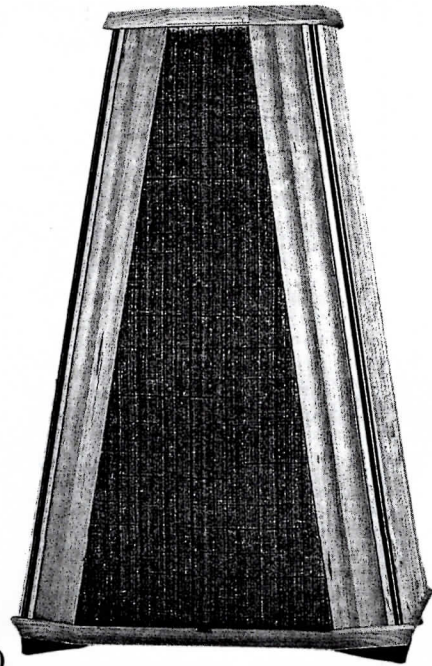


# The Audio Critic®

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Retail price: \$7.50

The pros love it. The tweaks tried  
to kill it. (See the loudspeaker reviews.)

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## In this issue:

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We review nine loudspeaker systems from \$829 to \$8400 the pair, mostly very good and all very different, plus an amazing low-priced subwoofer.

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### *Subwoofer*

## **Hsu Research HRSW10**

*Hsu Research, 20013 Rainbow Way, Cerritos, CA 90701. HRSW10 vented-box 10" subwoofer, \$750.00 the pair (with walnut top and standard 12 dB/octave passive crossover). Tested samples on loan from manufacturer.*

This very impressive product started its life as the Definitive Research SW10; subsequently discovered and debated name conflicts were resolved by changing both the company name and the model prefix. Dr. Poh Ser Hsu, the scholarly Singaporean technologist responsible for the design, should have had his name on his creations from the beginning; the days when you needed a Waspy name like Lansing or a techie acronym like Altec for your speaker brand are gone forever. We live in the age of Hyundai and Häagen-Dazs. So, in this case, Hsu is the name and deep bass is the game. Very deep bass.

It so happens that I know Poh Ser from his Boston Audio Society days (his tracks stretch from Singapore to the Massachusetts Institute of Technology to the Boston audio mafia to Southern California—a recent move). One of my more frequently quoted *bons mots* is about the Boston Audio Society—in 1977 I wrote that their members “would like to discover an audio Nirvana for forty-nine dollars and ninety-five cents.” Poh Ser is very much part of that tradition of penny-pinching audio romanticism, and in his subwoofer design he has brilliantly vindicated it. The HRSW10 is low-frequency Nirvana for \$375 per side—one of the two best subwoofers known to me, the other being the Velodyne, comparable models of which range from \$1095 to \$2750.

How did he do it? The enclosure is a cheap but extremely strong and acoustically inert paper tube with an inside diameter of 14", a wall thickness of 1/4", and end pieces made of 3/4" fiberboard. This structure is 27 1/4" tall and stands on four ordinary 1/4" thick hardware-store bolts that raise it 2 1/2" off the floor, for a total height of not quite 30". An inexpensive “sock” made of black knit fabric covers the entire tube except for the top end piece, which has a walnut finish. The downward-facing bottom end piece holds the 10" driver and the 3 1/2" port, which is ducted by a 23" long paper tube. Basically it's a Thiele-Small vented box.

That 10" driver is quite special, however. Since it doesn't have to reproduce any frequencies over 100 Hz or so, it can be totally optimized for low bass. It has a big, heavy 2" voice coil wound in four layers, with sufficient overhang to permit unusually large linear excursion. The cone is made of heavy paper, which is both cheaper and better for the purpose than fancy polypropylene and such. A driver like that, with a properly designed magnet structure, in a ducted enclosure having an internal volume of about 2 1/3 cubic feet, can do some fancy woofing. What's more, the relatively thin-walled but rigid tube can't bulge or flex under pressure, even though it weighs practically nothing and isn't braced, because its cross section is a circle and a circle already has the largest possible area for a given circumference, so there's no place for the bulge to go. There are more ways to build a solid woofer cabinet than throwing money at it.

I did my usual nearfield measurements with the driver facing up, a procedure that yields a close approximation to the free-field anechoic response. In the normal position of the subwoofer, the proximity of the floor plus the room gain will of course influence the response, but I wanted to explore the raw input/output capability of the system. At the best summing junction of the driver and the vent, the small-signal response was  $\pm 0.5$  dB from 20 to 100 Hz! At 10 Hz I measured -6 dB, but that included some contribution to the rolloff by the lab-bench amplifier, which isn't flat to DC. As I kept cranking up the input, the output above 26 Hz remained just as flat; just before I

ran out of amplifier power the 20 Hz response was down -2.5 dB, but the 10 to 15 Hz response actually went up. Never, never have I seen anything like it. The distortion may have been slightly higher than with the Velodyne ULD-15 Series II at equal SPLs (I didn't retest the latter side by side), but the Hsu HRSW10 appears to be capable of somewhat higher absolute levels—and who cares about a tiny difference in harmless second-harmonic distortion at 20 Hz? Boston Cheapie is at the very least the silver medalist! Unbelievable.

The vented box is tuned to approximately 15 Hz, where there's a deep null in the output from the driver, and the maximum output of the vent stretches from about 17 to 27 Hz. That's not exactly classic fourth-order Butterworth tuning—I don't know what it is precisely—but the results speak for themselves. The impedance curve in the 10 to 100 Hz range is of course a roller coaster, both in magnitude and in phase (the biggest swings are roughly 110 ohms and  $\pm 60^\circ$ ), but the resistive component is 8 ohms.

The subwoofer needs to be biamplified and should be used in pairs (no singles sold and no L + R matrixing recommended). I used a Bryston 4B power amplifier to drive a pair of HRSW10's and a Bryston 10B-sub electronic crossover to match them to various main speakers at different frequencies and with different slopes—but that's traveling first-class and not absolutely necessary (nor in the frugal spirit of the product, for that matter). Just about any old amplifier that can drive 8 ohms will do, and Hsu Research includes with each pair of subwoofers a simple passive network (a second-order RC lowpass filter or third-order if you wish) that goes between the output of the main amp and the input of the sub amp. It's a bit on the Mickey Mouse side in my opinion (I'm not of the Boston school) but it works, and there's really nothing wrong with the concept as long as you're content to drive your main speakers without highpass filtering. For finicky audiophiles there's also a special Hsu Research electronic crossover at a Boston price: \$350.00. I haven't tested it. There's some flexibility as to crossover frequency in both the passive and active Hsu crossovers, but you have to specify your needs before you buy.

Readers who have been waiting all this time for a quasi-pornographic subjective description of the bottom end obtainable with the HRSW10—how big, how firm, how rumbling, etc.—will have to be disappointed, as is usually the case in this publication. Flat, correctly damped, undistorted bass down to well below 20 Hz is just that; it can only sound one way. Once you've heard it you know it—and you never again want to be without it. It brings you the real world of music, not a preshrunk facsimile. And now, for the first time, it costs relatively little. If you have a listening room of reasonable size, nothing can improve your stereo system as dramatically for \$750 as the Hsu Research HRSW10.  $\diamond$