

Hook me up

→ BY Thomas J. Norton

THX Does Video

A new force in display calibration?

For years now, the Imaging Science Foundation (ISF) has owned the marketplace for training video display calibrators—the folks who come to your house and give your television or video projector the third degree. After he or she is finished, your set will provide the most accurate picture it's capable of.

Now there's another kid on the block, and it carries a familiar name: THX. Once a part of George Lucas' film empire (now independent), THX has long been linked with audio in consumers' minds. After all, Tomlinson Holman, who founded the THX feast when he worked for Lucasfilm, was and is mainly an audio guy. But THX's theatrical certification also involves film projection. This now carries over into a new program to test video components and, if worthy, certify them with the THX stamp of approval.

Certification of products inevitably led to the development of the THX Professional Video Systems Calibration workshop and THX calibrator certification. This three-day program involves extensive instruction with a hands-on training emphasis. It's followed up with an online, open-book test you complete after you return home. To become fully certified as a THX Video Service provider, a trainee must also perform at least 10 calibrations and provide the results to THX.

In addition to video calibration services, THX can provide certification for an entire home theater, either as a THX-Certified Home Screening Room or a THX-Certified Home Theater. The former involves THX consultants and engineers and is similar to the process THX uses to certify commercial theaters. It is intended for very high-end home theaters, generally with a budget of \$250,000 or higher. The THX-Certified Home Theater program (scheduled to begin this year) is for systems with a typical budget as low as \$25,000. At the very least, the project's lead designer/installer must be a

THX-certified professional. All of the components in the system must be THX certified (unless there are no THX products in a particular category).

I attended the video course this past summer at THX's headquarters in Northern California. I wanted to see what it was all about and perhaps pick up a few tips on both calibration and video. Although I've been doing video testing and calibration for years, there's always more to learn.

THX developed the course with contributions from Gregg Loewen and Michael Chen of Lion Audio/Video Consultants, Stacey Spears of Spears & Munsil, and Dr. Michael Rudd, Patrick Dunn, and John Dahl of THX. It covers all the video bases, beginning with the history of television, and moves on to contrast ratios, display geometry, contrast and brightness, color and tint, color tracking (gray scale), and gamma. It also

covers video processing, screens, anamorphic lenses for scope projection on a 2.35:1 screen, the viewing environment, and of course, in-depth training in video calibration.

The instructors were Loewen and Chen, and it was immediately obvious that we were in good hands. The course moved along quickly. Attendees who were new to the field probably felt like they were drinking through the proverbial firehose, but there was no other way to cover it all in three days.

THX dedicated at least half of the course time to extensive hands-on training. The displays on hand included LCD and plasma flat panels, a rear-projection DLP HDTV, and DLP and LCD front projectors. Calibration and

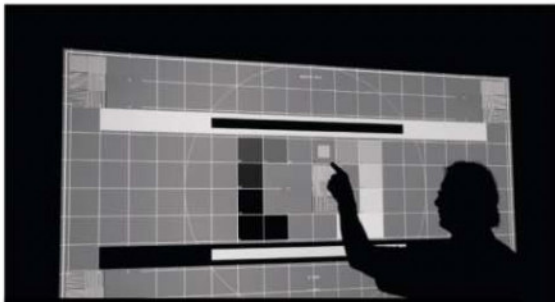
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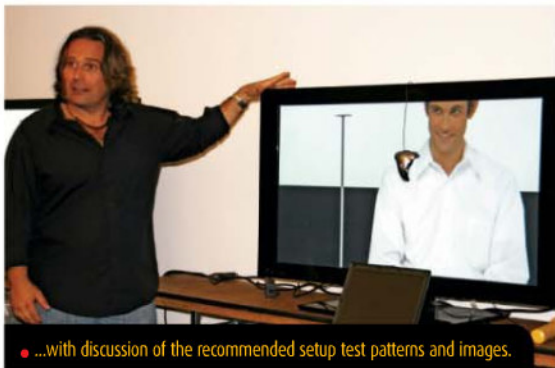
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Datacolor, was plentiful. Attendees broke into small groups to train with as many combinations of these displays and calibration devices as possible.

Since the course is aimed mainly at calibrators who deal with the public, we



• The THX training course includes classroom instruction...



• ...with discussion of the recommended setup test patterns and images.

heard plenty of warning tales about clients from hell. These range from those who swear, "You ruined my TV," to those who think a calibrator is also a TV repairman. (Not true, although the reverse is quite possible.) We heard about a client who called back to complain that SpongeBob wasn't yellow enough and one of Chen's clients who moaned that his TV had turned green. After a 75-mile drive, Chen found out that the client had been watching *The Matrix*. Lesson learned: Leave the client with a natural-looking demo disc as a reference.

Some clients demand impossible perfection. They watch the calibration procedure closely and wonder why the x,y white-point coordinates for the gray-scale calibration don't measure *exactly* 0.313 and 0.329 after the job is done. But this is not a reason to leave clients out of the process. Quite the opposite, in fact. A client who sees what you're doing is more likely to understand the improvement he or she is paying for—along with the compromises that are sometimes necessary.

While much of the course material was familiar to me, it increased my understanding of a number of subjects. One was the color management system (CMS) that's available on some sets. When a properly equipped calibrator

uses it correctly (*not* by eye), a CMS provides the means to move the color points and correct a display's color gamut. (Like color temperature, color gamut is rarely correct right out of the box.) But not all such systems work properly; I'll comment about this in future reviews. A properly functioning CMS is a requirement for THX display certification.

I also learned more about a figure of merit called Delta E. Simply put, Delta E is a single number that rates the measured color-temperature coordinates. It's weighted to not only include deviations from the true standard of D6500, but also the visible significance of that deviation at the measured brightness level. A Delta E of 10 or lower is tolerable, while 5 or lower is very good. A reading of lower than 3 (or 4, depending on the expert you ask) is effectively perfect to the human eye.

I suggested to some of the THX staff that perhaps we also need a similar figure for the accuracy of a display's color gamut. I found out that this is already on the to-do list of THX's video experts.

The following are a few of the flood of interesting factoids I gained from the sessions:

- TV marketing has nothing to do with presenting accurate images and

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has everything to do with selling more TV sets. That's why a proper aftermarket calibration is so important.

- Video contrast ratio can now exceed film contrast. This is the contrast ratio within a given frame, or ANSI contrast ratio, not the peak



• It involves hands-on training with a variety of measurement devices.



• This balanced program prepares the troops to go forth and calibrate.

full-on/full-off contrast ratio. The latter is more appropriately called dynamic range or, in the instructors' terminology, sequential contrast.

- Copying calibration settings from a different sample of the same display doesn't ensure a calibrated image. Most displays use parts with 10-percent tolerances.

- 35mm film has an equivalent video resolution of 4,000 by 3,000 pixels, or 12 megapixels. But a study has shown that, in a real-world test from a distance of 1.5 picture heights on a 1.85:1 screen (or 7 feet back from a 100-inch-wide screen), you can see a maximum resolution of 2,646 by 1,430 (just under 4 megapixels). With the mechanical losses of film projection (heat, frame jitter, and weave), video at 1080p can have more visible resolution than 35mm film.

- Gamma is the relationship between the input voltage and light output. It primarily affects the middle of the brightness range. Ideally, it would be linear (1.0), but gammas between 2.2 and 2.6 are most common. This is a legacy issue that carries over from the early days when television required compensation for nonlinear CRT TV cameras and telecines (devices that convert film to video). Many experts recommend a display gamma of 2.2,

but some prefer higher values. (Higher values are darker in the mid-brightness region.)

- THX recommends a peak light output of 14 to 16 foot-lamberts for front projection and 30 ft-L for one-piece video displays (plasma, LCD, DLP, LCOS).

At \$1,995, the THX video course is not cheap. (And that was a special introductory rate. It could go up to the regular price of \$2,700 at any time.) Most of our small group consisted of calibrators-in-training, where potential commercial gains can justify the expense. However, at least one student was a consumer determined to learn as much as possible before he plunged ahead with an expensive home theater installation. With a home theater likely to run into five figures, I'm certain he didn't regret the expense.

The cost of a THX video calibration to the average consumer should range from \$200 to \$500 (likely close to the latter figure), depending on the calibrator and the complexity of the job. Is it worth it? We've long recommended a full calibration to get the most out of an HDTV. Considering that the THX training program, from my experience, is remarkably thorough, I'd call it a smart investment. 📺

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— What Hi-Fi? Sound and Vision, November 2008

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