

Digital Connections

3DFusion Progressive Scan PC DVD Player

An experiment in PC/Home Theater Convergence

According to some industry pundits, the merging of PC and home-entertainment systems is the next step in the evolution of these two technologies. In theory this is exciting; it would bring the economics of the PC market to home-theater equipment. Rather than shell out thousands of dollars for a dedicated line doubler, PC software and hardware may do the same job for hundreds. Fantasy? With the PC products released last year this dream is much closer to reality than you think - at least when it comes to DVD playback.

CHRISTY WARREN

This article will discuss my experiences building a convergence PC around the 3DFusion PC-DVD player kit from Digital Connections. This effort showed me the potential of PC/HT convergence. It also revealed some of the obstacles that PC/HT convergence must overcome in order to be of wide interest to the home-theater community.

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Background

My home theater consists of an Electrohome 4501 7-inch CRT front projector, and an IEV T-1500 line doubler, to display sources that include a Sony DVP-S7000, a Pioneer Elite CLD-99 Laserdisc Player, DSS, and others on an 84-inch Stewart Videomatte 200 screen.

Since late 1997, I have evaluated PC-DVD players looking for an inexpensive way to get acceptable progressive video to drive a projector without spending \$7,500 on a Faroudja line doubler. When I found the 3DFusion card in June 1998, none of the other PC DVD player products provided anywhere near acceptable picture quality for home theater.

The 3DFusion card is based on the Mpack2 Media Processor originally designed by Chromatic Research. It is special because this chip provides direct progressive scan video from film-source DVDs with no deinterlacing artifacts. (See the accompanying Video Insights for details on how that is done.)

A great deal of interest has developed over progressive-scan DVD players, like the indefinitely delayed Toshiba product. Panasonic and Pioneer also showed prototype progressive-scan DVD players at the Winter Consumer Electronics Show. But stand-alone players have been delayed by movie studio concerns over copy protection. Hollywood has not tried to influence the PC-DVD market in the same way. As this is being written, none of the stand-alone progressive-scan DVD players are available.

A Home Theater PC

I built a dedicated home theater PC consisting of a 333 MHz

Pentium II, 128 MB RAM, 6.3 GB hard disc, a wireless keyboard, and Windows 98. With the 3DFusion, it cost around \$1,300, about the same as a good DVD player. The 3DFusion card and DVD drive kit is about \$300 alone. Although the documentation says it will work with slower machines, I wouldn't use this card with anything less than a 300 MHz Pentium II.

How It Works

The 3DFusion consists of a single PCI or AGP card for the PC. It connects to a PC monitor via a standard 15-pin DIN connection rather than the more common BNC connectors used by home-theater projectors. A special cable, not included, will be required for interfacing to most projectors. This is the only interface that provides progressive-video signals. There are also S-Video (Y/C) and composite-video interfaces for driving a conventional NTSC TV, but not with the same quality of performance.

The 3DFusion DVD player comes with a software-based human interface called the Entertainment Center. This software displays a graphic that looks like the faceplate of a DVD player with the usual transport controls. It has popup menus to choose the soundtrack language and subtitles. A search button puts up a dialog that lets you directly access a title and chapter.

A nice feature lets you navigate DVDs by clicking on the items in the DVD menu with the mouse pointer. It also provides a master menu to access other features like the root menu, the title menu, or player calibration screens.

Performance

The 3DFusion's movie playback quality was impressive. The picture revealed more horizontal detail than the Sony S7000 through the IEV line doubler. Better yet, there was no hint of line-doubler (deinterlacing) artifacts. At first it looked as good as watching through a Faroudja, but more careful examination revealed some minor picture deficiencies in comparison to a Faroudja.

I played the opening of the *Austin Powers* DVD where Austin marches around the street with people in polka dotted and striped clothing. This scene is an artifact extravaganza for other PC-DVD players and line doublers, including those in HDTVs and NTSC TVs. With the M-act2 board, these patterns were stable, exhibiting no artifacts. The only thing that struck me as odd was that the scan lines were a little more visible than when playing DVDs through the line doubler in 16:9 mode.

After fiddling with the controls a little more, I found the problem. The player was doing 4:3 letterbox downconversion of the 16:9 enhanced DVD. This was extraordinary. The 4:3 down conversion on this player looked as good as 16:9 playback through the Sony DVP-7000 and IEV line doubler. I switched to 16:9 and tried again. Now it was beautiful - the most film-like presentation I've ever seen on a home-theater system. The opening of *Terminator 2* was astounding, the approach to the Skynet building after Sara shoots the scientist even more so. The diagonal lines of the building caused artifacts on every other system I have tried it on, including a Faroudja quadrupler. On the 3DFusion, it was stable and revealed the way the building was lit. I have since used this as my primary DVD source and it has been video Nirvana.

The 3DFusion can also display slightly smoother image

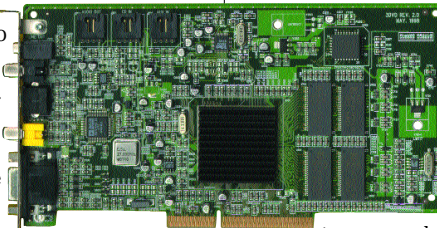
motion than most stand-alone line doublers by producing 72 frame-per-second (FPS) progressive video, rather than the usual 60 FPS progressive video. See the Video Insights on "Progressive DVD Players" to see how this works.

The 3DFusion isn't perfect. Over the seven months that I have used it, a number of glitches have come up. It also has limitations.

The 3DFusion provides only 18 bits-per-pixel RGB depth instead of 24-bit RGB found on stand-alone players. Although one would expect this to be a serious issue for picture and color quality, it isn't that serious in my experience. Only in Pause will you see banding of color gradients. If you compare it side by side with a High End line doubler like the Faroudja VP251, you can see the color-resolution difference in Leeloo's hair when she is about to jump off the building in *The Fifth Element*. In most cases, I find that MPEG-2 color quantization seems to dominate the pixel depth limitation. A 24-bit enhancement

is rumored to be in the works, but the manufacturer has made no commitment. One ramification of the 18-bit limitation is that you need to carefully calibrate the 3DFusion's brightness and contrast settings with *Video Essentials*. This is critical for getting the most detail out of the limited color depth. [Check the 10-step gray scale pattern to ensure no clipping at the 10 percent or 90 percent luma levels. - Ed]

Recently, some users of the 3DFusion discovered that a modification to the software settings in the Windows Registry allows you to run the 3DFusion in a pseudo 24-bit mode using resolutions other than 720 x 480. These include 640 x 480, 800 x 600, and 1024 x 768. This modification allows you to trade off a small



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amount of softening due to scaling for improved color output, although internal software limitations still inhibit full 24-bit RGB.

A more serious limitation has been lack of DTS audio support. Digital Connections plans a software upgrade soon. I tested a beta version that provides DTS, as well as Dolby Digital, from the coaxial digital audio output. In both cases, the sound was excellent and subjectively identical to a Sony DVP-S7700 using a B&K Ref 20 to drive Mackie HR824 studio monitors.

High quality video is limited to film-source DVDs only. On DVDs from a video-source (like Japanese Animation, videotaped rock concerts, or the video portion of the *Video Essentials* montage), the 3DFusion reverts to the performance of a budget line doubler. The earliest version of the software looked quite poor. Later versions improved significantly. It now produces an acceptable picture on DVDs made from video sources; by acceptable, I mean that it performs better than built-in line doublers you find in LCD projectors and HDTVs. It performs nearly as well as the IEV line doubler. If you like films, this is a decent trade off.

Is It for Everyone?

The greatest strength of a home-theater PC is flexibility in choosing hardware and software combinations. You can put

together a DVD solution that gives nearly reference quality movie playback for a great price. And if you want to play computer games like Quake on your projector, you can do that, too.

But this also means that the system is not turn-key. You can buy a High End DVD player and a line doubler, plug them together, and they will perform. With a PC solution, you must select a PC, install the 3DFusion card, add a wireless keyboard, install all the software, and hope it works. When you turn it on, it boots into the PC operating system. Often you must deal with glitches and upgrading hardware and software to make it work correctly. Using a PC as your DVD player requires more work and know-how, but for the more adventurous, it can be rewarding.

Companies that release convergence products will have to deal with these issues. I have looked at a Philips DVX-8000, which was an early attempt at building a home-theater convergence PC/DVD player as a consumer product. It did a decent job of making some things more turn-key, but in the end it still acted like a computer. The nice thing about the Philips DVX-8000 was that it had buttons on the front like most AV preamps, so it would respond quickly to the push of these buttons and even launch the appropriate software as needed.

If PC/home-theater convergence is going to succeed among people who are not computer nerds, products will have to respond much more like normal audio-video components and work as flawlessly. A single serious bug is enough to doom an otherwise great sound processor. The general instability of computers is unacceptable to someone who just wants to watch movies.

Another barrier to acceptance is the paradigm shift required. It still feels a little strange to pick up a computer keyboard to operate my DVD player. It's neat, in a way - but a little weird, too. The Philips product tried to address this by supporting a Marantz Mk1 Universal remote along with the wireless keyboard, but the overall solution seemed unsatisfying.

If these kinds of problems can be solved, the potential of PC/home-theater convergence is tremendous. A great thing about convergence is someone could come out with another PC-DVD card next month that will work even better. Or release a PC-HDTV receiver and, *voilà*, my PC can turn my projector into an HDTV for a fraction of the cost of a set-top HDTV decoder.

One may argue that this is a good product on its own, and the fact that it is on a PC card is incidental. To some extent this is true, but it glosses over some of the real advantages that I have enjoyed in using this product. I have received several upgrades to the software that provide functional improvements. This is not something you would normally get on a stand-alone DVD player. The 3DFusion also benefits from an active user community that has developed modifications such as the pseudo 24-bit modification mentioned earlier.

Summary

The 3DFusion is an excellent value for the more PC-inclined home-theater owner. The quality of movie playback and sound is impressive, and you will want to obtain the DTS upgrade when that software becomes available. If you aren't into messing around with PCs and software, and you can't afford it, stick with a Faroudja VP251 and your favorite High End DVD player. If tinkering is something you enjoy, then give the 3DFusion a look. ☺

Manufacturer Information

3DFusion
 Digital Connection, LLC
 20422 Beach Blvd., Ste. 400
 Huntington Beach, California 92648
 Phone: 1-800-327-8049
 URL: <http://www.digitalconnection.com>
 Source: Reviewer Purchase
 S/N: N/A
 Price: \$299

Bill Cruce Comments:

I love my 3DFusion because it gives me progressive-scan video. But I hate everything else about it. Owning it is like owning a vintage Fifties Jaguar. It looks beautiful, but if you want to get anywhere, you'd better have a full-time mechanic with you or be prepared to become one yourself. It is a PC product based on Windows 98, which should be enough to scare off all but the foolhardy. And it is not just *any* PC product. It is delicate, finely tuned, and highly unstable. This condition is not unique to the 3DFusion, but is shared by all PC-based DVDs. (I have tried them all and use none but the 3DFusion.)

The MPACT-2 chip on the 3DFusion card runs very hot in normal operation and is the cause of several problems. You should take precautions to have a PC with multiple fans and be especially careful to mount the card far from any processor cooling fan. It probably wouldn't hurt to mount a dedicated fan near the card. Symptoms of overheating include dropped frames, video lockup, suddenly deteriorating audio quality, and in extreme cases, a severe shift in the color balance of the video.

I think the situation was best stated by Tony Lai, who keeps the unofficial M Pact2 FAQ (<http://www.deckard.ign.com.au/>). "The type of person who buys M Pact2 is not your normal PC enthusiast. M Pact2 users are fanatical about decent equipment (cars, driving, fast PCs, home theater, and audio)." I would add that M Pact2 users are also not your normal home-theater enthusiasts. They have to be willing to tweak PC software and hardware and expect frequent breakdowns. I keep a stand-alone DVD player and line doubler in reserve so I can watch a movie when I want to rather than when the 3D Fusion wants to allow me.

Key Features - DVD Players

	Pioneer DV-09	Sony DVP-S7700	3DFusion
Progressive Video Output	No	No	Yes
Component Video Output	YPbPr	YPbPr	RGB
Advanced Digital Video Processing	YNR, CNR, NR, Y/C Delay H-Detail, V-Detail	DNR	No
Video Calibration Adjustments	S-Video Color, Black Switch	None	Yes
Below-Black Video Output	No	No	Yes
96 KHz/24-bit Digital Audio Output	Yes	No	No
DTS Digital Audio Output	Yes	Yes	Coming
5.1 Channel Audio Priority	No	Yes	No
Price	\$2,200	\$1,200	\$300