



A STEREOMOJO EXCLUSIVE
WORLD'S FIRST REVIEW



HSU HB1 MK2

List Price \$300-\$398/pair depending on finish

Auxillary HSU VTF-3 MK3 Subwoofer \$649 - \$799 depending on finish

Three-hundred-dollar-per-pair speakers are not our usual fare at Stereomojo. Our speaker selection usually starts at about \$2,000/pr and goes up to about \$25,000. We specialize in the "affordable high-end". And yes, with speakers costing as much as \$250,000/pr, \$25,000 is relatively "affordable". We think anything much beyond that crosses the threshold into "luxury" products where the performance increases are small and come at a very high cost.

While the Hsu's certainly meet the "affordable" requisite, who would think these unassuming bookshelf speakers would meet the second criteria? We confess that we did not, that is, until our publisher wandered into the HSU Research room at CES earlier this year. His experience there, including an extended visit with Dr. Hsu (pronounced "shoe") who promised us the first pair available for review when they reached production, led to this review.

It's easy to create a loudspeaker. It's hard to create a great loudspeaker. It's darn near impossible to create a great loudspeaker at a great price. Somebody must have forgotten to tell Dr Hsu about this when he designed the HSU HB1 MK2. The MK2 version is the direct result of a newly designed crossover compared with the original HB1. In addition, there is a new driver for the tweeter (much stronger Neodymium magnet, lower moving mass diaphragm), and a new horn. Also, cosmetically, there is a new magnetic grille that has more of a shape (the MK1 uses a plain rectangular grille), and much nicer finishes.

Background



Rosenut

Size matters. In the case of speakers, larger typically gives you more and deeper bass in addition to better power handling while smaller speakers tend to image better and have a higher Wife Acceptance Factor. A system with small speakers that image well combined with a capable subwoofer is now commonplace and slowly gathering acceptance by even the audio purists. Twenty years ago Dr Hsu demonstrated an astronomically huge



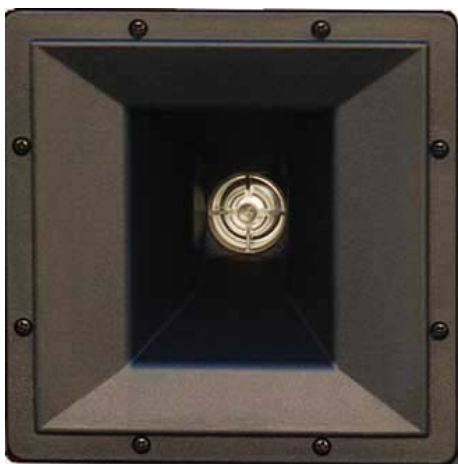
subwoofer to the Boston Audio Society which really impressed with dynamic, deep, well controlled bass. Twenty years later, he returns with smaller but potent subwoofers and the HB1 MK2 to complete the solution.

There are benefits to a three piece ensemble in comparison with large full range speakers. By moving the bass capabilities to a separate box, one can use much smaller speakers that can be placed where they image better and look less obtrusive. The bass module can be placed where it works best in the room and can be separately adjusted specific to the listening area. If the crossover is low enough and the system is adjusted correctly it's a win-win situation. I should mention up front that having heard HSU subwoofers several times in the past, I was a fan of HSU and already biased to be impressed with the HB1 MK2. The bar was set high.

The "VTF" in the model name signifies "Variable Tuning Frequency". Dr. Hsu explains it like this: *"The reason for variable tuning is that all subwoofer designs, especially consumer-level subwoofers, involve tradeoffs in design. You cannot have a small subwoofer that goes very low, plays very loud and costs very little. Traditionally, the engineer decides what tradeoff he or she thinks is best for the consumer. The consumer has to take it or leave it."*

The VTF-3 MK3 changes all that. It allows you, the user, to choose the tradeoff. If you enjoy music that is loud but does not have much deep bass, set the VTF series for maximum output. That way, you get maximum dynamic range with the lowest distortion. If you like music with deep bass, set it for maximum bass extension to reproduce the deep bass accurately. You can even switch between the two modes depending on what you play. That means effectively you get a subwoofer that can play loudly, and can play low, all in one, at a reasonable price".

Details



The HB1 MK2 is a 15" high bookshelf monitor that is only 8" wide and 8" deep. The shallow depth allows this speaker to actually be placed on a bookshelf. The woofer is a treated paper cone with a cloth surround. Looking at and touching the woofer indicates that it's treated in such a way that it feels more like a poly cone. The cone is smooth, shiny, and also quite stiff. Dr Hsu, being a fan of full range drivers, wanted to keep that same inherent controlled directivity but gain in terms of dynamics and transparency when creating the HB1. This led directly to horn loaded tweeters. A horn tweeter?!? I was skeptical too but we need to be open and listen.

The crossover is at 2 KHz where the woofer directivity matches that of the horn. The electrical crossover slope is 18db/octave for the tweeter and 12db/octave for the woofer. Each slope is chosen with respect to the particular characteristics of the driver. When combined with the acoustical roll offs of each driver, the acoustical crossover slopes match for both drivers resulting in good phase alignment. The crossover was designed using state of the art software and then tweaked by Dr Hsu until he thought it sounded good.

The attractive grills are held on with magnets that grab the cabinet with the tenacity of a snapping turtle. Watch your fingers when putting them back on once you eventually get them off. They are held on tight so you won't find them slipping or buzzing. Their brutish thickness adds durability and good looks but it also intrudes on the sound. Care was taken to minimize the grill diffraction by rounding over the outside and inside edges of the grill but these DO sound better with the grills off. In comparison, Wilson Audio designs their speakers to sound better with the grills on. As an amateur speaker designer and builder, I do the same. Grills hide the pieces that attract children's attention which is quite important to some.

The HSU HB1 MK2 was designed from the ground up to work with a subwoofer. They reach down to 60Hz but a subwoofer is definitely recommended as is crossing them over at 80Hz if possible. Dr HSU was kind enough to send a subwoofer along with his speakers for review. Given that this review concentrates on the monitors themselves, I will quickly just mention that the VTF-3 MK3 subwoofer was excellent. It integrated easily with three different speaker sets, went deeper than I have ever heard in my home, and was amazingly accurate and strong with music. A slam dunk. It was also capable of some serious SPL with little to no port noise and didn't even rattle the cheap lamp I put on it. I essentially used it as an end table to a loveseat in my listening room.

Controlled Directivity

Part of the reason for the horn tweeters is that they offer controlled directivity. At the RMAF last year, there were many speakers using "controlled directivity". A couple excellent examples that stood out were from Audio Kinesis and Emerald Physics. These are expensive speakers that sounded great.

The HB1 MK2 also implements controlled directivity but at a fraction of the price. Some of the main benefits of controlled directivity are reduced speaker room interaction and reduced diffraction. Room interaction can play a key role in how well a system sounds and can make or break even the best systems. High frequency reflections off the side walls, floor, or ceiling can really harm the stereo image and possibly make a room seem bright.

Diffraction off the face of the speaker and its' cabinet can be reduced using controlled directivity. Diffraction can harm the subtle queues that our minds use to recreate the stereo image. See our review of a diffraction control treatment for more in depth explanation of diffraction.

Another benefit is that Dr HSU was able to make the dispersion of the woofer match that of the tweeter at the crossover frequency. One more gain from controlled directivity is that the horn loading boosts the tweeter's lower frequencies allowing the tweeter to be crossed over higher and/or shaped such that the physical tweeter driver works less hard in the lower range of its operation. Why is this so important? It can lower distortion resulting in a cleaner sound and freedom from dynamic compression. Yet another benefit to controlled directivity is a uniform radiation pattern giving smoother and more consistent frequency response of the tweeter within the listening window.

SETUP



The HB1 MK2 boxes were easy to carry and unpack but the double boxed subwoofer, at 80 lbs, was difficult to heft up the stairs alone. This is really a two person job unless you are terribly excited and impatient like yours truly. The unpacked monitors were in a satin black finish. I went back to the website and longed for the wood finish which costs a bit more but looks so very nice. The satin black is benign which would benefit those who actually want them to disappear on a bookshelf or cabinet. The other finishes are real wood finish maple and rosewood as well as a piano black and espresso. When my kids saw them they both exclaimed "Those Are Cool!" in tandem. We all have our own tastes.

I received an email from Dr Hsu suggesting that when the speakers arrive I place them such that they are focused to meet at a point in front of me. I foolishly thought the word "front" was a typo and set them up angled in around 30 degrees. I soon learned the opposite. **Once the speakers are actually set up such that you can see some of the outside side of both speaker enclosures when seated in the middle, you're ready. This was consistent in three different listening areas and really makes a big difference with these.**

Initially, they were connected to a Jaton Preamp and a Forte Model 5 and fed both the output from a Pioneer Elite DV97A as well as a DAC AM modified by Pacific Valve. The interconnects were BlueJeansCable LC-1 and the speaker wires were Kimber 4TC. The bass was cut off from the HB1 MK2 at 80 Hz and the subwoofer was adjusted to match using a simple Radio Shack SPL meter. Later, when measuring the room, one could see that the setup went surprisingly well when I broke out the spectrum analyzer section of a WooferTesterPro. The speakers were set on 24" sand filled stands and the subwoofer was placed in the back corner of the room per HSU's recommendations.

LISTENING

After a week of break-in these speakers started to show their true character. The first day or two with them clearly reminded me that break-in is real. I popped my reference speakers in just to see if I was getting used to the sound or if they mellowed it. It was time.

Two major traits of these speakers were immediately evident. The soundstage was immense and more solid than I could believe. One can move around within the speakers and the sound doesn't noticeably change. They sound like a live performance whether the listener is right in the middle or directly in front of one of the speakers. When pushed to perform loud they are free from dynamic compression with a sense of attack on the notes and overall clarity.



My boys took a liking to them and started playing "Queen's Greatest Hits" on them over and over. With "We Will Rock You" my seven year old exclaimed "Oh... they're stomping on the stage and clapping". He had never noticed that before and felt compelled to tell me. My other son just rocked out with air guitar. These speakers are FUN. How can they cost so little was already running through my mind.

Can they do classical? Yes they sure can. In Track 1 from the Boston Audio Society test CD, the sense of space in the recording is amazing. Simply put; you are there. The locations and distances of the different sections of the orchestra seem correct although I was not there when it was recorded to actually verify that of course. What surprised me was how well the organ music was reproduced. This is where bass management for the HB1s comes into play. With real demanding music, the 6.5" woofers can only do so much.



There are clear tones centering around 25Hz, 20Hz, and 16Hz which are clearly audible as is some Doppler distortion. Ironically, it is actually in the recording and was not a function of the HB1 MK2.

Kudos to HSU for reproducing it well. In track 5, one can hear the trap door open and close as the trumpeters rejoin the ensemble.

The Dave Holland Trio "Triplicate" was great fun with the MK2 speakers. The drums really stood out with great attack and crystal clear realistic cymbals. The bass was amazingly articulate to boot. The tempo and energy through these speakers is addictive. When listening to this with my reference speakers, my speakers sound reserved, polite, sweet, and held back in comparison.



Bonnie Raitt can be a good test for women's voices as it spans a wide range being a little deep for a woman's voice but still womanly. In "Papa Come Quick" from "Luck of the Draw" her voice was portrayed

nicely with just a touch of added energy and life. When the background singers chime in they are clearly discernible. I also couldn't help note how much life and attack was in the guitars, drums, and cymbals. The bass was deep and tight and pretty much just right.

Note that these speakers will not fix a bright recording such as Prince's greatest hits. If it's bright coming in, you'll get bright coming out. These are not sweet or lush speakers, but the freedom from distortion and their clarity keep them from being annoying with bright recordings.

Got Tubes?

The HB1 MK2s are relatively efficient so one has to wonder how they perform with tubes. The impedance curve of a speaker can turn the amp into a big glowing tone control. Luckily, the impedance curve of the HB1 MK2 only has one minor flaw which is rising impedance on the top end. It rises at the speaker's box tuning frequency and is then quite smooth all the way until it hits the tweeter where it rises quite a bit. The end result is bit more of a bright sound on the top end and slightly slower thicker bass. It's better than you'd think however.

These speakers really shined when connected to a 12 watt Xindak MT-1 class A tube amplifier. There is enough definition to hear the improvements in the amplifier over the Forte and Jatón combination. The flat midrange impedance of the HB1 MK2 is clearly an asset here. Out of curiosity, I created a zobel network using a 10uf capacitor and an 8 ohm resistor and placed it across the speaker terminals. It flattened the impedance curve but actually ended up rolling off the top end of the speaker. The speakers were definitely better left "as is". The HB1 MK2 did sound slightly better out of the 4 ohm tap than the 8 ohm tap but the difference was subtle enough that one would have to judge for themselves which they prefer.



A Simple Receiver

Given their budget cost and preference towards bass management, I couldn't help but try these with a simple Denon 1508 receiver. The slower bass and less clear midrange of the Denon were still apparent. The HB1 MK2 brought forth life and excitement from my simple Denon receiver. The combination was excellent. **This is a speaker that sounds good with lower end electronics and even better with high end.**

Colorful Hsu's

One of the first visitors to hear these was Dr Hsu who kindly "adjusted" them in my listening room. **He showed that as long as they were pointed in and crossing in front of you, that they sounded great from most parts of the room. From this point on, I was floored by the sound of these speakers.** I was also impressed with the humble Dr Hsu. Usually, speaker designers can sometimes act more like rock stars and will talk endlessly about audio, tricks, tips, research, and upcoming designs. I enjoy that and was looking forward to soaking up some of this through osmosis but getting information out of him was quite difficult. He didn't want to talk about himself or his speakers unless pressed. Eventually I found out that an in-wall version of this speaker is coming out at some point and that he likes cinnamon muffins.



My friend Arthur is big music lover with a good ear. He is open to listening to anything without regard to any audio bias. He came by with a bunch of music and just fell in love with these. He just kept pouring through music shaking his head and telling me how good these were. I didn't tell him that a pair only lists for \$300 a pair until he gave me his impressions. Suddenly, he was telling me about issues he was having with his old Ohm Walsh II's and was seriously considering getting a set of these.

Another visitor, Keith, had a similar reaction. He mentioned that he was really impressed with the sound. For reference, they are voiced very close to his own system.

Yet another visitor took a look at the horn tweeter and didn't even want to hear them. He missed out on something good. Having owned horn speakers in the past, some of them can sound a bit honky and sometimes aggressive. These tweeters are amazing and just sound great and don't have that "horny" sound.

Boston Audio Society Demo

Dr Hsu came and "borrowed" his own speakers from my home for a Boston Audio Society meeting. A long time member who had since moved to California, he was welcomed back with open arms by the members. They even gave him an achievement award. Pictured is Alvin Foster handing Dr Hsu the award.



Dr. Hsu (right) receives an achievement award from Alvin Foster at the Boston Audio Society

When I arrived at the meeting, I was pleasantly surprised to see that his demo equipment was quite simple. Usually, the demos I have seen were in treated rooms with cables as fat as vacuum hoses, room treatments, cable lifters, etc. Here we had an Onkyo TX-SR506 receiver complete with long skinny zip cord and some sort of

simple transport. A bold move for sure. *His demo at CES was similar - no upscale components at all - publisher*

When the music was played, I slowly moved myself off to the side and watched the reactions. Jaws dropped and everybody got quiet as it started. Folks shuffled and jockeyed for a position that was at least near the large listening window. An older gentleman took my place and sat with his eyes closed waving an imaginary conductor's baton with a big smile. During the aforementioned song from the Boston Audio Society test CD, parts of the room's ceiling were rattling and some visibly shaking. The clock on the wall nearly fell during the 16Hz tone. The rest of the music was quite enjoyable and free from rattling the room to pieces.

When it was revealed that the price of the speakers was only \$300 for the pair and the subwoofer listed for \$650, many asked if they could just buy THESE there on this spot. Fortunately for me, they were coming back home to MY place. Yes! I did notice that the reactions were markedly positive for a group of rather talented and picky people. I had to wonder if they embellished a bit just for their friend. Then I noticed how well the sound mixed with the room and that I was really enjoying the music as much as everyone else. Never mind...

HSU & "SHU"chard



As part of our Stereomojo review process, we try as often as possible to interview the designer. Here's some Q &A with Dr. Hsu:

Question 1) When did you start getting involved developing speakers in addition to the subwoofers?

Answer) "2003"

Question 2) Did you start out with "controlled directivity" as a design goal or was using a controlled dispersion tweeter a function of an iterative design and test process?

Answer) "No. The first speaker system we developed was the Ventriloquist, which uses 2.5" full-range drivers to handle down to 200 Hz or so. I love great imaging, and full-range drivers. Their down side is a very small sweet spot. Off the sweet spot and they don't sound good at all. My goal was to design a speaker that has the great imaging of the full-range

drivers in the sweet spot, but still sounds great when not in the sweet spot. To me, controlled directivity is the way to achieve this goal."

Question 3) Do you have any strict thoughts on crossover design and topology and, if so, how did that affect the design of the HB1?

Answer) "I am quite open minded with regards to crossover topology. Given that the drivers are not perfect drivers, the crossover has to compensate for any driver shortcomings."

Question 4) Do you have any colleagues in the industry that really stand out as someone you respect and admire?

Answer) "Thilo Stompler from TC Sounds, and Dan Wiggins from Adire Audio are two highly innovative persons that I respect a lot."

Question 6) Do you have any plans for creating a "cost no object" flagship speaker?

Answer) "Maybe. I find it more challenging and fun to design speakers (and subwoofers) that are great but affordable. I like the idea of more people being able to enjoy my designs."

PUBLISHER'S COMMENTS

I heard the prototypes at CES in Vegas. Dr. Hsu was showing them in a home theater application with a flat screen monitor and video, but when I asked to hear them in a pure two-channel setup with no digital effect, he was happy to change a few things around so a CD player signal was going direct to the amp's output. I handed him the Stereomojo demo CD and sat back, fully prepared to be underwhelmed. Truth be told, I was expecting an all out assault on my ears, particularly since I had just spent a couple of days listening to systems with price tags well in excess of \$100,000. While the sound did not have the ultimate sophistication and refinement of the big boys, what I heard was not the least bit offensive and, amazingly, very engaging. Also - to repeat a word that William has used here - fun!

The little bookshelves disappeared leaving a soundstage of enormous proportions with good detail with instruments showing up well to the sides and deep in back of the petite cabinets. The presentation was zingy without excessive glare and while a bit on the bright side, it was not to the point where I wanted to flee. In fact, I stayed much longer than usual, listening to most of the cuts on the CD. Wide and very fast dynamics showed and ability to overcome what other niggling shortcomings may have been present. I particularly liked the rock and jazz cuts but the classical cuts, most with big dynamic contrasts, were very listenable as well. While I think I wanted to turn my nose up at these \$300 pikers, my ears just wouldn't let me. The little Hsu's have a way of reaching out and grabbing you. After I left, I found myself wanting to go back and listen again as if to prove to myself I wasn't nuts. I did wonder if, after time, the sound would become a bit fatiguing, but I was there for 40 minutes and experienced no trace of it. Apparently Bill and his friends didn't suffer from it either.

Dr. Hsu has a real winner here with a sound and bang for the buck that smokes anything you could get at Best Buy or Circuit City for many times the price. There is some serious Mojo happening here. I would like to hear these with a decent tube amp. I have a feeling the sound would be even more beguiling than what I heard at CES.

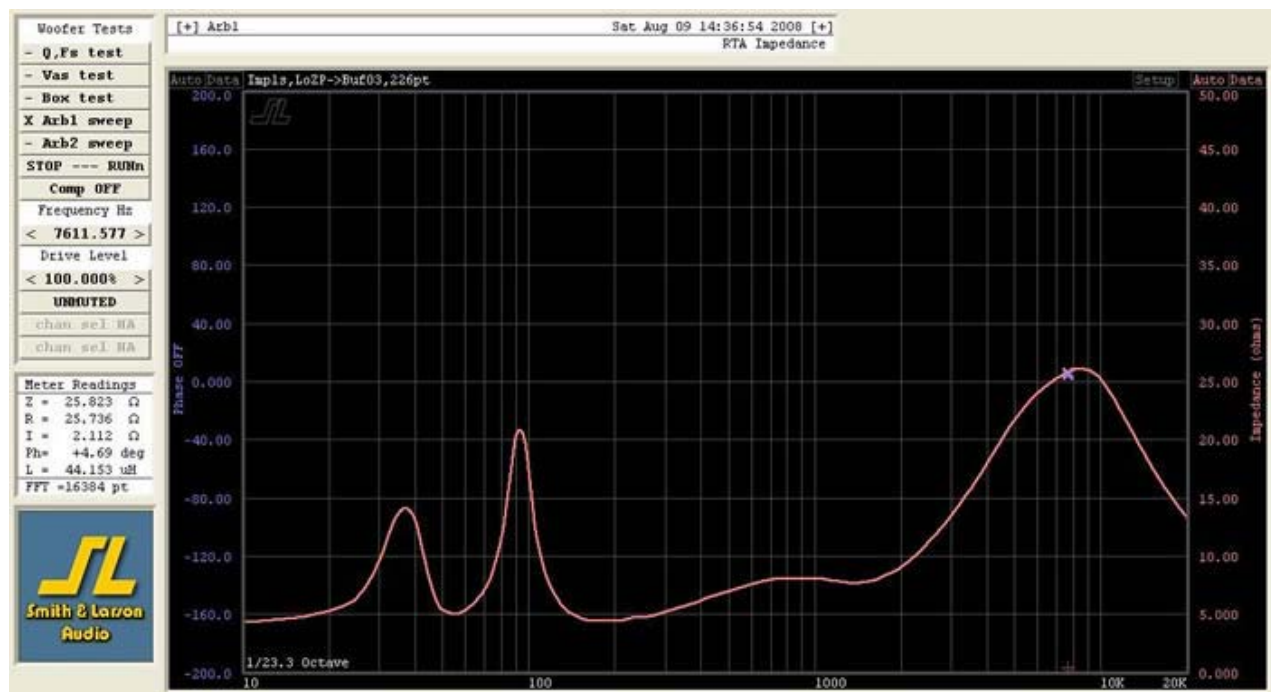
It is important to note that Hsu provides the following 30 day free trial offer:

"If you are not completely satisfied with your purchase, you have 30 days to begin the return process. We will refund the complete purchase price, minus any shipping charges, after our technicians review the return. The refund happens under four conditions: (1) all items must be in "like new" condition, (2) there must not be any missing items, (3) the product needs to be in transit back to Hsu Research within 30 (days) of delivery (4) you must call us to receive an RMA number. Failure to comply with all of these conditions may result in either the item being refused or you may be charged a 15% restocking fee".

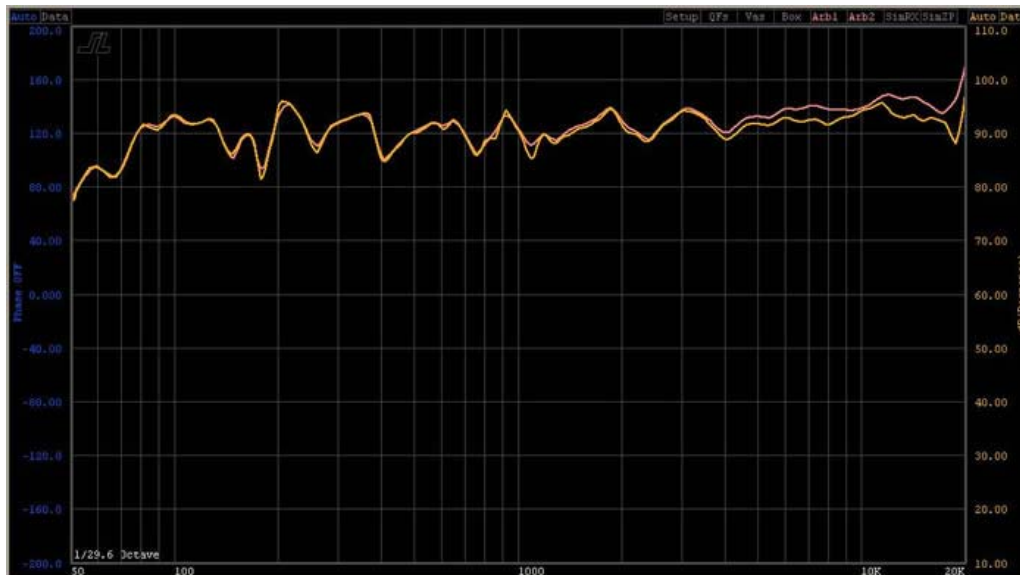
MOJO MEASUREMENTS

All measurements were done with the grills off unless otherwise noted. These measurements were taken using a WooferTesterPro and a calibrated Behringer ECM8000 microphone. For measurements that do not indicate "in room response" the data collection interval was shortened to help reduce acoustical effects of the lab. The curves were taken using 256 data points per octave and smoothed.

HSU HB1 MK2 Impedance is shown. Note the lowest dip is 4 ohms and that there is a rise on the top end. This should be an easy load for most amplifiers but the 4 ohm tap on a tube amplifier may be in order.



HSU HB1 MK2 Frequency Response On and 15 Degrees off axis. Note how closely the curves match. This is one of the reasons the speakers image so well with such a wide sweet spot. Also note that the lowest usable octave is around 60Hz as stated and why 80Hz makes such a good subwoofer crossover point for these speakers as 80Hz is just before it starts to drop off. This is definitely a candidate for a subwoofer.

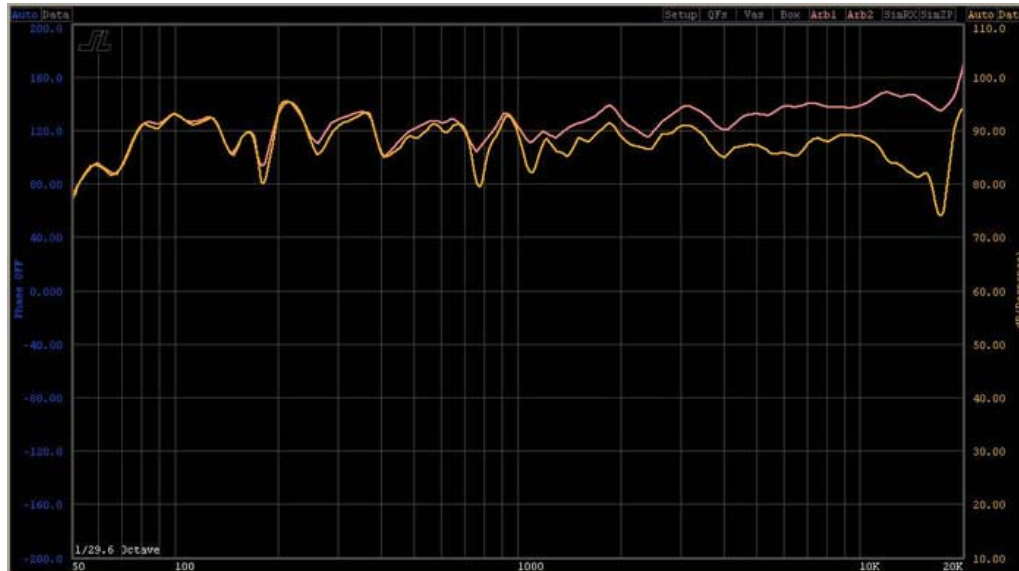


Note the rise on the top end of the response. This is less of an issue than it seems as the controlled directivity aspect limits the radiation of the high frequencies into the room such that the overall power response is quite nice. In other words; they pass the "other room" test nicely.

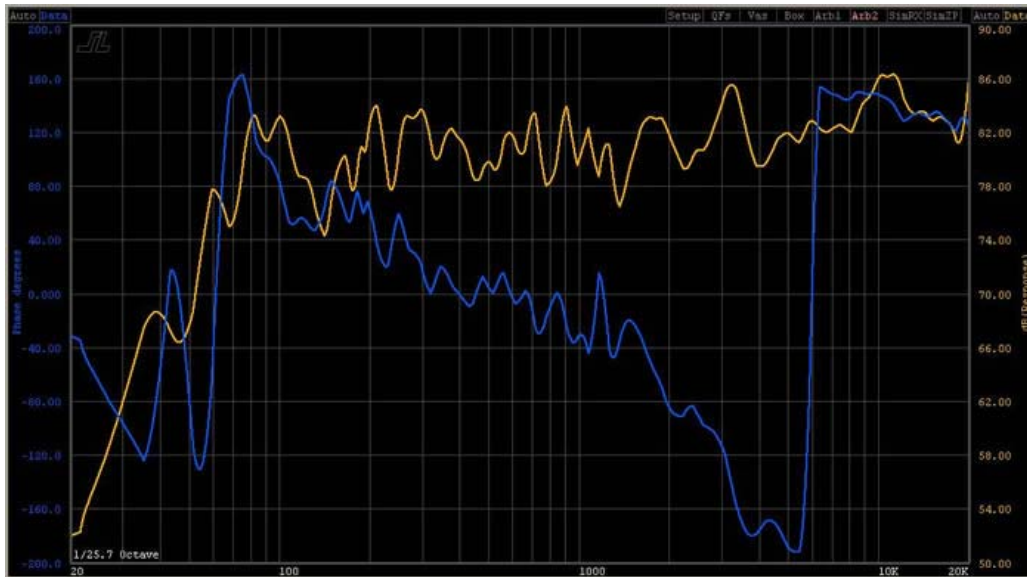
HB1 MK2 Frequency Response On and 30 Degrees Off Axis. Note that except around 10 KHz, the response is nearly identical which indicates the speakers are relatively easy to position.



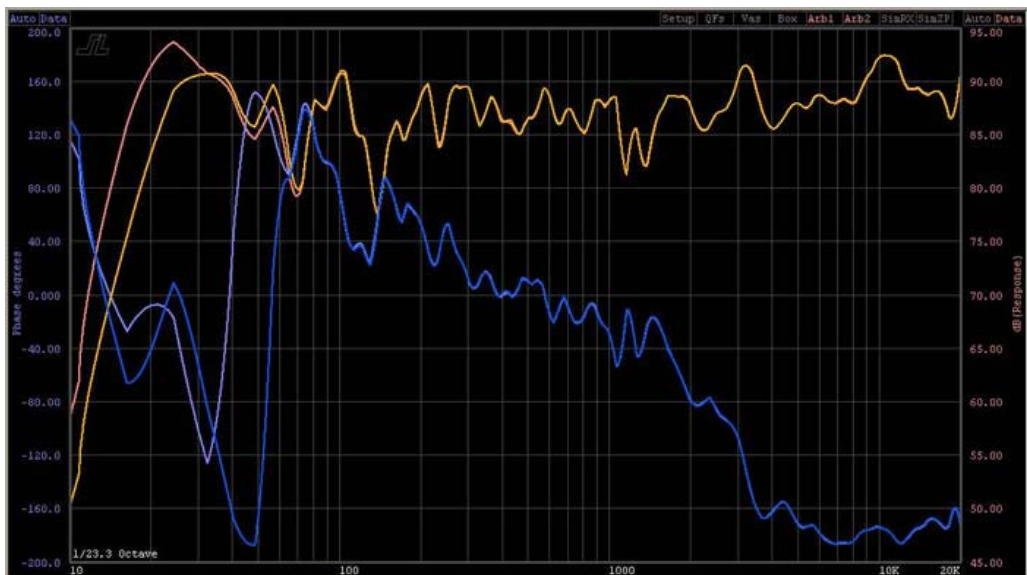
HSU HB1 MK2 Frequency Response On and 45 Degrees Off Axis. The tradition of similar on and off axis response curves continues. Even though the top end starts to really drop off, the overall shape of the curve stays quite similar helping keep the correct timbre across the soundstage. The data above shows how the speaker is able to achieve decent imaging even if the listener is directly in front of the left or right speaker at the listening position instead of sitting in between them. The highs will actually be at a rather similar level as the one which is on axis is also further away.



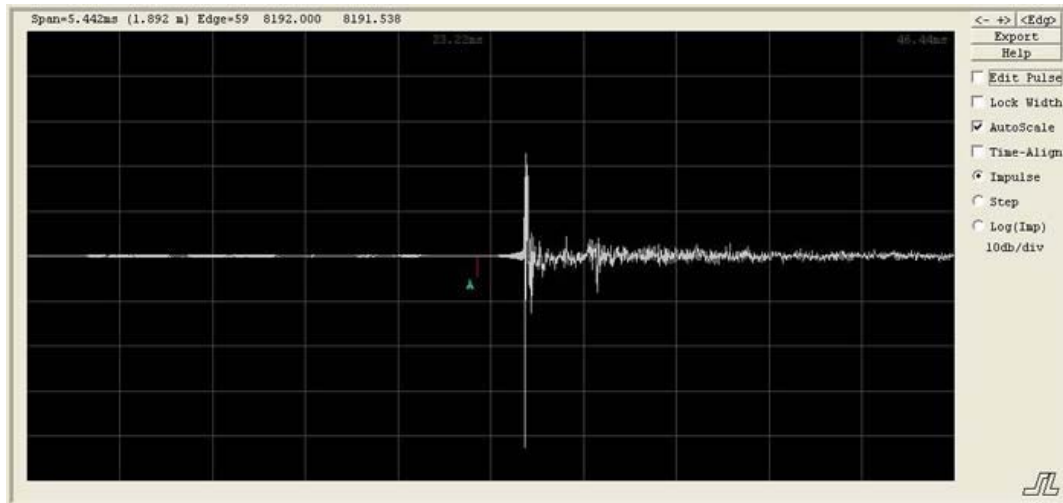
HSU HB1 MK2 In Room Response With No Subwoofer. Note that although the phase slopes downward, it is pretty linear. This response was taken before the microphone was completely calibrated so the bump around 3 KHz and drop off above 15 KHz are actually less pronounced than this.



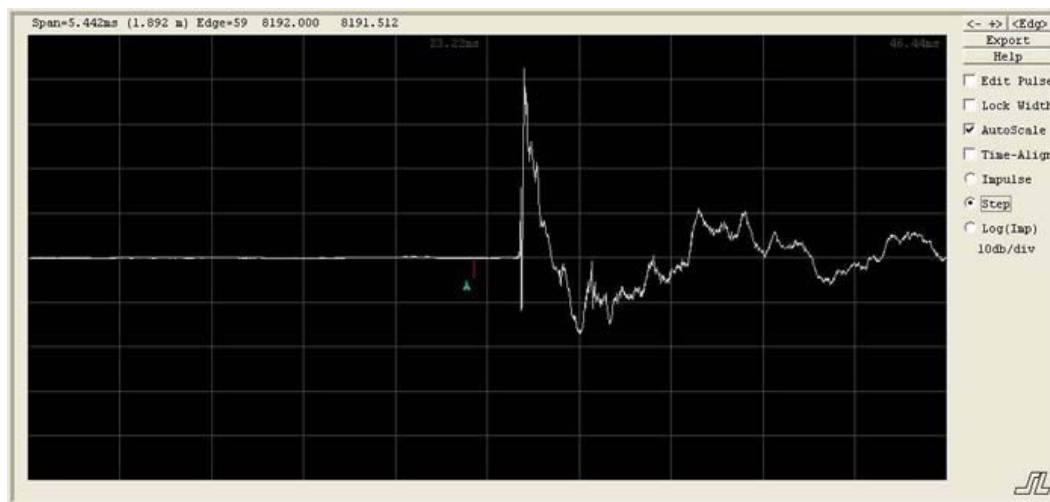
HSU HB1 MK2 In Room Response With Subwoofer. Note that the pink curve is with the 18 Hz subwoofer extension on. The 18 Hz subwoofer extension wasn't actually necessary in this setting due to the added room gain



HSU HB1 MK2 Impulse Response. Note the rather quick impulse and decay. The secondary blip there is likely due to a reflection off the floor followed by some room echoes which have not been completely squelched.



HSU HB1 MK2 Step Response shows a fast rise time and also indicates that the woofer and tweeter are not exactly in phase. The later ripples are likely room reflections.



Overall these speakers measured rather well. In comparison, my reference speakers are slightly smoother but rolled off on the top end and the HB1 MK2 is more extended out to 20 KHz. I did not measure the sensitivity to validate the 92db efficiency, but given that it is measured in half space, the actual sensitivity is likely more like a respectable 90db. In my small listening room and a 12 watt tube amp, there was adequate power even when using the 4 ohm taps.

STEREOMOJO

SPECIFIC RECOMMENDATION

The Hsu HB1 MK2 creates a world class soundstage with very little distortion and impressive dynamics at a great price. One can fully enjoy the music even well off axis and the midrange is quite smooth helping instruments and voices sound as they should. When mixed with a proper subwoofer, this is a true winner even at twice the price.

An owner of a simple receiver could purchase these and enjoy them and be able to keep them and get improved sound just by upgrading the electronics later. I would call them an investment, but they don't cost enough to really consider it as such. They mixed great with everything I hooked them up to.

There are caveats; they definitely sound better with the grills off. They really do need to be with a subwoofer for great performance and, although not tiny, do perform better with bass protection.

These speakers would be wonderful for a small to medium-large room. For adequate bass, they really do require a subwoofer, but then they were designed to be used that way. Remember, Hsu was first a subwoofer company. While they do not give you the level of sophistication of some (but not all) more expensive bookshelves at say \$2,000 and up, they are certainly better than anything you could buy at much higher prices (need we mention Bose?) from Best Buy or Circuit City. These would be great for an office or bedroom system or they would most certainly be the envy of dorm mates for the college student on a budget.

It may seem strange to have a subwoofer that costs more than twice that of the speakers. Not to worry. Hsu makes other subs starting at \$299. They also make more expensive subs that go as low as 16Hz. If you aren't sure which model would be best for you, Dr. Hsu is very accessible and will guide you as to which would be best for your tastes and your room. Other speakers are also offered for surround sound applications. We applaud the fact that they offer a 30 day in home audition.

Would I recommend these speakers to a friend? Within the boundaries listed above, yes. Would I buy them myself? I would. And I did!

Based on the astonishingly low price, level of performance and finish, and sheer musical enjoyment these provide, we bestow our rare Maximum Mojo Award on the Hsu HB1 MK2 speakers. Congratulations to Dr Hsu and company.

