

Tiny Killer Subs

Can you get big bad bass from little bitty boxes?

By *Daniel Kumin*

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What's big and black, rumbles a lot, and can go really, really deep? If you said "a submarine," you're right. If you said "a sub *woofer*," you're *half* right. Both kinds of subs can take you down into regions you've never been to before — and a subwoofer can do it without a nuclear generator, cramped quarters, and the possibility you'll never see daylight again. But unlike their nautical counterparts, subwoofers don't have to be big anymore to explore the lowest depths — a point well illustrated by the three models here.

Sunfire pretty much revolutionized the subwoofer world in 1999 with its 9-inch-tall True Subwoofer Junior, and the [True Subwoofer Super Junior](#) (\$995) follows in that "less is more" tradition. Veldodyne — which has long been synonymous with topnotch subs — offers up the \$999 [SPL-800R](#). And Pinnacle has the smallest entry here, the 8-inch-high [SubSonic](#) (\$699). None of these subs can drop a depth charge or fire a torpedo, but all three can make you feel like your house has just been hit by one. And they do it with true action-movie flair, while lurking out of sight in a dark corner of your home theater.

Why the big push toward little subs? To anyone but a serious A/V enthusiast, there is nothing beautiful about a great, hulking cabinet in the family room, and placing one there has caused more than a little discord in many homes. So it's no surprise manufacturers have developed ever smaller subs that can

disappear into their environments, or that they've tried to wring performance from them that's on par with their larger counterparts.

But getting a small box to put out deep bass isn't an engineering slam-dunk. The laws of physics say you need to excite large sound waves to create bass, and the easiest way to do that is to use big drivers in big cabinets. There's more than one way to skin this particular cat, though, and it usually comes down to employing shock-and-awe quantities of power, super-long-throw drivers, and generous equalization.

Those are the methods employed by our scofflaws here, the largest of which is hardly bigger than the box your kid's league-approved soccer ball came in. Yet any of them can deliver enough deep bass (under most circumstances) to satisfy even experienced listeners — and to knock their socks off when the source is revealed.

What qualifies as "deep bass?" In my book it's sound that goes substantially below 40 Hz. That's the region of the lowest bass notes and subsonic rumbles — the kind you can feel but not hear. The sub needs to play loud enough to compete with the rest of the speakers at typical listening volumes, and do it without making any of the clacks, buzzes, or rattles that can draw attention to its location.

Could these three pint-size renegades really stretch the laws of physics? Extensive listening showed that big surprises can come from small packages.

OUR TEST SETUP

Any subjective evaluation of subwoofer performance is as much a review of the room as it is of the sub. At about 350 square feet and 3,000 cubic feet, my studio is similar to many family rooms, except it's double-sheetrocked and built to dimensions I chose for achieving reasonable low-end smoothness and extension. As in any speaker evaluation, you can expect the same sub to perform differently in a different room.

From long experience, I know that subs deliver their smoothest 20- to 100-Hz response in my room when placed behind the left front speaker. Our three bantams were small enough that I could set them up cheek by jowl and switch among them for fair comparisons — as I verified using a sound-level meter to calibrate volumes and check positions.

I ran all three in crossover-bypass mode, setting my preamp's crossover at the THX-standard 80 Hz. And to simplify things, I did my listening using short segments of music tracks and movie scenes that I'm very familiar with (see "Test Tracks" below). My colleague Tom Nousaine also measured each sub's performance (see "[In the Lab](#)," as well as the individual reviews). —D.K

TEST TRACKS

CDs

- **James Taylor, *Hourglass* (Sony), "Line 'Em Up"** This track has probably the strongest bass guitar you'll hear on a pop recording. It's a six-string bass that occasionally hits low Cs down at about 32 Hz. The sound, which is rich and heavy through the range from 30 to 120 Hz, is occasionally quite powerful.
- **Janet Jackson, *The Velvet Rope* (Virgin), "Go Deep"** I'm no great hip-pop fan (though I like Miss J's album art), but this track is a bass classic. It features rock-steady synth bass at around 35 Hz, with a couple of forays into super-low 25-Hz country.

DVDs

Movies can demonstrate a different side of bass, since the low-end sounds are usually more fleeting and more likely to be masked by higher-frequency sound effects and music.

- ***U-571* (Universal), Chapter 15** The famous depth-charge attack produces powerful and dynamic bass with content well below 25 Hz. Listen to your sub alone and crank this segment up to hear what your woofer's working life is really like.
- ***The Fifth Element* (Columbia/TriStar), Chapter 2** Another valued clip for deep, deep bass is the moment in the movie's prologue when the stone chamber closes with a rumble. This is a good source of sustained bass that extends just about as deep as *U-571*'s depth charges.

Pinnacle SubSonic (\$699)

[What's in the Box?](#) | [How Big Is It?](#) | [Setup](#) | [How Low Does It Go?](#) | [How Big the Bang?](#) | [How Did It Sound?](#) | [What's the Bottom Line?](#)



What's in the Box?

- **Driver size** two 6 1/2-inch cones
- **Rated power** 350 watts
- **Cabinet design** sealed
- **Finish** platinum or matte white
- **Controls** continuously variable low-pass crossover (50 to 150 Hz); level; 0/180° phase, crossover-bypass, and power switches
- **Ins & outs** line inputs, speaker-level inputs & outputs (push-terminals)
- **Warranty** 7 years transferrable (2 years on amplifier)

[Back to top ^](#)

How Big Is It?

- **Dimensions** (WxHxD) 9 1/4 x 8 3/8 x 9 3/8 inches (including protrusions)
- **Volume** 0.28 cubic foot
- **Footprint** 0.52 square foot
- **Weight** 25 pounds

[Back to top ^](#)

Setup

The SubSonic's controls are straightforward, so setup requires little more than the usual placement-and-balance exercise. In my room, it delivered smooth response to well above 120 Hz, so it should be easy to integrate with small satellite speakers that demand a high crossover point.

[Back to top ^](#)

How Low Does It Go?

- **Bass limit** 25 Hz at 71 dB (maximum 10% distortion)

[Back to top ^](#)

How Big the Bang?

- **Average SPL from 25 to 62 Hz** 83 dB
- **Maximum SPL** 91 dB at 62 Hz
- **Dollars per dB** \$8.42

[Back to top ^](#)

How Did It Sound?

James Taylor The bass guitar was amazingly rich, full, and defined up to moderately high levels. Only when pushed harder did the SubSonic begin to sound a little bloated and the bottom octave slightly less substantial — a common effect of a sub's limiting circuits. Pushed even further, the Pinnacle produced some fairly rude noises on the most demanding bass — no hard “clacks,” but very audible “raspberries” on the lowest, strongest notes.

Janet Jackson The little Pinnacle delivered surprisingly strong bass on this track, too, and sounded solid and punchy even when it was played really loud. Only direct comparisons with the larger Sunfire and Velodyne subs revealed its weakness below 30 Hz — an area that the other two subs covered with pant-flapping grunt.

U-571 The depth-charge attack had room-shaking, grab-the-popcorn impact, and, again, you won't notice that the Pinnacle can't deliver the soundtrack's lowest notes unless you compare it directly with a sub that goes deeper.

The Fifth Element This movie clip proved a bit much for this mighty mini. Playing the closing of the tomb door with master volume set to my test reference level (–10 dB), which is probably louder than you listen at home, caused the Pinnacle to produce a chorus of soft rattles and “blubs.” I could just barely discern these sounds with all the speakers going, but they became more obvious as I pushed the volume higher.

[Back to top ^](#)

What's the Bottom Line?

The SubSonic wouldn't go as deep or play as loud as the considerably more expensive and larger Velodyne and Sunfire, but, hey — this thing can produce real, no-foolin' bass. It'll play loud enough for most folks in most rooms and blend well even with smaller satellites. And it's undeniably tiny and unobtrusive — by far the smallest in the group. At about \$300 less than the other two subs here, it's a great bargain, too.

Manufacturer Pinnacle, pinnaclespeakers.com, 800-346-2863

[Back to top ^](#)

Sunfire True Super Junior (\$995)

[What's in the Box?](#) | [How Big Is It?](#) | [Setup](#) | [How Low Does It Go?](#) | [How Big the Bang?](#) | [How Did It Sound?](#) | [What's the Bottom Line?](#)



What's in the Box?

- **Driver size** 8-inch
- **Rated power** 1,500 watts rms
- **Cabinet design** ported by 8-inch passive radiator
- **Finish** cherry lacquer
- **Controls** level; continuously variable low-pass crossover (30 to 100 Hz) and phase (0 to 180°)
- **Ins & outs** dual line inputs & outputs, speaker-level inputs
- **Warranty** 2 years transferrable

[Back to top ^](#)

How Big Is It?

- **Dimensions** (WxHxD) 9 x 9 1/4 x 10 1/2 inches (including protrusions)
- **Volume** 0.42 cubic foot
- **Footprint** 0.56 square foot
- **Weight** 29 pounds

[Back to top ^](#)

Setup

The Super Junior's phase control allows for very subtle adjustments — which are unlikely to be necessary in most installations. The crossover doesn't have a bypass switch, though the frequency knob's highest setting is marked Bypass, while the setting below it is marked 100 Hz, suggesting this is the highest recommended crossover point. That jibes with what I found in my room, where the Sunfire's bass extended only up to about 80 or 100 Hz, making it a poor match with mini-satellites that may drop off as high as 150 Hz. Note that the Junior has no power switch — its signal-sensing auto-on/off is always active.

[Back to top ^](#)

How Low Does It Go?

- **Bass limit** 32 Hz at 93 dB (maximum 10% distortion)

[Back to top ^](#)

How Big the Bang?

- **Average SPL from 25 to 62 Hz** 97 dB
- **Maximum SPL** 102 dB at 62 Hz
- **Dollars per dB** \$10.25

[Back to top ^](#)

How Did It Sound?

James Taylor The Sunfire made short work of this tune, with effortless oomph on the song's low Cs, which demand some honest action at 32 Hz. Both it and the Velodyne played the song about as loud as I could ask, but they weren't identical, with the Sunfire delivering more slam.

Janet Jackson In the dB drag-racing department, the Sunfire bested all comers, playing this track louder and with more solar-plexus smackdown than either of the other two subs. It did dramatically better than the tiny Pinnacle here, although the improvement over the Velodyne was much more subtle.

U-571 With the master volume set at my test reference level, which in my room produces sound close to what you'll hear in the middle rows of a top-rank cinema, the Super Junior poured out enough deep bass to excite my room's one incurable rattle. (It's in the wall — likely a piece of loose Romex cabling. If I could just get my mitts on the bozo who prewired the framing . . . wait a sec — that was *me*.)

The Fifth Element At volume settings greater than -5 dB (5 dB louder than my reference level), the Sunfire produced an odd "pumping" noise that sounded like port noise — but with only a passive radiator, there's no open port to let air escape from the cabinet. My guess is that it was the sound of rushing air currents produced by the driver's extreme long-throw action. Nonetheless, at these high volumes with all five satellites going, the noise wasn't an issue. Strong ultra-low bass also created a raspberry-like buzz at extremely high volumes, but here again the high-frequency sounds coming from the rest of the speakers masked it.

[Back to top ^](#)

What's the Bottom Line?

Possible second career as a paint-can shaker. This thing plays low *and* loud. No question — in my room the Sunfire had the most deep-bass grunt of our trio. Its ability to generate palpable amounts of energy in the sub-30 Hz region continually amazed me. Although our measurements suggested distortion in that range (for a full explanation, see "[In the Lab](#)"), the Sunfire played louder and seemed to go deeper — with more impact — than any other sub in this group.

Manufacturer Sunfire, sunfire.com, 425-335-4748

[Back to top ^](#)

Velodyne SPL-800R (\$999)

[What's in the Box?](#) | [How Big Is It?](#) | [Setup](#) | [How Low Does It Go?](#) | [How Big the Bang?](#) | [How Did It Sound?](#) | [What's the Bottom Line?](#)



What's in the Box?

- **Driver size** 8-inch
- **Rated power** 1,000 watts rms
- **Cabinet design** sealed
- **Finish** gloss black, maple, or cherry veneer
- **Controls** up/down pushbutton volume; continuously variable low-pass crossover (40 to 120 Hz); auto-on/off, master power switches; remote control with pushbuttons for volume, mute, phase (0°, 90°, 180°, 270°), EQ presets (1 to 4); LED on/off; Night mode
- **Ins & outs** dual line inputs & outputs; speaker-level inputs (multiway posts); mike in, IR repeater in, 12-volt-trigger minijacks
- **Warranty** 2 years nontransferrable

[Back to top ^](#)

How Big Is It?

- **Dimensions** (WxHxD) 10 3/8 x 10 3/4 x 12 1/2 inches
- **Cubic volume** 0.77 cubic foot
- **Footprint** 0.9 square foot
- **Weight** 35 pounds

[Back to top ^](#)

Setup

The Velodyne has two key features not shared by the other subs here: a potentially useful room-EQ adjustment option, and a remote control that allows you to adjust volume and the EQ setting on the fly from your couch. Set up the supplied mini-mike, hit the appropriate button on the remote, and the SPL-800R automatically adjusts for your room's acoustics. To maintain a level playing field, I did all of my comparisons with the Velodyne unequalized. When I experimented with this feature, it slightly mitigated a small 50-Hz bump in my room's response but otherwise had no dramatic effect. It might in your room. The EQ presets boosted output by a few dB in the 50- to 60-Hz range depending on the setting. Connection and calibration were straightforward, and being able to adjust phase from the listening position made it simple to hear changes. I had no trouble getting the Velodyne to integrate smoothly with crossovers as high as 120 Hz, so it should work well with very small satellites.

[Back to top ^](#)

How Low Does It Go?

- **Bass limit** 25 Hz at 82 dB (maximum 10% distortion)

[Back to top ^](#)

How Big the Bang?

- **Average SPL from 25 to 62 Hz** 96 dB
- **Maximum SPL** 108 dB at 62 Hz
- **Dollars per dB** \$10.41

[Back to top ^](#)

How Did It Sound?

James Taylor While both the Sunfire and Velodyne convincingly reproduced the bass guitar's lowest notes, the SPL-800R sounded a smidge warmer. This was due entirely to the Velodyne's audibly greater output between 60 and 120 Hz — even with its crossover set to Bypass, the Sunfire clearly began to roll off well below 100 Hz.

Janet Jackson The Velodyne once again impressed me as more natural and warm, while the Super Junior was harder-edged, exaggerating the synth-bass sound. But both subs gave convincing weight to the lowest notes.

U-571 With my system's volume set to the test reference level, the SPL-800R pumped out plenty of sound in the bottom octaves, delivering depth charges with stunning impact. Still, in that low 30-Hz region, the Sunfire simply moved more air before its limiting circuits kicked in.

The Fifth Element The Velodyne was the best behaved here. Its limiters kept rude noises in check except for some minor "fluttering" that came in at the test reference volume. But I could only hear this when I played the sub alone — it was otherwise masked by the other speakers. As I turned up the dial, the SPL-800R eventually stopped yielding more bass, but its limiters kept distortion in check.

[Back to top ^](#)

What's the Bottom Line?

Velodyne's pint-size powerhouse delivered deep bass with genuine impact and enough volume to fill small to medium-size rooms. Smooth response in the upper octaves will let it blend with smaller satellites, and it's very well behaved when pushed beyond its limits. Automatic room EQ and the convenient remote control will prove useful in many setups.

Manufacturer Velodyne, velodyne.com, 408-465-2800

THE LOW DOWN

My conclusions should be easy to guess. The **Sunfire True Super Junior** was my favorite, producing the loudest and most depth-rattling bass in my room — an incredible amount given its size. But its steep rolloff above 80 Hz will make it tough to blend with smaller satellite speakers. In fact, in my setup the Junior sounded best with its crossover set below 80 Hz.

The **Velodyne SPL-800R** played only a bit less loud and sounded just about as deep. It also had a distinctly more balanced sound higher in the frequency range, blending well with satellite speakers at the 100-Hz crossover setting and even at 120 Hz.

While the Lilliputian **Pinnacle SubSonic** couldn't equal the depth or power of the bigger and more expensive Sunfire and Velodyne subs, it should work well with tiny satellites that demand a 150-Hz crossover or even higher. And for such an attractively tiny sub, it sounded amazingly solid on almost everything that I listened to. —*D.K.*

IN THE LAB

It's not uncommon to find discrepancies between lab measurements and subjective observation of subwoofer performance, as here with the Sunfire, which didn't measure as well as the Velodyne in some respects but was Dan Kumin's favorite. There are several reasons.

We standardize our measurements of sound-pressure level (SPL) at any given frequency to the highest level generated, in decibels (dB), with a maximum of 10% distortion. The Sunfire produced output at 25 Hz, but did so with more than 10% distortion, so that measurement is omitted from the graph on page 71. At 32 Hz, its SPL with less than 10% distortion was 93 dB — equal to the Velodyne's.

In this context the word "distortion" has a somewhat different import than you might expect. As with the other subs here, if you feed the Sunfire a low-bass tone and turn up the signal, upper harmonics — multiples of the fundamental tone — will eventually constitute more of the sound than the fundamental itself. The Sunfire produced an additional 12 dB SPL when driven to maximum output. At this point, the second harmonic was louder than the fundamental. While technically this is a distortion of the input signal, it is generally difficult to detect as such by most listeners. It may give the suggestion of deeper bass but is really just an increase in overall volume.

In contrast to the Sunfire, the Velodyne bumped the sound-level meter only 6 dB at maximum output with distortion unchecked, and it produced a higher maximum SPL overall within the 10% distortion limit, hitting 108 dB at 62 Hz vs. the Sunfire's 102 dB. The Pinnacle at full output without regard to distortion also drove up the meter by 12 dB. For a full lab report on all three subwoofers, [click here](#). —*Tom Nousaine*