Home Automation Guides:

HOME CINEMA

Guide for Owners, Property Developers, Architects and Interior Designers

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2022

INTRODUCTION:

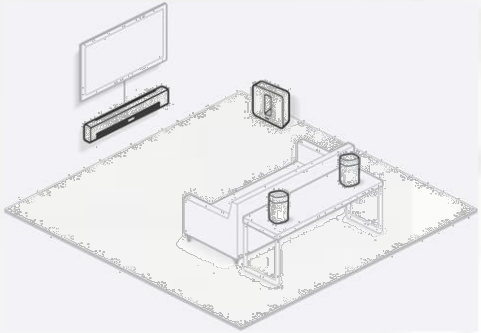
Reason why people invest in Home Cinema solutions

The idea is simple enough: bring the Cinema-like experience to your home. But how exactly would one achieve that goal? A Home Cinema can be as simple as few AV devices in your living room or as complex as a custom designed and acoustically treated room, with the reference grade audio and video gear.

At its core, your Home Cinema system should give you a high-quality video experience and an immersive audio experience that breathe life into your favourite movies.

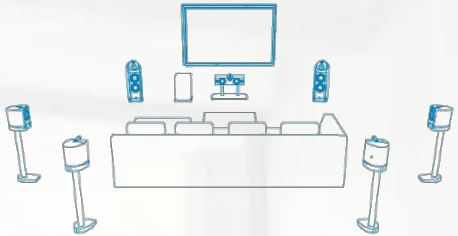
In order to help you make the right decisions when contemplating Home Cinema systems, we will start with defining three categories of AV designs, in terms of their fidelity, power and complexity:

- The Surround Sound System
- The Home Cinema
- The Home Theatre



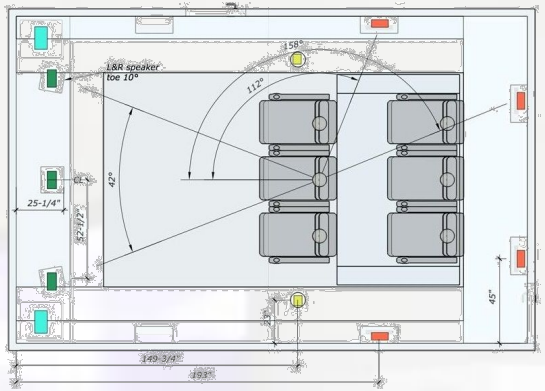
Surround Sound

- Commodity tech that is readily available at retailers;
- Mainly TVs, soundbars and wireless surrounds;
- No room EQ or correction;
- Gives limited representation of the “real thing”.



Home Cinema

- Larger TVs and speakers, usually in 5.1 or 7.1 configuration;
- Placement is for convenience;
- Includes basic levels of Room EQ;
- Does a better job of representation but lacks detailed calibration and standardization.



Home Theatre

- A designed and calibrated system for a dedicated Home Theatre or Media Room;
- Amplifiers and Speakers are chosen to match power requirements for Dolby, DTS or THX standards;
- 4K laser projectors and screens;
- Includes acoustic treatment of the room.

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The Surround Sound System

In some systems, soundbars rely on a single speaker enclosure containing an array of drivers to recreate the same sort of surround sound panning, achieved with separate speakers, by bouncing sounds off the walls and other surfaces within your room. Unfortunately, this doesn't work nearly as well as it is advertised. The problem with depending on reflected sound is that every room is unique. Some are square, some rectangular, and there are also L-shaped ones with a big hole in the wall. Some rooms have high ceilings, whereas others are short with sloping roofs. To make matters worse, if your room is carpeted and furnished with thick curtains and upholstery, it isn't going to allow much sound reflection anyway.

Modern soundbars from Sonos, Denon, Sony and Yamaha have built-in Dolby TrueHD and DTS-HD Master decoding, so external AV receivers are not needed.

While they are sometimes practical, e.g. in retrofit projects, soundbars should never be a replacement for dedicated speakers at the correct angles and reference SPL levels.

The Home Cinema System

Usually a system comprised of a Blu-Ray player or a media server connected to an AVR (audio-video receiver), with a set of 5.1 or 7.1 speakers.

For smaller rooms, bookshelf type speakers are chosen to fit nicely with the furniture layout, while audiophiles usually opt for the bigger, floorstanding main speakers, for extended power, frequency range and bass response.

Larger rooms feature 65” or 77” smart TVs with 7.1 or 7.2 speaker layouts*. Some designs include ultra short throw laser projectors, with screens up to `120” diagonal. The form and convenience take precedence here, so most of the systems suffer from poor alignment and room correction - the user will have to deal with the Room EQ software built into the AVR, which, on more expensive models, can be quite comprehensive. Room acoustic treatment is rarely considered.

At this level of investment into AV, all speakers should be wired to the power amplifiers - the wireless option can create dips in the audio playback, which can spoil the overall home cinema experience.

*Please refer to the “Speaker Layout” slide

The Home Theatre System

In larger properties, a considerable investment is made in turning a spare space into a dedicated family Media Room or a Home Theatre. Attention is made to aesthetics, furnishing, lighting and acoustics. Installation and calibration takes several days but the end result is a phenomenal Cinema experience.

In these types of rooms, a front projection system is installed, together with a multi-channel Dolby Atmos sound setup - both of these systems are meticulously calibrated and adjusted to provide perfect sensory experience.

Powerful speakers - A key part of the cinema experience is high SPLs, requiring the speakers to work consistently at reference playback levels. There are very few driver technologies that have the power handling needed to deliver these sound pressure levels. Most speakers use soft dome tweeters which are not reliable when used in this application. Compression drivers are a suitable technology, as are air motion transformers, some ribbons and planar magnetics. Companies like “Procella Audio”, “Wisdom”, “KEF”, “Monitor Audio”, “Triad”, “B&W”,“PMC”, etc. all have model ranges that satisfy even the most discerning customers.

B&W CT800 Series

KEF Ci5160RL-THX

Procella P610 & P18 subwoofer

Wisdom LS4i Line Source L&R

PMC ci140 Series

Monitor Audio
Platinum Series

Triad InRoom
Platinum series

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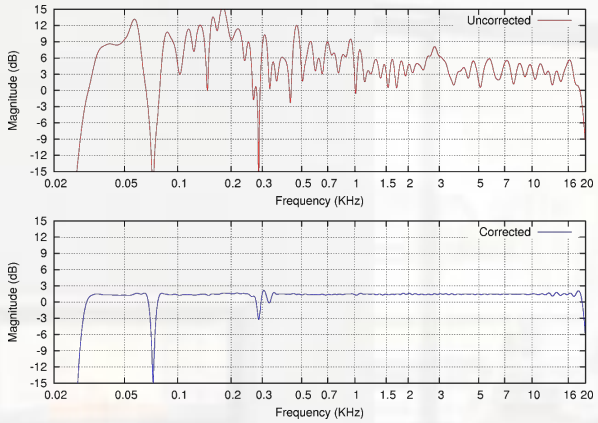
Room correction - “Digital filters, designed to ameliorate unfavorable effects of a room`s acoustics, are applied to the input of a sound systems, providing substantial improvements in the time domain and frequency domain response of the sound reproduction system.” (Wikipedia)



Original (top) and corrected (bottom) frequency response

Room correction processors (Trinnov Altitude, Lexicon MC-10, Lyngdorf “Room Perfect”, etc.) operate in distinct phases:

- Playback of a reference sound and capture of the room's frequency response with a studio grade microphone;
- Creation of correction filters to match the measured response to the targeted one;
- Applying the correction filters to the movie soundtrack.

This calibration process takes place in a fully acoustically treated room, eliminating the effect of reflective surfaces on tonal characteristics.

Trinnov Altitude 32

Lexicon MC-10

Lyngdorf MP50

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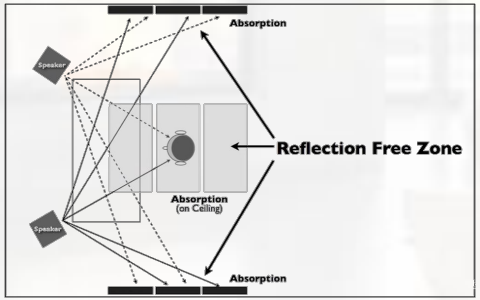
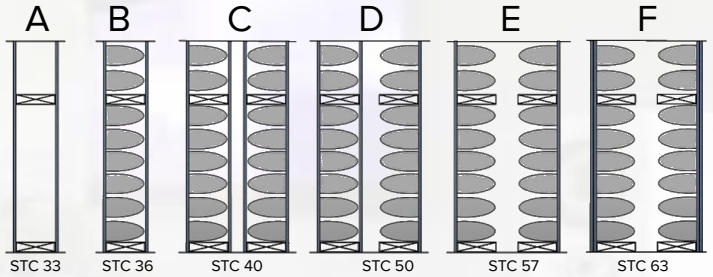
Room acoustics - The primary purpose of acoustic treatment is to prevent echoes within the listening room. Secondary goal is to reduce the sound levels outside of the room, i.e. “soundproofing”.

By strategically placing acoustic absorbers and diffusers in the room, one can achieve tight control of room reflections, reverberation and room modes, which is instrumental in providing the best possible environment for the sound production in the room.

On the other hand, sound isolation can be accomplished by using sound barriers between two adjacent spaces - the level of reduction of sound transmission is measured in STCs (Sound Transmission Class).



By placing acoustic absorbers on side walls and the ceiling, capturing early reflections, we can enhance the intelligibility of the direct sound in the room.



A - Basic stud wall
B - Basic stud wall + fiberglass insulation
C - Double isolated stud wall
D - Remove one inside plasterboard
E - Remove two inside plasterboards
F - Add two outside plasterboards

Lighting - Lighting levels should be just right to create the perfect environment - bright enough to navigate round the room and dim enough to truly enjoy the picture from the cinema projector.

Before

After

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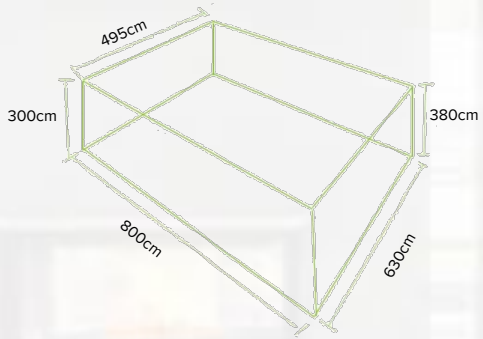
Home Theatre seating - In order to provide real-life cinema experience, most Home Theatres have dedicated seating installed. Inclusion of details like drink-holders and motorized reclining presets give a touch of luxury to home entertainment spaces.

Room sizes

The best shape of the room for the Home Theatre is the “golden trapagon” - this shape removes the room acoustic issues with parallel walls. This in turn reduces the effect of standing waves in the room.



The Golden Trapagon

A trapagon is basically a cuboid with one short side longer than the other. For example, if the screen wall is 6.3m wide by 3.8m high, then the room itself would need to be 8m long. The viewing wall (where you will sit) would then need to be ~5m wide and 3m high.

When designing the room with this shape, you are looking at the 1.272:1 ratio - it essentially funnels the sound in your direction and reduces reverberation and echo.

The next best shape for the cinema room adheres to the Golden Ratio, i.e. the Fibonacci sequence ratio of 1,618:

Height = 0.52 x Width, Length = Width x 1.618

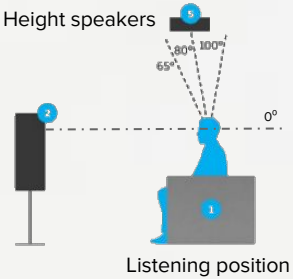
So, for a 2.4 ceiling height, the width of the room should be 4m at the length 6.5m.

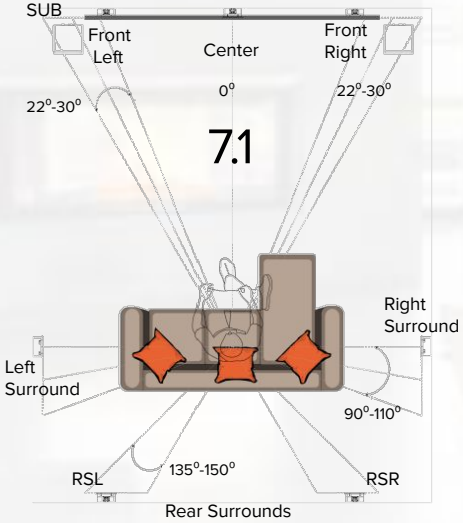
Speaker Layouts

Home Cinema speaker layouts refer to a 5.1, 7.1, 7.2.2, 9.1.4, etc. nomenclature, i.e.

7.2.2

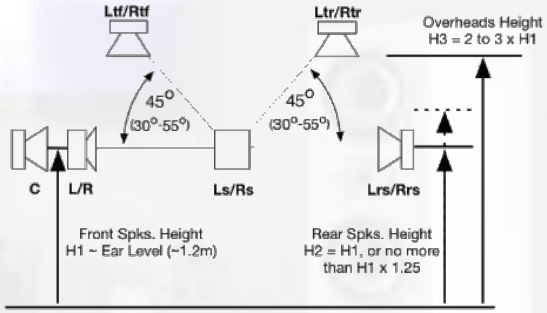
- **7** — Number of traditional surround sound speakers, like Front L&R, Center, Rear, etc.
- **.2** — Number overhead Dolby Atmos speakers enabled in the system.
- **.2** — Number of Subwoofer channels in the system





The speakers located in the front of the room are the reference point and should be at a 22° - 40° horizontal offset from the listening position.

Height of the centre of the front speakers should be at listener ear level – approx. 1.2m



Dolby Atmos speakers height placement

Height speakers should be full range and positioned at 80° from the horizontal axis at the listening position. They should have a wide dispersion characteristic of 45°.

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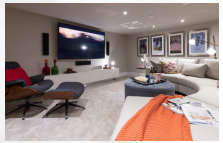
HOME THEATRE ROOM DESIGN PARTNERS:

navas partners directly with the world`s most renowned manufacturers of AV hardware for Home Cinema & Home Theatre rooms, so you can be rest assured your designs will feature the latest developments in the AV industry.





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WHY navas ?

“navas” is an innovation driven AV integrator which combines the latest trends in home automation, audio and video equipment, home cinema and lighting control with years of experience and passion for AV excellence.

We do our best to ensure seamless fulfilment of your needs: from the initial concept, through design and expert project management, to training and after sales support, we make sure all your projects are completed to your full satisfaction.

Founders of “navas” have 20+ years of experience in AV consultancy, project management and business development, so you can be assured your projects are in good hands.

With “navas”, you can have the future... now.

For all inquiries, please contact info@navas.global, or give us a call on +44203 969 9694

Thank you!

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