
The Importance of Professional Design and Planning for Home Theaters

**The room you build
will have a far greater impact on sound and video quality
than any other single component
you can buy or install.**

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You are about to embark on a new adventure and enjoy the excitement provided by a cinema in your home. This investment in family entertainment should result in many hours of enjoyment with your family, friends and close associates. Much like any other major investment in your home, such as adding a swimming pool, you want to extract the maximum value such an addition can supply.

Much like a swimming pool or tennis court, a home cinema is a significant investment that can return the same level of enjoyment. Unlike swimming pools, however, those who sell and install home theaters are not required to be licensed, accredited, trained or credentialed professionals. Yet, many home theaters can require an investment equal to or larger than a swimming pool!

It will come as a surprise to many that a home cinema is a bigger, more complex engineering challenge than that swimming pool. Everything that goes into that room will have an impact on both sound and video quality. Everything ... from the colors of finishes, right down to the location and type of air conditioning registers. Surprised? Don't feel alone.

When you install a swimming pool your contractor must deal with many engineering aspects of the installation from material choices, soil stability, plumbing, drainage, filtering, heating and others. A home theater requires similar attention to detail. This includes room size, room ratios, throw distance, screen brightness, projector location, finishes, lighting, seating, HVAC capacity, and even the method of framing and applying drywall. All of these items can affect usability, image quality and acoustics.

It is not uncommon to see photographs of home theaters that look attractive with the lights on. But when the lights go down and the movie begins the illusion ends. In many cases the cost difference between a nice home theater and a truly outstanding

theater is insignificant in the overall scheme of things.

There is one more analogy that should be made before we go on and that analogy is to chocolate. Recall your first experience with chocolate. It was great! It tasted good, it gave pleasure and you enjoyed the experience. As you went through life, you continued to enjoy chocolate and couldn't imagine how it could possibly get better. Then one day someone attempted to explain how much better it could be. You just didn't get it. Eventually, you spent the extra 50 cents and tried a piece of imported Belgium chocolate. After that everything that had preceded the experience was not as good as you thought. While someone may have attempted to explain the difference, they couldn't – it was something you had to experience to understand. The same holds true with home cinemas. Until you experience a properly designed, calibrated and set up theater, you cannot possibly contemplate the improvement in the experience.

I recall a home owner who was showing off his new “store bought” home theater. He and his family enjoyed it. It was great. After a few moments in the room, I took the liberty of moving the center channel speaker a couple of inches forward. He was shocked. Dialog he thought you weren't supposed to understand became clear, crisp and understandable.

So what's the purpose of this document? Plainly it is to encourage you to proceed with the adventure; but, in the process, to engage experienced, credentialed professional advice throughout the entire project. We are enthusiastic evangelists of home cinemas. At the end of the day, we are less interested in who gets your business than we are in the final result. We want the project done right. We don't want the owner to be happy, we want the owner to be enthusiastically overwhelmed with the experience. At the same time, we want throw caution into the formula. Just because the pictures of previous work looks nice and just because

someone calls themselves a “Home Theater Designer” doesn’t mean they are.

In the following paragraphs, we want to talk about some of the many issues and myths that need to be considered in your project. We want to convince you this is more than five speakers and a TV set. We want to provide you with information that may assist you in finding the appropriate professional, explain how this professional would work with your architect and/or interior designer, and, finally, provide you with some examples of the level of detail you should be getting from your home theater contractor. In the end, if that level of attention to detail is not present, look elsewhere.

The Room as a Component

We treat the room as the basic, if not primary, component of your system. Traditionally, speakers, electronics, screens and projectors are looked upon as the components in your ‘system’. When purchasing individual components, considerable research, listening, shopping, and viewing occurs before a purchase decision is reached. Comparisons made, opinions sought.

We view the room, the room design if you will, as not only the single most important component of your system, but also the most ignored and overlooked. It, more than any other item you can purchase, will have the largest single effect on sound and video quality. 80% of the sound you hear, is not coming from your “awesome” speakers ... it’s coming from the walls, floor and ceiling!

Spending considerable sums on cables, upgraded amplifiers, and new electronics will have a less marked affect on sound quality than spending the same amount on proper room design.

Sound & Acoustics

There are a couple key issues we’re concerned about with room acoustics: (1) sound transmission in and out of the room; and (2) sound reproduction quality in the room.

Sound Transmission. From the homeowner’s perspective, the desire is to eliminate the transmission of sound from the theater venue into the remainder of the residence. From the theater designer’s perspective, the focus is preventing sounds outside the theater from entering the room.

Neither of these objectives is mutually exclusive. The reality of the situation, however, is you cannot completely eliminate sound transmission without extraordinary efforts and, in most cases, significant costs. So it becomes a balancing act. Another point, which needs to be made, is those things that affect sound transmission have little effect on room acoustics and vice versa. Just because you have succeeded in isolating the room, does not mean you have good acoustics in the room.

None-the-less, considerable strides can be made in room isolation if the theater designer becomes involved in the project *before* framing is started – most certainly before sheet rock or dry wall is applied. Common means to reduce sound transmission included staggered framing, double sheet rock, mechanical isolation and damping materials. But these techniques alone will not totally solve the matter, and, indeed, could all be for naught if there is no attention to the details. Details such as caulking, sealing electrical outlets and attention to things such as the HVAC system. As a general concept, if the room is tight, you can solve the problems of sound flanking, but this is not the total solution.

Some designers will suggest the use of a product called resilient channel. While this can provide a means of sound isolation, if used under the wrong circumstance, it will also kill bass response in the

room. The use of resilient channel may help smooth out bass response; but there's no way to accurately predict its impact...and that impact can be positive or negative. More problematic is it's affect on the room cannot be predicted (including the wall's resonance frequency) and, if one guesses wrong, the only solution is to rebuild the wall. A poor choice at best. Even with the sheet rock, the devil is in the details. Sheet rock must be "screwed and glued" to framing members. Why? Rattles! In the end, there are far, far better ways to smooth out bass response in a predictable manner with materials and constructs that will already be in your well engineered room.

Why are we concerned about noise from outside the theater? It has to do with the "noise floor". Imagine our swimming pool. If the pool is empty, you can be at the lowest level of the pool and still have plenty of air. As the pool begins to fill, you must position yourself higher and higher in the pool. In a theater, as noise begins to 'fill' the room, you must turn up the volume more and more in order to hear the dialog. Further, low level sounds from outside the room can drown out, or hide, low volume sounds from the film, create a loss of audible clues and make the dialog difficult to understand.

Intelligibility

See if you've ever found yourself in this situation. When someone in the movie begins to whisper, you turn up the volume to hear what is being said. Later, when the train wrecks, tornado hits, or the T-Rex runs, you're running to turn the volume down. Been there? Done that? That's a result of bad sound isolation, bad acoustics or both. In a properly calibrated theater, you should never need to "touch the dial".

The softest sound recorded in a movie or music sound track is 22dB. The average ambient noise floor in a quiet residential home will be in the area

of 33dB to 35dB. In order to hear the entire dynamics of the sound track, you have to overcome the noise floor, so you turn up the volume. Surprise ... dB's aren't linear! Going from 22dB to 25dB is a doubling of "loudness". It also requires a doubling of amplifier output. From 25dB to 28dB, another doubling. From 28dB to 31dB, another doubling. On average, you have an 8 times increase in amplifier output and sound level to overcome the ambient noise in a typical residential room. At the quietest level of sound track that is a non-issue; but, normal voices are also now 8 times louder, the loud sound effects are also 8 times louder. Actually, they likely are not simply because neither your speakers or amplifiers can handle that load.

We want to make your rooms very quiet. We want them quiet so you can enjoy a movie without constantly fiddling with the volume control or being blown out of the room because it is just too loud for comfort.

Room Acoustics. Here is where the real challenge begins. You can put some incredibly expensive, high-end speakers in any given room and they'll sound horrible. Conversely, you can install moderate priced speakers in a properly treated room, and have them sound delightful. *The single most important component in the sound reproduction chain is the room itself!* It is not the speakers, the amplifier, sound processor, or \$10,000 exotic speaker cables that make the difference. It's the room. Sadly, it is not uncommon to see someone put \$16,000 speakers in a room and fail to spend \$3,000 to treat the room acoustics. Ever heard this line: "If you upgrade to these really awesome speakers, your room will sound better?" Nonsense! By far the majority of sound you hear in your room doesn't come directly from speakers. It comes from the room. Bad room, bad sound, and new speakers or equipment won't fix that.

The acoustic needs of a home cinema are significantly different than the needs of a two speaker stereo system. Indeed, the acoustic needs

for any multi-channel playback (music or cinema) are significantly different than the requirements for two channel systems. The reverberation time (called RT60) must be significantly less. Further, where you want reverberation and no not want reverberation is also different.

The primary objective in a home cinema is to reproduce the sound of the movie as the director wanted the sound heard by the audience. When the movie was made, and the sound mix completed, it was assembled based upon the acoustics typical of a large room or theater – one much larger than the typical home theater venue. The smaller the room, the greater the impact of the room on sound quality. More than 90% of all movies are mixed within one of 12 standard, identical sounding, sound stages.

The affect of room modes can be controlled. In order to do so, attention must be made to frequency absorption, reverberation (remember RT60?), dispersion, diffusion, speaker placement and seating placement. And, yes, you will require some form of equalization. The moment you hear “equalization is not needed”, it’s time to find a different designer. And, no, you cannot, absolutely cannot, equalize a room by ear.

But there is need for caution here. You cannot approach your room design and seating placements from a room mode spreadsheet. These spreadsheets are interesting tools but present several serious problems. First, a “good” seating position and a “bad” seating position can be separated by as little as 6”...not really practical in real life. Second, the spreadsheets can determine where a room mode will occur, but cannot speak to its amplitude. You may be attempting to solve an inaudible problem! Third, the spreadsheets assume a perfectly rectangular room with 100% reflective boundaries. Clearly, not reality. Our rooms have soffits, bulkheads, prosceniums, columns, raised platforms and stages. Fourth, it is our belief these programs focus undue attention on one of many, many factors affecting acoustic performance. Concerns including speaker

boundary interference response (SBIR) and right tri-corner effects can be far more damaging to your room’s acoustics. There are six areas that must be achieved with room acoustics: (1) dialog clarity; (2) front sound stage focus at all angles; (3) diffuse surround sound field; (4) smooth and wide frequency response; (5) wide dynamic range; and (6) no bad seats.

Proper treatment of the room for acoustics does not mean the interior designer and theater designer will be at odds. It may mean compromise but you also don’t need to have tall round columns of bass traps in the corners, funny looking beanbags in the corners and strange things hanging from your ceiling either.

In a real life example of compromise, George Lucas (yes, *that* George Lucas) wanted wood paneling below the chair rail in one of his screening rooms. These nice looking, very reflective surfaces would be exactly where you do not want reflective surfaces. With a ranch full of acoustic experts, George not his wood panels, and the acoustics of the room were preserved. It was a compromise, but everyone was happy. If you were to look closely at the way the panels were installed, you’d see where the acoustic engineers had their way.

THX™ or not THX™?

Before we answer that question, we must understand what THX is and what THX is not. The short answer? THX is tantamount to the Good Housekeeping Seal of Approval and Consumer’s Reports Check Rated products. It is indeed much more than that, but there’s a quick, simple start.

THX is not a surround format, it is not an amplifier, or a product you can purchase. It is a set of specifications, including quality control requirements, designed to assure the consumer the product they’re buying is suitable to the purpose intended.

The THX saga commenced when George Lucas tasked his engineers to establish a series of standards that would assure the movie going public that they would hear, feel and see a movie exactly as the director desired. Thus, a director could feel confident the effect he wished to convey was indeed conveyed from theater to theater.

Later in the evolutionary process, the challenge became how to convey that same experience in the smaller room's characteristic of a home theater. After considerable research, trial and error, a series of standards were developed for speakers, amplifiers, sound processors, and related equipment to achieve that goal. Lucas engineers didn't only focus on the minimal performance requirements, but as well on the ergonomics of certain components. In the case of receivers, surround processors, and pre-amplifiers, these specifications translated into a requirement to provide the ability to properly adjust equipment for phase, seating location, speaker size, and the like.

In the case of speakers, the THX specifications not only require proper frequency response and the capability to accurately reproduce the sound track (at appropriate volumes), but also addressed vertical dispersion (horizontal and vertical for professional speakers), lobbing, tonal quality between speakers and off axis response.

Now this does not mean that non-THX equipment is of lesser quality or capability. There indeed are some wonderful speakers and electronics that are not THX on the market. But here's what it does mean. In short, it means the designer knows in advance exactly how speakers will perform and that the electronics contain the means to tailor the system to the environment. That facilitates placement and design. Without it, the design becomes more difficult to implement.

Should a non-THX speaker system be used, it means the designer must know exactly, on all planes, how a speaker will perform in order to

properly place that speaker in the room. And, if you, the customer are not an expert in electronics and speaker design, it is your assurance the equipment will reproduce the sound track accurately.

By the way, speakers don't have a clue that the sound is coming from a movie or a symphony. THX speakers are to accurately reproduce the sound and that holds true for music as well as film. So why the debate? It gets back to the room. The acoustic requirements of a room are entirely different for multi-channel sound (music and film) than for two channel stereo reproduction.

Speaker Placement

We agree that speakers are not like children – they should be heard and not seen. That is not always possible but it is certainly a design goal. But beyond that, and even armed with THX speakers, the placement of the speakers is critical to the attainment of accurate sound reproduction. They cannot be too close together or too far apart.

Depending upon the speaker, one must be concerned with boundary effects, cabinet resonance (when built into a cabinet or theater proscenium), and side wall reflections. The most difficult speakers to place: the center channel and sub-woofer(s).

The sub-woofer is most affected by room modal response. Conversely, room modal response is most affected by the positioning of the subwoofer(s). When your designer is involved at the start of the project, the proper placement of the sub-woofer(s) can be accurately calculated. The bigger the room the bigger the sub-woofer required. Once you get into multiple sub-woofers, the design becomes a greater challenge. On the other hand, for an experienced acoustics engineer, the use of multiple subwoofers is a significant tool available to smooth out room base response.

Now back to the center channel. The minute your designer places the center channel speaker below the screen, find another designer. That's not where it belongs. This is not a joke, we're not kidding. If that's where your professional thinks the center channel belongs, you're dealing with someone more interested in selling you "stuff", not in sound quality. The absolute best location for the center channel speaker is behind the screen! When the lips move, that's exactly where the sound comes from. Now your brain does an excellent job in processing sounds to make you "think" sound is coming from a place it is not; but, that is fatiguing and subtracts from your enjoyment of what should be a relaxing environment.

While behind the screen is an ideal location for the center channel, there are indeed cases where that is not physically possible. Where's the second best location? Above the screen.

All speakers should be in direct line of sight from every seat. If they are not, you are not getting the direct sound from the speakers. If you are not getting the direct sound, you are losing spatial cues and dialog intelligibility. Equally important is the difference in distance from each speaker to each seating location (first time you've heard that?). The logarithmic nature of sound pressure decay over distance basically says you can have very significant seat to seat differences in sound pressure level. Something a true professional designer will approach in the design process. Hopefully, by now you're getting the idea this is all a matter of physics.

The problem with achieving correct speaker placement is not placing the speakers during the initial design phase. The problems occur when the designer becomes involved in the process at too late a stage. If the walls are up, the wire run, the cabinets are in place and the designer comes on the scene, the only recourse is to tear down walls, cabinets and other structure members. If you're spending \$30,000 or \$100,000 on your theater, you

want it to sound like a million bucks, not like \$5,000. The only choice is to tear away.

Lights, Projectors & Screens

Room Lighting. As in any special purpose room, attention should be paid to the lighting design. In the case of the home cinema, control of the lights becomes equally important. After all, you want the lights to dim when the movie starts without getting out of your chair. The most commonly used lighting control device used in home theater applications is Lutron's Grafik Eye. This device provides the various lighting 'scenes' needed in a theater and can be easily integrated with theater control systems from Crestron, AMX and others.

Where the theater designer needs to be involved is in the decision process of which lights should remain on, or dimmed, during the movie presentation. One common mistake is the use of tube lights in lighting coves and stairs. Why? Well, these lights emit a very yellow light. The side effect is often green flesh tones on the screen.

The lighting color is very important. In a properly calibrated theater, you've spent \$500 to \$1000 to have a trained Imaging Sciences Foundation (ISF) member carefully color calibrate your projector. (If you were present when this was done, you'll recall the calibration was done with *all* the lights off in room.) The front projection screen reflects all light, not just the light from the projector. So, if lights are on in the room, the color of those lights will affect the color fidelity of the picture on the screen and reduce the picture's contrast ratio.

In most theaters, some lights remain on during the movie presentation. Here again, you must be careful. Incandescent bulbs change color as they dim. One solution to this problem is to use D65 fluorescent lights. D65 tubes are 6500K in color. Yes, you can dim fluorescent lights when dimming ballasts are installed. Another choice is side

emitting fiber optic lights. If you must use incandescent fixtures, your designer can install theatrical filters to correct the color.

The intensity of the lights left on during the presentation also have an effect on picture quality. When you are in your theater, turn off all the lights, close the doors, curtains, drapes, what have you. What you see is the blackest black you can achieve on the screen. Now raise some of the lights to a low level. This is now the blackest black you can achieve.

There's one other aspect to room lights, more particularly the lighting fixtures themselves, which is often overlooked until too late. Rattles! Many lighting fixtures and sconces have parts that fit together rather loosely. If care is not exercised in the selection of the lighting fixtures, you could be introducing very distracting rattles into the room.

Remember the sound isolation discussion? Basically, you're building an aquarium ... a sealed room. So now, after all that work and effort, you're going to poke holes in the walls and ceilings for lighting fixtures? If you poke a hole in the side of your aquarium, the water is on its way out. There's a right way and many wrong ways to installed lighting fixtures, sconces, and electrical outlets to code, without adverse impact on your sound isolation efforts.

Care should be exercised in the selection of wall finishes and colors. White walls have no place in a home theater! White will reflect light from the projector and will make it almost impossible to properly calibrate your picture. As the scene in a movie gets lighter, more light is reflected off the white walls on to the screen, washing out the picture. Shiny reflective surfaces are also problematic. Not only do they have an unfortunate affect on room acoustics, I, for one, want to see only one copy of my movie. I don't want to see it reflected off the surface of the bookcase or in the glass frames over my collection of movie posters.

The point, really, is that care must be taken in the lighting design of the room. The type of care you need, is the type that can only come from an individual trained and experienced in theater applications.

Room Finishes. We've already discussed wall treatments for acoustics; but, the colors used in your room can have adverse effects on picture quality. When you turn off all the lights and fire up the projector, you can see the walls, floor and the ceiling. You can see these items because the light being reflected from the screen is illuminating the room. The light from the screen (and the projector) is bouncing off room surfaces and being reflected to your eyes. More to the point, this reflected light is also being bounced back to the screen! The reflected light is decreasing the contrast ratio on the screen and washing out the picture.

In this scenario, can you also see that the walls are red (or blue, or yellow)? If you can see those colors, so can your screen! This reflected light is not only reducing picture contrast, it's also affecting color balance.

None of us are particularly attracted to a solid black or gray room. On the other hand, care must be taken in the selection of colors, fabrics and room finishes so you don't diminish the value of all you've spent on electronics, screens and projectors.

Screens. There are several manufactures and sources of screens. These include DaLite, Draper and Stewart. There are also a lot of screens on the market whose heritage is unknown. Screen quality has a direct and marked effect upon the resultant picture quality. When you start cutting the budget, the screen isn't necessarily the place to begin. Using a \$300 OEM, brand X screen for a \$40,000 projector, is rather like putting \$10 tires on a \$60,000 Mercedes-Benz. Why spend all that money on the quality ride, performance and reliability of the Mercedes just to ruin the ride,

performance, and perhaps reliability using cheap tires?

Each screen material has its own attributes with respect to gain, reflectance and color shift. A competent and experienced professional can match the screen to the requirements of the room, its use and the projector.

Screen size is also a vexing problem. We all are tempted to buy the largest screen that will possibly fit on the wall. What is the ideal screen size? Several studies have been conducted on this issue. The studies have attempted to get the viewer close enough to the screen that part of the action takes place in the viewer's peripheral vision – adding to the sense of involvement in the film. At the same time, as you get closer to the screen you can see more of the defects in the picture. Defects such as line structure and film grain. For film, the consensus is a subtended angle in the area of 40 degrees. In other words, the angle created between your seating position and each edge of the screen would be 40 degrees. For a 92" wide screen, this would put your seating position at about 10-1/2 feet. For a line tripled and quadrupled picture, this would be about right. For a standard NTSC television picture, that's way too close. You couldn't see the picture for the line structure. In today's world of high definition source material, and high resolution projectors, we can sit closer to the screen and obtain a more immersive experience. None-the-less, too close is still unpleasant.

As screen size increases, the amount of light necessary to properly "light" the screen also increases...and increases dramatically. This comes from two areas. First, as the total square inches of screen area increases, the total light output necessary to light the screen increases. That's pretty intuitive. But that's not the end of the issue. The second comes from the throw distance of the projector. Most projectors must be located a fixed distance from the screen. This distance is a function of screen size. Thus, as the size of the screen

increases, the projector must be moved further from the screen in order to project the picture on the entire screen. At some point, even with a high quality zoom lens, the projector may not work in your room.

The relationship between screen size and the budget is a close one indeed. It can be real tempting to satisfy a customer's desire for a larger screen letting the result on picture quality be damned.

Projectors. Projectors come in all sizes and flavors running from just a few thousand dollars to well over \$100,000.00. There are "three gun", or CRT projectors, LED projectors, DLP projectors and even "light canons". What is appropriate in your application is entirely dependent upon screen size, ambient light conditions, and desired picture quality. There's no rule of thumb here except to say there is a direct relationship between cost and *potential* picture quality.

Why potential quality? Simply put, it's very easy to make a \$50,000 projector produce a \$10,000 picture. It takes 4 to 8 hours of work by a skilled and experienced technician to make a \$50,000 projector produce a \$50,000 picture. You don't want the Chevy mechanic working on your Ferrari, do you?

There are several manufacturers of projectors suitable for home cinema use. The leaders in this area include Runco, Digital Projection Systems, JVC, SIM2 and others. Be careful about what you hear on the street. While some manufacturers purchase their chassis from other suppliers, the resultant product isn't the same.

Today, the price of a projector is a very good indicator of its quality and suitability. If the specifications between two projectors look the same, yet one is \$3000 less than the other, there really is, somewhere, \$3000 difference in the projector. It could be in the electronics, the

convergence mechanisms, or even in the quality of the optics.

Don't be fooled by price or swayed by a sales pitch. You want quality and quality is something you must pay for – it's never given away.

What to look for in a Designer

There are no answers here because there are not pat, formula answers in cinema design. But there are things to look for in selecting someone to design and install your home theater.

THX. You may not want a THX cinema, but you do want a THX Level II certified individual. Even if you don't believe in THX, an individual with THX certification has an understanding of theater and room acoustics, understands the acoustic challenges and, perhaps, how to avoid them. But, more to the point, the individual cares enough about his craft to have taken the time, effort and money to acquire professional training.

ISF. An individual certified by the Imaging Sciences Foundation has taken course and practical work to fully understand projector and television calibration and set up. They understand the issues of "beam spot size", color temperature, contrast, geometry and all those other issues which go into getting a \$50,000 picture from a \$50,000 projector. But again, ISF certification is a measure of the individual's desire to fully understand his craft. You have to seriously question one's commitment to craft if they claim years and years of experience and no professional training.

CEDIA. The Custom Electronic Design and Installation Association recognizes organizations who have subscribed to a code of ethics, maintained professional standing in the industry, and have requisite experience and insurance to delivery quality results. In addition, we've been participating with CEDIA in the development of a

certification process for "Home Theater Designer". Seek out individuals with this certification.

Home Acoustics Alliance. HAA is the ISF of audio. This organization provides training in small room acoustics and proper acoustic calibration for home theaters.

Other professional memberships or certifications which are appropriate include the Society of Motion Picture and Television Engineers (SMPTE), The Cinema Audio Society (CAS), Acoustical Society of America (ASA), and the Institute of Electronics and Electrical Engineers (IEEE).

As important as the above, are the work products the designer will provide. If the designer simply points to where speakers should go, gives you a list of components and then returns to install the equipment, you don't have a designer, you have an equipment salesman. The professional designer will insist upon being a part of the project team from concept through completion. The work product would include floor plans, framing plans, HVAC requirements, electrical requirements, acoustical analysis and design, and direct involvement in design decisions as to fabrics, colors, finishes and lighting.

The Budget

Whether or not your intended budget is very large, or just modest, that budget is to be respected. A professional designer is well positioned to map your objectives against your budget and provide guidance where the objectives and budget don't align. One of the real secrets of proper budgeting has little to do with budget amount. It's all in budget allocation. You want to spend your first dollars on those things which are either very expensive or impossible to change later and your last dollars on items easily upgraded later. Speakers, surround processors and projectors can easily be upgraded. Rebuilding your room is not an

inexpensive prospect. On the bright side, it is the room that will make the biggest single contribution to sound quality, picture quality and your long term enjoyment of the space.

The Point Of It All

This is not your father's stereo system. It's a complex organism, if you will, requiring the integration of acoustics, design, electronic systems and visual effects. It is you who is making a significant investment into an entertainment venue that can provide years of immense satisfaction.

Building a home cinema is not a simple process and you shouldn't be fooled into thinking it so. Building that Mercedes was not a simple process either; but, you left the design and engineering up to the professionals at the factory...not to the salesman at the dealership. As complex and complicated as it may be, working closely with a professional will enhance the results, protect your investment and greatly simplify the entire process. More than anything, a proper home cinema is an engineered space. What makes it work, or not work, is all physics. It is not philosophy, magic pixie dust, nor outrageously expensive electronics.

And, a final word about price. We all want a bargain and you can always find someone to sell something cheaper. But, if it's the same product from a different dealer you must remember the dealers all pay the same price. So if they reduce their price something's got to give somewhere else. That somewhere else is always quality and service.

Finally, *enjoy your home theater!*

About the Author:

Mr. Erskine is a member of the Society of Motion Picture and Television Engineers, THX Level II Certified, Imaging Sciences Foundation Trained, a member of the Audio Engineering Society, and the Institute of Electronics and Electrical Engineers (Consumer Electronics and Computer Societies). Mr. Erskine is a Subject Matter Expert for CEDIA in their certification process for Home Theater Designers. He is an instructor for the Home Acoustics Alliance training dealers and enthusiasts in small room acoustics. He has been credited with the development of several new technologies. He can be reached by email at dennis@erskine-group.com.