

Thiel Audio SCS4T Loudspeakers

by Allen Edelstein, July 11, 2011

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Except for what appears to be a single driver, the Thiel SCS4T looks like a conventional dynamic floorstanding speaker. But just like the proverbial book and its cover, there's a lot more going on than meets the eye, all of it based on the well-wrought theories of the late Jim Thiel.

For nearly every speaker, if you compare the input and output signals with an oscilloscope (and the perfect microphone, which doesn't exist), you wouldn't recognize what you see, because the images wouldn't look at all the same. The culprit is phase distortion: when two (or more) tones occur simultaneously but are not reproduced at the same moment. There are two primary causes of phase distortion in dynamic speakers. One is physical and the other is electrical. The physical cause has to do with driver placement and the length of sound waves. If two tones created at the same time are far enough apart in frequency that they are reproduced by two different drivers, the odds are that the distances of each driver from the listener's ears are different, and the tone with the longer path will lag behind. How detrimental this is partly depends on how far behind the tone lags. As a rule of thumb, a 1kHz tone has a wavelength of about one foot (not exactly, but close enough for government work). If the 1kHz tone comes from the midrange driver and the third harmonic of



4kHz, which is about three inches long, comes from the tweeter, then 1kHz tone will probably be over a full wavelength behind, because the path distances from the drivers to the ears will be at least that different. Just imagine how late a low-frequency tone can be relative to a high-frequency one, given the drivers' spacing and the angles involved. It can easily be many wavelengths.

Electrical causes originate in a speaker's crossover. Capacitors and inductors are storage devices, and the storage varies with loading and frequency. That's how they roll off frequencies and why they are used to for traditional passive crossovers. A single device

in series with a driver (a capacitor affects the lows and an inductor affects the highs) rolls off a driver at 6dB per octave, and the roll off is phase linear. However, most crossovers are complex and use more than a single capacitor or inductor, in which case the roll off is not phase linear (in terms of conventional crossovers, only a 6dB-per-octave slope is phase linear).



If 6dB-per-octave crossover slopes preserve phase, which is good, and they're simple, just one device to roll off the low or high end, why doesn't every speaker maker use them? It's related to the same reason we don't usually have one-way speakers. Because phase-linear crossovers roll off slowly, you need wider-bandwidth drivers (the ultimate in wide bandwidth being a truly full-range driver) than when using steeper crossover slopes. So here we have a classic tradeoff necessary for phase linearity: potentially simpler crossovers but more complex drivers.

For a two-way speaker like the SCS4T to be phase linear, both causes of phase distortion must be dealt with. In this case, the crossover features a 6dB-per-octave slope. A swept-back or sloping front baffle generally is used to address time distortion, putting the tweeter physically behind the midrange and woofer. But in the case of the SCS4T, Thiel uses another method, one that also has other interesting positive attributes. Thiel's own coaxial driver places a dome tweeter in the center of the midrange/woofer's magnetic structure. This aligns the acoustic



centers of the drivers, ensuring that the time of arrival of a waveform emitted from each driver is identical. This equalizes the acoustic path lengths in a 360-degree pattern, which would not be the case when separate drivers are mounted on a swept-back baffle. In addition, this coaxial configuration can make narrowing driver dispersion with increasing frequency less of an issue. There still is some interference lobbing between the drivers, but this will also occur in a 360-degree pattern. By careful design of the relationship of the cone and dome, which Thiel has undoubtedly done, the lobbing and interference can be minimized.



Thiel designs its own drivers by necessity. Drivers are always a compromise. Most are bought from outside suppliers and designed for a wide range of uses, so the compromises are generic and not specific to any particular speaker design. By designing its own drivers, Thiel can make compromises that best fit its own needs. Thiel also uses passive equalization to optimize its drivers. Before applying the simple crossovers, Thiel designs inductor/capacitor circuits to make their driver/equalization combination closer to the properties of an ideal driver. This is more costly and complex than just using a simple first-order crossover because it uses more parts, but it has the potential for superior control of a speaker's response. It's also why when people see a Thiel crossover they are often surprised at its complexity.

The SCS4T is an unobtrusive floorstander -- a simple, slim, elegant box. It doesn't attract a lot of attention, and for this reason its spouse-acceptance factor will be on the high side. I suspect that the SCS4T is built better than most speakers in its price range. It uses 1" MDF for its cabinet, rather than the more usual 3/4", and the front panel is reinforced with a metal plate, which also supplies the speaker's ports. I never seem to be able to resist doing a very unscientific rap-on-the-box test for any speaker. The SCS4T did better than average, producing a deadened "thuk." To do even better requires an heroic cabinet structure that will readily add to the cost of the speaker.

One feature that attracted my attention was the SCS4T's adjustable feet. They're on outriggers that will add to the speaker's stability, and their large knobs give your hand something substantial to grab for making adjustments.

The SCS4T is rated at 87dB sensitivity, and its -3dB points are 20kHz and 47Hz -- nothing atypical for a speaker of its stature.

While phase linearity is a large part of the SCS4T's story, I'm not sure how critical it is to sonic performance. I've heard that it should help produce a very good soundstage and excel at resolving musical detail, and from other things I've learned I suspect that it should lead to excellent dynamic linearity. But I've also heard speakers with higher-order crossovers that I could also describe in these terms, including my own reference speakers.

Bass alignment is extremely critical for me, particularly the midbass, where I find many, many speakers to be bloated to various degrees.

This destroys any sense of reality, particularly because it always seems to muddy the next few octaves above it. This said, the SCS4T was excellent in this regard. *On The Pentangle* [Castle 06076 81120-2], one of my reviewing references, I could follow the changes in tone of the drums after being struck and could easily hear the recovery of the strings plucked on the upright bass. Murky midbass will always obscure these things. You might get reasonable attack, but the decay of the notes will be undefined. I've felt for many years that the control of this type of bass resonance is one of the primary factors separating good reproduction from great, and the SCS4Ts were clearly in the "great" camp here.

The speaker's bass balance was a tad on the light side, however. This shouldn't be surprising, given the quoted frequency response and relatively small bass driver. This will primarily be apparent on large-scale works played in large spaces, where that final octave is required to convey the ultimate sense of reality. Listen to something like that marvelous audio war-horse, the Reference Recordings *Rutter Requiem* CD [Reference Recordings RR-57CD]. It sounded lovely but just a bit small, although this was apparent mainly when compared to what much larger speakers can achieve. Fortunately, the bass was the kind that stayed in the background -- until something like a large drum was struck, and then suddenly I sat up at the impact, just as I would have at a concert.

I do need to mention that being a nut for transparency, I position speakers in free space, well away from walls, unlike the folks at Thiel, who prefer near-wall use, which will add a sense of weight to the bass. I tried this for a short time and the result was interesting. Bass balance varies with listening level, as explained by the Fletcher/Munson effect. Our ears are less sensitive to bass (and treble) than midrange frequencies at less-than-very-loud levels. Adding the resonance of a reflective surface to speakers with bloated midbass only exacerbates the problem, but the SCS4T handled being near walls quite well, continuing to sound fast and crisp. If fuller, weightier bass is more important to you than midbass clarity, I can recommend near-wall placement with this speaker.



In regard to the overall octave-to-octave balance of the SCS4T, the yin and yang of the speaker, as the esteemed Harry Pearson likes to put it, I suspect it is nearly ideal, indicating that the SCS4T is a fundamentally neutral speaker. I listened to loads of recordings, and the balance varied, from just a bit rich overall to slightly on the lighter side, depending on the recording. The combination of minor back-and-forth variation with recording change suggested to me that the differences were expressed accurately. This sense of balance extended at least as high as I can hear -- the metal-dome tweeter was smooth and not at all wiry even at its uppermost reaches.

Dynamics -- both large and small scale -- are the single most important characteristic of musical reproduction for me. I believe that the linear reproduction of level changes -- not merely overall loudness -- is the major factor that helps reproduced music sound live, passing the outside-the-room test, where live sound is always recognizable. The SCS4Ts were very dynamic. I'm not sure they were quite as dynamic as my reference speakers, but they were certainly close. And I suspect that the Thiel speakers sound a bit cleaner. The guitars almost exploded on *The Pentangle*, while the hard piano strikes soared on the *Kissin Pictures at an Exhibition* [RCA BG2 63884], another recording I always use as a starter because of my familiarity with it. On the other end of the dynamic scale, the SCS4T was also very good at low levels. This is mentioned every now and then in reviews and usually cited negatively, when a speaker seems to require lots of power to open up. It is a sign of a speaker that is dynamically compressed, and this compression is more detrimental at low levels. The SCS4Ts may not be highly sensitive, but they also don't seem to need a great deal of power to sound their best.

Transparency and retrieval of detail were superb, and I had a gut feeling that this was consistent with the

speaker's dynamic agility. *The Pentangle* and the *Kissin Pictures* were good musical examples of what the SCS4Ts could achieve. The overall aliveness of the speakers imparted a sense of transparency to the sound. It was easy to follow the decay of each note over time, the changes in tone as notes faded away being indications of the speakers' ability to portray nuance and detail.

Soundstaging was very realistic with both large-and small-scale music. I say "soundstaging," not imaging, because I'm not referring to the stereoscopic positioning of individual musicians, but to the continuous natural

spread of sound in three dimensions, as we hear in the world around us. Of course, this requires software that captures it, like two wonderful old demo recordings. The previously cited *Rutter Requiem* was obviously captured in a very large space that's continuous from right to left, top to bottom, and front to back. The instruments and voices filled the space as they would for a live performance, and the volume extended beyond the speakers, even though my listening was in the extreme near field. Switching to a smaller-scale recording like the classic *Jazz at the Pawn Shop* [Proprius PRCD 7778] gave a similar experience, except the venue was now

that of a small coffeehouse and the perspective was of sitting at a table fairly close to the band. I could almost feel the atmosphere of the performance -- almost smell the cigarette smoke in the room.

At this point, I guess it's obvious that I find the SCS4T to be a very high quality speaker, one whose design and performance belie its reasonable price. It's small and easy to place within a listening environment, and it provides minimal visual intrusion. Because of that it should make a marvelous speaker for use in a home-theater system.





If you can't use floorstanders as your rear and center-channel speakers, the bookshelf SCS4 is a perfect complement to the SCS4T. It uses the same driver in a smaller box. Thiel also makes some very interesting subwoofers. For two-channel listening, you'll want to use the SCS4Ts in a space that isn't too large, in which case they will provide a clear window to the equipment in front of them and your music.

I still don't know if I can hear the benefits of linear phase, but, based on my time with the SCS4T, the results seem sonically important.

Anything that leads to a more accurate signal can only be good in my opinion. I generally hold back my enthusiasm, but that's hard to do here. As my friend Murray, who designed my reference speaker system, would say, the SCS4T would "definitely earn an Allen OK," a grade I give only to products I would consider owning myself.

Price: \$3690 per pair in black ash, natural cherry and dark cherry.

Warranty: Ten years parts and labor.

Thiel Audio Products
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Associated Equipment

Analog: VPI HW-19 MK1 turntable with MK4 platter and VPI Isolator suspension, Fidelity Research FR64fx tonearm, Entec Black cube phono stage, Shure V-15 V cartridge with Jico SAS stylus, Technics EPC 205 cartridge with Jico SAS stylus, Sumiko headshell.

Digital: GeorgeMark Audio DAC/line stage, Pioneer DV-563A DVD player (used as a CD transport), two Monarchy DIP digital processors in series.

Preamplifier: GeorgeMark Audio DAC/line stage.

Power amplifier: Sunfire 300.

Loudspeakers: SEAS Froy III with two 18" woofers and two external passive crossovers.

Interconnects: Harmonic Technology (unnamed).

Speaker cables: Fulton Gold.

Power conditioners: API Power Wedge II.

Equipment rack, platforms and accessories: IKEA screwed-and-glued stacked coffee tables used as an equipment rack, modified Lead Balloon platform, caster cups and squash balls for isolation, Mod Squad Tip Toes, VPI Bricks, VPI HW-16 record cleaner.