whitefox™

**White Fox Inc.**
305, Mangaljyot Tower, Jodhpur Cross Road,
Satellite, Ahmedabad-380 015, Gujarat, India.
Phone: +91 79 26 92 33 99 • +91 989 845 6438
Email: info@whitefoxinc.in • Web: whitefoxinc.in

whitefox™

acoustic & audio-visual solutions

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## Introduction

White Fox provides leading edge solutions and services in the Information & Communication technology - professional communication, device control, energy internet and information offering of advanced, high quality solutions and services for Education, Enterprise, Health Care, Hospitality, Finance & Banking, Defense and Real Estate Facilities integrated technology infrastructure business needs.

Together with the collective strength of the world's leading companies and strong expertise, our prime focus is in offering integrated design for voice, data, video, audio and control with solution offerings which include turnkey services and technology program management for Green Building, Intelligent Campus and Modern City technology integration.

We believe that systems, processes and people should work seamlessly and securely supporting the organization's goals by providing the organization immense flexibility, manage risk, manage costs, improve service and align ROI with the business needs.

We are not going to put any new thing to you. It's just a Science(Physic's rules)in simple language. We do not have long to write about our aim.

**" We create a awareness about sound engineering so that you can enjoy sound more effectively then you do."**

## Why is AV important ?

Using or integrating audiovisual (AV) technologies creates possibilities. An amazing blend of science and art, AV systems are used in unlimited ways to communicate with entertain audiences, colleagues, market products, add drama, inform and build community, offer security, increase comfort and create ambience. From sophisticated presentation facilities and control system strategics, audiovisual technology can play an integral role in helping you to bring your vision to life.

## Where is AV used today ?

A tougher question is "Where doesn't AV come into play?" From the digital signage in a shopping mall to the sophisticated theatrical components of a concert hall, AV technology is practically everywhere. AV plays a role in : Schools and colleagues, Auditoriums and theaters, Recording and broadcast studios, Residential homes, Shopping centers and malls, Hotels and Restaurants, Airports and other public places, Offices and conference rooms, Research and medical facilities, Places of worship and religious centers.

## This is where an AV specialist comes in.

From very start of a project, a AV specialist can serve as a key resource to a design team. Working in concert with the architect, a AV specialist helps to develop communication and presentation environments bringing their expertise in AV technology, acoustics, lighting or mechanical systems to your project.

## A AV specialist can help you :

Save precious time and resources • Take advantage of technology
Achieve new dimensions in design • Bring your vision to life.

**You have a vision. Now make it work.**

From concept to completion, an AV specialist to create innovative, inspiring environments that successfully combine form and function. Visit **www.whitefoxinc.in** to ask for AV expert advantage.



## Care for acoustic & audio-visual

If you are reading this, you are very likely interested in improving your sound. The basic concepts put forth in these pages are not new. They are not revolutionary. You can find them in many texts. Our hope is that our presentation and treatment of these topics will be "down to earth" and easier to understand, The knowledge we have gained from our experience of music and acoustic - all Briefly condensed into one handy little brochure.

## For Acoustics & Audio-Visual Concepts it is very impotent to know

What is sound and how do we hear it ?
What is frequency, volume and decibel ?
How does sound work ? How does the sound, or 'disturbance', travel ? How does it propagate ?
How does a sound/system design ?

## From the answer of this questions you will easily understand that

What is acoustic? Why you need sound control?
How a Home Theater System and Room Design?

Let us understand the above points in simple manner with simple example.

## What is sound and how do we hear it ?

***"Sound is an alteration in pressure, particle displacement, or particle velocity which is propagated in an elastic medium, or the superposition of such propagated alterations."***

***"Sound is also the auditory sensation produced through the ear by the alterations described above." From "Music, Physics and Engineering" by Harry F. Olson***

Noise is simply unwanted sound. Sound is actually changing air pressure. Any disturbance that creates changes in air pressure or velocity that our ear/brain system hears as sound. You may easily relate these changes to vibrating objects such as a vibrating string. A generator of sound must move the air back and forth to crate "sound waves" that can be heard(presumably by humans). For example, when the mallet strikes the drum head it becomes moving back and forth, or vibrate. This create small changes in air pressure that move(or propagate) through the air and move out in all directions (not always equally) eventually striking our ear drum. The human eardrum is like a very small drum head as it moves back and forth, we perceive(hear) sound. Thus our brain "hears" the sound. In real life however, it can get somewhat more complex, even though following the same basic principles.

## What is frequency, volume and decibel ?

The bass drum has a very low-pitched sound where a flute may have a high-pitched sound. We perceive both differently because each one causes the air around them to vibrate differently. This is often referred to as frequency (or pitch) and is measured in Hertz. So the faster the air vibrates the higher the frequency and the slower the air vibrates the lower frequency.

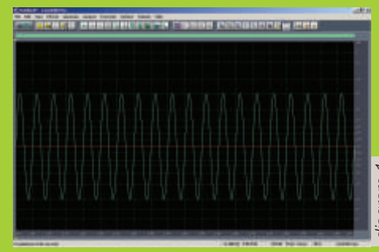


*diagram-1*

In the ***diagram-1***, a 20Hz sound is shown for one second of time. Notice that during the one second of time we can count 20 complete cycles.

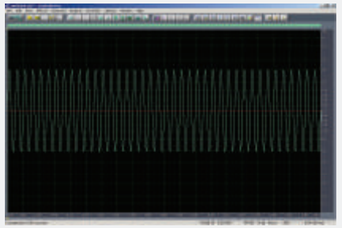


diagram-2

We can see the 40 complete cycles in the one second of time in the ***diagram-2***. It means frequency(pitch) is twice as high as the 20 Hz pitch. This is 40Hz sine wave.

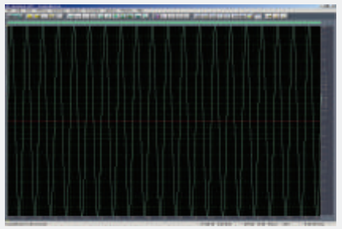


diagram-3

Now we need to understand loudness(or volume) of sounds. Loudness is determined by how much the air pressure changes. This can be illustrated in the example below.

***diagram-3***: Here is the same 20Hz sine wave we saw earlier, but this is now much louder. Note that the number of complete cycles is still 20 but highest points are higher and the lowest points are lower...thus creating large swings in air pressure and a higher perceived volume. Even though the frequency is exactly the same.

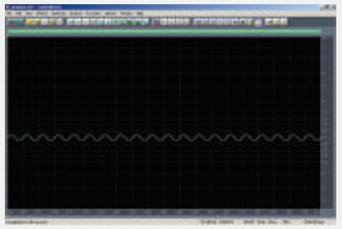


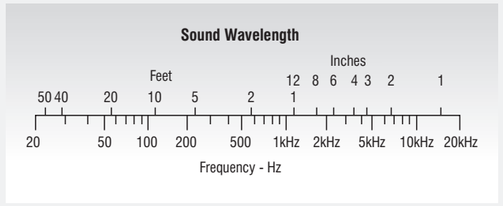
diagram-4

***diagram-4***: And again, we see a 20Hz wave, but this it is obviously very soft. The high peaks are not very far away from the lowest peaks. In this way, we can depict small changes in air pressure (and thus a softer volume) even though the frequency is exactly the same.

## Wavelength

The wavelengths covering the entire audible spectrum, 20 Hz to 20 kHz, range in size from 56.5 ft. long to less than 1/16 in. long in air. (1130 / 20 = 56.5 and 1130 / 20,000 = 0.0565). 1130=speed of sound(1130 feet per second)

In real life, there are few things that generate single frequencies at a time. Even musical instruments have a fundamental tone, as well as “overtones”. These “overtones” are frequencies that are generated in addition to the main frequency and help us differentiate a violin from a flute, even if they are playing the same note. The resulting sound is called a complex sound wave.




## The important points of this section are:

- Sound is generated by changing air pressure
- The volume is how much the air pressure changes
- The frequency ( pitch) is how fast the air pressure changes
- Most sounds we hear are complex sine waves



## Decibels

The volume (or loudness) of a sound is measured in decibels (or dB). Think of it as the pressure (or energy) behind the volume. The general range of human hearing is from ~ 0dB to 120dB. A quiet library is about 30dB,while 120dB is considered the threshold of pain, where the ears begin to feel pain from the volume. The Following table shows some common generators of sound and their typical Decibels levels as well as OSHA exposure limits:

| Maximum Exposure per day (OSHA) | Sound Level | Decibel Level | Examples |
|---|---|---|---|
| | No sound | 0 | Threshold of hearing...essentially no sound |
| | | 10 | Breathing |
| | | 15 | A soft whisper in someone's ear |
| | Very Quiet | 20 | Whisper, rustling leaves |
| | | 25 | Recording Studio |
| | | 30 | Quiet rural area, very quiet library |
| | | 40 | Very quiet residence |
| | | 45 | Typical neighborhood |
| | Quiet | 50 | Quiet suburb, conversation at home, private office |
| | | 60 | Normal conversation(3-5 feet), sewing machine, typewriter |
| | Annoying | 70 | Freeway traffic at 50 feet, vacuum cleaner |
| | | 75 | Typical car interior on highway |
| | Loud | 80 | Dish washer, average factory, Telephone dial tone, Noisy office |
| 16 hours | | 85 | City traffic (inside car) |
| 8 hours | | 90 | Diesel truck, Power drill, food blender |
| 6 hours | | 92 | Clarinet above 10 feet |
| 4 hours | | 95 | Subway train at 200 feet |
| 3 hours | | 97 | French horn at 10 feet |
| 2 hours | Very Loud | 100 | Jet takeoff at 1000 feet, farm tractor, very heavy traffic |
| 1.5 hours | | 102 | Motorcycle |
| 1 hours | | 105 | Power mower |
| | | 108 | Home Theater (loud peaks) |
| 0.5 hours | | 110 | Chainsaw, pneumatic drill, typical Rock concert, Steel Mill, auto horn at 3 feet |
| 0.25 hours | | 115 | Jackhammer |
| 0 hours | Pain threshold | 120 | Loud thunderclap, typical live rock music |
| Hearing Damage occurring | | 125 | Pneumatic riveter at 4 feet |
| Ear drum distortion | | 130 | Jet takeoff (300 feet), Noise level at stock car race |
| Permanent hearing damage | | 132 | Very loud rock concert, 50 feet in front of the speaker, |
| | | 140 | Gun muzzle blast, Prop aircraft on takeoff, aircraft carrier deck, jet engine at 100 feet |
| Ear drum rupture | | 150 | Jet takeoff (75 feet) |
| | | 155 | Shot from handgun(.38 or.44) at 1 foot |
| | | 160 | Jet aircraft on takeoff at 30 feet |
| Immediate death of tissue | | 180 | Jet engine at 1 foot |
| | | 194 | Loudest sound in air, air particle distortion(sonic boom) |



## How does sound works?

### How does the sound, or 'disturbance', travel? How does it propagate?

Sound coming from one source can easily fill every corner of a room by propagating out in all directions and by reflecting off of the surfaces in the room. Air pressure not only move our eardrums back and forth, but also move other object in the room. For example, if we seal off all the airflow from one side to the other by wall out of cellophane, do you think you could hear someone banging a bass drum on the other side? The answer is, of course you can, even though no air is flowing between the bass drum and you. So the rapid changes in air pressure (sound waves) hit the cellophane in an almost identical fashion. This creates changes in air pressure on the other side as bass drum would have directly done. Now, as we move farther away from any sound source, that sound generally gets softer. This is due to air, even air has some mass. This loss of energy, through air and objects, causes the sound to get softer and thus, a lower dBA level.

Sound waves, like water, will find any leak to get through. Since air offers less resistance to sound than a piece of metal. So, a 5-foot square 1" thick lead wall might reduce the noise traveling from one room to another. However, if there were three ½"holes for wires in the lead wall, the majority of sound will exit through that holes, reducing the effectiveness of wall.


**"Most buildings support activities such as speech, music, studying, work, or rest and relaxation, that can be adversely affected by noise or vibration. These activities can be impacted by each other, or by noisy or vibrating mechanical equipment, plumbing or machinery located elsewhere in the building. Noise from outside the building may also intrude and interfere with activities inside."** - "Acoustics and Noise Control Handbook for Architects and Builders" by Leland K. Irvine and Roy L. Richards

Mechanical equipment like **Duct-Borne, Plumbing systems, Electrical Systems, Airflow Noise, HVAC, Exterior Sources** not only generates noise in buildings, but also generates vibrations that can propagate throughout a building's structural members if not properly isolated. These vibrations can excite building members far from the sources an cause remote building components to rattle and generate their own noise.

### Conclusion:

There are a variety of techniques to reduce noise and vibration in a variety of structures today. Every method relies on 1 of 2 principals, mass and viscoelasticity. Both methods can be effective, depending on how much material one would want to use. However the materials are tested to absorb vibration, it does not mean they will eliminate any particular noise

## How does a sound/system design?

Fixed sound installations pose a variety of challenges. Each venue requires a specific Solution – be it in sound quality, or integration with interiors. We design sound from a large range of audio equipment especially venues like auditoriums, discotheques, pubs, retails outlets, restaurants, clubs, conference facilities, places of worship, home sound and education. While each sound application deserves a specialized installation approach and device selection from the vast range, we shall try to express our novelty by discussing how we approach the most challenging types of fixed installations.

### Example 1: A mall

(This example embodies almost all needs in the retail and entertainment sector)

This path-breaking retail outfit has the following sound requirement: Background Music {BGM}: Separate music in each of its levels.

- The food court should be able to convert to a live performance venue; otherwise can select room filling background music.
- Paging:- Addressing each of its levels individually or all at a time from various remote locations the BMS room, and the information kiosks on each level. Additionally, there is separate kiosk for car calling.
- Evacuation:- level-wise or all together.

The selection of speakers:

BGM ( Background Music):

- In each mall, the ground level foyer holds a special significance since it hosts many events, and also creates the mood in the mall. we recommend good range of compact monitors that are capable of producing exceptional sound quality at the highest playback levels.
- The rest of the BGM features in-ceiling monitors. These may be chosen from range of 4", 6" or 8" in ceiling monitors. Typically we recommend the two way high-end in ceiling monitors.

Food Court:

- In normal BGM circumstances, the food court sways to the charms of the tiny micro monitor in conjunction with its wall-mounted subwoofer. Some food courts have a terrace. For such areas, weather-proof high-grade monitors come in real handy!
- Come performance time, high-grade professional performance monitors may look imposing but stay out of your view since they are suspended from the ceiling.

## Example 2: An auditorium

(This example embodies high grade sound being addressed to a large gathering)

This prestigious auditorium has the following sound requirement:

- Every seat in the house to experience high-grade sound (also in the balcony).
- Speakers and associated electronics must not be visible.
- Applications: Conference, Drama, Live Music (Eastern and Western).

By our experience we understand how a high-efficiency horn loudspeaker behaves in a room. These horn loudspeakers are not to be mistaken as those loud, unimpressive devices you hear during an election speech. These have the

sophistication that you would expect a high-end home audio or studio loudspeaker.

Often in auditoriums that are exceedingly long or high, it is necessary to provide re-enforcement. This is accomplished using one or more of the compact and stylish loudspeakers or high-grade in-ceiling monitors. Additionally, active monitors are installed in control room and green rooms so that high-grade reference is obtained in these enclosed areas.

Also important are the power amplification devices for these loudspeakers.

## Example 3: A conference Room

Today's sound needs in a conference room have evolved to a large extent as audio and video conferencing. The in ceiling monitors are the ideal solution for high-grade conferencing. The crystal clear and highly dynamic sound of this monitors caters both speech and multimedia application. For large rooms, the wall mount monitors are the best choice. The range of mono and stereo amplifiers suit multi-room conferencing.

## Example 4: Large Transportation Hubs

Airports and Railway Stations need a high grade sound system for well distributed and intelligible speech reinforcement. All such facilities require the audio announcement to be limited to specific areas, or zones. The digital zoning mixers with push-to-talk microphones will take care of it. The last element is the selection of amplification devices, which is a fallout of the wattage required and number of zones. The end result is an ungradable, user friendly system that not only performs utility functions effectively but also sounds wonderfully natural.

## Example 5: Custom Home

Sound requirement in today's lifestyle typically feature the following:

- Home theater (Dolby Digital, DTS, THX etc).
- Fixed installation in each living zone rooms, garden, terrace etc – with facility to control the music input to each zone, switch on /off, and volume, from the zone itself or from a central control panel.
- Loudspeakers that not only provide high-grade sound but also blends with the interiors.

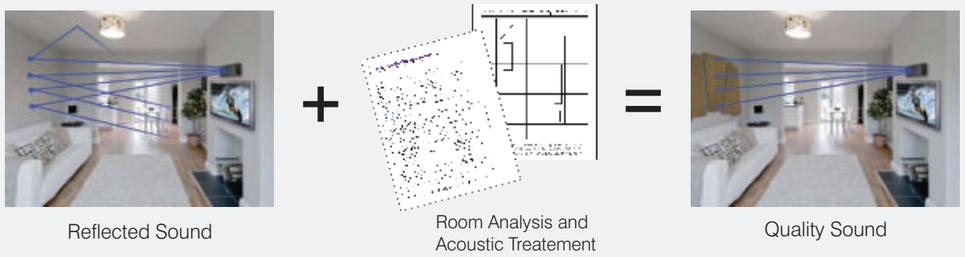


## What is Acoustic and why you need it?

**"Acoustics – the science and technology of sound in all its aspects. Covers its production, propagation and control; its interaction with materials; its reception by the ear, and its affects on the hearer."- Dictionary of Acoustics**

Acoustic is not all common sense. Unfortunately, the subject can sometimes be quite confusing. However, in simple meaning, acoustic is a method to control sound transmitting from one room to another or control the reflected sound waves (ecos).

There's a lot more to acoustics than simply hanging some fabric or other treatments on the wall to solve a problem. What we hear is always a complex sound(direct sound+reflected sound).Reflected sound travels a longer distance and arrives to our ears later then direct sound. So to improve the sound quality and to reduce the noise, you need to treat the room with proper sound absorption materials, which is called acoustic.




Reflected Sound | Room Analysis and Acoustic Treatement | Quality Sound

This will allow you to hear more of the direct sound and loss of the undesirable, inaccurate, reflected energy.

Absorption results in reduced levels of the various frequencies contained in the sound that's being absorbed. The thicker the absorptive treatment, the lower in the frequency range it will affect. Low frequencies (drum sound) require more absorptive "muscle" than do higher frequencies(flute sound).

An acoustical consultant, understanding how a venue is to be utilized, can predict each of these events by evaluating and making recommendations regarding the size, optimum shape, finishes and materials to be used, etc.

Absorption coefficients are measured at 125, 250, 500, 1000, 2000 and 4000 Hz according to ASTM C423-08a, "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method". The NRC (Noise Reduction Coefficient) takes an average of the four middle test frequencies (250, 500, 1000 and 2000). Generally speaking, NRC values less than 0.20 are considered to be reflective while values greater then 0.40 are considered to be absorptive.

The barrier(partition) can be used to control the propagation of noise from one adjacency to another. TL (Transmission Loss) provides information of the loss provided by the partition at certain frequencies. STC ratings are appropriate for the speech range of roughly 500 – 2000 Hz only. The STC does not take into account lower frequency energy that would be found in music or mechanical systems.

These are some typical STC ranges that are associated with certain expected levels of privacy.

*Note: that these ranges are assuming a specific background noise level and again, are applicable only to speech privacy.*

Typical Speech Privacy Associated with STC ratings and Assuming Background Noise Levels Of Approximately 35 dB SPL A - Weighted

| STC Range | |
|---|---|
| 0 - 20 | No Privacy. Voices clearly heard between rooms |
| 20 - 40 | Some Privacy. Voices will be heard |
| 40 - 55 | Adequate Privacy. Only raised voices will be heard |
| 55 - 65 | Complete Privacy. Only high level noise will be heard. |
| | Note: The term complete may not be adequate for some secure facilities. |

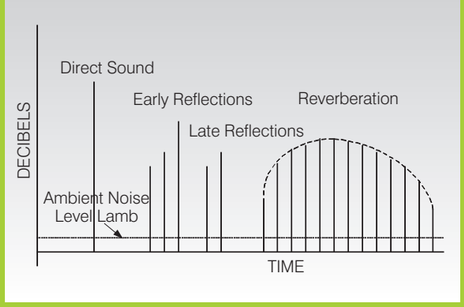


"Air gaps (e.g., around doors, windows or penetrations) are notorious to the sound reduction effectiveness of walls. An air gap just one tenth of one percent the size of a wall can lower the TL rating from 45 to 30 dB. This emphasizes the importance of sealing wall, avoiding air gaps, and airtight doors.

A rule of the TL spectrum of homogenous partitions (the mass law) states that TL increases at a rate of 6 dB with each doubling of mass and with each doubling of frequency. This rule can make it impractical to solve privacy issues with homogenous partitions. For example, if a 1/2 meter-thick concrete wall does not provide enough sound isolation than doubling the thickness of that wall to 1 meter would only offer an additional 6 dB of sound reduction. Multilayered partitions (comprised of layers of different materials) are the only way to avoid this kind of issue. Each time sound passes through a different material, its level is reduced. From this method you can reduce cost, weight and space restrictions while providing sound reduction. A sharp change in density of material is most effective in raising TL. Air spaces between wall sections and materials are effective and also breaking any rigid connections between sides of a partition. For example, the noise reduction effectiveness of a studded wall filled with fiber insulation between studs can be short-circuited because sound may travel through the studs to the other side of the wall.

STC36 | STC44 | STC39 | STC46 | STC57

Absorption (air absorption as well as absorption in the materials in the room) eventually takes over. We'll look at each of these components.




ITG or Initial Time Gap - this is gap of time between the arrival of the direct sound and the first significant reflection and it provides a good indication regarding the overall size of the room.

Direct Sound - sound directly from source to listener – it's a straight path.

Early Reflections - reflected Sound requires additional travel distance and arrives after the direct sound arrives to the listener. In large spaces, these reflections typically arrive to the listener between 35-50 ms after the direct sound.

Late Reflections - reflected Sound arrives to the listener much later after the direct sound requires longer travel distance (associated with a larger space). In large spaces, these reflections typically arrive to the listener between 50-100 ms after the direct sound.

Reverberation - reverberation is a high density of reflections arriving approximately 100 ms after the direct sound. Highly refection density with time creates reverberant field.

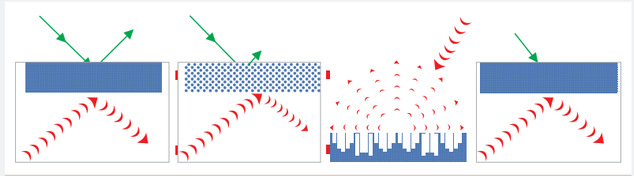
## Law of Conservation of Energy

The total energy is neither increased nor decreased in any process. Energy can be transformed from one form to another, and transferred from one body to another, but the total amount remains constant. There are two types of reflected energy – that which is direct and "mirror like" (specular), also known as a "hard reflection" and that which is scattered (diffuse). So, basically, one of three things occur (actually it will typically be a combination of all three):

Reflections - as the sound energy moves away from the source, some of it will be reflected off of various sources and returned back into the space. Those reflections can either be in a specular (direct) fashion of diffused (scattered). Either way, the energy remains in the space.

Absorption - this is sound energy that is absorbed either in the air or absorbed by the materials in the space. (Sound energy is converted into heat.)

Transmission - this is sound energy that actually passes from one space into another.

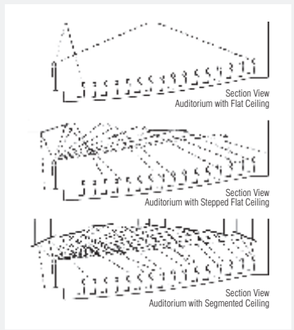


*Reflection (Specular/Diffused) Absorption(Air/Materials) Transmission*

This is easily demonstrated by :

- Talking very closely into the steel door – Most of the energy is directly reflected off the door and back into the classroom.
- Talking into the absorptive panel next to the door – Much of the speech range is absorbed into the panel and you will sound very "dull" or "muddy" as only the lower frequencies are reflected back into the classroom.
- Going into break room, closing the steel door and talking outside the door – Some of the energy will be transmitted through the boundary (the door) and into the classroom.

"The basic law of the conservation of energy states that 'energy can be transformed but it is never created or destroyed'. - "Sound System Engineering", 2nd edition

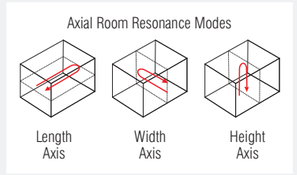



These illustrations show how an acoustician may direct reflections in an auditorium.

Bear in mind that these illustrations show only energy reflected off the ceiling. Reflections from the floor and especially the side and rear walls must also be taken into consideration. This is where an acoustician can provide recommendations in room shapes and materials used.

The sound reflected between the parallel surfaces in your room: the side walls, the front and rear walls, and the floor and ceiling - creates areas of differing sound pressure or loudness. You can easily hear these standing waves if you play some music with a lot of bass and take a walk around your room, listening at different spots. You'll probably notice that the bass sounds stronger near the walls and especially in the corners. These are specific types of standing waves which are called "room resonance modes."






*A room's primary or "axial" resonance modes are based on the room's three main axes: length, width, and height.*

It's actually pretty easy to calculate the axial resonance modes for your room. For example, we'll use these typical room dimensions: 25 feet long x 15 feet wide x 9 feet high.The formula for finding axial room resonance modes:

$$F = \frac{1130}{2 \times D}$$

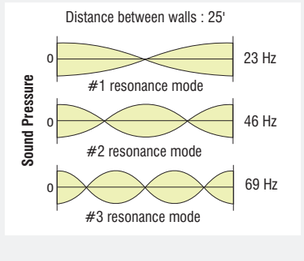
*F - frequency of resonance mode (in Hz)*
*1130 - speed of sound (1130 feet per sound)*
*D - distance between tow parallel surfaces (in feet)*

$$F = \frac{1130}{2 \times 25} = \frac{1130}{50} = 23 \text{ Hz}$$

*In the example above, we've calculated our sample room's main resonance mode for length. The room's length is 25 feet, so plugging in 25 for our distance variable in the equation, we get a resonance frequency of 23 Hz*

So, the main mode for the length axis of the room falls at 23 Hz (actually 22.7). This means that although you'll still be able to hear deep bass sounds from your speakers below 23 Hz, your room cannot provide any reinforcement of frequencies much below 23 Hz. In addition to this fundamental mode at 23 Hz, there will be other weaker modes at multiples of the fundamental mode (2x23, 3x23, 4x23, etc...). So, there will be other resonance modes at 46 Hz, 69 Hz, 92 Hz, etc....

*Resonance modes occur when the distance between the room's walls equals half the wavelength of the sound, and at multiples of half a wavelength.*




| MODE | LENGTH | WIDTH | HEIGHT |
|---|---|---|---|
| | 25 feet | 15 feet | 9 feet |
| #1 | 23 Hz | 38 Hz | 63 Hz |
| #2 | 46 Hz | 75 Hz | 126 Hz |
| #3 | 69 Hz | 113 Hz | 188 Hz |
| #4 | 91 Hz | 150 Hz | 251 Hz |
| #5 | 113 Hz | 188 Hz | 313 Hz |
| #6 | 135 Hz | 225 Hz | 376 Hz |
| #7 | 158 Hz | 263 Hz | 439 Hz |
| #8 | 181 Hz | 301 Hz | 501Hz |
| #9 | 203 Hz | 338 Hz | 564 Hz |
| #10 | 226 Hz | 376 Hz | 627 Hz |
| #11 | 249 Hz | 414 Hz | 690 Hz |

*In this example, you can see trouble spots at 113 Hz & 188 Hz.*

So, the main mode for the length axis of the room falls at 23 Hz (actually 22.7). This means that although you'll still be able to hear deep bass sounds from your speakers below 23 Hz, your room cannot provide any reinforcement of frequencies much below 23 Hz. In addition to this fundamental mode at 23 Hz, there will be other weaker modes at multiples of the fundamental mode (2x23, 3x23, 4x23, etc...). So, there will be other resonance modes at 46 Hz, 69 Hz, 92 Hz, etc....

Now we can use the same formula for the room's width and height. It's a little easier to see what's going on if we arrange our room modes into a table.

Besides the axial modes (involving two walls) there are also tangential resonance modes involving four room surfaces, and oblique modes involving all six surfaces. These other room modes don't affect the sound as strongly, but as we've mentioned before, all reflections affect the overall sound.

Certain room shapes are fundamentally bad from a room-mode standpoint. A cube is one of the worst shapes for a room — each resonance mode gets triple emphasis. You'll also hear more standing wave distortion in rooms with two equal dimensions, or rooms with dimensions that are multiples, ie. 8' x 16' x 24'.

If you're building a house or finishing a room, here are some room dimension ratios that are superior soundwise.

| HEIGHT | WIDTH ( or Length) | LENGTH ( or Width) |
|---|---|---|
| 1 | 1.4 | 1.9 |
| 1 | 1.3 | 1.9 |
| 1 | 1.5 | 2.2 |
| 1 | 1.2 | 1.5 |

*Applying the 1 : 1.4 : 1.9 room dimension ratio (see table) to a room with an 8-ft. ceiling yields dimensions of 8'H x 11.2'W x 15.2'L.*



We generally think of the speakers after finishing the room as per the above formula. But there's much more to the sound you hear than just where you place your speakers in a stereo or home theater setup. You might not even realize it, but your room and placement of speakers plays a rather large part in the sound that you hear from your system. For Home theater system's good performance, first you have to know your speakers ( center, front, surround, woofer) before setting up them in your room.

## Center channel speaker

Center channel speaker should be the first speaker you place in your home theater room. Because your center channel speaker's job is to anchor dialogue and other on-screen sounds to the screen, its position should be precisely the same distance from your listening position as your front left and right speakers.

## Front left and right speakers

Front speakers pull double duty: along with handling movie soundtracks, they're responsible for reproducing all of the sound when you listen to stereo music. This makes their position relative to your listening position especially important.

- Position your front speakers at equidistant points of your primary listening spot. We recommend measuring the distances - just an inch or two can actually make a noticeable difference in the way your system sounds.

## Surround speakers

Surround speakers are meant to envelop you in a cloud of atmospheric sound and special effects, so you feel like you're actually in the middle of the scene but it's important to note that surround speaker placement is one area where positioning may vary widely.

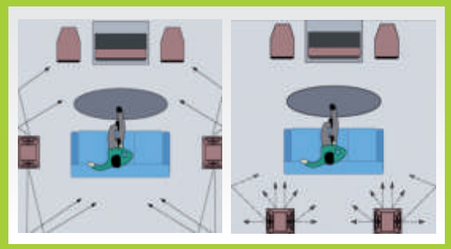
- Surround speakers should be placed high enough so that the drivers do not fire directly at your ears when you're sitting down - one rule of thumb is to place them at ear level while standing.

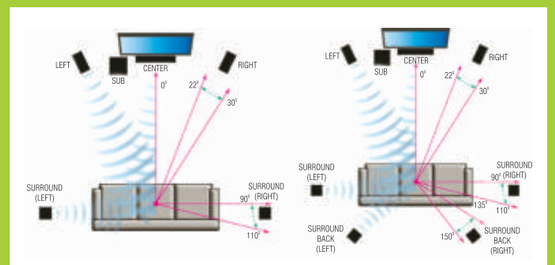
## Dipole and Bipole Speakers

Dipole/Bipole surround speakers (sometimes referred to as "Solid/Diffuse" speakers) are ideal for movie surround use, because of their ability to produce a diffuse sound field and their flexibility in a variety of placements. They are specially built for high-end movie- focused home theater setups.

Dipole mode creates a diffuse, ambient sound field when the speakers are placed on the side walls.

Bipole mode fills your room with surround sound when the speakers are placed on the rear wall.






*5.1-channel* *7.1-channel*

## Subwoofer

A powered subwoofer delivers crucial impact in a home theater system, but is one of the least demanding speakers to position. Since low bass frequencies are omnidirectional, you can usually place your subwoofer just about anywhere in your home theater room with good results.

*5.1-channel setup with the surround speakers wall-mounted to the sides of, or slightly behind, the listening position.*

*7.1-channel setup with the surrounds wall-mounted to the sides of the listening position, and two back surrounds wall-mounted behind the listening position.*

## "Cable Design-To transmit a signal without changing it"

The following discussion is based on decades of evaluation experience. It is not the result of "ivory tower" isolation. Designing, whether it be amplifiers, speakers or cables, requires attention to all empirical data, whether derived from test equipment or from human eyes and ears. The most effective audio and video designs come from those who take into account all the evidence, regardless of how measured or how well understood.

**The logic of a good system is very simple: Every component matters.**

The electronics, the speakers, the cables, even every solder joint, all cause damage. Cable's "damage" comes in two basic forms: a relatively benign loss of information, or a change to the character. if the path between the speaker and ampilifer has too much resistance, the sound quality will suffer. For this reason, even a short speaker cable should be at least 18 (0.82 sq. mm) awg ( american wire gauge) or larger. The lower the gauge, the thicker the wire and the better its capacity.

When choosing wire gauge, consider the quality of your components and speakers, the overall sound quality you're trying to achieve, and the budget you're working with. Also, keep in mind the distance between your receiver or amp and your speakers - long wire runs can cause significant power losses and thus require thicker cable.
You can use the following chart as a guideline:

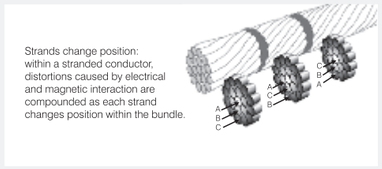
You may want to consider thicker speaker cable if:

- For audiophile-quality music system or a surround sound home theater setup, thicker wire can help your system deliver fine musical detail or the explosive effects of 5.1-channel surround sound.
- You can't avoid long wire runs to your speakers; for example, in the case of a wired multi-room system, thicker wire reduces the overall resistance, lightening the load on your receiver or amp.

| Length of wire needed | Gauge |
|---|---|
| Less than 80 ft. | 16 |
| 80 ft. to 200 ft. | 14 |
| more than 200 ft. | 12 |

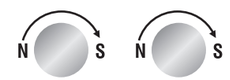
On the other hand, if you're buying a modestly priced system and trying to keep the overall cost down, or if your speakers are located relatively close to your receiver, standard 16-gauge wire may be the way to go.

If we take a group of strands and put them into a bundle, the entire bundle will suffer a "skin effect".The strands on the outside present an ideal electrical pathway, but the ones on the inside have different electrical values. This causes the same information to be distorted differently in different parts of the cable.



Strands change position: within a stranded conductor, distortions caused by electrical and magnetic interaction are compounded as each strand changes position within the bundle.

The most relevant fallacy in this discussion is the one about "the more strands, the bigger the cable, the better". The bigger the bundle of strands, the bigger the problem. If resistance is to be lowered by using a bundle of strands, the bundle size must be kept small.



North and South of adjacent strands attract each other in proportion to signal strength.

Magnetic Interaction is the other primary problem in cable design, both with a stranded conductor, and between conductors. A strand carrying current is surrounded by a magnetic field.

Material quality also dramatically affects the performance of cables and their terminations. Pure silver is the very best per forming material for cables. However, if silver is not carefully processed, even low grade copper will sound better. The noble metal - Gold is used on connectors. it doesn't corrode easily and ideal for protecting. The grade above normal high purity copper is called Oxygen-Free High-Conductivity (OFC) copper and the cable is called OFC. OFC copper having longer grains (about 400 per foot). The sound of an OFC copper cable is smoother, cleaner, and more dynamic than the same design made with standard high purity copper.

The quality of insulation (PVC, polyethylene, polypropylene and Teflon) material is dramatically affect the performance of a low-level cable. If the relationship between conductors (can be parallel, spiraled (twisted), or braided.) is not consistent, then the electrical parameters of the cable will be constantly changing and the signal will be distorted.



Connections - Solder is never a good conductor, not even "silver solder." A good solder connection is one that uses as little solder as possible. Welding makes the best connections: either resistance welding or cold welding.

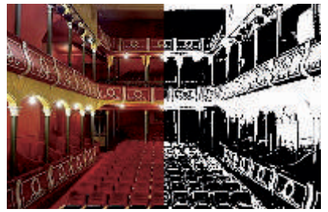
Connectors - The most common form of "preparing" or "terminating" cable ends has been soldering. This is still an effective solution for connecting to push-to-connect terminals. The solder will prevent corrosion and the spring action in the push-to-connect will bite into the solder. This method is superior to using hard gold plated pins-the round pins offer almost no contact area. The advantages of gold plating are often misunderstood. Gold is not a very good conductor, and as an extra layer of material, It does not corrode easily.

Burn This - We sincerely hope that after you have absorbed some of this information, and after you have set up your music system, you will put on a recording and hear the music, not the equipment. We hope that after all this discussions about sound & acoustic, burn any print outs of this text, or better yet, give it to a friend. or for more information visit **www whitefoxeinc.in**

## Audio-visual And Architects

### Audio Visual Solution And Today's Architectural Project

Universities, malls, house of worships, corporate towers, museums, government buildings, and auditoriums that use the communications equipment of the modern era have an unique audiovisual (AV) technology challenges. Every project has their own need which requires a sophisticated equipments, from communication and screens to sound systems and projectors. Architects has to be in touch with the latest AV technology, and to integrate this technology seamlessly into a building design.



### The Architect - In modern Audio Visual era

A good architect discover the client's needs and translate these needs into a physical manners. A room, a building or an integrated campus must take into account the acoustic, visual and communications needs of every user or occupant. For the architect, that means choosing or changing room dimensions, ceiling heights and lighting levels to provide good sight lines and acoustics for every seat in the room. The points need to pay attention such as:

- The walls are adequately insulated to seal the room from outside noise.
- Appropriate shades of colors to be chosen for the necessary level of darkness for presentation viewing.
- Lighting levels must be design to suit the different styles of presentation.
- The ceiling must be design in the way to achieve desired screen heights for the room and also take care of heating and ventilation systems.
- Modifying standard furniture or designing custom furniture to accommodate AV and IT connectivity and equipment integration.
- Making design choices that support the client's image while meeting a room's acoustical and lighting needs This is where we comes in. We - A Team, coordinates with the architect to develop A/V design from the inception of the project. Since architects and designers may not have expertise in AV & acoustics technology systems, AV experts can serve as a key resource in the Design Team.



### Expertise of Audio Visual and Acoustic Consultant And Today's Projects

In past, AV experts have been called in late to the design process. Architects can avoid the mistakes by calling us early at the designing stage. Mistakes such as

- Lighting concept beautifully designed, but obstruct the projector space or installation or conflict with the projection lighting requirements.
- Because of the too low ceiling height, people sitting back of the meeting room are unable to see the projection image on the front.
- HVAC system are too noisy to accommodate acoustical requirements.
- Basic requirements of AV projects(cabling, raceways, proper space for proper equipments) is difficult and costly to add to a project late in the construction process.


### We And AV & Acoustic Solutions

We, here, are able to help the clients to have a overview look of the AV and Acoustical needs as per his requirements. Any project has a goal to complete it in proper manners. We can help architects in the following areas:

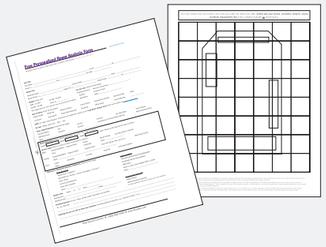
- The design of sound of speciality presentation areas - galleries, conference rooms, classrooms, entertainment areas.
- The networking and underlaying for making AV available throughout the infrastructure.
- The lighting design specialized for AV requirements.
- The user friendly system integration as per the clients needs.

whitefox™

acoustic & audio-visual solutions

## What we provide.....

We scale our scope of work to fit the needs of the project, its Owner and thedesign & building team. A typical "core" scope of work specifies that we will:

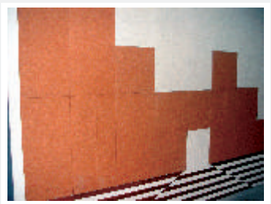


Analysis the Room's structural details by **RAF(Room Analysis Form)** to meet our goals for internal sound quality, as well as immunity from external noise and vibration.

Based on RAF, Specify type, quantity, model, location and mounting of wall- and ceiling-mounted acoustic treatment (e.g., absorbers, diffusors, reflectors and compound devices) to optimize sound quality of the playback system.

Issue drawings and specifications to the owner's **electrical agency** for the room, including wiring, circuiting and grounding specifications.

Work with Owner to finalize a core **playback equipment** plan that fits the application. (Equipment supply, interconnection design, control features and installation).



Specify an acoustically qualified **fabric/paint** material to be used at walls and ceiling to conceal acoustic materials, speakers, subwoofers, etc.

Make **site visits and coordinate with** owner, architect, general contractor and other key project personnel to establish design direction, present drawings, review/ inspect the progress, and/or to test and to facilitate the smoothest possible integration of final installation.



# Clients who trust our expertise...

| Client Name | System Installed |
|---|---|
| Sumarbhai Brahambhatt<br>Divine Highland, A'bad | Residence - HT Room with Acoustics & Channel Music |
| Planet Health<br>All Gujarat | Retail Outlet - Channel Music with PA System |
| Vipul Thakkar<br>Thaltej, A'bad | Residence<br>HT Room with Acoustics |
| Ashwin Patel<br>Naroda, A'bad | Office - Channel Music |
| Gormoh<br>Bopal-Ambali, A'bad | Restaurant<br>Channel Music & PA System |
| Hotel Ramada<br>Prahaldnagar, A'bad | Restaurant & Banquets<br>Multizone Music |
| Ashok Gulguliya<br>Prahaladnagar, A'bad | Residence<br>HT Room & ChannelMusic |
| Ankur Panchal<br>Satellite, A'bad | Residence - Acoustic For HT Room |
| Shailesh Mistry<br>Satellite, A'bad | Residence - Acoustic For HT Room |
| Archi. Alkesh Patel<br>Naranpura, A'bad | Office - Channel Music & Conference Room |
| Cher Spa & Salon<br>Multiple Branches (A'bad, Surat) | Salon - Channel Music |
| IFF Office<br>Prahaladnagar, A'bad | Office - Channel Music |
| Hirise Hospitality<br>Prahaladnagar, A'bad | Office - Conference Room |
| Treatotal<br>Gurukul, A'bad | Restaurant, Banquet & Conference Rooms - Channel Music, PA System |
| Shangri-la Grand<br>Changodar, A'bad | Restaurant, Banquet & Conference Rooms - Channel Music, PA System |
| Black Salt<br>Thaltej, A'bad | Restaurant, Banquet Hall-<br>Channel Music |
| Rankar Farm<br>Satadhar, Junagadh | Farm House - Channel Music |
| Chandrakant Patel,<br>Satellite, A'bad | Residence - HT Room |
| Navin Pahwa<br>Kalhar Bunglows, A'bad | Residence - Channel Music |
| Yatin Patel<br>Pariwar Soci., A'bad | Residence - HT Room |
| Tejash Patel<br>Vastuvilla, A'bad | Residence<br>HT Room with Acoustic |
| Ranveersingh Bhati<br>Gandhinagar | Residence - Channel Music |
| Dangee Dums<br>Multiple Branches (A'bad, Gandhinagar) | Retail Outlet - Channel Music with PA System |

| Client Name | System Installed |
|---|---|
| Galaxy Mall Pvt. Ltd.<br>Naroda, A'bad | Office - Conference Room |
| Pragnesh Patel<br>Gota, A'bad | Residence -<br>Acoustic for HT Room |
| Archi. Kabir Thakor<br>Paladi, A'bad | Office - Conference Room |
| Vibhor Agraval<br>Abhishree Bunglows, A'bad | Residence - HT Room |
| Estelle Salon<br>Multiple Branches, A'bad | Salon - Channel Music with DJ Sound |
| SunGlow Spa & Salon<br>Multiple Branches,(A'bad, Baroda) | Salon - Channel Music,<br>Surveillance System |
| Sanjay Patel<br>Gandhinagar | Residence<br>Acoustic for HT Room |
| Lincon Polimers<br>Khatraj | Office - Channel Music |
| Angan Garden Restaurant<br>Bopal, A'bad | Restaurant - Channel Music & PA System |
| Navin Patel<br>Divine Highland, A'bad | Residence - HT Room with Acoustics & Channel Music |
| Dharmesh Patel<br>Surdhara Circle, A'bad | Residence HT Room,<br>Surveillance System |
| Litmus Branding Pvt. Ltd.<br>Mithakhali, A'bad | Office - Surveillance System |
| Ketul Patel,<br>Ashokwatika, A'bad | Residence<br>HT Room with Acoustic |
| Hemal Sheth<br>Sanand | Residence - HT Room,<br>Surveillance System &<br>Channel Music |
| Chetan Pawar<br>Pearl 36, A'bad | Residence - HT Room, Surveillance System & Channel Music |
| Gajanan Bhavsar,<br>Saket-3, A'bad | Residence - HT Room with Acoustic, Surveillance System |
| Chetan Patel<br>Ranip, A'bad | Residence - HT Room with Acoustic, Surveillance System & Channel Music |
| Dixit Patel<br>Divine Highland, A'bad | Residence<br>HT Room with Acoustic |
| Zavod Sargasan | Site Office - Channel Music with PA system |
| Zold Sargasan | Residential Scheme<br>Channel Music with PA system |
| Dr. Chirag Patel<br>Surdhara Circle, A'bad | Residence - Channel Music with & Surveillance System |
| Dr. Mahendra Narvariya<br>Vastrapur, A'bad | Residence - Channel Music |

*and many more...*

whitefox™

acoustic & audio-visual solutions

# A Glossary of our product range...

Acoustics: All types of Industrial, Residential & Commercial

Projection Screen

Multimedia data / video projection systems

Video & Audio conferencing

Ceiling mount kits & Concealed cabling

Interactive smart boards & Pen pads

Electronic copy boards & White boards

Home: Installed: Professional: Studio sound solution:

Document cameras

Interactive touch screen controls - automation