

Many consumers are pursuing a great home theater experience, constrained by limited knowledge and frustratingly restricted funds. They are part of a small population interested in a truly high quality system; most consumers just want something they feel meets their expectations and hopes. They don't want to do the homework needed to understand the possibilities, or to know how much they might have compromised unnecessarily.

Education requires some digging. Educated consumers might still opt for lower-than-optimal video or audio quality within their budgets, but at least their choice is an informed one.

Consumers' two primary sources for much of their home theater information are magazines (print and online) and retailers (especially sales staff). Both must make money to stay in business. While retailers are driven by profits related to sales, for magazines, the link between content and financial success is less direct.

Among the many factors that affect a magazine's content are the cost of articles and equipment reviews, the topics and optimal length of articles to keep the reader interested (and therefore a repeat buyer), advertising revenue (based on circulation), and printing and distribution expenses. These and other factors affect both the number of pages allotted to content, and the comprehensiveness of that content, particularly in equipment reviews. *Widescreen Review* provides more video equipment review data and analysis than most other sources, but even they aren't able to tell the reader everything necessary for a fully informed purchase decision.

Equipment reviewers primarily report what can be measured and quantified, so reviews are filled with numbers. They include subjective comments in an attempt to fill out the picture.

As Joe Kane has pointed out in his CES and CEDIA presentations on the Samsung SP-H700AE/800BK DLP projector,

there are numbers *not* generally reported that can affect image quality. Examples include:

- Digital processing bit range (by spec, digital 16 is black and 235 is white: according to Kane, processing that goes beyond that to cover digital 1 through 254 (within the digital 0-255 of an 8-bit word) can yield a higher-quality image, particularly when a display must be adjusted to accommodate output from various devices).

- Uniformity of brightness, grayscale, and primary-color purity over the entire display (the CIE coordinates for R,G,B, and D6500 white).

- Falloff in light level toward the sides and corners of the display, which should be reported with reference to the SMPTE recommended practice for projected 35mm film images in the 1.85 aspect ratio (adjusted for film in the projector gate. This aspect ratio closely matches the 1.78 of DTV).

- For single-chip DLP projectors, the number of segments in the color wheel—more segments “minimizes the rainbow effect, increases contrast ratio, and [in the case of the eight-segment wheel] allows for simulated 10-bit processing,” according to Kane's website: www.VideoEssentials.com.

The methods used for measurement and computation also have a substantial effect on the usefulness of the numbers reported. The best-known example is contrast ratio. The most stringent technique in general use is the SMPTE 16-block checkerboard pattern with alternating black and white blocks, with the contrast ratio computed by dividing the average white level by the average black level. This result is not perfect, but comes reasonably close to real-world perception.

Most manufacturers, and many reviewers, compute contrast ratio by dividing the full-on center-screen white level by the full-off black level (sometimes even with the projector turned off, and also possibly with color settings, brightness, and contrast levels adjusted to maximize the result). This can produce ridiculously high numbers that bear no resemblance to perceived in-use contrast.

The same kind of understanding and analysis is needed for any measured or computed numbers to be meaningful.

Since different manufacturers and reviewers use different techniques, comparing one manufacturer's or reviewer's figures with another's is neither possible nor useful.

Even at that, numbers don't tell the whole story. There are many factors that have a substantial effect on system performance, and on our experiences, that as yet have no quantifiable measure. Among these factors are: variable effects of MPEG2 decompression artifacts (related to the quality of MPEG2 decoders in DVD players and display devices); unpredictable impact of transmission signal interruptions; complexities of H/DTV equipment choices and characteristics; interconnectivity (almost nothing in the H/DTV world is simply plug-and-play with complete compatibility); choices among the many signal sources; copy inhibition; limited recording functionality; pricing; and the impending analog transmitter cutoff.

How many consumers understand that “digital quality”—a term used in DirecTV ads—has little meaning? It is generally true that bits out equals bits in (with error correction there is no loss of data in the transmission), but in any lossy-compressed digital data stream (such as the MPEG2-encoded data used for DVD-Videos, H/DTV broadcasts, and DBS transmissions such as DirecTV and Dish Network), the quality of the image is directly, yet nonlinearly, related to the bit rate. A professional high-definition video source starts out from the camera at about 1.4Gbps, and is reduced to no more than 19.39Mbps for OTA H/DTV broadcasts (including audio and overhead). DirecTV has been reported to transmit “high-definition” video at 8Mbps or less. In comparison, DVD-Videos output the video portion of the movie at less than 11Mbps, often averaging around 3-5Mbps, for *standard* definition images. Thus, “digital quality” can vary from excellent to lousy, depending on the amount of lossy data reduction applied to the source data.

Then there is the question of why this new technology has been presented in so complex a way that the FCC and the CEA have joined forces, creating a website and brochures that attempt to inform sales people how to present H/DTV to their customers.

Consumers also rely on retailers' sales staffs to have adequate knowledge and to impart it in guiding the customer toward his best choice, even while knowing that sales is often more important than truth and full disclosure. The problem is that retailers generally are driven by the numbers—units sold and profit made—and believe they will see limited financial benefit from educating their sales people and their customers.

This leads to the most likely reason why almost none of the displays in retail outlets are set up properly. Historically, the more dramatic the display's image, the more likely it will sell. A display accurately set up won't look as dramatic, even though the image is of substantially higher quality. The same is true in the home—out of the box, the display is dramatic (only a handful of individual models are even close to correctly set up as delivered); only after having it properly adjusted by a technical expert who has the knowledge and equipment, as well as access to the display's service menus, will the device exhibit the highest-quality image of which it is capable.

There is much commercial, FCC, and Congressional activity, including lobbying, regarding the return of NTSC broadcast licenses (turning off the analog TV transmitters), in large part because several industries want the spectrum. Some government officials believe they can get lobbyist funding by supporting this. There's also the question of how much money the government can raise selling off the spectrum (estimates cover more than a 30:1 range, depending on the source and their objectives).

There are claims that about two-thirds of the US public is getting its TV via cable, about 20% via direct broadcast satellite (DirecTV or EchoStar), and about 13% via OTA (using an antenna) broadcast. But how are these numbers counted—households (assuming one TV per household)? Do they count additional TV sets in each home? Do they count VCRs and PVRs (ReplayTV or TiVo), which will also need DTV-to-NTSC converters? And where are the converters and what will they sell for?

The experience of a California PBS station that turned off their analog transmitter has been widely reported.

Their audience research had yielded numbers similar to those above. Thus, they planned to turn off their analog transmitter, which would reduce their maintenance and electricity expenses substantively while apparently costing them no more than an eighth of their audience. The station ran on-air announcements around the clock for quite some time before the cutoff date, even offering phone consultation to those with questions about how to receive the station once the turn-off occurred. Nothing in the phone calls or any other communications with the public led them to anticipate results any different from their original expectations. They turned off the transmitter, and lost 38% of their audience, which they have not recovered more than a year later. This strongly challenges the validity of the cable and satellite percentages.

There is one theory that the cable subscriber numbers are based on "passed by" counts, meaning houses the cable company *can* feed (their cable line runs past those houses), not the number who currently subscribe. Obviously, the former would be a larger number than the latter.

From these few examples, it is clear that figures don't tell the whole story, whether it's sound quality, image clarity, or the distribution of the viewing audience.

H/DTV and some of the equipment that can be assembled into home theater systems can present outstandingly involving and entertaining experiences. However, only with sufficient knowledge can the consumer make purchasing choices that optimize his home theater enjoyment.

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