**Home Theater Projectors**

***Purpose***

To project an image on a screen

***Goal***

To portray the most life like image possible thereby allowing you to be immersed in the story.

***Factors to Evaluate***

There are several key factors to consider when evaluating home theater projectors:

They are:

1. Resolution
2. Processor (HDR, contrast, color space etc.)
3. Brightness
4. Light Engine Type
5. Lens Construction
6. Lens Shift
7. Image shift
8. Inputs
9. Noise
10. Price

In my mind I believe the first three have the greatest impact.

***Resolution***

The projector's resolution determines the number of pixels that make up the image, and the more pixels, the sharper the image will be. The most common resolution for medium to high performance projectors is 4K. There are two ways to display a 4K image the best is to use a chipset that has native 4K resolution. The other is to use a 2K chipset and interpolate two mages to achieve a 4K image. Therefor you make see reference to Native resolution and Max resolution.

Native resolution the native (unenhanced resolution) of the imaging chip

Max Resolution the enhanced resolution capable. Typically implemented by quick doubling the image output of a 2K ship to achieve 4K. [3840 horizontal x 2160 vertical pixels]

***Processor***

The video processor. The “brain” for calculating how to present the image in the best possible way.

A video processor in a home theater projector is an electronic device that processes the incoming video signals and prepares them for display on the projector screen. It takes the incoming signal and then performs a series of signal processing functions to improve the video quality.

Sony stands out for their exceptional video processors. Sony’s X1 Ultimate for Projector is now available across Sony’s entire XW laser projector lineup where before it was only found in their Flagship GTZ380. They use the following techniques to give you the best possible Picture:

HDR

This feature is a function of the processor. HDR = High Dynamic Rage. This is a must! HDR enhances the display quality of images and videos. HDR technology allows for a wider range of colors and brightness levels to be displayed, creating a more vivid and lifelike picture. The way the human brain works HDR is interpreted as greater resolution. Dolby Vision is a proprietary HDR format developed by Dolby Laboratories. It uses dynamic metadata to adjust the brightness and color of each scene in real-time and is widely supported by premium TVs and content providers. Many projectors support Dolby Vision

Contrast

Contrast is the difference between the darkest and bright image. Measuring contrast can be done in two ways: Full On/Full Off (FOFO) and ANSI Contrast. FOFO is easy to manipulate and is commonly used in the industry, whereas ANSI produces more valid numbers, but is hardly used.

Full on / off contrast measures the ratio between the brightness of a solid white pattern (Full On) and that of a solid black pattern (Full Off).

ANSI uses a single checkerboard pattern (consisting of 16 rectangles, out of which 8 white and 8 black). The brightness of both the black and white squares are measured and averaged, and the ratio between them is the ANSI contrast ratio.

Color Space

This is a function of the processor. Color space refers to the total number colors a projector can display. Sony’s Triluminos Pro let the viewer see over a billion colors come to life. The TRILUMINOS PRO algorithm can detect color from saturation, hue, and brightness to reproduce natural shades in every detail. You'll enjoy colors that are closer to those seen in the real world. Sony Projectors with their Wide Dynamic Range Optics achieve a 95% DCI-P3 wide color gamut.

Dual database processing

Two powerful image improvement databases work together to improve picture quality in real time. One database helps reduce on-screen noise, while the other is used to upscale the resolution.

Object-based Super Resolution

Object-based Super Resolution technology detects individual objects in a picture and enhances each one for exceptional accuracy and detail. Since Sony is also a movie company, they use 4K and 8K content captured by their cinema cameras as reference points to upscale both resolution and image noise.

Digital Focus Optimizer

By analyzing every pixel and detecting possible degradation in advance, the Digital Focus Optimizer corrects the image quality so that the focus is better than ever, even in the corners.

Object-based HDR remaster

Object-based HDR Remaster analyzes the color of individual objects on screen and adjusts the contrast, resulting in more realistic pictures with greater depth and texture.

Overall, the video processor is an important component in a home theater projector setup, as it helps to ensure that the video content is displayed in the best possible quality, with accurate colors, sharp images, and smooth motion.

***Brightness:***

Expressed in lumens. You need enough lumens to meet the needs of your screen size and the room.

***Light Engine Type***

Laser or traditional bulb. Most performance projectors are laser based. Typical laser life is 20,000 hours or 5 hours a day for 11 years.

***Lens Construction***

Glass is better than plastic. You find glass lens on higher end projectors. Typically, better projectors have more optical element to provide a sharper picture. With the exception of the Aspherical front lens element, which is a special optical resin, the rest of the lens elements are glass. For critical elements they employee extra low dispersion glass.

***Technology:***

There are several basic technologies that can be used to display and image. They are: DLP, LCD or SXRD. Sony uses SXRD which is a LCOS (Liquid Crystal on Silicone) panel to allow more tightly controlled contrast, resolution, and overall picture quality. Since Sony manufactures SXRD in-house, they can make needed changes to better fit with the specific projector model’s laser light source, lens, and other components that go into the viewing experience.

There are pros and cons to each technology. We don’t have time to address these various technologies in this article. While a technology in the abstract is good you also need a top flight implementation to get the best from the technology. This is oven very difficult to achieve with budget priced projectors.

***Lens shift***

The ability to shift the displayed image while keeping the projector in a set spot. This should be avoided since in employe digital correction called Digital keystone correction which degrade picture quality.

***Image shift***

Ability to display a 1:1.78 or 1:2.40 image. Very handy when shifting from regular TV image size to a widescreen movie format.

***Inputs***

Not an issue with modern projector where you are supplying the signal through and HDMI.

***Noise***

Often the projector is in the same you with you. Therefore, the amount of noise a project generate is important. Sony projectors are very quiet.

***Price***

Projectors range in price from $3,000 to 80,000

***Conclusion***

We have looked at all the factors that are important to evaluate when selecting your projector. This as a major decision when designing you home theater. Projector is the number one factor affect the WOW factor of your theater. Of the items discussed above are these are the most important

1. Resolution
2. Processor (HDR, contrast, color space etc.)
3. Brightness

For additional resources please visit our website’s Knowledge Center. Here you will find several articles on home theaters. Additionally, please check out our gallery of home theater photos. There you can find a series of 19 photos that chronical a home theater install from start to finish.

Contact Tom Curnin at 908-953-0555 or Tom @ BravoAV.com. Your Professional AV Expert.

Tom Curnin, the owner of Bravo AV, is a CEDIA Professional Designer, THX certified professional home theater Level 1 and Home Acoustic Alliance trained to Level II.

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