



## WELCOME!

I think you will find that this month's Newsletter is packed full of interesting and informative home theatre offerings. Besides the archived article written by John Dunlavy from Issue 59 of *Widescreen Review*, "Loudspeaker Accuracy: Parameters And Elements Of Accurate Loudspeakers, Part 2," we have included an On Screen interview with GalleryPlayer®'s Kevin Akeroyd, and an article written by Nick Johnston from Blue Ocean® Projection Screens on Rear Projection—a nice follow-up to Issue 119's "Ultimate Screen Manufacturer Roundup," including a screen buyer's guide and an article written by Joe Kane on the "Qualities Of A High-Performance Home Projection Screen."

Gary Reber  
Editor-In-Chief, *Widescreen Review*

## COMING SOON TO NEWSSTANDS

Here's a sneak peek into what's coming in Issue 119, April 2007 of *Widescreen Review*:

- Alen Koebel brings us "2007 International CES Part I: Displays & Video Sources"
- Bill Cushman watches the Panasonic PT-AE1000U
- Danny Richelieu interviews Furman Sound's Dave Keller and Garth Powell
- "The Ultimate Screen Manufacturer Roundup"
- Joe Kane's "Qualities Of A High Performance Home Projection Screen"
- "The Wife Assistance Forum" helps your significant other see things your way
- Over 30 Blu-ray Disc, HD DVD, and DVD picture and sound quality reviews
- And more...

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# Coming Soon To A Retailer Near You

## Tricia Spears

### New Accessories

Are you in need of support...for audio-visual components for your flat panel TV? (What did you think I meant?)

**Chief® Manufacturing** has the perfect solution for wall- or pole-mounted flat panels. The **PAC-101** and **PAC-102** accessory shelves support up to 20 pounds and feature solid steel construction, a decorative shelf cover for a finished look, and include all mounting hardware for quick-and-easy installation. The PAC-101 is perfect for single-stud wall installations, and the PAC-102 can be used with pole installations. Additionally, the **PAC-103** Safety Strap can be added to both shelves for added protection against component damage.



Chief Manufacturing PAC-102

Chief Manufacturing

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Also new from **Chief Manufacturing** is the **Cinematic™ Series** line of automated mounting solutions for swing arm mounts, flat panel and projector lifts, and table stands. Cinematic Mounts offer programmable viewing angles and fast, fine-tuned viewing adjustments. Solid steel construction and carefully engineered electronics make for state-of-the-art mounting solutions. The **CM1W18** Automated Swing Mount, **CM2L40** Automated Pop-Up Lift, and **CM3T45** Automated Swivel Table Stand are all shipping now, and the **CM4S57** Automated Speaker Adapter and **CM5V42** Automated Art Accessory will be available in the second quarter of 2007.



Chief Manufacturing CM1W18

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Chief Manufacturing Reaction

And finally, **Chief Manufacturing** has added some innovative new features for their **Reaction™** swing arms and **Fusion™** fixed and tilt mounts. The Reaction mounts feature ClickConnect™, which engages the television to the mount with an audible click—no tools necessary. The Centris Select™ Technology for the Reaction

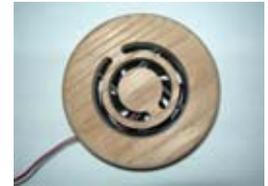
line adjusts to the weight and depth of any screen for easy fingertip tilt. The Fusion mounts feature a redesigned universal interface, which provides new mount options for 30- to 50-inch flat panel TVs, compatible with screens as large as 63 inches. Chief's Reaction and Fusion lines offer easy-to-install universal mounting solutions for 10- to 65-inch displays and offer a sleek look.

Chief Manufacturing

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**Active Thermal Management** is pleased to introduce their new **Circle-vent™** powered air vents. Designed for easy mounting, the elegant, quiet cooling venting system is available in surface- (easily retrofitted into existing cabinets) or flush-mount (for installation during cabinet construction) configurations in a variety of different woods. Easily field-adjusted to either exhaust hot air out of an audio/video cabinet or pull fresh air in, the Circle-vent consists of two fan assemblies, a power supply, and a magnetic-base thermal switch assembly. The fans can be set to either turn on and off with the temperature or run continuously at idle, speeding up as temperatures rise. The Circle-vent is available now for \$300.



ATM Circle-vent

Active Thermal Management 661 294 7999

www.activethermal.com

**Active Thermal Management** has also introduced their latest home theatre component cooling solution, the **Dual-Mode Component Cooler**.



ATM Dual-Mode Component Cooler

Perfect for use on shelves, bookcases, and other semi-enclosed locations, and able to support components weighing over 100 pounds, the Dual-Mode Component Cooler provides effective, quiet thermal protection for A/V components. The ultra-quiet fans run continuously at an idle speed, suitable for removing heat produced by always-on components, and switching to a higher speed as temperatures rise. As shipped, the Cooler is meant to be placed on top of a hot component, cooling it while forming a shelf on which a heat-sensitive component can be placed. In an alternate configuration, the Cooler is to be placed under a hot component, forcing air up through the component. Mode switching is quick and easy and can be accomplished with the use of a Philips screwdriver. The Dual-Mode Component Cooler will be available in May 2007 for \$220.

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Sanus Systems MF215

**Sanus Systems** has introduced four new **VisionMount™** full-motion wall mounts for medium LCD flat panel televisions. **Model MF202** (\$70), **MF203** (\$90), **MF209** (\$110), and **MF215** (\$130) all offer a variety of features, including tilt, swivel, pan, and extended motions. The Virtual Axis™ 3D technology features a cup-shaped design that allows mounts to move effortlessly, with the touch of a finger, in all directions. The aesthetic design cleverly hides wires while supporting TVs up to 50 pounds. All of the models are available in silver or black with a powder-coated finish and include a quick connect/disconnect feature allowing for easy installation.

Sanus Systems

800 359 5520

www.sanus.com

On Screen With

## GalleryPlayer®'s Kevin Akeroyd

DANNY RICHELIEU



With the mass proliferation of high-definition displays into the home over the past few years, consumers have finally been provided an avenue for viewing their high-resolution digital photography (consider the fact that a 1920 x 1080p display has fewer total pixels than a 2.1-megapixel digital camera) in a large format, getting much of the fine detail captured. But it doesn't stop there.

Enter GalleryPlayer®, the 2003 start-up whose mission is to "provide the world's finest high-definition art and photography to HDTVs." As their Web site says, "GalleryPlayer delivers rights-protected, high-definition imagery that transforms any screen into a stunning showcase for viewing renowned artwork and breathtaking photographic imagery."

Intrigued, we set up an interview with Kevin Akeroyd, GalleryPlayer's Chief Executive Officer, to learn more about the company and its products.

**Danny Richelieu, Widescreen Review:**

Let's start with the basics. What exactly is GalleryPlayer?

**Kevin Akeroyd, GalleryPlayer:**

GalleryPlayer is a content aggregator and distributor that is building a brand new content category in high-def television content that we call HD Lifestyle Imagery. We have focused on aggregating the world's finest art and photography initially, although, now we're branching into literally every iconic imagery category that's out there. And we have focused it specifically on 1080p, stunning high-resolution, on the HDTV flat panel display. So, a content aggregator and distributor that's focused on art and photography for the HDTV.

**WSR Richelieu:** And where are you getting this art and photography?

**Akeroyd:** Literally, over 50 content providers from around the world. So, it includes some of the top museums in the world, including the de Young, Metropolitan, Museum of Modern Art, etc. It includes major publishers of iconic imagery like *Life*

*Publications*, *National Geographic*, and *DK*, for instance—they're the guys who do "1000 Places Before You Die," which has sold 15 million copies, or something like that. And then a wide variety of photographers, artists, and other content owners that give us all of our categories that include everything from ancient civilizations, to beaches, to space, to nature, to travel, to architecture—literally, thousands of artists and photographers represented by 50 different content owners.

**WSR Richelieu:** Great. And how can users get GalleryPlayer images on their home theatre displays?

**Akeroyd:** Currently, GalleryPlayer can be found in one of several ways. One: we are one of the most popular—as a matter of fact, we're the third out of 20 most popular high-definition programming on Comcast® every single month. And they can find 12 different galleries on Comcast every single month.

**WSR Richelieu:** And that's a channel on Comcast?

**Akeroyd:** It's actually 12 different channels—it's a VOD [Video On Demand] offering. So, you click GalleryPlayer in high-definition, and then you can choose from any of 12 galleries that we update every single month. And that is rapidly scaling into many more cable providers. I'm not at liberty to name the other ones yet, but we expect that we will be in between a third and half of all cable and satellite in the United States by the end of the year because of the success on Comcast, as well as the growing demand for this category. The second is consumer electronics devices. That starts with Panasonic. We are embedded in every DLP, LCD, and plasma HDTV that Panasonic will put out for their entire 2007 line, and we expect that to branch out into other relationships. But Panasonic alone is five million TVs this year.

**WSR Richelieu:** How are you embedding that into the display?

**Akeroyd:** Panasonic has embedded the

actual technology itself as well as they have embedded the CPRM [Content Protection for Recordable Media], which is what you need, since we deal with rights-protected imagery rather than just stock imagery.

With the technology in place, we worked with Panasonic to create two easy, seamless ways for consumers to access our HD Lifestyle Imagery. First, since every new 2007 HDTV from Panasonic has an SD card reader, GalleryPlayer is launching two branded SD cards that will be available at both retail and online. The two collections will be officially announced later this month. Second, consumers can use any standard SD card to download content from the GalleryPlayer Web site. We are just like iTunes. You can go get individual images, you can build play lists, or you can buy entire collections of images just like you can do with music on iTunes.

So in other words, Danny, there are dozens of ways that people can get content from the PC to TV, whether that's physical memory, whether that's USB, whether that's wireless, whether that's media center, you know, etc. So all the ways you can get content from PC to TV are available, and you can download and burn just like you do in iTunes. And then, finally, we do consumer goods as well, so you can get DVDs, SD cards, etc., so we do pre-packaged consumer goods.

**WSR Richelieu:** How many high-definition collections do you have available?

**Akeroyd:** We have about 200 collections available, and we add about ten collections a month to that, and that's tens of thousands of images, so you can go get literally tens of thousands of images and build your own collection, so the answer is really infinite because if you're a consumer, you can go build your own personal collection out of so many images that there is no ceiling. But the ones that we've gone ahead and pre-packaged and put into collections and put music to—that number should be right around 200.



**WSR Richelieu:** Okay, great. Now, you said something about them being available for the PC, are they also available for Macintosh users?

**Akeroyd:** Right now, no. However, we just had our Vista release, and any Mac that is running Vista will be able to...or if a Mac is running Windows® Vista or XP, then the answer's yes. But we are not currently in the native Apple environment, so the reality is a lot of Macs run with Vista or XP, so most of the Mac universe is available, but it's got to be via Vista or XP.

**WSR Richelieu:** Are there any plans to release these high-definition collections via next-generation optical disc formats, like Blu-ray Disc and HD DVD, like you're currently doing with DVD?

**Akeroyd:** Absolutely, yes, yes. The last couple of years, those high-definition formats have gotten a lot of buzz but virtually no adoption. This is the first year that you're finally going to see HD DVD and Blu-ray Disc players start to get critical mass in the marketplace, so this is the year we will actually start outputting our material on Blu-ray Disc and HD DVD. We did it in SD last year simply because 99 percent of the market didn't have a Blu-ray Disc or HD DVD player in their home. Now that that's changing, we're going to go ahead, and we'll be format-agnostic, so whether it is an SD card, which is also high-definition, whether it's a memory stick, which is high-definition, whether it's Blu-ray Disc, we have built the technology and curated the content so that we can support any physical memory device that people would like to order.



**WSR Richelieu:** Great, and how would people order your products?

**Akeroyd:** The Panasonic relationship is very exciting because people will actually be able to purchase our high-definition-branded content on SD cards alongside the Panasonic televisions in virtually every retailer where Panasonic is sold. So, literally hundreds of millions of people will see GalleryPlayer in the second half of this year because it's going to be sold anywhere Panasonic is sold. If you watch it on Comcast or any of the other channels, we tell you explicitly how to go to the Web site, and if you loved what you saw there, here's how you go buy more, or here's how you own the experience. And then the online store allows you to both buy DVDs as pre-packaged titles if you like or to download for the iTunes example I gave you. So you're going to get a lot of exposure on how to actually go buy them online, in retail, and then cable will drive you to both. The cable will tell you how to go buy it in retail or how to go find it online.

**WSR Richelieu:** Great, and what is that Web site, just for those who are reading this?

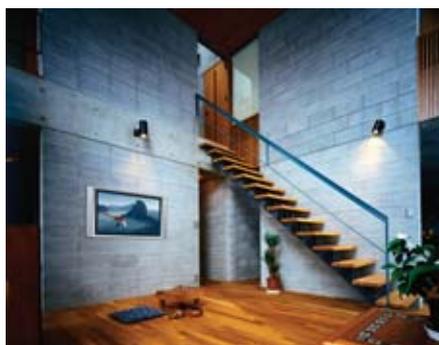
**Akeroyd:** [www.GalleryPlayer.com](http://www.GalleryPlayer.com).

**WSR Richelieu:** Great. Is there anything else you want our readers to know about GalleryPlayer?

**Akeroyd:** You know, the only other thing I think that might make some sense is certain offerings like us are, an offering looking for a need, or a solution looking for a problem—we're the exact opposite. We literally are one of the top three most popular pro-



grams on Comcast. The TV companies have done a lot of research around what consumers want to see, both content-wise and feature sets, so we are literally kind of fulfilling a demand, filling a need, fulfilling a trend for this content category to be as prevalent as music programming and movies are on TV. And then again, this might be a little self-serving, most of the people that we talk to that really comes up and what comes across is we're not talking about kind of a cool little accessory, we're talking about how people want to use their TVs when they're not viewing core programming. And on Comcast, for instance, people are using the television to view GalleryPlayer as often and as frequently as they are core programming. So what may be worth noting—is that this isn't just a cute little gimmick, this is something that cable subscribers, TV buyers, and art aficionados literally want, so we're stepping in and filling a need or desire rather than trying to evangelize something that people may or may not want. **WSR**



# Loudspeaker Accuracy

## *Parameters And Elements of Accurate Loudspeakers*

### Part 2

JOHN DUNLAVY

This is the second in a series of articles on the topic "Loudspeaker Accuracy" that I have written for *Widescreen Review* as a guest editorialist.

### Accurate Measurements

The perfect loudspeaker doesn't exist, of course—at least not yet. We're still constrained by the materials available to us and the laws of physics. Still, we have come a long way. This month, I would like to share with you an overview of the performance properties and design features you should look (and listen) for when evaluating the accuracy of loudspeakers. The following 10 topics discuss in brief how to objectively evaluate a loudspeaker for reproducing music and voices. A full set of accurate measurements are essential for determining the potential of a loudspeaker to accurately reproduce complex musical sounds and transients. Necessary for accurate measurement is an instrumentation-quality microphone used in conjunction with a computer-based measurement program such as MLSSA (Maximum Length Sequence System Analysis), which typically involves the use of 32,768 individual impulses, randomly separated. The computer uses an FFT (Fast Fourier Transform) analysis to obtain all of the measurable properties of a loudspeaker, except for the directivity patterns and impedance. In addition to the use of this program, if maximum accuracy is desired, it is best to also take the measurements within a large anechoic chamber with excellent properties. Why do I put so much emphasis on accurate measurements? It is because there is a correlation between what measurements have to reveal to us versus what we hear. Without measurements, how can you be certain that you've got it when you only think you have it. I'll be discussing each of them in greater depth in the months ahead. I hope the information will be useful to you.

### Enclosure Design Properties—External And Internal

Proper enclosure design requires that the designer gives attention to the free-air resonance of the drivers and their "Q," along with the resonance and "Q" of the enclosure. System resonance is a function of the combination of the resonance frequency of the driver and the resonance frequency of the enclosure. Resonance is that frequency of a system at which the reactive component goes from a positive value through zero to a negative value. At the frequency at which the reactive component goes through zero defines the resonance frequency of the drivers and/or the system, i.e., the driver(s) plus its enclosure. It really doesn't matter how esoteric the drivers used in a loudspeaker system are. What does matter is that the drivers are selected for their measurably accurate performance within their frequency response range and their properties are suitably matched to the properties of the enclosure.

At bass frequencies, you need a certain volume in the enclosure combined with a driver having an appropriate resonant frequency and "Q" properties. Enclosures that satisfy these properties will yield overall, the most accurate performance. Without either appropriately rounded enclosure edges or effective acoustical absorbent materials between the drivers and the enclosure edges, edge diffraction will create significant peaks and valleys in the frequency response of the system, along with ringing in the reproduction of musical transients.

To maintain a symmetrical radiation pattern, both vertically and horizontally, individual drivers or arrays of drivers must be located symmetrically with respect to enclosure edges, otherwise significant peaks and valleys will be created in the horizontal and/or vertical radiation patterns of the loudspeaker.

### Impulse, Step, And Phase Response

#### Impulse Response

An acoustical impulse is a very brief "tic" sound that, surprising to most people, simultaneously contains all audio frequencies. The measured impulse response of a loudspeaker is important because it defines how faithfully a given loudspeaker can reproduce complex or short-duration musical transients without "blurring." While non-technical people may find it difficult to imagine, mathematically, the impulse contains all of the information needed by a computer to accurately derive the frequency response, step response, cumulative spectral decay (waterfall) response, and phase response. Impulse response is usually based upon using a rectangular pulse having a very fast rise time and a width of less than about 20 microseconds.

#### Step Response

Step response, sometimes referred to as the "transfer-function" of a device, is a measurement that reveals how accurately a loudspeaker can reproduce the shape of a rectangular pulse having a very long duration (greater than 100 milliseconds.) A "perfect loudspeaker" would have no linear or non-linear distortion over the intended frequency spectrum, and would reproduce such a signal with little or no initial overshoot or slope, followed by an exponential roll-off in amplitude versus time, until the amplitude approached zero. Step response reveals a great deal about the overall properties of a loudspeaker because the shape of the reproduced curve provides an easy, visual picture of both amplitude and phase versus frequency, crossover network parameters, and driver time alignment. Therefore, a properly reproduced step response is a reasonable guarantee of a truly accurate sounding loudspeaker, capable of preserving the spectral properties of the original live musical performance, all else being equal.

A well-designed loudspeaker should yield

an impulse response with a rapid rise-time in the positive direction, a steep drop from the maximum, followed by an "overshoot" in the negative direction that is more than about 12 to 15 dB below the level of the positive peak. This should be followed by no more than about 200 to 500 microseconds of additional ringing which has a maximum amplitude at least 15 to 20 dB lower than the peak amplitude of the impulse. A large overshoot and/or ringing of substantial amplitude and duration can have the effect of blurring complex musical transients or dulling the impact of fast rise-time musical signals. Ringing can be described as repetition of the original impulse in the time domain. Such pronounced overshoot and/or ringing can also turn a sharp "tic" sound into a dull "toc" sound and significantly alter the quality of plucked strings, orchestral bells, cymbals, castanets, and so forth.

### Phase Response

Phase response is related to the time domain response of a loudspeaker, i.e., the ability of the loudspeaker to accurately reproduce complex signals over a wide range of frequencies without any time domain delays or distortion. Phase response is directly related to the impulse and step responses of a loudspeaker and is therefore relevant to the accurate reproduction of complex musical transients. A loudspeaker with excellent frequency and phase response properties should also exhibit good impulse and step responses. Conversely, a loudspeaker with an excellent step response should exhibit a smooth curve of both amplitude and phase versus frequency with no time-domain distortion or irregularities. Thus, a loudspeaker with poor phase response (resulting in a poor transient response) can be expected to create an audible "blurring" of complex musical transients, etc.

### Frequency Response

The frequency response of a loudspeaker is the modulus (variations) of amplitude versus frequency. Measured accurately within a good anechoic chamber (preferably in conjunction with a state-of-the-art measurement program such as MLSSA), it reveals a loudspeaker's spectral balance, i.e., its ability or inability to reproduce all frequencies or musical tones with equal intensity or volume. This is an essential property if the reproduced sounds of familiar musical instruments are to be heard as possessing "live" properties.

It is usually considered the most important performance property because it is the easiest for the average person to evaluate when listening to loudspeakers. Anomalies

in frequency response are most detectable when the direct arrival curve departs from the "average level" by more than about  $\pm 2$  dB over a range of more than about one-quarter to one-third of an octave in frequency. (An octave is a 2:1 ratio of frequency, e.g., 100-200 Hz, 1-2 kHz, 4-8 kHz, etc.)

However, truly accurate loudspeakers have amplitude versus frequency curves that fall well within  $\pm 1-2$  dB limits, with excursions of less than about  $\pm 1$  dB within any given octave (without any amplitude or bandwidth "smoothing"). Some loudspeaker designers will argue that room reflections will modify the frequency response heard by a listener by greater values than this. However, the effect of room reflections, as long as they arrive later than about 5 to 6 milliseconds than the direct arrival sound are generally recognized as such by most experienced listeners.

### Cumulative Spectral Decay (Waterfall) Plot

Time domain response is viewed by means of a Cumulative Spectral Decay (waterfall) plot. It provides a sequence of individual frequency response plots, each delayed by a short time interval from the preceding plot. It is another excellent tool for gauging the accuracy of a loudspeaker's ability to reproduce complex musical passages possessing significant transient details without blurring or smearing of complex details in the frequency or time domains.

### Directivity

The directivity of a loudspeaker, both horizontally and vertically (at numerous frequencies covering the audio spectrum), can reveal a great deal about a loudspeaker's ability to accurately reproduce complex musical transients within listening rooms containing typical reflective surfaces, e.g., floor, ceiling, and walls. It is graphed with plots at several different angles in both vertical and horizontal planes, usually measured in increments of 5 or 10 degrees, as the loudspeaker is rotated about its central axis. These plots are important for they reveal:

- The size of the "on-axis" angular window (vertically and horizontally) within which accurate reproduction should be optimal. This window is usually defined as the angular limits at which the response at 10 kHz is 3 dB below the response on-axis.
- Symmetry of the main radiation lobe in both horizontal and vertical planes, relative to the listening axis.
- Undesirable high-intensity off-axis radiation "lobes" that might bounce off of a

sidewall or ceiling, resulting in an audible deterioration of sound quality and imaging at the listening position.

### Harmonic And Intermodulation (IM) Distortion

Harmonic and intermodulation (IM) distortions are created within any network or device, including loudspeakers, that exhibits a non-linear property with respect to the amplitude of a signal. Harmonic distortion consists of even and odd harmonics, which were not present in the original signal. IM distortion is caused by two frequencies interacting with each other to produce sum and difference frequencies, which were likewise not present in the original signal.

Within a loudspeaker driver, most non-linear distortions can be traced to the voice coil not being properly centered in the flux field generated by the magnet and its structure. However, if the voice coil encounters any asymmetry within the magnetic field during the extremes of its physical travel when reproducing loud sound passages, non-linear distortions will be produced.

### Crossover Networks

The Crossover Network (often called a "Dividing Network") of a loudspeaker is, in many respects, its "heart." Its purpose is to electrically separate (or divide) the audio spectrum into different frequency ranges, with each range designed to best match the individual frequency requirements of the woofer, bass, mid, and tweeter drivers. For example, if signals encompassing the full audio range were fed to most tweeters, the sound reproduction quality would be terrible and, most likely, the tweeter would not survive without damage for very long.

To accomplish this task, most crossover networks for loudspeakers with multiple drivers covering bass, mid, and tweeter frequencies use several capacitors, inductors, and resistors within relatively complex network configurations to best match the electrical requirements of each driver. A properly designed first-order Butterworth crossover network will permit a loudspeaker with time-aligned drivers (drivers whose voice coils are equidistant from the preferred listening location—typically 10 feet, on-axis) to most accurately reproduce complex musical waveforms with the least amount of waveform or time distortion.

### Dynamic Range

The dynamic range of a loudspeaker is the highest sound pressure level (SPL) the

loudspeaker can produce “above the noise floor,” expressed in dB. The highest SPL that a loudspeaker can reproduce is limited by a given level of non-linear distortion, or before one of the voice coils begins to over-heat. The noise floor is set either by the noise of the electronic system, or the noise of the surrounding environment (such as the dishwasher in the other room, the HVAC, the passing truck, etc.)

Limited dynamic range, typified by a compression of amplitude above a relatively low listening level, is usually associated with the production of high levels of non-linear distortion (harmonic and IM). At frequencies above 300 Hz, harmonic and IM distortion levels above about 0.5 percent can usually be heard by most audiophiles. It is usually most easily heard at SPLs greater than about 80 to 90 dB.

Today’s advanced loudspeaker design technology provides the capability for designing and manufacturing loudspeakers that can reach short-duration peak SPL levels of 105 to 110 dB without generating audibly bothersome levels of non-linear distortion—dependent, of course, upon the type of music being heard, the “deadness” of the listening room, the properties of the power-amplifier, etc.

## Input Impedance

Impedance is the combination of the resistive and reactive components of a load, i.e., loudspeaker load. Impedance versus frequency plots describe whether a loudspeaker represents an easy or a difficult “load” for an amplifier to drive. Many loudspeaker designers pay little attention to the impedance excursions of their loudspeakers, assuming that most of today’s solid-state amplifiers exhibit sufficient stability and low internal output impedance to eliminate any interface problems. But many present-day loudspeakers exhibit an impedance curve that swings from as little as 1 ohms to as much as 30 ohms (or greater) over the audio spectrum. Such fluctuations can create serious interface problems with many amplifiers (especially with tube amps with a fairly high internal output impedance), resulting in typical deviations in system frequency response of  $\pm 2$  to 6 dB and/or generation of audible non-linear distortion. To provide an “easy impedance load” for most amplifiers, a loudspeaker’s impedance should be mostly resistive and should fall within the range of 3 to 10 ohms.

## Listening Room Considerations

The acoustical properties of the listening

room and the location of the loudspeakers within it, relative to the primary listening position, can significantly alter the sound of even the most accurate loudspeakers. Thus, it is important to devote a reasonable amount of time assessing the best location for the loudspeakers and the primary listening chair within the room.

The room should not have too many or too few reflections—neither being good for best listening. Also, symmetry of loudspeaker location within the room and with respect to the primary listening chair can help preserve the original imaging of the recording. Doors and windows should preferably also be in symmetrical locations, relative to the loudspeakers if at all possible. Loudspeaker placement, like in real estate, is all location, location, location. ■

About John Dunlavy

John Dunlavy, MAES, FIREE, etc., is a well-known and highly-respected engineer and scientist with a number of patents to his credit, and 40 years at the forefront of audio innovation. John’s special interest is loudspeaker accuracy, a notion he’s been working on and talking about for decades. Agree or disagree with him, we can all learn something valuable about the world of audio reproduction, sitting at John’s knee. That’s why I’ve invited him to pen this Guest Editorial column for the next several months to provide us all a “short course” in acoustics and audio reproduction. I’m looking forward to it, as I look forward (as always) to your comments.

Gary Reber, Editor-In-Chief, *Widescreen Review*

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from an article in  
*Widescreen Review*,  
Issue 59.



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already have access, so check it out!

## The Return Of Rear Projection Blue Ocean® Projection Screens

Nick Johnston

*Editor's Note: The following article was written by Nick Johnston, Reseller Accounts Manager for Blue Ocean® Projection Screens, on the advantages of rear projection with Blue Ocean screens. For more on Blue Ocean, as well as 10 other home projection screen manufacturers (and a buyer's guide of the screens available in the marketplace), look at Issue 119, April 2007, of Widescreen Review, which is now shipping to newsstands and subscriber mailboxes.*

As technology advances and equipment prices drop, people are beginning to bring the box office experience into their homes. For years, the home theatre market has been dominated by front-projection systems that are simple in design and use existing space. However, this setup is plagued with many problems, including:

- It requires a room that must be nearly completely dark, making other activities very difficult.
- The fully exposed projector can be unsightly, produce heat, and have a fan system that produces audible noise.
- The light path from the projector is easily obstructed by someone walking around the room.
- The screen surface is easily soiled, damaged, and difficult to maintain.
- A narrow view cone creates only a few "sweet" seats.

Despite all of the shortcomings of the system, front projection has been the favorite simply because it is the easiest. But why should you sacrifice all of the advancements in optical technology and resolution, when they can be enjoyed on a rear-projection system that may not be as difficult to create as it seems?

Blue Ocean® Rear Projection Screens not only help eliminate the weaknesses mentioned above, but they can offer remarkable optical transmission, resolution, and color fidelity in a full-bodied "dimensional" image. Blue Ocean is different from earlier generation rear-projection screens, because it allows for the use of short-throw lenses while minimizing aberration, hot spotting, and distortion. Another advantage is that there is no visible matrix in Blue Ocean, so it has no resolution limitation, meaning that it can be used with today's standard 1920 x 1080

resolution, and, better yet, will be suited for all higher resolution standards of the future.

The actual space required for designing a stunning rear-projection display is not as significant as once thought. With good planning and proper equipment selection, a space-efficient rear-projection setup is very attainable. U.S. Nippura Inc., distributors of Blue Ocean Rear Projection screens, has recently created a home theatre showroom and outdoor theatre area, in a residential two-story garage with a dedicated theatre upstairs, which can serve as a reference on how to design a space-friendly home theatre.

### Planning

The first step is to find a suitable A/V integrator in your area who can provide advice on the latest in audio, video, automation, and smooth low-voltage wiring. U.S. Nippura chose one of their trusted Blue Ocean resellers, Playback Audio & Video Creations of Charlotte, to provide advice and to handle the installation. A/V integrators can offer the most up-to-date knowledge and experience on seamlessly incorporating A/V requirements into the construction schedule. Many people make the mistake of not including the A/V integrator early enough in the planning process, and they run into obstacles later on. Together, you can determine the best room designs for your needs.

The size and layout of the theatre will greatly depend on the size of the screen, because a larger screen requires a greater distance to the seating area and to the projector. In this case, U.S. Nippura has chosen to use a 100-inch 16:9 (1.78:1) Blue Ocean Rear Projection Screen (87 x 49 inches).

### Room Size

Popular formulas state that the distance between the screen and the viewer needs to be 1.5 times the width of the screen. This can serve as a starting point for the seating and can be adjusted for optimal viewing.



Figure 1

The main goal is to make sure the audience cannot see or detect the pixel structure of the projector. With a 100-inch screen and a base high-definition resolution of 1366 x 768 on a DLP projector, U.S. Nippura set the optimum viewing between 12 and 14 feet for our showroom. But as resolution increases, such as with the new 1080p projectors, seating distances could drop as low as eight feet. Although higher resolution allows viewers to sit closer without detecting pixels, seating width and view angles to the screen need to be kept in consideration. U.S. Nippura settled on designing a room that has the flexibility of optics, layout, and future adjustment for upcoming improvements in digital resolution.

One of the most common questions is, "How much distance do I need behind the screen for the projector?" The answer to this question is going to depend on the size of the screen and the lens to be used. To determine your throw distance (the required distance from the screen to the lens), you simply multiply the throw ratio of your lens by the width of the screen. U.S. Nippura has chosen to use a short-throw lens that has a throw ratio of 0.747:1. So to find the required throw distance: 87 inches x .747 = 65-inch throw distance.

It is very important to remember that the throw distance only measures from the back of the screen to the front of the lens. So to determine the total distance required behind the screen, you must add the length of the projector and lens to the throw distance. The projector and lens that U.S. Nippura are using is about 28 inches long, so they need a total of 93 inches behind the



Figure 2

screen for the projector to properly fill the screen.

There are several ways to reduce that distance even more. Some projector manufacturers have shorter throw lenses, such as 0.64:1. The space occupied by the projector can be eliminated (Figure 1) or up to a 35 percent reduction in space (Figure 2) can be achieved by just having your A/V integrator add a first surface mirror mount and fold the projection path.

U.S. Nippura simply placed the projector 65 inches directly behind the screen with a straight throw, as it is well within our plans for the surrounding spaces. The dedicated projection room also houses the critical A/V equipment and accomplishes the goal of total containment of sound, vibration, light, and heat. The walls and ceiling are finished from top to bottom in ultra-flat black to create the sharpest blacks and greatest contrast. The room is a great benefit because it allows for fine control of temperature and humidity, perfect for the client who wants to take good care of their electronics investment.

U.S. Nippura utilized the floor space in front of the projection equipment as a storage space for three carpeted seating risers (82 x 48 x 8—LHW in inches). These risers are placed behind the main theatre sectional sofa for elevated seating for bigger parties. All control of the equipment is from a Crestron® remote graphic controller in the theatre room. U.S. Nippura designed a removable media console cabinet in the adjacent multi-purpose room, which allows connection of the equipment to the clean power supply of the control room, while at the same time preventing any need to access the projection room. They also maximized space on the opposite side by neatly tucking the toilet alcove in toward the projector to create more privacy.

Since Blue Ocean screens work almost as well in a fully lit room as they do in a completely darkened room, U.S. Nippura made the space relatively larger than most dedicated home theatre rooms, with an expansive 22.5- x 21.5-foot footprint. The room is cozy enough for just the family and spacious enough to invite the whole neighborhood over for a boisterous Super Bowl party. Because Blue Ocean works so well in lit conditions, there is a lot of additional

functionality that you can incorporate into the room—in our case we chose to add a bar area.

## Layout

Location of the screen in the wall is influenced most by the type of loudspeakers chosen to surround the screen. To make it simple, your A/V integrator can assist you with the best audio layout for your room. U.S. Nippura decided on a 7.1 surround sound system using Triad InWall loudspeakers. Ideal screen placement is at the viewer's eye level when sitting. On the screen wall, we have a left and right loudspeaker, center loudspeaker, and subwoofer. The opening for the screen was made 31 inches from the floor.

## Framing And Infrastructure

Once the size and layout of the room has been determined, the framing can be built (Figure 3). U.S. Nippura used typical 2 x 4 construction with doubled 2 x 8s as headers. Your A/V integrator will be able to make sure the framing coincides with all loudspeaker, wiring, and cable requirements.

As soon as the framework has been completed, the location of all of the electrical outlets, loudspeakers, and equipment need to be finalized so that cables and low-voltage wiring can be installed before the insulation is installed and inspected. It is imperative to make sure you have enough electrical outlets in the necessary locations to avoid any unsightly extension cords later. At this point, Playback AV ran HDMI™ (High-Definition Multimedia Interface) cables needed to connect all of the components to the projector. They also installed the loudspeaker mounting brackets in the designated locations and ran speaker wire to them from the projector room where the receiver will be. Playback also ran HDMI cables to four extra outlets around the room, so that projectors can easily be installed when we add more screens for demonstration. It is important to know what equipment you will be using and where it will go early in the process, so that you don't have to go back later to feed cables through a maze of drywall, insulation, and 2 x 4s. Once all of the electrical wiring and cabling has been finished, insulation and then the drywall can be installed.

## Adding Your Personal Touch

Blank walls are a great place to add your personal touch, whether it's with a fresh coat of paint or designer wallpaper. U.S. Nippura decided on a design after visiting the Venetian Hotel And Casino in Las



Figure 3

Vegas. A blue sky scattered with wispy clouds was painted on the vaulted ceiling, and the walls were painted with a faux finish to resemble a stone wall. White crown molding serves as a divider between the two and also contains pink, purple, and orange rope lights that simulate a sunset on the ceiling. Fiber optics dots the night sky ceiling with sparkling stars. U.S. Nippura also added a wet bar, fridge, and small kitchenette at the back of the room to fully compliment any hosting situation. They limited the use of hardwood floors to the room entrance and just under the bar and stools, and covered the rest with a deep shag carpet to help mask audio reflections in the room.

## Finishing Touches

After all of the painting and carpet is completed, the screen, projector, components, and loudspeakers can be installed. The Blue Ocean projection screen has two mounting flanges that secure to the header via 3/8-inch threaded rods, and the screen sits slightly atop the sill plate stud. The screen can be hung flush with the drywall surface, or (as U.S. Nippura did in this project) it can be set to protrude 1/2-inch from the wall so that the groove of the artistic frame (Figure 4) hugs along the screen perimeter, achieving 99.9 percent image space on the screen surface. The decorative frame, or trim, around the screen must be at least 2.5 inches wide to cover the mount transition. Playback A/V installed a B&K Components receiver, DirecTV receiver, DVR, Triad amplifiers, and UPS system into a 45-inch equipment rack directly



Figure 4



Figure 5

below the projector. Then they installed the Samsung BD-P1000 Blu-ray Disc player and Toshiba HD-XA1 HD DVD player in a media console cabinet in the adjacent room, so that they can be accessed without disturbing the projection room. Once they installed and connected the loudspeakers, Playback AV calibrated the system to optimum optical and audio performance levels. Then they programmed all of the components and projector into a control system so that they can be navigated at the touch of a button on the Crestron touchpanel remote. The remote also has environmental adjustments for the lighting in which different lighting schemes can be programmed for movies, parties, etc. that can be changed with just one button.

## Outdoor Theatre

As outdoor living spaces blossom into luxurious retreats for entertainment and

relaxation that resemble resorts rather than porches, it seems only fitting to be able to create an outdoor theatre that lives up to these standards. To demonstrate the versatility of Blue Ocean screens, U.S. Nippura has installed a 72-inch 16:9 screen in the exterior wall of the first story so that it can be viewed outside on the back deck (Figure 5).

By design, Blue Ocean Rear Projection screens are perfectly suited for unique applications such as this, because the diffusion particles are finely cast into the center of optical cell cast acrylic. This is the same acrylic that is used in the largest aquariums around the world, as well as fighter jet canopies, so it acts as a perfect barrier to the elements. Normal wear-and-tear scratching have no long-term effects on the screen's performance, and a 10-year-old screen simply re-polished will literally look and perform exactly as it did the day it left the factory. And since the innovative, proprietary Blue Ocean diffusion particles do not restrict resolution, the screen will not be rendered obsolete after only a few years, but will fully utilize and enhance all upcoming advancements in high-definition viewing. Blue Ocean Rear Projection screens can even be custom fabricated to hold back the entire depth of a swimming pool, to be used as a wall under water, allowing you to swim laps alongside your high-definition dolphin companions.

Installing a screen in this type of application is as simple as designing a window opening in a new home, or adding a window in an existing home, and actually

proves to have many advantages. The screen location allows for the projector and any other components to be safely installed inside the garage where they are protected from the weather. In this case, U.S. Nippura suspended the projector from the ceiling and connected it to the components in the projector room with HDMI cables that had been dropped through the floor. The location of the screen also makes it possible to utilize existing space for the projector placement. The functionality of the garage is in no way compromised by this setup, because both cars can be parked in the garage without obstructing the projector.

U.S. Nippura recommends installing shutters or doors over an outdoor screen to avoid damage from high winds and projectiles. They took it a step further by installing an automatic air-piston-lifting door in front of the screen. When the door is closed, the screen is hidden and protected, but then it lifts open to reveal the screen and four loudspeakers.

The entire system can easily be navigated from the comfort of your favorite patio chair with a waterproof Crestron remote control. Now you can savor every high-definition moment while enjoying a cool summer evening with loved ones or when having the friends over for a barbecue while you cheer on your favorite football team. **WSR**

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# The Essential Home Theatre Resource™ Widescreen Review®

# The Studio Scoop

Rumors, Reports & Ramblings

Jack Kelley

## Buena Vista

Disney has hit pay dirt with *Wild Hogs*. Opening the weekend of March 2, 2007, it grossed \$39.7 million, which is double what box-office forecasters had predicted. (How does one get a job doing that?) The film stars Tim Allen, John Travolta, Martin Lawrence, and William H. Macy as mid-life-crisis bikers. Tim Cogshell of *Boxoffice*, who rated this PG-13 flick with just two stars, describes the film as "just silly...silly things immediately begin to happen that often involve poop, falling off their motorcycles, and more poop." Hmm, for some reason, I'm not too anxious to view this title. Call me a Party Pooper.

## DreamWorks

Just in case you were not at ShoWest in Las Vegas from March 12th through the 15th Chris Miller and Raman Hui were honored as directors at the closing-night ceremony. Chris and Raman who? Not to worry, I have the answer. These guys are the co-directors for the yet-to-be-released *Shrek 3* (or *Shrek The Third*) to be released by Paramount Pictures on May 18, 2007. However, you may better know Miller as the voice of Kowalski The Penguin in *Madagascar*. Speaking of penguins, *Happy Feet* makes its DVD and BD debut on March 27, 2007.

## HBO

Fresh off his Oscar® win for direction in *The Departed*, Martin Scorsese, along with fellow *Departed* member Mark Wahlberg, has teamed up with HBO to bring you *Boardwalk*. This dramatic series, based on the book *Boardwalk Empire: The Birth, High Times, and Corruption of Atlantic City* by Nelson Johnson, will tell the tale of the development of Atlantic City. No, Martin will not be directing, but rather serving as executive producer. Man, how would you like to be the director of *Boardwalk*? You'd always be looking over your shoulder to make sure Mr. Scorsese was nodding in agreement with your decisions.

## Lionsgate

If you're a closeted *Little House On The Prairie* fan, I come bearing good news. Lionsgate will distribute all 208 (seems like there were hundreds, if not thousands, more) Ma and Pa Ingall episodes. So grab a box of tissues, and hunker down for over 9,000 minutes of full-frame family fun. That Nellie Olsen was a meanie.

## Paramount

Paramount has confirmed that J.J. Abrams (*M:I III*) will direct the next *Star Trek* film. And already rumors are flying about casting...Matt Damon, Adrien Brody, and Gary Sinise in the roles of Captain James T. Kirk, Mr. Spock, and Dr. McCoy, respectively. And also James McAvoy as Enterprise engineer, Scotty. And he sounds like the most logical, already having the accent.

## Sony Pictures

Looks like Tobey Maguire may just leave us hanging out on the web after *Spider-Man 3*, which is scheduled for its United States theatrical release on May 4, 2007. According to IMDB, the Spidey star, along with costar Kirsten Dunst, is hanging up his latex suit for good. "To me it seems like this is a natural point for the team to break up because we have a lot of story conclusions that were going along for the main characters for the first two movies, and we kind of tie almost everything up for the third movie. It feels like a trilogy to me, and it feels like the end," he said. And this just in, according to *The Hollywood Reporter*, *Spider-Man 3* will premiere in Japan on May 1, 2007...three days before its U.S. release! What the... So, for all of you Spidanatics out there, I did a little research. For \$975, you can get there. You will leave San Diego on April 29, 2007, at 6:20 a.m. and arrive in Tokyo, Japan on April 30, 2007, at approximately 3:05 p.m. Long two days. Your return flight is much better, leaving Japan at 4:00 p.m. on May 2, 2007, and arriving into San Diego at 12:45 p.m. the same day. You are on your own for hotel accommodations, not to mention the flight to San Diego...

## 20th Century Fox

M. Night Shyamalan has found a new home at Fox after parting ways with Warner Bros., which distributed his last film, *Lady In The Water*. His new project, *The Happening*, will mark, according to *Variety*, his first R-rated feature, and have an estimated budget of \$57 million, which is about \$18 million less than his previous budget, and \$15 million less than *Lady* brought in. Now, I am not much of a gambler, but it looks like the people at Fox are.

## United Artists

Grab your checkbooks. It has been reported that Tom Cruise is very close to raising the capital needed to resurrect United Artists, a studio founded 86 years ago by Charlie Chaplin, D.W. Griffith, Mary Pickford, and Douglas Fairbanks. According to the *Los Angeles Times*, Cruise, along with partner Paula Wagner, has raised \$500 million. It was also reported that there is already a film in the works. *Lions For Lambs*, which will star Cruise and Meryl Streep, will be a political drama directed by Robert Redford and have a budget of \$35 million.

## Universal Pictures

Following in the (cha-ching) footsteps of DreamWorks' *Dreamgirls*, Universal is bringing *Mama Mia* to the big screen. According to reports, former 007 Agent, Pierce Brosnan, is in final negotiations, along with Amanda Seyfried (Who? Karen from *Mean Girls*. Who? Don't worry about it.) to star alongside Meryl Streep (she's a busy one). The musical features 22 ABBA songs, including "Dancing Queen" and "Take a Chance on Me." No release date has been announced.

## Warner Bros.

Attention Harry Potter fans. Daniel Radcliffe has signed on to reprise his role in the last two installments of the series, *Harry Potter And The Half-Blood Prince*, which has a guesstimated U.S. theatrical date of November 21, 2008, and *Harry Potter And The Deathly Hallows* (TBA). There had been concerns and speculations that he may not be able to resume the role of Harry Potter after performing in the London play *Equus*—a story about a boy and some horses—in which he appears naked. But only for a mere ten minutes, and with solid reviews. **WSR**

*Contrary to popular opinion, Research/Production Editor Jack Kelley is not responsible for any release date changes, price changes, or any other perceived errors contained within. He can be reached at jack@widescreenreview.com.*