

Frequently Asked Questions

Planar Magnetic Technology

Why are planar magnetic speakers popular with audiophiles?

When speakers using this technology are implemented well, they reproduce tremendous detail and create an involving experience that is hard to forget. For people who like to “get away from it all” in the comfort and privacy of their home, it is tough to beat a quality A/V system based on excellent planar magnetic drivers.

I don't have “Golden Ears” — why should I care about planar magnetic technology?

Many people wrongly assume they won't be able to hear the difference between a decent system and a truly great one. This is a shame, since the enjoyment that can be derived from a great system is almost unlimited, and almost everyone can appreciate the difference. In fact, about the only people who lack the “golden ears” to which you refer are people whose hearing has been badly damaged, whether by an prolonged exposure to excessive noise or by advanced age.

If you don't use hearing aids, you can hear the difference. We encourage you to listen to a truly great system, and hear what you've been missing.

I've seen other “flat” speakers — aren't they basically the same?

It depends on what you've seen.

Some “flat” speakers are essentially the same as the common cones-and-domes you have seen elsewhere, except that the diaphragms have been flattened out, sometimes for purely aesthetic reasons, and sometimes for performance reasons. But the underlying technology of these speakers is the same as all the others you typically see.

Other “flat” speakers are “electrostatic” in nature. They use a different technology, but share similar goals to planar magnetics in terms of fine detail and accuracy. Electrostatic speakers tend to be quite large, however, and are sometimes difficult to integrate into the home's decor.

Finally, we come to our preferred technology, planar magnetic speakers. In our opinion, planar magnetics offer the best combination of detail, dynamics and low distortion.

If you are interested in learning more about how all these speaker technologies work, you might want to read our white paper on [Planar Magnetic Technology](#). It reviews the major types of speaker technology, giving the strengths and weaknesses of each.

Isn't "planar magnetic" just another name for a "ribbon" speaker?

There is confusion around this terminology, and it is true that some companies wrongly refer to planar magnetics as "ribbons." However, there is an important distinction between the two. If you would like detailed information, we suggest reading our [Planar Magnetic Technology](#) white paper, which goes into detail on both these and other types of speakers.

For the purposes of this FAQ, you can tell the difference between a true ribbon speaker and a true planar magnetic speaker this way: a ribbon speaker's magnets flank both edges of a tall, narrow "ribbon" of pleated metal (usually aluminum) that is attached only at the two ends; a planar magnetic speaker's magnets lie behind and/or in front of the diaphragm, which is flat and under some tension, like a trampoline. In general, ribbons tend to be quite delicate, whereas planar magnetics are quite robust. Both can deliver exceptional sound quality.

Surely planar magnetic speakers are not perfect, otherwise everyone would use them. What are their limitations?

For one thing, planar magnetic devices (PMDs) are difficult to manufacture, particularly at the level required for the performance Wisdom Audio demands. This is one reason why we design and build all our own drivers — PMDs represent a fairly specialized technology that is little understood outside a small group of people.

High performance planar magnetic devices also require advanced materials technology of a kind that is more common in the aerospace industry than in the music business. In fact, the type of film used in Wisdom Audio PMDs is also in use today on the Mars Rovers. Few speaker designers have the necessary experience to evaluate such materials. Frankly, it is a lot easier to design and build conventional cones-and-domes.

How loudly will planar magnetics play? Are they delicate?

One of the great things about planar magnetic speakers is that they are extremely robust. Unlike some "audiophile" designs, you can get rowdy with Wisdom Audio speakers without undue concern. In fact, when you compare our planar magnetic drivers to the next-best design approach, you discover that you would need an electrostatic speaker to be between 10-20 times the size of a Wisdom Audio speaker before it could reproduce a similar dynamic range.

Is not having enough power dangerous to the speakers?

Absolutely. When an amplifier runs out of power, it generates a large amount of high frequency distortion, effectively skewing the distribution of power toward the tweeter. In severe cases, a tweeter that might normally handle between 5-10% of the total power coming from the amplifier might suddenly be exposed to 40% of the amplifier's total power. Most tweeters are damaged quickly under these conditions.

Wisdom Audio planar magnetic speakers are quite sensitive (meaning, they produce a lot of sound for a given amount of power), so your amplifiers will not have to work as hard. The planar magnetic drivers are also extremely easy loads for your amplifier to drive, ensuring that it is not unduly taxed. They also handle extreme power levels more easily than traditional speakers. Ultimately, they are less susceptible to this sort of distortion-

induced abuse than most speakers. But no speaker is completely immune from it. Besides, even if nothing is damaged, you won't like the sound of a distorting amplifier.

Our advice: buy more, high quality power than you think you will need. That way, you can relax and enjoy your system without wondering whether the next climax is going to harm anything.

Can I place Wisdom Audio planar magnetic speakers near my TV?

Probably. Most modern televisions, whether they use plasma, LCD, LCOS, or DLP technology, are not sensitive to magnetic fields. The only ones you need to be concerned about are the old-fashioned "tube" televisions. Such televisions should probably be kept at least a three feet (roughly 1m) away from the closest Wisdom Audio speaker.

Line Sources

Your speakers don't seem to get louder as you walk up close to them. How is that so?

We make some speakers that behave as "point sources" and others that behave as "line sources." This distinction bears some explanation.

Most speakers in this world are point sources, whose sound expands away from the speaker as an ever-enlarging sphere. The reason for this is that the vibrating diaphragm is small compared to the sound waves it is producing. The sound spreads out like ripples from a pebble thrown into a pond... except in three dimensions.

When the vibrating diaphragm approaches the size of the sound wave it is producing, the sound becomes more directional, moving away from the speaker like a spot light instead of a flood light.

When you have an extremely tall and narrow driver like those in our tallest speakers, the sound radiates outward in a cylindrical fashion. This is because the width of the diaphragm is small compared to the sound waves (wide dispersion), while the height of the diaphragm is large (resulting in controlled directivity in the vertical plane).

Because more of the sound is being focused where your ears are (somewhere in the horizontal plane of the speaker, not up on the ceiling or down on the floor), the difference in volume as you move away from the speaker is significantly less. In technical terms, it falls off in a linear way rather than as the square of the distance.

In more common language, the perceived volume is quite uniform throughout the listening area. This is a big advantage when entertaining, since even in a large room you can set a single volume that supports conversation for all... even those close to the speakers.

What are your best speakers all so tall?

In a typical home environment, a true line source must be on the order of five to six feet tall (or more). While this setup isn't for everyone, the result is a level of realism that few people have experienced. It is genuinely like "being there," whether that means attending a great concert or feeling as though you are there in the action of

your favorite movie or TV show. Both musical detail and dialog intelligibility are significantly improved, and you can expect more consistent results since the nature of the way the speaker radiates sound into the room allows you to hear more of the speaker itself, and less of the room.

There are solid technical reasons for true line sources having this subjective effect. They project sound into the room as an expanding cylinder, which minimizes unwanted reflections from the floor and ceiling. (Most speakers generally act as “point sources” whose sound radiates outward in all directions.) This same behavior also serves to create a more uniform level of sound throughout the room (people sitting near the speakers are not overwhelmed by the volume as they tend to be with normal speakers). In effect, the sound is focused where the people are, and minimized in other directions, creating an even envelopment while minimizing potential adverse room interactions.

How many of the benefits of the really tall speakers do I get if I buy a smaller version?

All Wisdom Audio loudspeakers have more in common than they have differences between them. For example, they are all based on planar magnetic technology for the critical midrange and high frequencies, with all the improvements in detail, dynamics and low distortion you have come to expect. They all also benefit from being biamplified, with purpose-built power amplifiers driving the high operating pressure woofers. They all also take full advantage of the Audyssey® MultEQ™ XT room correction system, minimizing the adverse effects caused by your living space without having to make it look like a recording studio.

The tallest Wisdom Audio speakers behave as line sources throughout most of the audible range, which provides a wide, but vertically controlled area of optimal sound. This approach minimizes the reflections from the floor and ceiling that blur the sound, thereby improving musical detail and dialog intelligibility, and making the speakers easier to place for obtaining optimal results.

The medium-sized and most compact Wisdom Audio speakers behave as do almost all other speakers on the market — as point sources — with an important distinction: they retain all of the advantages outlined in the first paragraph of this FAQ (detail, dynamics, low distortion, biamplification, the remarkable high operating pressure woofers, and Audyssey® MultEQ™ XT room correction). So, while the benefits of line source reproduction are real, they should not be confused with the overall performance of the system. They are the finishing touch on an already superlative system.

Hear more of the speaker itself, and less of the room.

Dipolar & Monopolar Radiation

According to your literature, Wisdom Audio speakers are “monopoles.” What does that mean?

Whenever a diaphragm moves back and forth to create sound, it does so on both sides of the driver: when one side is “pushing,” the other side is “pulling.” This is true of all drivers, whether dynamic, electrostatic, or planar magnetic.

If nothing is done to isolate the front wave from the back wave, the speaker is said to be “dipolar.” This simply means that it is radiating an equal amount of sound from both the front and the back, with the one side being out of phase with the other. In practice, dipoles generally need to be placed well away from the wall behind them, in order to minimize the inevitable interference between the out-of-phase information and the sound that is being projected toward you.

By contrast, most speakers are “monopoles,” meaning that the back wave is isolated from the front wave, typically by an enclosure that traps and absorbs it. This approach delivers a more consistent result, and allows more flexibility in placement (including on-wall and in-wall applications).

Almost all dynamic speakers are monopoles. Electrostatic speakers tend to be dipolar in their final form, due to the low forces involved and their large size — the technology simply doesn’t work well in an enclosure. Planar magnetic speakers can go either way, and good examples exist of both. In our experience, however, we find that you can get more consistently excellent results in a wider range of circumstances from a monopolar approach. Thus, we enclose the speaker and absorb the rear wave.

Crossover Technology

Why do I need more than one channel of amplification to drive a single Wisdom Audio speaker?

Almost all speakers must divide the audible range into two or more parts, since the devices best suited to reproduce thunderous bass tend not to perform as well with delicate treble (and vice versa). We choose to perform this division of labor in an active crossover (before the power amplifiers), where it can be done with greater accuracy and without adverse sonic effects.

The resulting signals are then routed to two amplifiers per speaker: a Wisdom Audio designed power amplifier that is specifically optimized for our unusual bass system, and to your power amplifier of choice for the midrange and treble ranges, which are handled by our planar magnetic drivers. The results speak for themselves: a level of both power and finesse that cannot be found in any speaker of comparable size.

Why are active crossovers considered superior to passive ones?

Ideally, you would have a direct connection between your power amplifier and the drivers that vibrate to make the sound you enjoy. Doing so gives your amplifier vastly superior control over the motion of those drivers.

The vast majority of loudspeakers, however, use passive crossovers to divide up the audible range after the power amplifier's signal has entered the speaker cabinet. This is accomplished by a crossover network of capacitors, coils, and resistors that sits directly in the signal path, between your amplifier and the speaker's drivers.

In effect, with most speakers the amplifier is driving the crossover network, not the drivers themselves. This has two fairly obvious effects: it lessens the amplifier's ability to control what is happening by inserting an electrical buffer between it and the components that actually make the sound; it also presents the amplifier with a much more difficult electrical load to drive, which may compromise the performance of the amplifier itself. (In fact, one of the biggest reasons for buying exotic power amplifiers weighing over a hundred pounds is that they are less susceptible to the difficulty presented by these complex speaker loads. This imperturbability comes at a cost, however.)

Using an active crossover maintains the intimate connection between the amplifier and the speaker's drivers by moving the division of frequency ranges back, prior to the power amplifiers. The disadvantage is that you need multiple amplifiers, one for each range. But this is offset by a huge leap in performance. Dynamic range, low level detail, imaging clarity and specificity, and freedom from distortion are all improved with active crossovers and biamplication.

Moreover, with the simple, resistive load that Wisdom Audio planar magnetic drivers present to your amplifier, you can often save money by focusing on amplifiers that merely sound terrific, as opposed to those that sound good and are also overbuilt to handle the obscenely difficult loads found in many high performance loudspeakers.

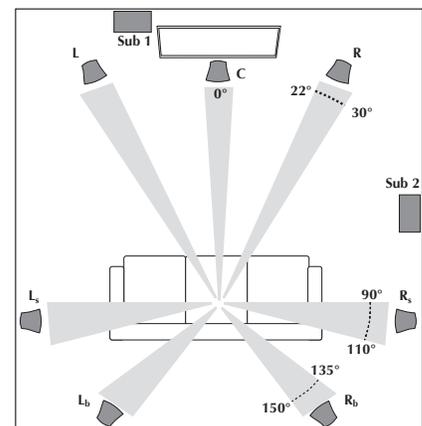
Optimizing the Room

Where should I place the speakers in the room?

The best advice here is to work closely with an experienced dealer/installer who can look at your space and make specific recommendations. We know that sounds like an evasion, but it's true.

Still, you wouldn't be reading this FAQ if you didn't want an answer, so here is some extremely general advice. (You are still better off engaging an experienced, local dealer/installer.)

If possible, place the front speakers first, then the screen. Of course, you'll have some idea of where you want the screen to be in your home theater. But televisions will largely look the same regardless of where you place them in the room. By contrast, speakers to do not sound the same regardless of where they are placed. If you place the left and right



speakers up front in such a way that they image well and sound good, you can then easily fit a screen between them in the available space.

Surround speakers belong on the sides, or slightly behind you. In a 5.1 channel system, the surrounds should be located between 90°–110° from front and center as seen from above. If you have a 7.1 channel system, the Surround/Side speakers go in the same location, and the Surround/Back speakers will usually be spread apart on the rear wall by about the same amount as the front speakers are on the front wall.

Can I put a center channel speaker behind the screen in my front projection system?

Absolutely, with one caution: if you do this, be sure to use an acoustically transparent screen material, either a woven fabric or one with a “micro-perf” treatment from one of the leading suppliers of such screen materials. Even these high-quality screens are not quite transparent to sound, but they come close. Our room correction system can easily make up the difference, making our speakers more suitable for such application than most.

Of course, we also build dedicated center channel speakers that can be placed above or below the screen as needed. Try to minimize the difference in height between the L/R speakers and the center speaker, so that sounds that pan across the front do not vary significantly in perceived height as they move.

What does the “system controller” do?

Our SC-1 system controller is a combination active crossover and room correction system designed to ensure optimal results with your Wisdom Audio system in a wide variety of environments.

The benefits of [active crossovers](#) are discussed in a separate FAQ.

Wisdom Audio has always been at the forefront of optimizing the interaction between the loudspeaker and the room. We recognize that you cannot separate the performance of a loudspeaker from the room in which it sits. Our latest and most advanced room correction system is based on the Audyssey® MultEQ™ XT system, developed by Tom Holman and his team at USC. This technology represents the most sophisticated room correction approach on the market today. We have worked closely with Audyssey in characterizing our loudspeakers to ensure that the system will achieve results far beyond what a more “generic” approach could hope to yield.

General

What characteristics would make for an ideal home theater loudspeaker?

Actually, the “ideal” speaker for home theaters and for high performance two-channel music reproduction are the same. In addition to the obvious traits (smooth, balanced sound, lots of detail, the ability to create a lifelike “image” of the sound being

You cannot separate the performance of a loudspeaker from the room in which it sits.

produced), ideally you would like to have at least three additional characteristics:

- **Control where the sound goes.** Early reflections of the sound off the floor and ceiling introduce severe colorations in the sound. It would be great if you could limit — or even eliminate — these reflections by controlling the way the sound is dispersed into the room. You want the sound to be focused where your ears are to minimize the confusion. The result is greatly enhanced clarity and realism.
- **Uniform volume throughout the area.** No one likes being the one sitting too close to the speaker and being blasted as a result. And no one likes being in the back row, and struggling to make out what someone said in the movie. Surround sound, by itself, does not address this problem, since the dialog is all coming from the front of the room, by the screen. The surround speakers (although they are working hard on other things) don't help people in the back hear what the actors are saying.
- **Damped, Detailed Dynamics.** Okay, this one is really several characteristics rolled into one, to emphasize the importance of having all three. Modern recording technology makes it possible to capture the dramatic dynamic range of life with vivid detail and realism. Historically, many "high end" speakers did a good job reproducing the detail, but struggled with the dynamics — they would "run out of gas" when things got really exciting. Other speakers handled the dynamics well, but lacked the detail and introduced distortions and other colorations to the sound. And almost all speakers also have a difficult time when it comes time to be quiet. They continue to vibrate for a fraction of a second after the signal has ceased, due to simple inertia. Engineers call this inability to start and stop instantly when told a "poorly damped behavior." So you want all three: well-behaved dynamics with lots of accurate detail.

Where can I hear these speakers?

You can search for a displaying dealer on our web site's Dealer Locator, at www.wisdomaudio.com.

Do the speakers need AC power like some others I have seen?

You do not have to have AC power anywhere near the speakers — neither the planar magnetic drivers nor the woofer require AC power. However, our system does come with an outboard active crossover and room correction system, as well as woofer amplifiers, all of which can reside with the rest of your equipment. Only speaker wires need to be run to the speakers (two sets per enclosure, since they are all bi-amplified).

Do the rear/surround speakers have to match?

Some people prefer the sound of identical speakers all the way around, and it is tough to argue with this approach. It makes it easier to get a completely seamless, enveloping experience. However, Wisdom Audio speakers are all closely voiced to one another, and our room correction system addresses the biggest remaining variable in how well the system performs. So getting a seamless and enveloping experience from a properly installed Wisdom Audio system is pretty much a given.

In some cases, there may actually be an advantage to using the smaller speakers for the surrounds, even if you are in a position to have the larger speaker up front. If your surround speakers must be significantly above ear level, it is better to have a point source system that will disperse its sound evenly in all directions. This is especially true for the surround channels, given the nature of their use in most recordings.

What is Wisdom Audio's warranty?

The Sage series warranty is twenty years on the speakers, and five years on the electronics. The specific details are available in all of our owner's manuals, which are available on the web site.

Q: Is it possible to use your SC-1 as a room correction for speakers produced by other brands?

A: Technically, yes. There is a "generic speaker" setting in the software that allows you to use non-Wisdom speakers. This setting effectively turns off all the Wisdom-specific functionality of the SC-1, leaving only the Audyssey MultEQ XT room correction circuitry active.

However, if this is what you intend to do on all channels, you are better off buying one of the Audyssey-branded Sound Equalizers, either the single-ended version or the balanced version. That way, you aren't paying for a bunch of capability you won't be using.

Q: Is it possible to build a system with WA front and a SC-1 controller and the surround produced by other brands?

A: Yes, it is.

We recognize that there are times when you need a product that we simply don't make (e.g., an in-ceiling speaker) to make things work -- especially in surround channels. This situation is what our "Generic Speaker" setting in the setup software is designed to handle. Using it, you can use Wisdom speakers for the most critical speaker locations, and if you need to use another brand elsewhere in the room to solve an installation-specific problem, you can still do so.

Moreover, the non-Wisdom speaker will be voiced by Audyssey's MultEQ XT software to match the same target curve as the main Wisdom speakers. Thus, the timbre matching between the disparate speakers will be far better than you could otherwise expect.

Q: I want to use multiple subwoofers, but my surround processor only has a single output. Should I split the signal before or after the SC-1?

A: Our recommendation for these types of situations is to split the subwoofer channel after the output of the SC-1. Before calibrating, one should level-match each of the subwoofers using an SPL meter. If the subwoofers cannot be placed in symmetric locations, we recommend using a delay that is the average of the distances from the subwoofers to the principal listening location.

This approach works quite well, though having the flexibility of independent level and distance settings for each subwoofer is obviously ideal.

Q: How do your "Regenerative Transmission Line™" subwoofers work?

A: There is a class of bass enclosures that has been around since the 1950's, which can be described generically as "low frequency tapped waveguides" or "tapped pipes." It was an idea that was a bit ahead of its time then, since fully optimizing its use required both powerful drivers and computer modeling. But if you are into such

things, check out [US Patent 2,765,864](#) (filed in 1955), and this AES paper published in 1959, "[Analysis of a Low Frequency Loudspeaker System.](#)"

We have utilized sophisticated modeling software in order to fully optimize our enclosures, and have developed drivers that are specifically optimized for this application. We call our unique implementation of this relatively old idea a "Regenerative Transmission Line™" subwoofer, or "RTL" sub for short.

All dynamic drivers develop energy on both sides of the diaphragm, with the rear energy being 180° out of phase with the front energy. If you allow the driver to operate in free space (no enclosure), the front and rear energies largely cancel each other out -- especially at low frequencies.

In our Regenerative Transmission Line™ subwoofer, the energy from the back side of the driver is sent along a long, folded path in such a way that its lowest frequencies arrive back at the front side of the driver *in phase*, effectively summing to an increase of 6 dB in output. Thus, the energy from *both sides* of the woofer cone is used in a productive way, resulting in a substantial reduction in distortion and an effective surface area *double* compared to what you would otherwise expect. As an example, the effective radiating surface area in the S90i is roughly equivalent to a 13" diameter round woofer, yet the enclosure fits in a 5.5" deep stud bay.

The results are quite stunning. Low frequencies are strikingly dynamic and responsive, and integrate quite seamlessly with the fast and detailed Sage Series planar magnetic hybrids. As an example, the SCS "suitcase sub" is modestly sized (and easily hidden), yet is flat to 23 Hz and can output in excess of 120 dB at 25 Hz (measured at its output port to minimize the room's effects on the measurement).

Q: What is "4m Equivalent Sensitivity"?

A: Line source loudspeakers distribute sound more evenly into a room than do point sources. Specifically, the rate at which the sound decreases with distance is half that of normal, point source speakers.

The standard Speaker Sensitivity specification is measured at a distance of one meter (1m). This is a convenient measurement, but not particularly real-world -- few of us are so close to our speakers when listening. A four meter (4m) distance is probably more representative of how people actually use their speakers.

But here is the catch: at a distance of 4m, point source loudspeakers (including our own) will have lost 12 dB of volume due to propagation loss. By contrast, line sources will have lost only 6 dB of volume, based on the physics of how they disperse sound.

So if what you are really concerned with is how loud the sound is at *the listening position* -- which seems the most meaningful measure -- a line source will be 6 dB louder than a point source which has the same 1m sensitivity measurement. Thus, its "4m equivalent sensitivity" will be 6 dB higher than what you measure at 1m.

Another way to think of this is to ask what the sensitivity of a normal, point source speaker would have to be in order to achieve the same result as the line source being measured. At a distance of four meters, the point source would have to be 6 dB more sensitive than the line source simply to yield the same result for the listener.

Q: Is the SC-1 a surround processor?

A: No, you should really think of the SC-1 as part of the speaker system. It serves three functions:

- **active crossover** (instead of the passive crossovers used in most speakers)
- **model-specific parametric EQ** (so as to deliver deep bass from enclosures that are otherwise too small)
- **powerful room correction** (to mitigate the damage done by the room's invariable imperfect acoustics)

In practice, you send the line-level outputs of your surround processor to the inputs of the SC-1; from there, the signal goes to the various power amplifiers and on to the speakers themselves.

The SC-1 supports up to 7.3 channels, in any combination of up to 3 separate zones.