

Yamaha

Soavo-1 Loudspeakers

The audio industry presents the consumer with a staggering over-abundance of choice when it comes to loudspeakers. There are products to fit any budget, from the entry level to the if-you-need-to-ask products that cost as much as a new German or Italian sports car. And whereas many high-profile manufacturers specialise—purely and solely—in the production of loudspeakers, Yamaha on the other hand, has a portfolio of products that spans the full gamut of audio reproduction... and I mean the full gamut; it's a three-link chain that encompasses the instruments that create music, through the studio equipment used to craft and produce the musical work of art, to the playback equipment that reproduces the music that inspires us and enriches our lives.

I have personally been witness to and experienced all three 'links' of this chain. Most recently, I had the pleasure of visiting Japan as a guest of Yamaha and was witness to the extraordinary attention to detail and the meticulous—almost fanatical—precision demonstrated in the manufacturing processes of the company's superb musical instruments, including pianos, woodwind instruments, and others.

Having said that, the electronics giant has expended considerable research and development resources in the creation of its latest flagship speaker products. The culmination of this engineering effort has resulted in the Soavo range of speakers. I decided I should start at the top by investigating the performance of the most expensive speakers in Yamaha's range, the Soavo-1s.

The Equipment

Being the Yamaha flagship speaker product, the new Soavo-1 has a considerable legacy and



history to live up to. For starters, the Yamaha NS-10M studio monitor is almost ubiquitous in music production facilities around the world where it's used as a near-field 'real world' reference loudspeaker. Step into almost any professional sound studio and you'll see the white drivered speaker sitting dutifully atop the mixing console or perched near the studio viewing window.

Secondly, the Yamaha NS-1000 speaker from the 1970s is regarded by most audio *cognoscenti* as one of the very best speakers of that era (and beyond) and is widely regarded as an out-and-out classic. Decades ahead of its time, Yamaha produced the first commercially-available speakers sporting beryllium tweeters and dome midrange drivers. Sadly, Yamaha stopped production of the classic NS-1000 a few years after. Only relatively recently—due to the complexities and health issues involved in its production—has the prized material resurfaced as a superbly suitable conduit for speaker drivers, and still there is only a handful of manufacturers that have the resources and capabilities to produce them.

By the way, according to those I spoke to at Yamaha, Soavo is an acronym made up from the Italian '*soave*' meaning soft, and '*voce*' meaning voice, the intention being to describe a natural-sounding speaker.

Back to the Soavo-1, then. Let's just say it at the outset; this speaker is drop-dead gor-

geous and has been conceptualised by the artisanship of renowned industrial designer Toshiyuki Kita. My review sample came in an immaculate piano black—finished using the same techniques employed in Yamaha's piano-finishing factory—that was truly stunning. They exude class from all pores; from the diffraction-conscious enclosure shape to the high-quality speaker terminals (although the posts proved a tad too wide to accommodate standard spade connectors) to the spade-terminated linking cable between the bi-wirable terminals—no cheap brass linking bridge here. And I haven't even started on the nicely-shaped diecast aluminium tweeter baffle plate and the drivers themselves.

Actually, let's start on them.

Yamaha says it designed this set of advanced-technology drivers from the ground up. The tweeter is an aluminium dome which the company labels as a 'DC-Diaphragm' design. This is basically a topology that physically integrates the tweeter's actual dome area with the voice coil. The tweeter sits flush on a dedicated cast aluminium baffle plate. The plate aids in the reduction and isolation of resonances and, as an added bonus, looks terrific as a visual contrast to the black finish. A neodymium magnet is used to power the driver.

The 'Advanced Polymer Mica Diaphragm' (A-PMD) 130mm midrange driver is another clever piece of engineering. The diaphragm

Laboratory Test Report

The frequency response of Yamaha's Soavo-1 as shown in *Graph 1* extends from 50Hz to 10kHz ± 3 dB when using pink noise as the test stimulus. This is an excellent result. This trace is the averaged result of nine individual frequency sweeps measured at three metres, with the central grid point on-axis with the tweeter. Although the capture is unsmoothed, some smoothing is inevitable as a part of this averaging process. Overall, the graph shows superb flatness right across the midrange, so that it's within just ± 1 dB from around 300Hz all the way up to 2kHz, which is the note 'C7' in the top octave of a piano keyboard. Below this you can see there is a slight 'lift' in the bass between 80 and 240Hz that peaks at around +3dB at 150Hz. There's also a very slight prominence in the high treble, between 4kHz and 10kHz (the latter frequency being the upper measurement limit for this particular test), but since it's only around +1dB and could affect only the harmonics of instruments, and not their fundamentals, I don't think it would be audible.


Graph 2, which shows the high-frequency response in far greater detail, thanks to the use of the gated sine wave technique, shows that the rise in output level above 4kHz increases to about 4dB at 6–7kHz, after which it rolls off, shelves slightly, then rolls off to end in a sharp –8dB dip at 15kHz after which there's a rise to a +10dB peak at 30kHz. This 30kHz peak would be the fundamental resonance of the aluminium dome, but at this frequency it's high enough to be well out of harm's way, where it would be completely inaudible to the human ear. And severe though that suck-out at 15kHz seems to the human eye, it has such a high 'Q'—occurs over such a narrow bandwidth—that it, too, would be inaudible to the human ear, not least because few—if any—people over the age of 40 can hear a 15kHz tone.

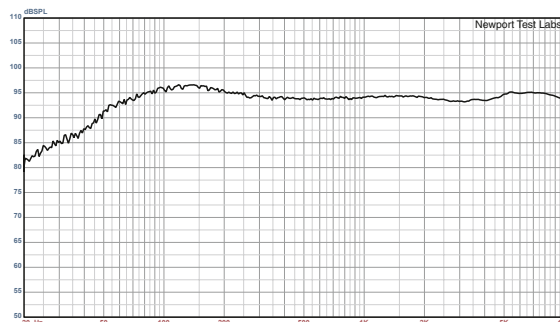
Low-frequency performance is shown in *Graph 3*, which was measured using the standard near-field microphone technique. You can see that the Soavo-1 is tuned to a very low frequency (32Hz) and that the woofers (the single trace is the summed version of both bass drivers) roll off very smoothly from around 150Hz down to this frequency. The port's output peaks a little higher than I might have expected given this tuning, at around 40Hz. The port nonetheless produces significant energy over quite an extended bandwidth, as its output is 6dB down at 23Hz and 80Hz, so it's able to substantially reinforce the output from the bass drivers.

Impedance was controlled, except that the lower resonant bass peak is moderately high at well over 40 Ω and the upper resonant peak also comes in at a fairly high 34 Ω (at 54Hz). You can see the 'saddle' between the two is at 32Hz, electrically confirming the system tuning. The variation in impedance between the two peaks is confirmation that Yamaha's engineers have deliberately tuned the Soavo-1's port a little high. The impedance of the Soavo-1 drops to around 3.2 Ω at 160Hz, and there's a difficult point in the impedance around 85Hz, where the impedance is 5.4 Ω and the phase angle is -63° , which means any amplifier used with the Soavo-1 will need to be capable of delivering its rated power output into a 4 Ω load. However, it does mean that the Soavo-1 should be rated as 'nominally' 4 Ω rather than the 6 Ω specified by Yamaha.

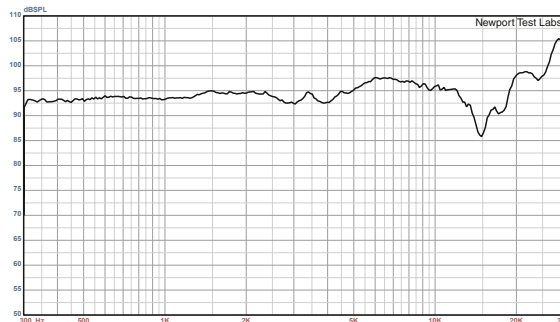
The amplifier you use to drive the Soavo-1s won't have to be overly powerful in order to achieve high sound pressure levels in your listening room, because *Newport Test Labs* measured the Soavo-1's sensitivity at 89.5dB SPL at one metre, for a 2.83Veq input, which is both very good (being significantly higher than the average for all speakers) and also a fraction higher than Yamaha's own specification. It's also a good result because *Newport Test Labs'* methodology for testing loudspeaker efficiency is particularly stringent.

The last graph in this series is a composite plot showing how the various drivers interact with each other to produce the complete 'system' response as measured by *Newport Test Labs* of 40Hz to 20kHz ± 6 dB. Looking at the left-hand side of this graph, it's apparent that the particular loading and alignment used by Yamaha means that although the frequency response is –3dB at 50Hz, the roll-off below this point is a little shallower than I might have expected, so you can expect to hear significant bass output down to around 30Hz, particularly if you position the speakers effectively in your room.

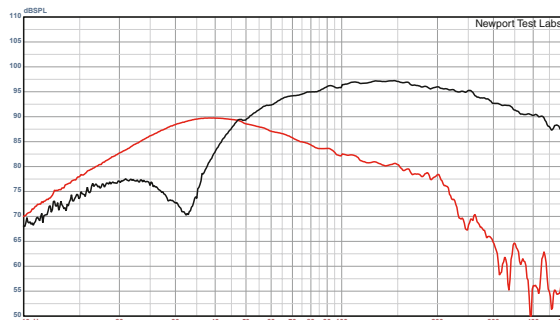
Overall, this is an excellent set of test results, showing that Yamaha's engineers have created a very musically balanced loudspeaker in the Soavo-1.  **Steve Holding**



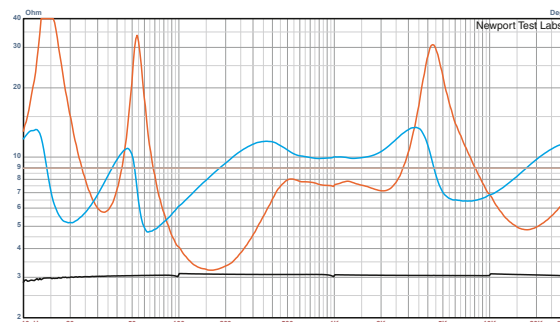
Graph 1. Averaged frequency response using pink noise test stimulus with capture unsmoothed and band-limited to 10kHz. Trace is the averaged result of nine individual frequency sweeps measured at three metres, with the central grid point on-axis with the tweeter. [Yamaha Soavo-1]



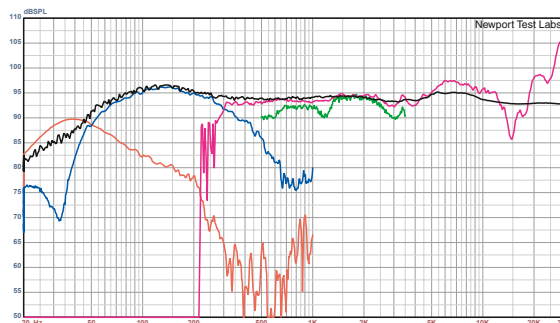
Graph 2. High-frequency response, expanded view. Test stimulus gated sine. Microphone placed at three metres on-axis with dome tweeter. Lower measurement limit 300Hz. [Yamaha Soavo-1]



Graph 3. Low frequency response of front-firing bass reflex port (red trace) and woofer. Nearfield acquisition. Port/woofer levels not compensated for diff. in radiating areas. [Yamaha Soavo-1]



Graph 4. Impedance modulus (red trace) plus phase (blue trace). Black trace under is reference 3-ohm precision calibration resistor. [Yamaha Soavo-1 Loudspeaker]



Graph 5. Composite response plot. Red trace is output of bass reflex port. Dark blue trace is anechoic response of bass driver. Pink trace is gated (simulated anechoic) high-frequency response. Green trace is section of near-field response of midrange driver. Black trace is averaged in-room pink noise response (ext version of Graph 1). [Yamaha Soavo-1 Loudspeaker]