**Thasmai Automation: Home Theatre Almanac**

## HTA 1- Home Theatre Display Options: Projectors

The most visible aspect of your Home Theatre is the mode of display. What you opt to use your Home Theatre for determines the display; if you plan to connect your DTH or watch regular television you could use Plasma or LED TVs, whereas if you opt to watch movies, you are better served using a projection system and a screen. In a dark setting of your theatre, a projector/screen is known to offer more immersive experience with the largest screen dimensions.

**Size**: The largest HDTVs/LED TVs are about 50-90" in dimensions, whereas the screen output for a regular projector can be 120-180", an image almost 3 times as big as your HD television offers. Ultimately, you want the largest possible viewing image for your dream theatre, and a projector trumps all other options here.

**Cost**: For comparable dimensions, HDTVs are usually much more expensive than a projector/Screen combo. Since a projector can be moved to any room you want to view your content, it saves you the cost of purchasing multiple TVs for more than one room

**Space & Aesthetics:** A projector can be mounted on a small table, or from the ceiling where it can be retreated when required. The screen can also be fixed, curved or retractable (foldable) so you can opt to keep both these invisible when you want the room for other events. The Projector/Screen can also be shifted to other rooms/outside for special events or parties. A TV on the other hand is bulky, and not easily movable once installed in a room.

**Clarity:** Projectors offer big screen imaging, with excellent picture quality (measured in high resolution and high contrast ratios) which TVs cannot match at similar price points.

In the next articles, we will attempt to explain what you should look for while buying a projection system.

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## HTA 2- What should you consider when buying a Projection screen

Isn't your screen is just a flat surface? Why spend money on something as basic as a screen when a cloth or a blank wall will do just fine? The answer is No & No!

The screen is usually made of material that is designed to reflect light back to you, whereas a wall has imperfect finish and a rugged coarseness, which although not easily visible to the naked eye can scatter the light all over the room and destroys the image quality and contrast. Also, it is not adept at dealing with Hot spotting (the term for a bright light to be shown on some parts and noticeably lesser light on other parts of the surface), side angle viewing or off axis viewing (where the display is not at an angle to facilitate best visual performance).

Now that we've decided that buying a screen makes sense, let's look at the fine details that make up your dream home theatre experience.

**Fixed or Retractable**: Fixed screens offer a better surface for viewing, in addition to being slightly less expensive and easier to install than retractable screens. Retractable screens (where the screen can roll up when not needed) can offer flexibility to the room for other events or purposes, in addition to being supremely cool (Imagine rolling down 120 inches of screen with your remote control, bet your friends hate you for that!)

**Size & Distance:** A screen size between 90-120" should accommodate most viewing needs, in addition to nicely fitting in normal sized rooms. A wall that is more than 8 feet in height, along with being 10-12 feet wide should be able to house most screens.

Due to the extremely image rich nature of today's content (your 1080P can house over 2 million pixels), it is also important to maintain a minimum distance to the screen to enjoy the picture as a whole. The minimum recommended distance would vary according to the dimensions of the room, the screen size and other factors. Best option is to let a Home theatre expert set this up for you to have the most optimal experience.

**Aspect Ratio:** The aspect ratios (proportion between the width and height) are not standard across media, for example an IMAX format uses 1.43:1, and most cinemas now use 2.40:1, while TV programs stick with 4:3. If you primary intend to watch TV (Sports/Videogames), then we would recommend a 4:3, for movies the default aspect is the 2.40:1.

**Other Things to remember**

- Make sure your screen is acoustically transparent (i.e. the main speakers can be placed behind the screen, like in cinema theatres)
- Most people choose White as the colour of the screen, but if you can also opt for Grey or Black depending on the amount of light present in your room. If you plan a normal room with lot of natural lights, black screens can be better than plain white screens to view pictures.

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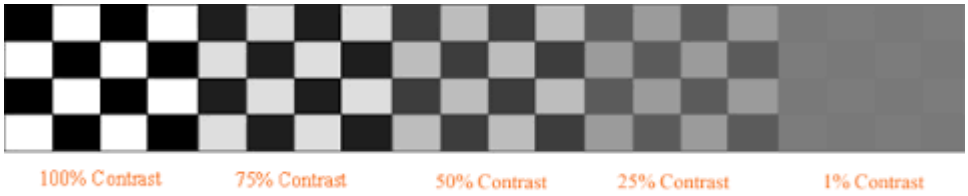
**HTA 3- What should you consider when buying a Projector (Part 1)**

Projectors offer you the best visual option to deliver truly staggering and brilliant picture quality on your screen. On a cost per inch comparison, Projectors offer better cost value and image quality compared to HDTVs. Projectors come in various sizes, and types; and are usually projected on to a screen for best image quality, hence everything within a projector is focussed on creating the sharpest, most detailed picture possible. We list down the factors you need to check while shopping for your dream projector;

**Light Source:** Most projectors available in the market use a technically advanced, ultra high intensity lamp which provides the brightness to project pictures on a screen. Lamp based projectors offer the best quality images and brightness to your pictures. There are also projectors that use solid state technologies (like LED) for folks who prefer portability and decent picture quality but aren't too demanding of the brightness levels.

**Lamp Life:** Projectors use a very high intensity discharge lamp (using mercury, or xenon in expensive models) and replacement lamps cost a fair bit of the cost of the projector itself. Manufacturers measure Lamp life in hours; most will claim 3000-4000 hours to begin with, with some of the newer models going up to 8000-10000 hours too, to make it simple 3000 hours translates to around 1200 movies watched or 3 years of TV/sport watching (assuming daily usage of 3 hours). LED lamps, on the other hand, can claim a usage life of about 20,000 hours.

**Contrast Ratio:** The contrast ratio can be defined as the ratio of the luminance of the brightest colour to that of the darkest, that the system can produce. Usually, manufacturers explain contrast ratios in ANSI contrast, by displaying a checkerboard of white and black squares to show the contrast between the dark and bright spots.




Contrast ratios are an important metric for Home theatre projectors since you'll mainly be projecting video, and a higher contrast ratio ensures that there is more depth added to the images; the projector is able to show subtler colours and tolerate some level of extraneous light in the room.

**(To be continued in Part 2)**

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**HTA 4- What should you consider when buying a Projector (Part 2)**

Continuing the discussion on projectors from last week, let us analyse what other parameters are vital while choosing a projector for your dream theatre.

**Brightness:** Brightness can be interpreted as the amount of light produced by the projector (measure in ANSI Lumens, which is what all manufacturers will advertise), or as the amount of illumination that you can perceive on your screen (measure in foot-Lamberts, this also takes into account your screen and hence is harder to measure).

Also, the brightness level of the images you project depend on the content itself, the brightness of the room, size of the image and the seating distance from the screen. The size & brightness of the room will determine how many Lumens you should opt for, the larger & brighter the room the higher the Lumens recommended.

**Resolution**: The resolution of a projector is the number of pixels used to display an image, as a general rule, the higher the number of pixels the greater the detail created on the screen thereby leading to a clearer image, and also reducing the visibility of the pixel structure. Today, manufacturers offer a wide range of pixels with multiple resolutions (usually depicted as A X B, where A is the number of pixels on each horizontal row and B is the number of pixels on each vertical column, so 1024 X 768 indicates 1024 pixels on each horizontal row, 768 pixels on each

vertical column). Some of the common resolutions found in the market are **720 P** (1280 X 720 pixels, with P denoting progressive scan, essentially meaning the whole picture is displayed all at once), **1080 P** (1920 X 1080 pixels, currently the top choice to display high quality HD content from Blu-Ray and other formats), and the new buzz in town **4K** (which shows a picture with 4 times the 1080P pixel output, either in 4096x2160 or 3840x2160 pixel formats)

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**HTA 5- Audio & Speakers- Surround Sound & Speaker Channels**

The Audio component of your home theatre accounts for more than 60% of your home theatre experience, and identifying a good set of speakers is highest on the list to complete your dream theatre replete with surround sound. A good speaker system can be expensive (ranging from a couple of lakhs for a mid-level Revel or JBL brand, to more than 10-20 lakhs for high end Synthesis or Ultima series), and it is important for you to know the ins and outs before buying one.

**Surround Sound:** While speakers initially were positioned in the front of the audience (called screen channels; comprising centre, centre-left and centre-right speakers), sound technicians figured that the audience would be treated to a more immersive experience if sound was made to come from a 360 degree radius, thereby surrounding the listener and enriching the sound reproduction quality of the original audio piece. Thus was born **Surround Sound**, which now through many iterations, works well enough to identify the listener location where the audio effect(s) sound the best and feed the sound into the corresponding speaker closest to that sweet spot relative to the listener.

The standard configurations are 5.1, 7.1 and 9.1 systems. The .1 denoted here is the Low frequency effects channel (usually the Subwoofer), meant for low pitched sounds from 3-120 hz. The 5, 7, or 9 refer to the number of speakers & full range channels into which sounds are directed.

- A 5.1 surround system, now considered the basic home standard, comprises 5 speakers and a subwoofer. 3 speakers are placed in the front channel (in the forward arc of the listener's radius), usually a front, left and right speaker. Two surround speakers are placed behind the listener, one to the left and right.
- A 7.1 system, now considered the basic studio standard, comprises 7 speakers and a subwoofer. The front channel has the same 3 speakers, but 2 additional rear speakers are added behind the listeners hearing arc to create a more complete surround sound experience.
- A 9.1 system uses the same surround configuration as a 7.1, but adds left and right height speakers above the left and right front channel speakers.

Newer configurations are being added each day (**11.1** being 9.1 + front width (L,R) speakers , **13.1** being 11.1 with rear height (L,R) speakers), and the latest in this sequence is Dolby Atmos, which supports up to 128 separate audio tracks and up to 64 unique speaker feeds!!

For current Home theatre needs, we feel a 7.1 system performs well enough at a reasonable cost outlay. But if you don't have a budget, then the sky is (literally) the limit!

*To experience for yourself these different speaker configurations in Bangalore itself, do visit our offices in various locations in Bangalore for a free demo. What's more, we'll play a movie/scene of your choice in Blu-Ray or HD (if it's available). If you have any further queries on Home theatres, do write to us and we'll get back to you.*

**HTA 6- Audio & Speakers- Types of speakers**

Technically, all speakers fall under 2 categories; **Passive speakers** (which require separate power amplifier to produce sound) or **Powered speakers** (contain internal power amplifier, and can be connected to a mixer).

Speakers are also categorized based on what frequencies they handle; **Woofer** drivers (called just Woofers or Sub-Woofers, focussing mainly on bass range) handle low frequencies (below 200 Hz), **Mid-range** speakers handle frequencies between 200 to 2000 Hz, and for high frequencies (above 2000 Hz, focussing on Treble range), **Tweeter** drivers are used.

Coming to the different shapes and sizes of speakers available;

- **Floor standing (or Tower)** speakers are the real deal, offering the entire range of audio frequencies. Used typically for the front channel (i.e. Left and Right to the viewer alongside the display), they can be as tall as you (!) and occupy a lot of space in the room. These add to the impressive look and feel of your Home theatre, provide unmatched power and performance, but are usually more expensive than other types of speakers.
- **Book Shelf** speakers can usually fit in a cabinet or shelf, or can be mounted on the wall. While they don't offer the same range of frequencies as Floor standing speakers, they tend to be favoured when the room size is small, or you prefer a more minimalist design to your theatre. They are usually supplemented by a subwoofer to produce bass sounds.
- **Subwoofers** handle the low pitched frequencies range (called bass), and are heavier than bookshelf speakers. They're usually placed on the floor for this reason, but are considered indispensable since most Movies/Video Games or Music tracks have a channel earmarked for deep bass as it gives the sound a more lifelike feel.
- **In-Wall speakers,** as the name suggests, are designed to be 'invisible' by blending in with the walls (the speaker can be installed in-wall) and out of sight, thereby saving valuable floor space, and more importantly refining the aesthetics of your room. Specs wise, they're similar to book shelf speakers, but are typically used as the surround speakers in the system,

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**HTA 7- Audio & Speakers- Placement of speakers in the room**

The arrangement of speakers in your Home theatre follows a fairly simple configuration

**Main Speakers (Front Channel):** The Speakers placed in the forward arc of your hearing tend to carry most of the weight since a major portion of the dialogues/sounds recorded tend to be made for this channel. The front channel considers the **Centre, Left** and **Right** speakers (along with the **sub-woofer**). The **centre** speaker is usually placed below the screen, or behind the screen itself to give you the impression that the sound is coming straight from the screen (Fun Trivia: Did you know

that in commercial theatres, the centre, front and right speakers are all placed behind the screen, which is why the audience in the front rows sometimes get a headache from the heavy sound).

The **Left and Right** speakers are usually the work horses of your home theatre, and it's recommended to have full range floor standing speakers to provide a powerful auditory experience.

The **sub-woofer** is usually placed on the floor (as it's a heavy unit) and handles Low frequency sounds (Bass). It is usually recommended to shift all the bass to the woofer, lending lesser load to the other speakers.

Home theatres also have the option to Centre focus instead of surround sound, which will have the effect of all sounds coming from the screen, you can opt this mode for older recordings or 'music only' content.

**Surround Speakers:** These speakers usually are towards the back of the viewer's arc, adding another dimension to your hearing experience. Depending on whether you opt for 5.1, 7.1 or 9.1 (or further), the number of surrounding speakers will vary. Newer formats, such as Dolby Atmos which have upto 128 simultaneous audio tracks supported, also encourage more speakers on your ceiling (front and back) providing an even more immersive surround sound experience while watching a movie.

**Sound Bars:** While not typically recommended for Home theatres, Sound bars offer reasonably good sound quality from a small, thin, long (wide) enclosure, with multiple speakers arranged within the rectangular space. Sound bars are usually placed below the TV or mounted on the wall below the display.

*To experience how these different speaker look in a typical room, do visit our experience centres in Bangalore for a free demo.*

**HTA 8- The heart of your Home Theatre- The A/V receiver!**

Surprised at the title? Don't be; many people assume the speakers or the projector are the most key component of the home theatre but it is the humble A/V receiver which functions as the heart of your home theatre.


**Not So Simple? The back of a typical A/V receiver available in the market today**

A/V receivers started off with the basic functionality to receive & amplify an audio signal, provide power to the speaker system, and connect the corresponding video signal to a display device such as a projector or a television. As home entertainment options have expanded, so has the role of the A/V receiver, which now house more amplifiers for surround-sound playback, Video switching capabilities from one device to another, video processing, wireless streaming, Bluetooth and a gazillion other things (check the photo if you think we're exaggerating). Some terms you should be familiar with are:

- **Preamplifier** (or **Preamp**) – A/V receivers have a preamplifier section, which lets you select which source you'd like to listen to or watch. The options nowadays are almost limitless; from DTH, radio channels, your smartphone, wi-fi router, entertainment console or gaming device. The preamp section processes incoming audio and video signals from all your different sources, allows you to switch from one source to another, and ready the signal ot be boosted by the Amp.
- **Amplifier (**or **Amp) -** Simply put, an amplifier delivers the power to run your surround speakers. Your A/V receiver contains multiple outputs, each linked to the corresponding speaker unit in your theatre, and the amount of power needed usually depends on the size of the room & the sensitivity of the speakers. Most manufacturers typically compete to provide maximum amplifier power in their products.

*To further know about which A/V receivers to choose, do speak to our experts in any of our experience demo centres in Bangalore. Or write to us at queries@thasmai.com with your questions and we will put our experts on the case!*

**HTA 9- Choosing the best location in your house for your Dream Home theatre**

Choosing which room you want to dedicate for your Dream Theatre can be a decision that involves multiple factors;

**Location**: If you plan on regular usage of the home theatre for movies and loud music, it would be a good idea to plan it in a part of your house away from rooms where you need peace and quiet (say, your bedrooms or office/working area). Although good insulation and acoustics can all but negate

most sounds emanating from the theatre, we still recommend not having common walls between your home theatre and any other room. If you're in the pre-construction stage you could devote a small standalone room in a different floor just for the home theatre, but if you have just one floor don't worry; we can help select the most appropriate room in the space available

**Shape and Size:** The best option for a Home theatre is to have a rectangular room, but if the layout of your room is slightly different (or there are pillars in between or walls jutting out), we can plan the design according to the specs of your room. A space as little as 14 (length) * 8 (width) feet can be sufficient to install a good Home theatre, but if you're going for one anyways, we'd recommend about 20 * 12/14 for a wholesome experience. Lesser the windows in your room, the lower the sound distortion

**Recommended viewing and seating distances:** With a 120 inch display, you need make sure you're optimally seated to ensure you head isn't bobbing sideways (or worse up and down) to catch all the action on the big screen. The optimal viewing angle is estimated at between 30-40 degrees, so all seats/couches in your home theatre need to be contained in these angles. The distance at which the visual experience works best is estimated at 1.5-2 times the diagonal screen width (which is to say that if you have a 96 inch (8 feet) screen, you're recliners or chairs need to be about 12-14 feet away from the screen)

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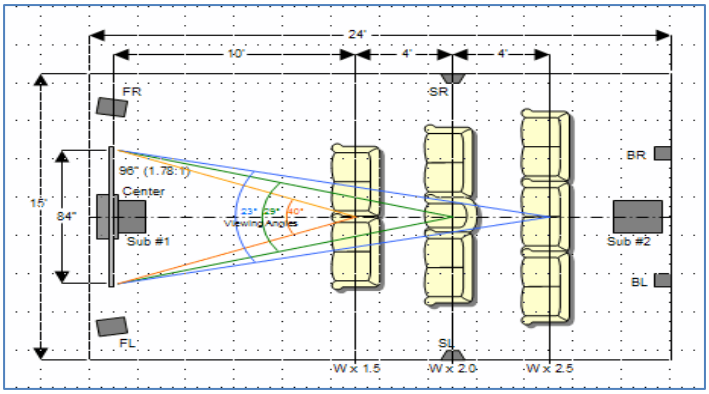
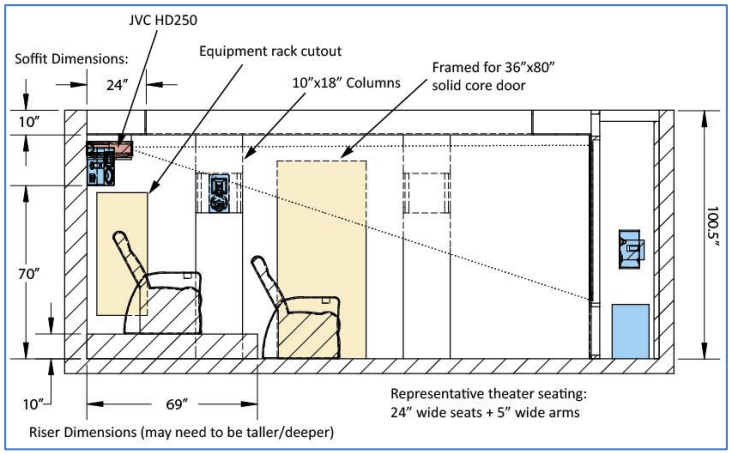
**HTA 10- Stages of my Home theatre's construction**

Below are the Typical Stages of construction of your Home theatre

1. **Deciding on a Theme:** Once the room has been finalized, a contractor can help you with the theme, colour combinations, as well as seating layout for your theatre. The possibilities here are limitless, and you can pretty much choose any combination you want as your final look. You also have to consider acoustic panels; Using patterned fabrics or decorative print material, these panels will add an edge to your theatre's look besides enhancing the audio effect.

2. **Blueprint/Diagrams**: This is the step where your architect or contractor lays out the blueprints for the room specifying the dimensions and specifications for the construction of various elements of your home theatre.




As you can see in the sample plans, every minor aspect has to be included here to ensure perfect execution of the theatre. Some little details you'll want to check at this stage are if you have any special requirements, maybe a custom wood panelling directly into one of your walls, the design proposal has to encompass these aspects.

3. **Wiring/ Panelling (Framing)/ Drywalling:** Once the design is complete, Wiring is completed for all locations (speakers/AV receiver/Projector/Screen), while contractors simultaneously work on the wood panelling (over the concrete walls) or drywall installation and also the multiple layers of flooring (raised seating levels for recliners at the back etc) in the theatre.
4. **Insulation & Acoustics:** The insulation material (to be discussed further in the next article) is now added along with the carpeting, and inspections are made to ensure minimal sound escapes the confines of the theatre, and also that the audio quality is optimal.
5. **Installation of speakers/AV equipment:** All the speakers/Woofers/projectors/other fancy AV equipment you have purchased will now be slotted into their positions and tested.

When is the best time to call a Home theatre expert while constructing your home? Simple Answer: The earlier, the better. Planning for your home theatre during the blueprint stage itself allows you to dedicate a room for the theatre and ensure proper wiring/cabling/wood work/Finishing. However, if you've already ventured partway into construction, then don't fret; we can still re-work on a bare room that has been partially/fully constructed.

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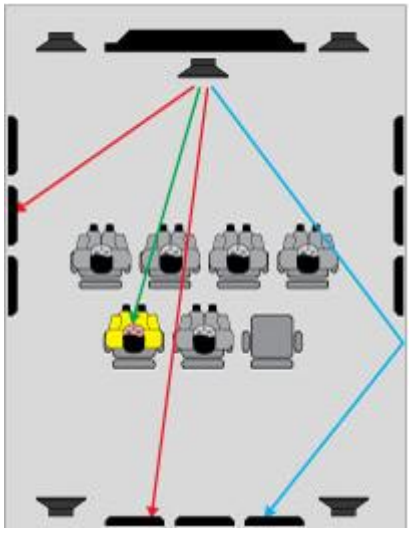
**HTA 10- Acoustics in the Home theatre**

It's time to dispel a commonly held notion; that the most important component of your theatre's auditory experience is the brand of speaker you purchase! While it's true that buying a high performing speaker can greatly enhance your Theatre's audio quality, the sound from the speakers is only a fraction of the overall sound 'effect' in the theatre. The room itself plays a vital role in the final sound you hear from the speakers, this is where you will encounter an important term- **Acoustics.**



**Acoustics** refers to the interaction of sound waves with the room's surfaces, the final sound you hear combines the direct sound that travels straight from the speakers to your ears, and the indirect sound — the sound from your speakers that bounces off the walls, floor, ceiling and other material in the room before finally hitting your ears. All the objects react differently to different frequencies of sound depending on what material they're composed of, and their shapes. Hence, every speaker system will sound different in different room setups. When sound hits a surface, some of it is absorbed, while some part of it is reflected & some is transmitted through the surface itself.

Do not confuse Acoustics with sound proofing, the latter deals with minimal sound loss/shrinkage from the Theatre itself, but Acoustics deals with how to best get optimal sound within the Theatre. Acoustics mainly deal with reducing/eliminating echoes in the room, as well as managing different frequencies to give you the best sound for that room.

Typical Acoustic treatments involve using absorption material like Foam or Wool, and Diffusers, and keeping a balance of smooth surfaces with uneven material/designs to ensure sound travels evenly to all parts of the room, and avoid emphasizing one range of frequency while damping out the others.

In general, the design should have about 50-60% of the surface area - wall, ceiling, and floor area, absorptive, most of these absorptive surfaces should be in the part closer to the screen. The rear end of the room (away from the screen) should contain more reflective surfaces; this helps diffuse the sound from the rear speakers more effectively.

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