Home Theater: From Good to Great

As technology advances and equipment prices drop, people are beginning to bring the box office experience into their homes. For years, the home theater 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 totally dark so other activities are very difficult
- the fully exposed projector is unsightly, produces heat, and has a fan system that produces an annoying hum or buzz
- the light path from the projector is easily obstructed by someone walking around the room
- the screen surface is easily soiled, damaged, and very difficult to maintain
- it produces a 2 dimensional, flat image
- narrow view cone: creating only few sweet seats
- it doesn't really leverage all the optical potential that today's HD projectors are capable of

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 is not as difficult to create as it seems.

First off, Blue Ocean® Rear Projection Screens eliminate all of the weaknesses of front projection, but above all, they offer the absolute best in optical transmission, resolution, and color fidelity in a full bodied dimensional image. Blue Ocean® is also different than earlier generation rear projection screens because they allow the use of short throw lenses without aberration, hotspots, or 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 HD 720-1080 resolution, and better yet will be perfectly 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 because with good planning and proper equipment selection, a space-efficient rear projection setup is very attainable and all of the downfalls of front

projection can be avoided. U.S. Nippura Inc., distributors of the famed Blue Ocean® Rear Projection Screens, has recently created a home theater showroom and outdoor theater area, in a residential 2-story garage with a dedicated theater upstairs, which can serve as a reference on how to design a space-friendly home theater.

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. US Nippura chose one of their trusted Blue Ocean® resellers, Playback Audio & Video Creations of Charlotte, to provide advice on and handle the installation of the latest in audio, automation, and smooth low voltage wiring. 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 theater will greatly depend on the size of the screen because a larger screen requires a greater distance to the seating and to the projector. In this case, US Nippura has chosen to use a 100" 16:9 Blue Ocean® Rear Projection Screen (87" x 49").

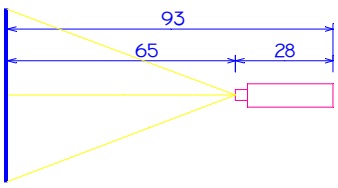
Room Size

Popular formulas state that the distance between the screen and the viewer needs to be either 1.5 times the *diagonal* of the screen or 1.5 times the *width*. Either of these can serve as a starting point for the seating, and can be adjusted for optimal viewing. The main goal is to make sure the audience can not see or detect the pixel structure of the projector. With a 100" screen and a base HD resolution of 1366 x 768 on a DLP projector, US Nippura set the optimum viewing between 12 and 14 feet for our showroom. But as resolution increases, such as with the new 1080 projectors, seating distances could drop as low as 8 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. US Nippura settled on designing a room that has the flexibility of optics, layout, and future adjustment for upcoming improvements in digital resolution.

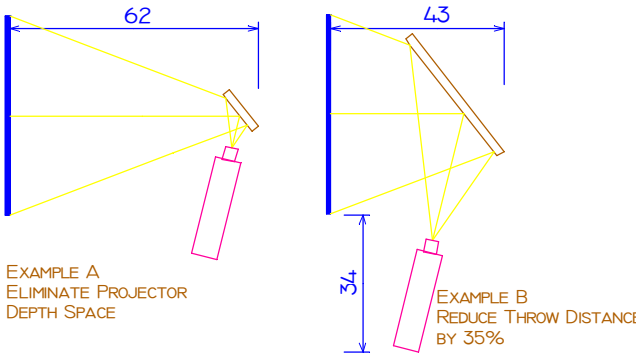
One of the most common questions is, "How much distance do I need behind the screen for the projector?" The answer to this question is going to depend on the size of the screen and the lens to be used. To determine your throw distance (the required distance from the screen to the lens) you simply multiply the throw ratio of your lens by the width of the screen. US 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" x .747 = 65" 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 US Nippura are using is about 28" long so they need a total of 93" behind the screen for the projector to properly fill the screen.



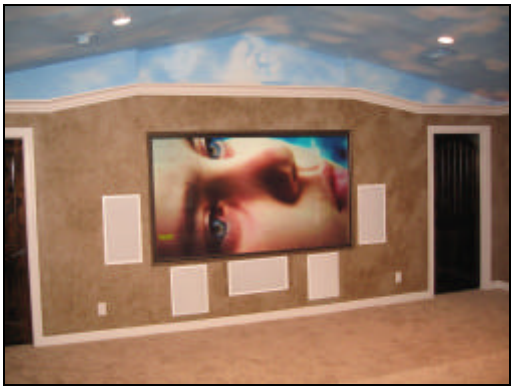
There are several ways to reduce that distance even more. Some projector manufactures have shorter throw lenses, such as 0.64:1 that will reduce the throw distance. The space occupied by the projector can be eliminated (Ex A) or up to a 35% reduction in space (Ex B) can be achieved by just having your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



US Nippura simply placed the projector 65" 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 AV 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.

US Nippura utilized the floor space in front of the projection equipment as a storage space for three carpeted seating risers (82L"x 48W"x 8H"). These risers are placed behind the main theater sectional sofa for elevated seating for bigger parties. All control of the equipment is from a Crestron remote graphic controller in the theater room. US 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 towards the projector to create more privacy.

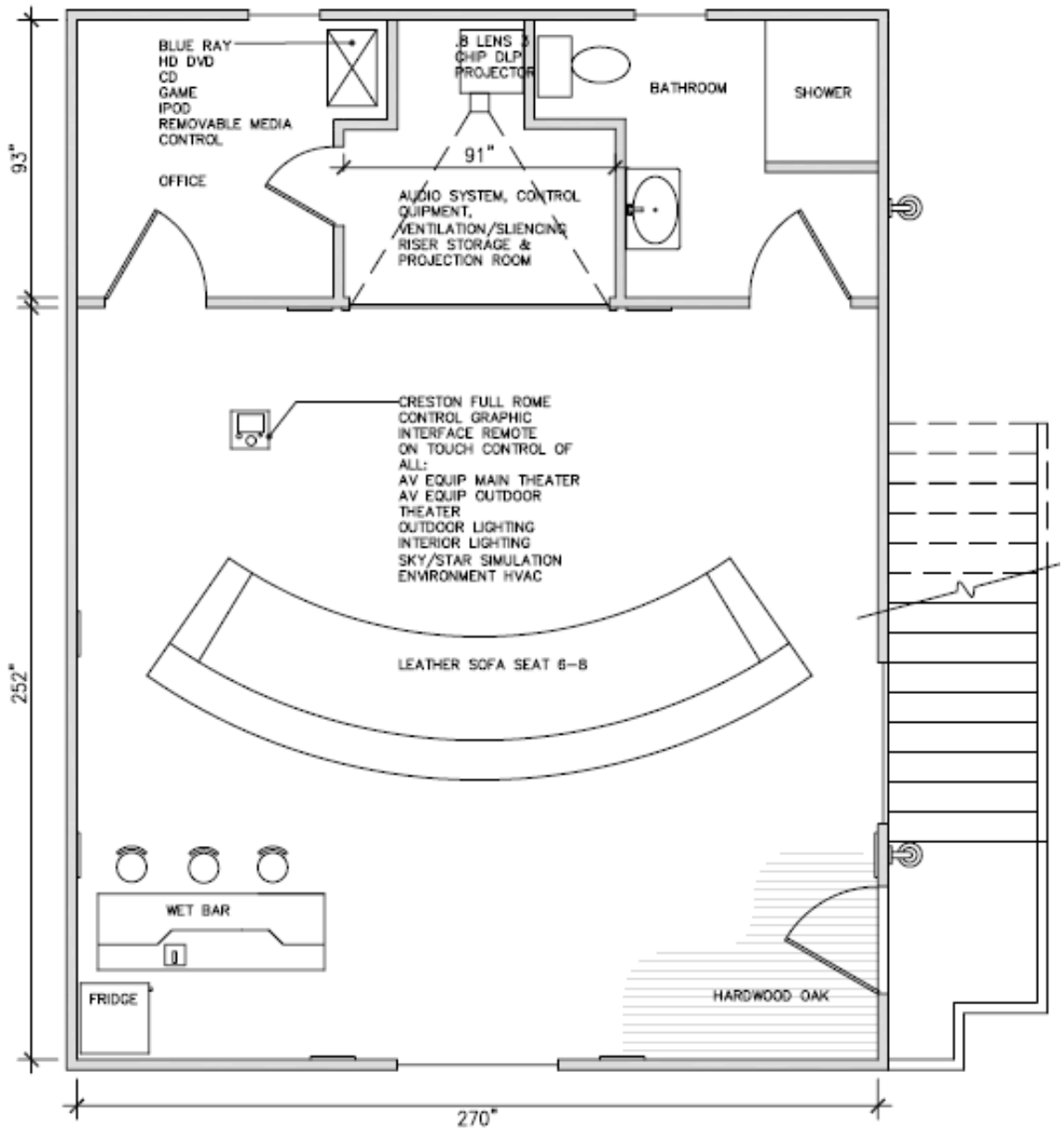
Dimly lit



Totally Lit

Since Blue Ocean® works almost as well in a fully lit room as it does in a completely darkened room; US Nippura made the space relatively larger than most dedicated home theater rooms, with an expansive 22'-6" x 21'-6" foot print. The room is cozy enough for just the family and spacious enough to invite the whole neighborhood over for a boisterous Super Bowl party. Keep in mind that 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.



FLOOR PLAN

SCALE:1/4"=1'-0"

Layout

Location of the screen in the wall is influenced most by the type of speakers chosen to surround the screen. To make it simple, your AV integrator can assist you with the best audio layout for your room. US Nippura decided on a 7.2 surround sound system using Triad InWall speakers. Ideal screen placement is at the viewer's eye level when sitting. On the screen wall, we have a left and right speaker, center speaker, subwoofer, and then a faux subwoofer for a visual balance. Given that the subwoofers (with speaker screen) are 20.5" tall and the decorative screen frame is 3 ½" wide, the opening for the screen was made 31" from the floor. Notice that the speakers are arranged very close to the screen to give the effect that the audio is emanating from the image.

Framing & Infrastructure

Once the size and layout of the rooms has been determined, the framing can be built. US Nippura used typical 2x4 construction with doubled 2x8s as headers. You're A/V integrator will be able to make sure the framing coincides with all speaker, wiring, and cable requirements.

As soon as the framework has been completed, the location of all of the electrical outlets, speakers, 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 speaker 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 2x4's. 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 a fresh coat of paint or designer wall paper. U.S. Nippura decided on a design after visiting the Venetian Hotel Casino in Las 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 dot the night sky ceiling with sparkling stars. US Nippura also added a wet bar, fridge & 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 & stools, and covered the rest with a deep shag carpet to optimize the acoustics of the room.

Finishing Touches

After all of the painting and carpet is completed, the screen, projector, components, and speakers can be installed. The Blue Ocean® projection screen has two mounting flanges that secure to the header via 3/8" threaded rods and the screen sits slightly atop the sill plate stud. The screen can be hung flush with the drywall surface, or (as US Nippura did in this project) it can be set to protrude 1/2" from the wall so that the groove of the artistic frame hugs along the screen perimeter, and we achieve 99.9% image space on the screen surface. The decorative frame or trim around the screen must be at least 2.5" wide to cover the mount transition. Playback A/V installed the B&K Components receiver, Direct TV receiver, DVR, Triad amps, and UPS system into a 45" equipment rack directly below the projector. Then they installed the Samsung Blu-ray Disc™ player and Toshiba 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 speakers, Playback 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 even be programmed for movies, parties, etc. that can be changed with just one button.

Outdoor Theater

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 theater that lives up to these standards. How else can you create a one-of-a-kind outdoor theater that promises to be the envy of the neighborhood than to use one of the most remarkable products to hit the A/V industry in several years, the Blue Ocean® Rear Projection Screen? And to demonstrate the versatility of the screens, US Nippura, has installed a 72" 16:9 screen in the exterior wall of the first story so that it can be viewed outside on the back deck.

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 has 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 like most other media technologies, 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, allowing you to swim laps alongside your high definition dolphin companions.

The screens are not only a superior outdoor A/V product, but they actually act as a very suitable building material. The thickness of the screen (23mm or .89") gives it an r-value of about 5.5 which is a better insulator than double paned windows that have an r-value of about 2 and even energy-efficient windows that reach about 4.5.

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, US 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 either because both cars can be parked in the garage without obstructing the projector.

US 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 4 speakers.

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 def moment while enjoying a cool summer evening with loved ones or having the friends over for a barbecue while you cheer on your football team.