DLP and LCD televisions are two emerging technologies competing for a place in every consumer's home theater. Here's the thousand-dollar question: Which technology provides the best picture? The answer: It actually depends on the application(s) for which you intend to use your new DLP TV or LCD TV. Part of the reason has to do with basic mechanics: LCD and DLP technologies differ greatly in how the image is generated. What follows is a brief overview of how both technologies process light and display images.

DLP (Digital Light Processing) technology utilizes a small digital micromirror device (DMD) to tilt micromirrors less than the size of a human hair in width toward or away from a white lamp inside the DLP television. This process creates a light or dark pixel on the face of the projection screen, depending on how much light is reflected by the mirror. Each mirror can turn on or off several thousands of times per second, so this technology can reproduce 1024 shades of gray. There are four main components in the system: the DMD chip, the color wheel, the light source, and the optics. Light from the lamp passes through a color wheel filter and into the DMD chip, which will switch its mirrors on or off in relation to the color reflecting off them, producing an image.

Whether spread across a flat-panel screen or placed in the heart of a projector, all LCDs are pretty much the same. A matrix of thin-film transistors (TFTs) supplies voltage to liquid-crystal-filled cells sandwiched between two sheets of glass. When hit with an electrical charge, the crystals untwist to an exact degree to filter white light generated by a lamp behind the screen (for flat-panel TVs) or one shining through a small LCD chip (for projection TVs). LCD monitors reproduce colors through a process of subtraction: They block out particular color wavelengths from the spectrum of white light until they're left with just the right color. And, it's the intensity of light permitted to pass through this liquid-crystal matrix that enables LCD televisions to display images chock-full of colors—or gradations of them.

PICTURE CONSIDERATIONS

A Note On Methodology: Size is the most relevant attribute to investigate when evaluating the picture quality of either DLP or LCD televisions. As this is a discussion of both technologies, I must first point out that I compared the units in the sizes where they perform best, i.e., 50" for DLP TVs and 22" for LCD TVs. Today, DLP displays can be purchased in sizes ranging from 43" to 65" on the diagonal. LCD monitors run a bit smaller, from about 13 to 40 inches. I viewed the units in standard modes, that is, with all picture enhancements modes turned off. I found the edge enhancement mode on some DLPs to be very distracting, causing noise and jaggies rather than enhancing the image.

CONTRAST

LCD and DLP technologies have made tremendous strides over the past few years with respect to the reproduction of black levels. The current crop of LCD displays will have contrast ratios ranging from 350:1 to 800:1, while the new DLP televisions will range from 1000:1 to 1500:1. These are the manufacturer's specifications, so they're ascertained with the displays configured to maximize the unit's contrast-ratio performance, not necessarily to provide the best picture quality. Therefore, the manufacturer's specifications can be a bit misleading if you take into account more realistic viewing conditions, where exaggerated contrast rations aren't always the key to good image quality.

This can make for some counterintuitive observations. For example, the units I compared specified their contrast ratios at 500:1 (for the LCD TV) and 1000:1 (for the DLP TV). Therefore, you might expect the DLP to have had twice as good black levels as the LCD. Instead, the smaller 22" LCD TV had the edge over the larger 50" DLP TV.

Advantage: LCD, with the following caveat: There is not a clear winner here, since size impacts this performance level significantly. A large LCD TV cannot reproduce black levels remotely close those of a smaller LCD TV. Therefore, when comparing units of similar size, the DLP set will display richer black levels.

CLARITY

The native resolution of a display has a major impact on the clarity of the image reproduced. The 50" DLP TVs have native resolutions of 1280 x 720 using Texas Instruments HD2 Mustang Chipset. The 22" LCD TVs, by in comparison, had an EDTV resolution of 854 x 480. Thus, comparing playback through a progressive scan DVD player at 480p, the LCD monitors had the edge, since they were displaying the DVD signal in its native format. This allowed the smaller LCD monitors to be much clearer in image reproduction. The DLP televisions have to use built-in scalers to upscale the lower resolution signal to the DLP's higher native format. Given that the DLP televisions were scaling the signal, they produced a remarkably clear image. In general, a smaller screen will evoke a clearer image, especially when the viewing distance is not appreciably different. The Society of Motion Picture and Television Engineers (SMPTE) suggest a seating position to allow for a viewing cone of 30 degrees side to side in order to have the optimum theater experience (this recommendation hold true regardless of the display technology). That equates to approximately 2.5 to 3 times the diagonal size of the screen for 16:9 aspect ratio displays. Therefore, a 50" television screen would have an optimum viewing distance of 10.5 feet to 12.5 feet and a 22" television screen would be 4.5 feet to 5.5 feet. Your viewing position may vary as these are recommendations only and are subject to personal preference.

Advantage: LCD for scenes with fine details, as it will display the image much more clearly than a DLP television within the optimum viewing distance.

COLOR SATURATION

Color saturation is the absence of gray in color. The less gray, the more saturated the color is said to be. The issue of color saturation is also evaluated independently of display size. Upon watching both the LCD TVs and DLP TVs, the LCDs clearly had more vivid color resolution. Watching scenes of nature showing thing like mountains, lakes, and flowers, proved that the LCD reproduced images more realistically.

Advantage: LCD. When you're watching scenes with vibrant and brilliant colors, the LCD displays will seem more lifelike.

ACCURACY / BRIGHTNESS

The human eye is more sensitive to levels of brightness than it is to variations of color. Therefore, most people will perceive a brighter television as being better. The brightness of an LCD display depends on the brightness of its backlight lamps. Likewise, a DLP monitor's brightness is relative to the output of its single lamp. Both the DLP TVs and LCD TVs had bright pictures; however, the LCD unit's were much brighter in their factory default settings.

The method with which color is rendered differs for each technology. The DLP television's color accuracy is heavily dependent on the color wheel filters for single chip designs. Since the color wheel has fixed color filters (red, green, and blue), color adjustment is limited on these single chip designs. The LCD televisions, on the other hand, contain individual red, green, and blue cells in each pixel, which offers increased flexibility in rendering colors. In the factory-default settings, the LCD monitors were clearly brighter and had colors that generally seemed more accurate

than the larger DLP televisions. The LCD monitors also had more natural (or accurate) flesh tones than the DLPs did. There was even a large variance in the accuracy of colors amongst the DLP televisions.

Advantage: LCD, with the following caveat: The LCD TVs will be brighter and have a distinct color accuracy advantage during the first few years of their lives (each sets has about a 70,000-hour lifespan). An LCD panel will slowly decay with time, as will its backlight(s). This decay will result in colors that slowly shift (towards more red or blue) over time. DLP technology, on the other hand, may not be quite as accurate, but the colors will not shift over the course its lifespan. The lamps can also be replaced in DLP units (sometimes easily), which should return them to their original brightness levels.

OTHER CONSIDERATIONS

VIEWING ANGLE

Manufacturers claim viewing angles of 160-170° for both LCD and DLP displays. The viewable picture at these extreme angles is quite impressive for both technologies. The picture on the LCD displays remained consistent throughout all viewing angles. This was not the case with the DLP TVs. Viewing a DLP set from various angles will impact the overall color accuracy of the image. There is a considerable shift in the tints when changing vertical positions. You will notice this if you shift positions (i.e., stand up or sit down) while watching your DLP unit.

Advantage: LCD. If having a sizeable "sweet spot" for optimal viewing pleasure is a must, then an LCD television is your best bet.

COMPUTER USE

Both display technologies can be used with a computer. Neither LCD monitors nor DLP TV's will succumb to the problem of image persistence, which is certainly a concern when displaying static data and graphs (like the Excel spreadsheets, etc.). One will just have to that verify that the television has PC compatible inputs because not all displays will have a computer compatible input.

Advantage: Draw. If you need a display to double as a monitor and television, verify that it has a PC-compatible input through either VGA or DVI.

SIZE / PRICE

From a price-per-square-inch standpoint, the DLP TV is a better value. The initial capital cost of a DLP unit is less than that of a similarly sized LCD unit. However, the LCD TV will draw less power and operate quieter than a DLP will in direct comparison. Your LCD TV will not require any maintenance throughout the life of the unit; however, the DLP will require an occasional bulb replacement every 8000 hours or so. (These replacement bulbs cost about $250 - $350, and you may or may not need to hire a technician to do it. Some DLPs are configured so that a layperson can replace their bulbs, other aren't. This is definitely worth checking out before you buy.)

Advantage: DLP. DLP TVs generally cost less and currently are available in sizes larger than the largest LCD TVs in production. DLP displays are available in sizes ranging from 43-65" diagonally. LCD displays max out at 40" diagonally.