens (Red) and with the Digital Lens in the system (Blue).

SPDIF encoder. The music and the left and right channel information are recombined into a single stream of data, necessary for one digital audio machine to communicate with another.

Output Clock. This is the heart of the Digital Lens. The output clock is not only separate from the master clock (provided by your CD Transport) but also from the rest of the circuitry in the Lens. The output clock of the Digital Lens is generated by a temperature Controlled Oscillator (TCO) that is isolated from all the other circuitry in the Lens with its own power supply and optical coupling. The output clock is used to synchronize all the activities necessary to create music from what is essentially computer information, the digital audio data stream.

D/A Converter. The output of the Digital Lens can be connected to any D/A Converter or Digital Recorder via XLR, RCA or ST output connectors.

Original Master Clock Error Detector. It is necessary for the Digital Lens to measure the speed error of the digital source to determine the amount of memory to allocate. That error information is presented as a display on the front panel. When a digital source is connected to the Lens, the right hand display will read out the Parts Per Million (PPM) error of the digital source component.

Track Timing Information. The Digital Lens displays the elapsed time of each track of the source material in the same manner as does a CD Transport or DAT.

Finally, the Digital Lens has two power transformers, one which provides power to the stages through the master clock stage, and the other which provides power to only the output stage. The output stage itself uses a high current, high speed dedicated driver to waveshape the signal as it leaves the Digital Lens. It has been found that by using such a technique to ensure that the square waves leaving the Digital Lens have the same shape, despite their pulse width, is an important parameter for allowing subsequent components to operate most effectively and for achieving the best possible sound.

Digital Lens (back view)

The Digital Lens is a unique and essential part of any high end digital reproduction system. The Digital Lens will accept any digital signal from any source (via Toslink, ST, BNC, RCA or XLR) and as its name implies, will focus that signal (no matter how flawed the source may be), and output it through any of its three digital outputs (ST, RCA, and XLR) so that the D/A Converter or Digital Recorder which follows it can truly demonstrate its potential.

The Genesis Digital Lens will demonstrate the full potential of, and will represent the single most significant improvement to, your audio system. More apparent space, depth and openness are the most obvious sonic benefits.

If music is your aim, then focus it with the Digital Lens.
Until you have heard music through the Lens,
everything else sounds like a blur.

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