



Alchemy² D²L Digital Delay Line



Danny Richelieu

The Switch To High-Definition Video Equipment Is Running My Home Theatre Experience

Okay, so now that I have your attention, let me explain. While video quality has improved dramatically, and the fidelity and spatial dimension of the audio has increased substantially as well, I still find that something is not quite right, and it is intruding into my movie viewing experience, something that I have only recently been able to identify.

Here's the problem...my ear/eye/brain interface is being confused by something that we all used to simply call "lip sync." Though subtly different on all content, in general the movies and other video material we receive have the audio and video signals pretty well coordinated so that the dialogue matches the visual cues we see of the actors' mouths moving. Special effects, like explosions or car tires screeching, seem real to us because they appear to be timed properly with what we see. When viewed in standard-definition (SD), we are not aware of there being any problems with the synchronization. As specified by Advanced Television Systems Committee (ATSC), synchronization is to be within 1 frame, or 1/60 of a second (17mS).

Where the difficulty begins is with the better, high-definition-capable video products. Video processing of an incoming image requires that the display device or processor must store one or more frames of video information in order to perform the mathematical processing necessary to produce the quality image you expect. Somewhat basic video processors will store frames for deinterlacing, scaling, and some types of image enhancement. Each of these temporal processes uses several megabytes of high-speed Random Access Memory. At least two frames of video (34mS) would be used to perform this level of performance. Additional levels of visual improvement require additional frame storage. The most sophisticated processors available today are storing as many as five video frames for a total of 85mS, or almost 1/10 of a second.

The problem will only get worse. There are processors coming in the future, which are planning twice this much internal delay.

If this were not enough, there are several other possible sources of delay within our content delivery system. Often the cable and satellite systems many of us rely on for an HD feed to our homes are creating part of the problem. Whether it is due to the HD conversion at the head-end, or delays within the set-top box equipment itself, we are sometimes forced to start with less than

SPECIFICATIONS

Signal Format: S/Pdif
Signal Type: PCM, Dolby® Digital, DTS®
Frequency Response: No effect on incoming signal
Signal To Noise Ratio: No effect on incoming signal
THD: No effect on incoming signal
Delay Range: up to 1.4 Seconds @ 44.1KHz, proportionally less as S-R increases.
Connectors: (1) RCA input, (1) Optical input, (1) RCA output, (1) Optical output, (1) 2.5mm DC power jack, (1) 3.5mm mini-jack RS232 port

General

DDL Dimensions (WHD In Inches): 4.25 X 2.125 X 5.25
DDL Weight (In Pounds): 1
Power Supply Dimensions (WHD In Inches): 1.75 X 1.25 X 3.25
Power Supply Weight: 0.25 lb
Power Consumption: 5 Watts
Warranty: 1 yr P&L
Price: \$399.95

Designed And Assembled In The United States By:

Alchemy²
3533 Old Conejo Road, Suite #107
Newbury Park, CA 91320

"...I found the Alchemy² D²L to be a fine product, and well worth the small price of \$399 for all of the improvement it has made for the WSR reference system."

perfect synchronization to begin with. Then we add video processing in our homes and it's no wonder it sometimes looks like we're watching an early Japanese science fiction film.

It's not that the problem has gone totally unnoticed. There are a few surround sound processors that allow you to add varying amounts of delay to their output. Though useful, the feature is often hidden deep in the menu structure and not easily accessible for fine-tuning. Further, to be able to correct for each video source in the system, one would want each input to have its own adjustable delay value.

As a further confirmation of the problem, at least one of the new video processing chips on the market actually includes variable audio delay as an on-chip feature. The compressed audio ends up running through the video chip to match the delays. This, however, is only a partial solution, as it is not easily adjusted for delays caused outside the chip.

Enter The Alchemy² Digital Delay Line

Alchemy² is a new company formed by several of the original members of the Audio Alchemy team. Like products from that company, the D²L (Digital Delay Line) [three-letter acronyms seem to follow these guys around...] is a small, elegantly finished metal enclosure "no larger than it needs to be," according to Peter Madnick, one of the founders.

The input to the D²L can accept PCM, Dolby® Digital, DTS® encoded material or anything that can be transmitted in the S/PDIF format. The box does not decode the incoming signal, in effect, it simply stores it for a pre-selected period of time and then sends it back out.

The box is inserted between the digital outputs of your video source and the input of the surround sound processor. As can be seen in the picture, there are four buttons (input select, bypass, delay + and delay -), plus a three-digit LED display. The display tells you what your delay selection is. Settings range from 000 to 255 (more about this later). The current model supports two inputs and two outputs, (one coaxial and one optical), the next model will add a second set of coaxial and optical inputs. Audio is provided on both a coaxial and optical output, and both outputs are active at the same time. A three-pin 3.5mm mini jack RS232 interface is provided for use in automation systems and for future software upgrades. Power is supplied from a small wall-wart power adaptor (another old Alchemy habit).

To use the D²L, you first select the input you wish to use. The display will toggle from one to the next with each press of the Input

Select button and show a rather cryptic "in1," "in2," "in3," "in4." The input selection soon disappears and is replaced by the detected sample rate of the selected input (44.1, 48, 96, or 192 kHz) or with "--" if there is no input or it cannot be identified. A few moments later, the display indicates a relative delay value. This will be a number from 000 to 255, even though the actual delay may be different, depending on what the incoming sample rate is. According to the chart in the instruction manual, the D²L can provide 1.4 SECONDS of delay at 44.1 kHz, down to about 300mS at 192 kHz. Apparently, the designers felt that the use of a three-digit display with a relative scale was more useful than an actual readout in milliseconds because it allowed the user to not have to consider the sample rate in their determination of a delay. One minute after the last selection is made to the D²L the display will start to dim, a nice feature given the bright red display. A touch of any button will "wake up" the display.

The D²L stores the delay setting for each input source, as well as the last input source selected. Thus, you can have one set for DVD, another for cable, and a third for satellite.

Home Theatre, Fixed

In use, the D²L did exactly as it was designed to do. I put in a disc, and simply adjusted the + and - buttons until I was happy with the "lip sync" (easiest to do with dialogue) and sat back and enjoyed. The use of the bypass button lets you compare delay to no delay. If you are like me, you will stop doing that after a few days and just find your setting and forget the box. So far, all of the DVDs I have reviewed have sounded best with the same delay settings, maybe within one or two clicks. Cable and satellite are a different story. Settings appear to vary widely, with each channel even varying from movie-to-movie. I found myself making note of the display settings so I could compare and, hopefully, detect a pattern. None has appeared yet.

An additional interesting effect of the D²L in the *Widescreen Reference* Holosonic® Spherical Surround™ Laboratory System was to significantly improve the effect of the D-BOX Odyssey Motion Simulation System. Where before there were times when I felt that there was a noticeable mistiming of the D-BOX effects, I now see that this effect has been a manifestation of the same problem. Fixing this delay had a profound effect on the D-BOX experience.

In summary, I found the Alchemy² D²L to be a fine product, and well worth the small price of \$399 for all of the improvement it has made for the WSR reference system. Welcome back to Peter and his group! ■



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