



## Alex Rosner - Systematic Sound part 1

Alex Rosner began his love affair with sound in the golden age of hi-fi – and by the early '70s had pioneered the first stereo sound system in clubs, the first pair of tweeter arrays and crossover. You're likely to hear his name mentioned in connection with the success of legendary New York discotheques such as David Mancuso's 'The Loft'; but you might not know he radically changed the world of DJing when he came up with the prototype for another new gadget - a friendly little mixer with cueing system called 'Rosie'. Alex Rosner has plenty of tricks for people interested in clear, lo-in-vibrating sound reproduction - but when we say 'That's magic', he says 'That's just ordinary basic principles.'

**Alex Rosner:** »I never was far from music. After my engineering education, the hi-fi bug bit me badly. When the LP was invented in 1949 I was just entering high school. It was love at first sight and I could play records much better than I could play the piano. So I stayed with that.

The golden age of high fidelity began in 1949 and lasted to the fifties and stereo sound became popular in about 1956. Unless people of that time did not think that stereo was an improvement. They kept saying that mono was really better, but this wasn't true.

I got into this business very slowly, but by 1967 it was a fulltime career. And it didn't disappoint. The good part was that it never was a decision between business or pleasure – the line of demarcation between private life and the business didn't exist, it was just one life.

Most of you here are interested from a sound standpoint. You are interested in reproduced sound as opposed to sound reinforcement, like a microphone is reinforcing my voice in real time.

Sound reproduction is about playing a stored sound from a record or a compact disk. And there are basic principles. And the way to think of it is:

Imagine five panes of glass, vertically, that you look through onto an object on the other side. Each one of these panes of glass represents a component in a sound system. The last component would be the loudspeakers. The component before would be the amplifier. The component before would be the processing equipment – if you have any. And the component before that would be the preamp. And then the playback device itself, whether it is a turntable, phono cartridge or tape deck, CD player or any electronics.

You could also consider the acoustic space as a component. That would be even closer to you than the loudspeakers, because the sound has to travel from the loudspeakers to you.

The purpose of a sound reproduction system is to tell the truth: To reproduce it, the way it really is. And the only way to make a fair test is that you have to have an original – an instrument like guitar or some live instrument for example – and record the instrument, play it back through the sound system and compare the original with the reproduced sound of the sound system(...).

A good looking loudspeaker helps! **If you have a good looking loudspeaker versus a lousy looking loudspeaker, and they both sound identical, I promise you that you will choose the good looking one.** I found speaker wire cable, that costs 60 dollars per foot. They sell it so expensive, because it looks so pretty. But I promise you, if I take a lamp cord, that cost 20 cents per foot, you would not hear a difference.«

**RBMA:** »Now that we've got the expert here, why don't we test the best position for the speakers here?«

**Alex Rosner:** »There are principles and from experience, I can guess what the best position is for those speakers in this space – but only from experience. There are computer programs, that can make some predictions, but they are very time consuming and you could easily do mistakes. So that's not as reliable. You mentioned that these speakers are too big, well it's like money: You can never have too much because you know you will give some of it away.«

Loudspeakers never can be too big, because you always can turn the volume down. About 20 years ago, I did a sound system for a chef [cook]. He said: 'Can you put a pair of Klipsch horns in my kitchen?' Klipsch horns are very big loudspeakers, about 5 feet tall and 4 feet wide, it goes into corners and are intended for a large room. I asked him: 'Well, how big is your kitchen?' and he said: '10 by 12 feet'.

I said: 'Of course, no problem!' I put them in the kitchen and it sounded great. His issue was, if a pair of small speakers would sound better than big ones. And the answer is NO! Why would a pair of small loudspeakers sound better?

The only question I had was, should I put them on the floor rather than on top. Normally they are raised, because the sound of the tweeters would be blocked by the people in the front and the high frequencies could not go through to the people standing in the rear.«

**RBMA:** »What is a frequency, how does it work?«

**Alex Rosner:** »Sound is composed of a wide range of frequencies. Most humans can hear a range from as low as 20Hz for the bass notes, up to 19KHz for the top high notes. As you get older you don't hear so good in the very high end. Most human speech falls in a range between of 100Hz to 12KHz. While musical instruments have a greater range and what separates the sound of different instruments are the very, very high frequencies. It would be nice if sound systems could reproduce this whole range error-free, but that's difficult to do.

That's why they break up the speaker setup of a loudspeaker into three ranges: The bass, midrange and the highs. The crossover network (a device inside the speaker) determines which are the low, mid and high frequencies and sends these frequencies to the different loudspeaker drivers. In this particular sound system the crossover network comes before the

amplifier. So we have three steps of independent amplifiers here: One for the woofer, one for the midrange and one for the highs. That's a more elegant way of doing it. It's like putting the engine directly on top of the wheels [of a car].«

**RBMA:** »How do frequency, air and movement relate?«

**Alex Rosner:** »OK, forget the sound systems for a moment: The sound of my voice modulates the air, which means it pushes the air around. The molecules in the air travel through the air and reach your ears. Through a sound system, it's the speaker that moves the air back and forth and modulates the air molecules to the person that hears the sound.

Most of the energy in the sound is in the low frequencies. The bass speakers of a sound system need a lot more power than the high frequency speakers.

The difference between a direct driver loudspeaker and a horn speaker is that the horn speakers have more acoustic power, but the direct driver will give you a cleaner signal, assuming that you have an amplifier that can drive it.«

**RBMA:** »What is then the difference between a Jamaican sound system and a club sound system?«

**Alex Rosner:** »It's the same thing, except in a closed room, like a club, the sound is affected by the acoustic space. Whereas outdoors the sound isn't reflected very much. **It's much easier to make an outdoor sound system sound good, than one in a room. The sound system in a room is always affected by the room. The room is usually the enemy, not the friend.**

This particular room happens to be a really good room acoustically, because: the ceiling is not parallel to the floor, that's enemy No.1, when you have a ceiling that's parallel. Especially when it's hard surfaces. Second thing is that it has these perforations in the ceiling so that it can absorb reflections to some degree. Third is, that we have a nice rug on the floor, that absorbs some frequencies. We do not have too much glass like windows and the surfaces [of the wall and the interior] are very irregular. The more irregular you can make the surfaces, the better the acoustics are going to be.

An ideal room would be the golden rectangle. In Greek mythology you hear of the golden rectangle. The golden rectangle is a rectangle, where each side of the room is times of squared of 2 of the other. Squared of two is about 1.416. So, imagine a room that's, lets say 10 feet, by 14 feet, by 21 feet. That would be a golden rectangle, or in that proportions.

Those proportions seem to be the best for sound. Where no two surfaces are parallel, so you have to have skewed walls. Whenever you see a recording studio, generally, that's how they are made. Those are ideal rooms.

But normally, we don't have the choice; when we are going to a space, then the room is given, so we have to work within the room, we can't really fool around too much. All you can do is: you can pad some of the walls or put cylinders in there, because the cylinder is a diffusing element that diffuses the sound. As opposed to a focusing element, which is a concave element - that's the worst.

When I do churches, usually I have these domed ceilings and they are public enemy number

one, because they focus the sound, instead of spreading it around. So a bunch of columns and pillars, that's wonderful. Any irregular surface, anything that doesn't focus it back and forth, or makes it bounce around is good. So this room is very good acoustically you can get good sound reproduction in here, good sound reinforcement. You will have no trouble understanding me – it's a good room! A good room for musical performances, too.

You can test a room. If you are going to a room and you want to know if it's gonna sound good, you just have to speak and have someone else to walk around and if he can understand you, it's a good room. If he can't understand you, then it's a reverberant room in which you have to do the following: **Do not put speakers all around the room, because that gives you too many sound sources and each of the sound sources is reverberated in the room, so you will get a multiplication of the problem. Instead, focus the sound, centre the sound: put the sound in the middle of the room.** If it's a very reverberant space, put the loudspeakers in the middle of the room in an omnidirectional way, so that the sound is aimed outward from the centre.

Imagine dropping a stone in the water and you see the ripples going outward from the centre. That's how this would be. That way will get the most intelligible sound. If you go to a very big arena, like Madison Square Garden, you will notice they put the sound system loudspeakers in the middle of the room and the sound goes outward from there and everybody can understand what's going on.

As a practical matter it is hard to make a dancefloor – take up the loudspeaker cluster in the middle of the room – that wouldn't be too popular. But I must tell you, I did it once: Casablanca Records threw a party in New York at the Hilton or one of those hotels, many years ago. And I looked at the room and I said: 'That's impossible, you got to be kidding! You can't have a party here. This room is humongous and it's gonna sound atrocious!'

They said: 'We don't care; we're having a party here. We have got 4,000 people coming and you gotta make it work.' It happens that I was working on another sound system in another club at that time and I had all their equipment in my possession. So we took this system and made a circle out of it; a whole big tower of speakers, all emanating outward, starting in the centre of the room. And I took white gauze and covered the loudspeakers with it. They called it 'the bride'.

And it became the talk of the town, because nobody could understand how this system could sound terrific in a terrible room like that. That was never done since, they thought it was magic. I said: 'It wasn't magic, that were just ordinary basic principles.' And they had to dance around the 'bride', that's the way it was.

It took up about 3 or 4 meters across in diameter, but the room was huge, so what? But the sound was not strong coming out since it was omni directional with eight loudspeakers. There were eight bass horns in the middle - that was a four way system - eight lower midrange speakers, eight upper midrange speakers, and 16 tweeters on top. You know, that was a big tower!

If you were in front of one loudspeaker, you didn't get killed, because you only got some of the sound. All the other sound was emanating in all different directions. People then really did not know where the sound was coming from. All they know was, that there were no echoes to speak of and the sound was really intelligible. The bass did not mask the rest of the sound,

because what you get if you space the bass speakers 30 or 40 feet apart, is, that the bass is going to mask the midrange and you got no intelligibility at all.

This is one of the problems with clubs, aside from playing too loud: The spacing of the bass loudspeakers being too far apart is a problem. One should try to keep the bass as close together as possible. A good place for bass loudspeakers would be under the stage, all together in one spot.

Bass travels omnidirectionally outward. You cannot control [it]. Even if the 15inch loudspeaker in the system here [in the academy's sound system] is facing directly to the audience, believe me as much [bass] energy is *behind* the loudspeaker. **The bass speaker sends the sound completely omnidirectional, that's the nature of low frequency energy.**

High frequencies are different; you can have them around the room, because they are more or less focused. They travel in narrow beams, relatively speaking. Not like light, but in narrow beams, that can get reflected.

If you put speakers into a corner, for the same power going to the speaker, you gonna get more sound coming out of it, because the corner acts as an amplifier. You would notice, that if you're speaking when you back away into a corner, you sound much louder than if you are away from the corner. If you don't have a corner, put [the loudspeakers] against the wall. Here [in the academy] we don't have them against the wall, because we don't care, we got plenty of power. But if you want more loudness, out of your speakers, put them against the wall and put them close to the floor or close to the ceiling.

The trouble [putting a sound system] close to the ceiling is, that you should keep the bass speakers close to the floor. **The function of bass is to sort of vibrate our loins. That's what you really want to do with bass. You don't want to go down too low in the bass, because if you put out too much energy in a very low frequency range – it's called the hypersonic region, you actually vibrate the sphincter muscles...which you don't want to do!«**