



## Hsu Research 5.1 Loudspeaker System

*Doug Blackburn*

Hsu Research was founded in 1991 in Southern California following Dr. Poh Hsu's completion of his engineering PhD from MIT. The early Hsu subwoofer products were focused on producing full-range bass down to 16 Hz without the final product being grossly expensive. Dr. Hsu's first subwoofers were modestly priced and constructed using a high-density cardboard tube (sono-tube) seven feet long. These tubular subwoofers could be placed vertically in a corner or laid down on the floor horizontally behind a couch or otherwise hidden. The subwoofers Hsu sells today are more conventional designs, cuboids with built-in amplifiers, ports, and various controls used for integrating the subwoofers with home theatre and stereo audio systems.

Hsu sells their products direct, through their Web site, [www.hsuresearch.com](http://www.hsuresearch.com), at very attractive prices with a 30-day return policy. If you are looking for a complete system, there are several "bundled" systems available at additional savings over the single component prices. The review system is the same as the Enthusiast 3 system bundle minus the rear surround loudspeakers. The main front loudspeakers and surround loudspeakers are Hsu's HB-1 MK2 bookshelf loudspeaker (\$149 each in satin black) with a horn-loaded compression tweeter and a 6.5-inch woofer in a medium-sized enclosure with a single port on the back and all-metal binding posts that are recessed at the back of the loudspeaker. The center channel loudspeaker, the HC-1 MK2 (\$239 each in satin black), uses the same components, but there are two woofers with the horn-loaded compression tweeter in the center of the two woofers. The cabinet size is expanded to provide room for the second woofer, and there are two ports on the back. The subwoofer is Hsu's VTF-3 MK4 (\$699 in satin black). The modest cost of this subwoofer belies the claimed frequency

response down to as low as 16 Hz, unprecedented at the VTF-3's price, and darn near unprecedented even at multiples of the VTF-3's price. Can a \$700 subwoofer really do 16 Hz in a big room? We shall see. All of the loudspeakers in the review system have the standard durable satin black finish, while rosenut wood grain finish is available as an extra cost option on most models.

Hsu's product line currently features six subwoofer models, an interesting mid-bass module, one bookshelf loudspeaker, one center channel loudspeaker, and one in-wall loudspeaker based on the components used in the bookshelf loudspeaker. Subwoofers are clearly the focus of Hsu's product line starting with the \$299 STF-1, but the bookshelf and center channel are forces to be reckoned with in their price ranges. The subwoofer line tops out with the ULS-15 at \$1,099 in satin black and rated down to 15 Hz +0/-1 dB. But that's not as low as you can go with Hsu subs. They offer package deals with two or four ULS-15 subs. The four sub Quad Drive system goes for \$3,999 in satin black, and Hsu says four of these subs will get you down to 10 Hz in most rooms while delivering up to 16 times the output of a single ULS-15. Of course, we don't hear 10 Hz, but it might add to the mayhem if present in a movie soundtrack, say, during an earthquake scene or something similar.

Most people probably hear little or nothing at 20 Hz and lower. Females, according to numerous sources, don't hear low frequencies as well as men. We've proven that in our house many times when I hear things outside that my wife cannot hear, even if they go on for some time. That can even happen with the windows closed and me in the finished-basement theatre room while my wife is upstairs. If I say, "What was that?" I usually get "I didn't hear anything." Even if I say, "There it is again." She still doesn't hear it. But even if you can't hear 20 Hz or lower, you sure can feel it. You feel it through the floor, through the furniture, in various parts of your body (for me it's usually chest and legs), and just in the air in general.



### HB-1 MK2 Bookshelf Loudspeaker

For use in the front channels, these were mounted on loudspeaker stands that placed the tweeters slightly above ear level. Flexible adhesive was used to “stick” the loudspeakers to the support plate of the sand-and-shot-loaded (for damping of resonances), all-metal loudspeaker stands. This adhesive is one of the best ways to hold a loudspeaker on a stand. It is sold under a variety of brand names like Blu-Tak and Fun Tak. I got a Borden’s brand product at a national chain office supply store. Look for “flexible adhesive” or some variation of that on packages. Some home improvement centers may carry a similar product. It’s somewhat like chewing gum, but it doesn’t dry out and get hard. Place four pea-sized blobs on the loudspeaker stands’ platform. Align the loudspeaker and lower it onto the adhesive, then squeeze down (apply weight on top) to compress the adhesive. For a couple of dollars, you isolate the loudspeaker from the stand as well as couple the loudspeaker to the stand with the same product. The adhesive is strong enough to prevent the loudspeaker from being easily toppled off the stand as well. But if the day comes when you do want to separate the loudspeaker from the stand, it is easily done.

The surround loudspeakers in the back corners of the room were placed on brass cones on top of MDF storage cabinets that happen to be just the right height to be used as stands for bookshelf loudspeakers. The sturdily framed grille cloth sticks to the cabinet with magnets. Rather than the predominant molded plastic binding posts, the Hsu bookshelf and center channel loudspeakers use all-metal multi-way binding posts that work with spades, banana plugs, pins, or bare wire. Take special care with bare wire, as any loose strand of wire could short to the other post.

The loudspeakers are revealing enough that using good loudspeaker cable rather than zip cord (lamp cord) or other “economy” cabling is worthwhile. There are some really good moderately priced cables available from some big-name cable manufacturers that provide worthwhile sonic benefits. I keep some “treated” zip cord (DeoxiT applied to the bare ends to stop oxidation of the bare copper as far in as air can penetrate) available for periodic comparisons. I found entry-level cables from Monster, AudioQuest, Blue Jeans, and DH Labs easily outperformed zip cord. You can even find used or discontinued branded cables being sold online for typically half the original price, or even less.

I have this nagging prejudice from the 1970s through the 1990s that I hate the sound of horn drivers and have never been impressed with the sound of loudspeakers equipped with one or more of them. It’s almost as if there’s an unconscious fingernails-on-a-chalkboard thing going on. I almost cringe when forced to listen to horn-equipped loudspeakers. But I have to admit, some of the more recent horn-equipped loudspeakers do not have that old character and they can actually create some space/air/dimension in the soundfield. These loudspeakers are in that category. There’s no overly etched or shout-y character to these horns. The sound isn’t flat and dimensionless either. In fact the only disconcerting thing about the loudspeakers I really didn’t like was the appearance of the silver compression driver at the bottom of the black “throat” of the horn with the grille covers removed. It looked like a silver eye in a black tunnel. Using the grille covers solved that visual issue. I suppose some owners will actually like the look since it is different than most loudspeakers.

### HC-1 MK2 Center Channel Loudspeaker

The drivers and construction of the HC-1 MK2 are the same as the HB-1 MK2, but the cabinet is larger, to accommodate the second woofer. In most installations, the HC-1 will likely be laid-down horizontally, though, you could use the loudspeaker vertically as well and get better horizontal dispersion characteristics. In fact, the HC-1 could be used for any channel. You could use one horizontally for the center channel and use six more standing vertically for the front, side, and back loudspeakers, though, it’s unlikely you would need any more loudspeakers than four or six HB-1 bookshelves for the main, side, or rear locations. The HC-1 includes a separate “bottom” plate for use when used horizontally as a center channel loudspeaker. There are a couple of guide ribs that keep the HC-1 centered on the plate and allow it to be tilted easily so it is aimed towards the listeners’ ears. I put two-inch tall brass cones under the plate, but flexible adhesive would also be useful and more stable if the loudspeaker was somewhere a kidnik or pet could bump it.

### Thoughts On Audio Measurements

It’s essentially impossible to know what an audio system is doing if your ears are your only evaluation tool. When you install a subwoofer, especially one that has tuning options like the VTF-3 MK4, you’ll be lost without some way to measure what you are hearing. I’m mostly out of date on the best choices for measurement instruments at moderate prices. The analog Radio Shack sound pressure level meter was a longtime favorite but it seems to no longer be available. I have one, but it needs some help to get accurate readings at low frequencies (thanks to Hsu for providing this information); you have to add 12 dB to 16 Hz measurements, add 7 dB to 20 Hz measurements, add 4 dB to 25 Hz measurements, and add 2 dB for 31.5 Hz measurements. Your best source for a measurement microphone recommendation that’s not terribly expensive is probably online forums. Be sure you are specific about using it primarily for bass and lower-midrange measurements from 16 to 250 Hz. Accuracy in that range is more important than accuracy at higher frequencies. You could even get your computer involved using “free” RoomEQ Wizard software with a USB microphone or with a conventional microphone and a separate analog-to-digital converter (for the analog microphone feed) with a USB output. RoomEQ Wizard can provide the test tones itself if your computer has a compatible audio output. Hsu ships a CD-R with each VTF and ULS subwoofer that they compiled with the Boston Audio Society. It contains live music recordings made by BAS members and bass test tones from 16 Hz up to the lower midrange. It can be difficult to find 16 Hz test tones, so this disc can be very useful.

Audio measurement is a big topic and it’s fascinating. But if you don’t have the time, or inclination, or interest in learning, you can hire



an audio calibrator to get things set up far better than you could ever do by ear. The Home Acoustics Alliance (HAA) is the ISF of audio calibration. Certified audio calibrators are listed on their Web site. THX® also certifies audio calibrators, though, some may work only on commercial/industrial jobs. But the THX Web site is also worth checking to locate local THX-certified audio calibrators. We spend a lot of time talking about video calibration in display reviews, but little or no space is devoted to audio calibration. Personally, I find audio just as important for home theatre as video. So if video calibration is important, so is audio calibration.

### VTF-3 MK4 Subwoofer

The “VT” part of the model name stands for variable tuning. The VTF-3 MK4 has all the tuning, input, and adjustment capabilities you could ask for. There are the usual items like a volume control, phase reversal (0/180) switch, and crossover frequency control. Other features include: stereo line level inputs (you can bypass the crossover to make this an LFE input); Q control; off, on, auto power control; two EQ settings; high-level (amplifier) inputs; and crossover bypass switch. The Q control alters the “Quality” factor, a loudspeaker design parameter. The setting range is 0.3 to 0.7. Low settings reduce deep bass a bit, while adding a small boost in the mid-to-upper bass region. Low settings may be useful for smaller rooms and are definitely useful for high SPLs. Higher Q settings extend bass response to lower frequencies, while not boosting the mid-to-upper bass. For larger rooms, higher Q settings may work best. But every room has its quirks and there is no way to know the best combinations of settings for your room without measurements. I guessed about the right settings for this room before doing measurements, and I wasn’t close. The results you get after measurements will change how you perceive this, or any other subwoofer.

The VTF subwoofers ship with closed-cell foam plugs blocking both ports. The owner can remove one or both port plugs as desired, for more bass power or more bass extension and lower distortion, with less total power available. The VTF manual discusses the role of the ports and plugs, though, it certainly does help to be able to make measurements to determine what combination suits your room best.

The LFE and stereo line level inputs shouldn’t be used at the same time. If you want to use both connections, it would be best to use an external switch to change between stereo and LFE if you don’t want to be manually moving interconnects to do the same thing. The high level inputs are intended to be used to connect the VTF-3 MK4 directly to the amplifier. If you use the high-level inputs, the VTF-3 MK4 won’t use any amplifier power since it has its own internal amplifier producing up to 350 watts continuously, or as much as 1400 watts for short durations.

The first thing you notice about the VTF-3 MK4 is that it is larger than most other subwoofers you’ll find in the \$500 to \$1,500 range. I’ve even seen \$4,000 subwoofers smaller than the VTF-3. Your wife or interior decorator may not appreciate the size, but no petite subwoofer can hope to produce 16 Hz, nor maybe even 25 Hz. The VTF-3 MK4 was capable of 90 dB at 16 Hz in my room without even working hard. In fact, in this room, the VTF-3 had to be adjusted to limit the energy it delivered at 16 to 20 Hz to keep those frequencies from being too loud. Many subwoofers in the VTF-3’s price range employ 10-inch or 12-inch drivers in enclosures that are somewhere in the 12- to 15-inch range for each dimension. That’s about one cubic foot of volume, and less than that when you take away the space required for the internal amplifier, internal bracing, and the subwoofer structure and magnet(s). The VTF-3’s outside dimensions occupy 5.5 cubic feet, leaving an estimated 4+ cubic feet inside. That is a big difference when it comes to making deep and powerful bass. The smaller the subwoofer box, the harder it is to make deep bass, and the harder the driver works to produce deep bass. When you see a subwoofer as physically large as the VTF-3 MK4, chances are you are going to get some pretty good deep bass, unless the design is a complete disaster. The VTF-3’s bass

## SPECIFICATIONS

### Features – HB-1 MK2 Bookshelf Loudspeaker

One 6.5 inch woofer  
One horn-loaded compression tweeter with neodymium magnet and ferro-fluid cooled voice coil  
One rear port  
¾-inch MDF cabinet  
Recessed metal multi-way binding posts  
Magnetically attached grille cover

### Specifications – HB-1 MK2 Bookshelf Loudspeaker

Frequency Response: 60-20,000 Hz (+/- 2 dB)  
Nominal Impedance: 6 ohms nominal, 4 ohms minimum  
Crossover Frequency: not specified  
Crossover Type: not specified  
Sensitivity: 92 dB  
Recommended Amp Power: 10-250 watts  
Dimensions (HxWxD): 15 x 8 x 8 (inches)  
Weight: 12.2 lbs  
Warranty: 7 years parts and labor  
Direct Sale Price: \$149 satin black, \$179 rosenut + shipping

### Features – HC-1 MK2 Center Channel Loudspeaker

Same as HB-1 MK2 except two 6.5-inch woofers and two rear ports

### Specifications – HC-1 MK2 Center Channel Loudspeaker

Frequency Response: 60-20,000 Hz, +/- 2 dB  
Nominal Impedance: 12 ohms; 8 ohms minimum  
Crossover Frequency: not specified  
Crossover type: not specified  
Sensitivity: 92 dB  
Recommended amp power: 10-250 watts  
Dimensions (HxWxD): 8 x 23 x 10 (inches)  
Weight: 21 lbs  
Warranty: 7 years parts and labor  
Direct Sale Price: \$239 satin black, \$279 rosenut + shipping

### Features – VTF-3 MK4 Subwoofer

One 12-inch side-firing woofer  
Dual rear ports can be used with 0, 1, or 2 plugs to tune bass response  
Variable Q tuning for additional tuning flexibility  
16 Hz-capable with one port open  
Input options: stereo line level, and amplifier level inputs  
Crossover bypass switch—switching crossover to “out” bypasses internal crossover  
Volume control  
Phase switch, 0- or 180-degrees

### Specifications – VTF-3 MK4 Subwoofer

Frequency Response (1 port open, EQ1 setting, Q=0.7): 16 Hz to crossover setting +/- 2 dB  
Frequency Response (2 ports open, EQ2 setting, Q=0.7): 22 Hz to crossover setting +/- 2 dB  
Crossover Frequency: adjustable from 30 Hz to 90 Hz, bypassable, 24 dB/octave slope  
Amplifier power: 350 watts continuous; 1400 watts peak  
Q-control range: 0.3 to 0.7  
Power consumption: 430 watts (at 350W output)  
Dimensions (HxWxD): 22.5 x 17 x 25 (inches), without feet or grille  
Weight: 80 lbs  
Warranty: 2 years on electronics, 7 years on rest of sub  
Direct Sale Price: \$699 satin black; \$799 rosenut + shipping

Designed in: USA  
Manufactured in: China

### Manufactured By:

Hsu Research  
985 North Shepard Street  
Anaheim, California 92806  
Phone: 800 544 0150  
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capacity makes the bass produced by other subs I’ve reviewed in the \$500 to \$1,500 range sound anemic. Hsu has used all that internal volume to fantastic effect. You just can’t get bass like this from a small box.

### Amplifier Requirements

The HB-1 MK2 and HC-1 MK2 are extremely easy to drive and very undemanding of the amplifier. That means you can drive them with just

about anything from a 50-watt-per-channel AVR to an excellent stand-alone amplifier. Of course, if the amplifier doesn't have very good sound, you're not going to hear the best these loudspeakers can deliver. Based on my experience with them, I don't think they have an upper range in regards to amplifier quality. They just kept sounding better and better as I used better and better amplifiers. The one entry-level AVR here is maybe 12 years old with 50 watts per channel. That sounded pretty poor when driving the Hsu loudspeakers, but it has never sounded good driving any loudspeakers. I mention that experience only to point out that these loudspeakers will definitely let you know if you are using amplification that's not particularly good.

## Stereo Sound

A pair of HB-1 MK2 bookshelf loudspeakers was used for the stereo music evaluation. I found these to be a fantastic sonic bargain at \$298 per pair (plus shipping)—easily competing with other loudspeakers in that price range and sounding better than most of the competition. Bass response was surprisingly robust, and Hsu's -2 dB specification at 60 Hz was realistic rather than the typical over-optimistic specs you see for other loudspeakers in this price range. I didn't have to place these loudspeakers in a corner to reinforce the bass either, they were way out in the room with maybe nine feet of space behind them, several feet to the side walls and 20 feet in front of them. Dr. Hsu recommended severe toe-in so that the axes of the loudspeakers crossed about two feet in front of the main listening position for stereo music. And, surprisingly, I did like that unconventional setup option, as it gave a bit more of a sense of space than more conventional aiming of the loudspeakers with the axes aimed a little outboard

not only hear 16 Hz but for it to be powerful and not just some kind of over-hang-y distorted afterthought. I had no test tones below 16 Hz, but 16 Hz was so strong I have to believe there were a couple more Hz down there that were going to be well represented in spite of the VTF-3 specification being -2 dB at 16 Hz with one port open and -2 dB at 25 Hz with two ports closed. In fact, I was getting strong 16 Hz response with both ports closed and the VTF-3 MK4 being positioned well away from walls and corners. Bass is fickle, though, you may get similar or different results in different rooms.

It's not so much that 16 Hz is audible as it is that 16 Hz capability provides a weight and solidity to higher-bass frequencies present in the soundtrack. A powerful explosion is going to be impressive if the subwoofer can do 25 Hz with good power. But when the VTF-3 MK4 throws 16 Hz into the mix, you get the same powerful explosion, but it has an extra foundation of terror-inducing room and furniture shake. I found when the subwoofer and other loudspeakers were well integrated so that the system's measured response was at the same level as the other loudspeakers, bass sounded a little reticent, borderline boring. But bringing down the level of the five loudspeaker channels by 1.5 dB and raising the sub by 1.5 dB upped the ante by just the right amount. That's a perfect example of using measurements to know what the system is doing (or not doing) then using observational results to make changes to get the bottom end to do its part, a major part in my opinion, for the soundtrack. In this room, other subwoofers in the \$500 to \$1,500 price range have been pretty much given their all by the time they get down in the range between 25 and 30 Hz. There is one entire octave between 16 and 32 Hz. I don't know about you, but for me, this is one of the more exciting octaves in a movie soundtrack. It doesn't get used all that often. When the low frequencies are there, the VTF-3 MK4 really delivered the room-shaking

IT'S DIFFICULT TO UNDERSTAND HOW, AFTER MORE THAN 20 YEARS IN BUSINESS, HSU RESEARCH DOESN'T OWN THE SUBWOOFER MARKET OUTRIGHT.

of the main listener's shoulders and crossing somewhere behind the listener. But the latter aiming worked better for surround sound.

I've heard loudspeakers in this price range with a little more air and space in the presentation, but the HB-1s weren't as completely dimensionally flat as some other horn-equipped loudspeakers I've heard. I didn't hear anything in the presentation that called attention to the crossover between the horn tweeter and the 6.5-inch woofer. And the sound did not obviously change character when it transitioned from one driver to the other.

The HB-1s deliver all the "basics," even if some of the filigree is missing. Even though I had several other loudspeakers here that sell for many multiples of the cost of the HB-1s, I didn't feel like I was in the penalty box when listening to the HB-1s. I still greatly enjoyed music and was consistently surprised by the performance in the bass and upper bass regions. Every type of music I tried sounded great. And these little guys would play L O U D without obvious stress, though, if there was some powerful electric bass, you could push the woofer and port to deliver a little distortion and chuffing, but it was surprisingly minor. I wouldn't necessarily use them as party loudspeakers, but I can't imagine anybody wanting to listen to music louder than these can go. Aside from being easy amplifier loads, they are fairly sensitive/efficient at 92 dB per watt, so a powerful amplifier is not a requirement.

Adding the VTF-3 MK4 subwoofer connected for stereo music playback using line level inputs from the preamp, the VTF-3 delivered excellent bass extension, with 16 Hz and 20 Hz registering the same sound pressure level as 160 Hz. And that is remarkable. I've never heard 16 Hz from a subwoofer before in this room. It was stupefying to

power with excellent control. I try to be realistic and honest in my evaluation of products in reviews. If I don't use superlatives in a review, it's because the product didn't deserve superlatives. The VTF-3 MK4, as far as I'm concerned, is the best subwoofer money can buy for less than about \$1,750. I'd be willing to revise that limit upward if it's justified, but I need to experience more subwoofers that sell for more than \$1,750. I've heard plenty of them at various industry shows, but you can't really rely on what you hear at shows to translate to what you'll hear in a home theatre room. The VTF-3 MK4 is so impressive that it is taking a permanent spot as the primary subwoofer in my reference system. Having a sub that can produce 16 Hz to 25 Hz with great power and authority will make it more obvious when some other subwoofer can't reach the depths the VTF-3 reaches in this room. Sure you don't get 16, 20, or 25 Hz very often in music, but it is there for fans of organ music and some synthesizer recordings that make full use of the audio spectrum. In addition, fabulous recordings like Ladysmith Black Mambazo's 1987 album *Shaka Zulu* (many tracks also on the 2000 compilation *The Warner Bros. Collection*) can have unexpected treats just waiting to be heard. On the a cappella song "Wawusho Kubani?", you might not expect any bass to speak of, but the whole 10-man group uses their feet for rhythm, and the recording stage they used was incredibly resonant. So the multiple feet stomping in unison create some very deep and strong bass rhythm that builds to a thrilling crescendo towards the end of the song. Hearing recordings like this in all their full-range glory will thrill you and visitors in your theatre room.

All that said, there are limits to what two-way bookshelf loudspeakers can do for \$300 per pair. The sound isn't as refined, transparent, or



spacious as high-quality, meaning expensive, loudspeakers. Think of them as the bad boys of the loudspeaker world—like a 15-year-old 100-horsepower Japanese compact converted into a brand-new 400-horsepower street fighter that can hold its own in a drag race or on a road racing course—the work done by a meticulous obsessive-compulsive perfectionist. It may not be as suave as an exotic car, but it will get around the Nürburgring just as quickly. That's what you're dealing with here; maximum bang for minimum bucks. You may find another loudspeaker in this price range that has a more spacious sound, but it's likely that loudspeaker won't match the bass capabilities of the HB-1/HC-1. You may find another loudspeaker that has more detail, but it can't handle the SPLs and dynamics the HB-1/HC-1 can deliver.

## Surround Sound

I don't think there's a loudspeaker system in existence that can do what this 5.1 system does for anywhere close to this amount of money—\$1,534 with individual prices, but only \$1,599 for the Enthusiast 3 bundled 7.1 system with six HB-1 MK2 loudspeakers, plus shipping. 16 Hz to 20,000 Hz at that price is almost unimaginable. The only competition I can think of is Hsu's Enthusiast 2 5.1 system (\$1,249 plus shipping) with just four HB-1 MK2 loudspeakers and the slightly smaller VTF-2 MK4 subwoofer. The VTF-2 MK4 subwoofer "only" goes down to 18 Hz per Hsu's specifications.

The VTF-3 MK4 delivers such deeply extended bass, I was hearing things in movies and TV programs I never heard before. Who knew there was sub-25 Hz in *any* TV programming? I didn't. Not that it is common, but it did happen often enough to be surprising and was fun to hear. At those low frequencies, half the fun is feeling the bass in your body and resonating through the furniture. The most listening fun you'll have with a full-range subwoofer is likely to be when watching action, thriller, and science-fiction movies on Blu-ray Disc™. Having the whole room involved in the bass is amazing, and every "big" scene you can think of gets even better with the VTF-3 delivering a full measure of the lowest frequencies that show up in movies. Of course, you want some balance. You want the low frequencies to be subtle when required and powerful when required. The fireworks scene near the beginning of *Lord Of The Rings: The Fellowship Of The Ring* makes good use of the subwoofer in a more restrained manner. You hear and feel the distant booms of the fireworks, but it's not overdone.

Other subwoofers have seemed impressive until hearing what the VTF-3 MK4 does with the same soundtracks. The *Transformer* movies, *Terminator Salvation*, and *The Chronicles Of Riddick* are all great examples of how much more you hear and feel in the soundtracks when you hear everything down to 16 Hz. In *Riddick*, the extra bass capability gives you more of a "you are there" experience. When the Necromongers arrive at Helion Prime, the ground-based artillery has an additional dimension of power that's missing with more typical subwoofers. Then there are the sounds of the Necromonger interstellar ships, fighters, and transports... all with unique flavors—to the sounds they make with the subwoofer doing its part to make each ship have the right "feel" for its relative size. *Terminator Salvation* has a very dynamic soundtrack, and the entire Hsu 5.1 system did an amazingly good job of creating spaces and delivering the dynamic demands of this soundtrack. The subwoofer is an almost-constant element of this soundtrack, with many instances of very low frequencies at many different volume levels with many different textures. The VTF-3 always delivered exactly what the soundtrack demanded. Once you hear what the VTF-3 does, you immediately begin planning how you're going to come up with the time to watch every action movie in your collection again. Other subs only hint at the variety and power in the deep bass that the VTF-3 MK4 delivers. It's crazy that a \$699 subwoofer can do this and embarrassing to all the other subs that cost as much or much more without delivering the same level of deep bass performance. The whole point of subwoofers is deep bass that's not rolled off. This ain't

no wimpy hipster "lifestyle" system, this system is badass in the best ways possible.

The HB-1/HC-1 loudspeakers don't have the "whole new level of performance" thing going for them, but they are *really* good loudspeakers in their own right. Combined with the VTF-3 MK4 sub, you end up with a true full-range system with no holes in the frequency-response curve once everything is configured as best it can be. The five channels create believable sonic spaces, deliver the full emotional range of soundtrack music, and produce well-integrated phantom images when sounds exist in two or more channels at the same time. Since all channels use identical components, the channel-to-channel match and sonic envelopment are excellent. The total environment created by the Hsu 5.1 system was always very convincing and always conveyed the intent of the soundtrack unambiguously. The tension the HB-1/HC-1 system produced during *Terminator Salvation* was palpable. Most of the time, the soundtrack propels the story with tension, anticipation, fear, or flight, and the HB-1/HC-1 combo delivered it in spades. Add the VTF-3 MK4 sub and you end up reacting physically to the movie, tensing muscles unconsciously, and heart rate jumping up during the most tension-laden scenes. When a sound system consistently delivers the goods like this one, it's pretty obvious you're listening to something special.

## Summary

It's difficult to understand how, after more than 20 years in business, Hsu Research doesn't own the subwoofer market outright. The level of performance of the VTF-3 MK4 subwoofer is a whole order of magnitude (or two) better than the competition. The ability to produce 16 Hz at realistic levels in large rooms is not something common or even available from most other subwoofers. The HB-1 MK2 and HC-1 MK2 bookshelf and center channel loudspeakers are excellent performers at their very modest prices, though, perhaps somewhat overshadowed by the all-conquering awesomeness of VTF-3 MK4 subwoofer. I think it would be pretty safe to say that the VTF-3 MK4's only competition is Hsu's own top of the line ULS-15. Two or four ULS-15 subs in a single system would likely challenge any low-bass system at nearly any price. If you've read my reviews in *Widescreen Review* for a while, you know I don't throw around superlatives lightly. I've *never* encountered another product that moved me to use anything remotely close to "all-conquering awesomeness" before, but the VTF-3 MK4 is the real deal. Even if you can afford a more expensive subwoofer... the VTF-3 MK4 (or maybe the ULS-15) is almost certainly a better subwoofer. The HB-1/HC-1 MK2 system is highly recommended, but the VTF-3 MK4 is spectacular by any standard, and at \$699 plus shipping, it's a phenomenal value too. **WSR**

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