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POWERED SUBWOOFER

Hsu Research

VTF-3

Robert Deutsch

Doing one thing well is an effective strategy for success in business, and one that appears to have been followed by Hsu Research. Headed by Singapore-born, MIT-trained (Ph.D. in civil engineering) Poh Ser Hsu, Hsu Research has been in business for more than 10 years now, and has not wavered from its single-minded mission of offering high-quality, low-cost subwoofers to the public. Hsu produces subwoofers and *only* subwoofers, resisting the temptation to come out with a line of speakers, cables, amplifiers, digital processors, etc. They have also stuck to the principle of offering products that the average audiophile can afford, selling factory-direct

with prices staying below \$1000.

The first Hsu models had tall, cylindrical cabinets and downfiring drivers, a design that, according to Poh Ser Hsu, has some inherent advantages over the more conventional rectangular box with forward-firing driver. However, the market for these strange-looking subs was limited, and while they remain available, Hsu eventually had to face the fact that, if he wanted to sell more subwoofers, he had to come out with designs that were more domestically acceptable. The \$499 VTF-2, which I reviewed very favorably in the December 1999 *SGHT*, was the first of these more conventional designs. The VTF-3 is described as

the VTF-2's "more powerful 12-inch cousin."

Description and Design

The VTF-3 is a fairly big box (20 by 15 by 22 inches), with what the product literature describes as a "beautiful, elegant, and unobtrusive black finish with rounded edges and corners." The finish is certainly black, and the edges and corners are indeed rounded, but I wouldn't describe the VTF-3 as "beautiful" or "elegant." "Utilitarian" is more like it, at least compared to the glossy black of the Velodyne HGS subs—but I agree that the Hsu's appearance is unobtrusive. The box is obviously very solid in construction, and I'm told it has bracing between the top, bottom, and side panels, placed asymmetrically to reduce enclosure resonances.

The 12-inch driver weighs 20 pounds, has a 120-ounce magnet, and features a rubber surround and a poly-cotton spider. It's driven by a 250W amplifier designed specifically for subwoofer duty, and the adjustable (lowpass only) crossover can be bypassed. A phase switch selects 0° or 180°, and a signal-sensing circuit turns the amplifier on and off automatically.

Like the VTF-2, the VTF-3 has two rear ports (side-firing on the VTF-2, rear-firing on the VTF-3), flared to minimize port noise. Stuffing one of these with the supplied foam plug and selecting "20Hz" on a toggle switch puts the subwoofer in its Maximum Extension mode, recommended for the reproduction of music

SPECIFICATIONS

VTF-3 ported powered subwoofer

Driver: 12" paper cone

Frequency response: 18Hz, ±2dB, Maximum Extension mode; 22Hz, ±2dB, Maximum Output mode

Amplifier output: 250W

Crossover frequencies: 30–90Hz, 24dB/octave, continuously variable

Crossover type: lowpass only

Controls: subwoofer level, phase (0°/180°), bass extension (20/25Hz), crossover bypass

Inputs: line level, speaker level

Outputs: speaker level

AC power requirement: 375W

Finish: black

Dimensions: 20" × 15" × 22" (H×W×D)

Shipping weight: 93 lbs

Price: \$849

Manufacturer

Hsu Research
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www.hsuresearch.com



that has very deep bass. Removing the plug and changing the switch to the "25Hz" position selects the Maximum Output mode, said to produce more output with less distortion while giving up some extension in the process. This mode is recommended for most home-theater applications.

Dialing In the Performance

I placed the VTF-3 just slightly out from the left front corner of my home-theater room, a position that has worked well with a vari-

ety of subwoofers. With the VTF-2, I had also tried the behind-the-listening-seat placement favored by Poh Ser Hsu, and, as he predicted, that position produced even better performance. However, for me (and, I suspect, most people who have priorities in life other than optimizing subwoofer performance) that position is just not practical. For this reason, and to provide consistency with my other subwoofer reviews, I left the VTF-3 in the front corner position.

I connected the VTF-3 to the subwoofer

output of the Anthem AVM-20 surround pre-amp-processor, set the processor's crossover to 80Hz, and bypassed the Hsu's built-in crossover. I initially set the VTF-3's level using the AVM-20's calibration signals and my trusty RadioShack SPL meter, which I placed on a small tripod at the central listening seat.

I had preferred the sound of the VTF-2 in Maximum Extension mode, and I assumed that my preference would be the same with the VTF-3, so I kept the port plugged and left the switch in the 20Hz position. I used



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the VTF-3 this way for a while, mostly watching DVDs. This setup seemed to work well enough, but at times there was some bass heaviness that I didn't think was part of the program material. Some more tweaking was called for.

One feature of Infinity's latest series of subwoofers (I reviewed the IL120S in the November 2001 *Guide*) is their Room Adaptive Bass Optimization System (R.A.B.O.S.). This consists of a CD with 23 test tones covering the 20–100Hz range, a custom SPL meter designed and calibrated for testing bass response, and controls on the subwoofer to minimize any measured peak in the bass region. Although the VTF-3 has no similar controls, I thought I could use the measurement part of R.A.B.O.S. to check out the Hsu's response and then make whatever adjustments were available to optimize it.

Placing the R.A.B.O.S. SPL meter at the listening position and playing the test CD revealed that the response from 100Hz through the 80Hz crossover region was fair-

ly flat, but there was a peak of about 6dB in the 40–38Hz region, followed by recovery to the same level as 100Hz from 30 to 24Hz, and then a 10dB peak in the 22–20Hz region. No wonder the bass seemed heavy! Although the standard calibration using the surround processor's subwoofer test signal indicated a good level match between sub and main speakers, R.A.B.O.S. revealed that the match was far from optimal.

Improving the linearity of the subwoofer's response turned out to be easier than I'd anticipated. A very slight downward adjustment of the VTF-3's volume control left the frequency response in the crossover region intact, but reduced both the 40–38Hz and 22–20Hz peaks by about 4dB. There was still a rise from 24Hz down to 20Hz, but now it was 5dB rather than 10dB. Overall variation from 100 to 20Hz was within ± 3 dB, which is quite good for in-room response without equalization or room treatment.

These measurements and subsequent tweaking were done with the VTF-3 set to Maximum Extension. I then repeated the measurement with the sub in Maximum Output mode (foam plug removed, toggle switch in the 25Hz position). From 63Hz up there was no difference, but the 26–56Hz output was about 2dB higher than in Maximum Extension mode, peaking again in the 38–40Hz region. That's more or less as expected. What I found surprising was that the response stayed flat between 20 and 26Hz, with no indication of a rolloff at 20Hz, and less overall frequency-response variation from 20 to 100Hz.

I also did a brief test of the VTF-3's frequency response below 20Hz with a Hewlett-Packard sinewave generator (the R.A.B.O.S. test signals don't go below 20Hz). This showed

REVIEW SYSTEM

Sources

Sony DVP-S7000 DVD player
JVC HR-4700U S-VHS VCR

Display

DreamVision DV LC-5 LCD projector
DreamVision Pantograph 160 screen

Preamp-Processor

Anthem AVM-20

Power Amp

Anthem PVA-7

Speakers

Dunlavy SC-1 (5)

Cables

Digital: Kimber Kable D-60
Interconnect: Nordost Blue Heaven
Speaker: AudioQuest Type 6+
Video: Monster M1000v

Misc.

PS Audio Ultimate Outlet AC conditioner
Chang Lightspeed CLS HT1000 AC conditioner
AudioPrism Quietline LF-1 Mk.II parallel AC filters



that Maximum Extension mode *did* result in greater response below 20Hz, with strong response evident down to 16Hz (albeit with some doubling), but the cost of the increased extension was a peak in the response at 20Hz.

Back in December 1999, my comparison of the VTF-2's Maximum Extension and Maximum Output modes showed that sub dropping sharply below 31Hz in Maximum Output mode, which led to my recommending use of Maximum Extension. In the case of the VTF-3, the situation was reversed: At least in my room and with my subwoofer placement, Maximum Output mode resulted in more even response and still-excellent low-end extension, even down to 16Hz. This is better than Hsu Research claims, and it may represent a fortuitous augmentation of the subwoofer's response by a room resonance.

Listening Low

While these measurements are technically rather crude, their implications were generally confirmed by my listening tests. I spent

some time comparing the Maximum Output and Maximum Extension modes using the deep-bass CD-R music compilation provided by Hsu Research as well as some of my own bass torture-test CDs and DVDs.

One test that I find most telling is in chapter 6 of *Jumanji*. In that scene, the children—including babe-to-be Kirsten Dunst—run upstairs to look for the source of the throbbing sound that seemingly only they can hear; at one point, the sound turns into a loud *thud* that can be scary in its impact. With the VTF-3, it *was* scary. Comparing the Maximum Output and Maximum Extension modes, my initial impression was that this impact was greater, more room-shaking, in Maximum Extension mode. But, as I listened some more, it became apparent that the bass was actually tighter, crisper, with less overhang, in Maximum Output mode. The only subwoofer that I've heard in my system that did better on this test was the Bag End Infrasub-18 (\$1650), which reached even further into the nether regions.

Although the VTF-3 performed well in Maximum Output mode, at times I felt that the bass, while clean, was not as powerful as it should have been. As calibrated, the explosions in the pre-title sequence of *Tomorrow Never Dies* (my favorite James Bond movie with Pierce Brosnan) were just a bit on the wimpy side. Rather than switching to Maximum Extension—which involves having to fiddle around at the back of the sub—I used the Anthem AVM-20 pre-pro's subwoofer level control. This worked well, a 5dB boost providing the impact that was missing. (I just had to remember to restore the original subwoofer setting afterward.)

My preference for the Maximum Output mode held up for music as well as home-theater material. Mickey Hart's *Planet Drum* (Rykodisc RCD 10206), with its variety of drum sounds and occasional low-bass synthesizer note, is a good test of a subwoofer's extension, power, and integration with the rest of the range. The VTF-3 did very well on this test, making its presence felt in a way that did not draw attention to the low-bass range except when required by the music.

New King of the \$1000 Sub Market?

In my review of the \$899 Infinity IL120S in November 2001, I said that, with the R.A.B.O.S. settings optimized, this was *the* subwoofer to beat in the under-\$1000 category. Although I no longer have the IL120S around for direct comparison, I feel comfortable in saying that its performance has been conclusively bettered by the \$849 Hsu Research VTF-3. The VTF-3 goes much lower (the Infinity is good down to just below 30Hz, whereas the Hsu has strong response to 20Hz and even as low as 16Hz), and it plays louder without strain.

The IL120S R.A.B.O.S. equalization is very effective in controlling a peak in a subwoofer's response. I wish that something like it was part of every subwoofer's design, including the VTF-3's. There *was* an uncorrected peak in the VTF-3's response in my room, but its magnitude was low enough that whatever negative impact it had on the subwoofer's performance was more than compensated for by the VTF-3's greater extension.

The Hsu VTF-3 offers a significant improvement over the \$499 VTF-2, itself an outstanding product in its price range, and provides a challenge to subwoofers in the \$1500–\$2000 range.