EQUIPMENT REPORTS

SONUS FABER GUARNERI HOMAGE LOUDSPEAKER

Martin Colloms

Limited-edition, two-way loudspeaker with matching stand. Drive-units: 1.1" (28mm) silk-dome tweeter, 6.5" (165mm) polypropylene-cone woolen. Manufacturer's specifications: None. Measured specifications: crossover frequency: 2.5kHz. Electrical crossover slopes: 1st-order, 6dB/octave. Frequency response: 55Hz–20kHz, ±3dB. Sensitivity: 86.5dB/W/m (2.83V). Nominal impedance: 6 ohms. Power handling: 100W peak program. Approximate internal volume: 10 liters. Dimensions: 15" (381mm) H by 7.5" (190mm) W by 14.75" (375mm) D. Price: starting at $9000/pair. Approximate number of dealers: 1. Manufacturer: Sonus Faber, Via L. da Vinci 63, Arcugnano (VI), Italy. Tel: (39) 0444-962699. Fax: (39) 0444-962687. Distributor: Sumiko, 3101 Telegraph Avenue, Berkeley, CA 94705. Tel: (510) 843-4500. Fax: (510) 843-7120.

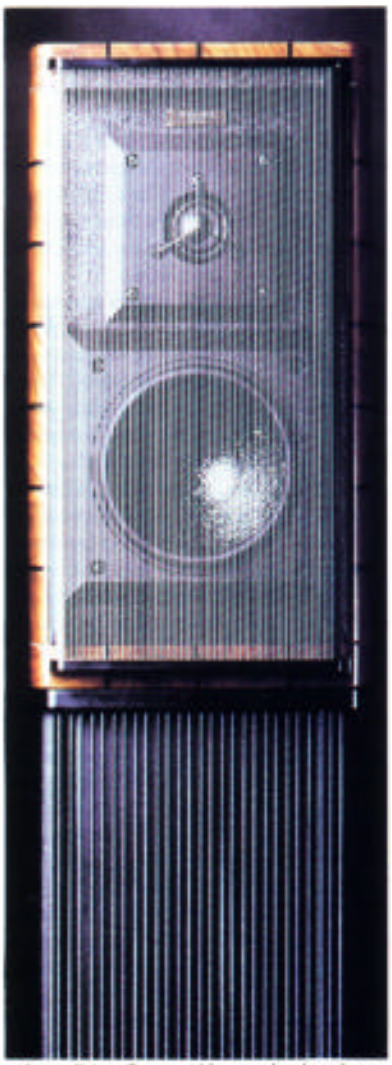
Sonus Faber provides a fascinating and challenging insight into the art of high-quality sound reproduction. This Italian company makes two costly two-way stand-mounted speakers that couldn't be more different from each other.

Sonus Faber's big reference model is the extraordinary Extrema.[1] *Stereophile*'s writers voted the Extrema their 1992 "Loudspeaker of the Year," appropriately so, I feel, considering its amazing looks and equally remarkable performance. The $14,000/pair Extrema is built like a tank, and is capable of producing a seriously big sound, even in quite large rooms.

Now there's the Guarneri Homage. Conceived as a complete entity in harmony with its elegant matching pedestal —I hesitate to call it a "stand"—it looks like no other loudspeaker. The exquisitely finished cabinet is small, perhaps a third of the Extrema's volume (if only half its apparent size). The Extrema announces its presence, especially when it's sitting on its industrial-looking, four-pillar frame stands; the Guarneri, on the other hand, blends into the room, and is a fine piece of furniture in its own right.

The Guarneri is seductively designed, with tapering curved sides and a deeply lustrous piano-gloss finish. In order to get a smooth curve inside and out, the side panels are assembled from sections of solid wood, similar to the construction of a traditional boat hull. The seven primary sections are interleaved with ebony,

1 See *Stereophile*, June 1992, Vol.15 No.6, p.133.



Sonus Faber Guarneri Homage loudspeaker

the result reminiscent of the body of a fine lute. This was no accident; designer Franco Serblin, founder of Sonus Faber, wanted to commemorate the 250th anniversary of the master Italian violin maker, Guarneri, which explains this speaker's full name: the Guarneri Homage.[2]

While Serblin's work to date has been indisputably musically rewarding, and executed with unmistakable Italian *brio*, its foundations are firmly fixed in traditional high-fidelity concepts and engineering. By contrast, the Guarneri owes more to fine materials, centuries-old craftsmanship, and the vital contribution that the structure of a musical instrument plays in its sound. The Guarneri Homage is a limited-edition, virtually made-to-order speaker. Only a few craftsmen are capable of building its enclosure, and then only in limited quantities—no more than 10 pairs per month.

A typical design strategy for a new loudspeaker consists of a program of technical research into various acoustic options, which are then tailored and tuned to produce a good-sounding product. With the Guarneri, however, the music came first. I can do no better than to quote Sonus Faber: "High technology has a way of blurring and obscur-

2 Sonus Faber presented Pair 001 of the Guarneri Homage to the Salon of the Violin in Cremona, Italy in June 1993. The speakers are to remain on permanent demonstration amid the real Guarneris, Amatis, a Stradivarius, and other fine instruments. The Guarneri Homage at Cremona is driven by an Electrocompaniet amplifier, with source material from a multimedia computer program that tells the story of the Guarneri violins. The company presented Pairs 002 and 003 to master violinists Salvatore Accardo and Uto Ughi; Pair 004 will remain at the factory as a reference standard. —KK

ing the ideal solutions that precede us, in the belief that only the latest solutions can possibly be the best."

To justify the use of the name Guarneri, Serblin started from the view that this loudspeaker had to be a music-making instrument. This can be a mixed blessing: it may result in a radically different design, but there may also be some fatal, unforeseen flaw in the overall performance. For example, if an engineer consciously or unconsciously limits the design's frequency range and/or maximum available loudness, then magically satisfying results can be obtained in the all-important midrange. Sounds restricted to that range may be reproduced with unprecedented vibrancy. But if such a speaker is incapable of satisfactorily reproducing the climax of a symphony, or fails to do justice to even a moderately loud drum or the sparkle of a chime, then it will ultimately be found wanting.

However, Serblin's putting the music first, coupled with the novel and acoustically optimal cabinetry, has resulted in a speaker that's not only superbly musical, but also Sonus Faber's most accurate to date. As an acoustic engineer, I find that particularly rewarding.[3]

Whether just sitting there or playing music, the Guarneri is never boring—it's fundamentally true to the spirit of the music it plays.

Musical instruments

The Guarneri is loosely based on the "larger-than-life" Sonus Faber Minima Amator (reviewed in December 1993),[4] which costs a fraction of the Guarneri's price. As the Guarneri's every detail has been fine-tuned, it's worth exploring in greater depth how the speaker is built. Again, quoting Sonus Faber:

"The [cabinet] comprises 42 separate elements hand-sawn from solid wood. Each element is bonded to its neighbor using organic glue and heat pressing techniques identical to those used centuries ago in the manufacture of violins.

"The walnut, maple, and limewood used for the various parts is dried naturally for two years and then stabilized in kilns. The rear of the enclosure is shaped from a single block of limewood. The interior walls of the enclosure are selectively damped using proprietary sheet copper and lead tuning elements."

To which I would add that the 1"-thick driver baffle, covered in grained black leather, consists of 15 layers of birch multi-ply. An aluminium-alloy extrusion forms the inner section of the sculpted rear deck and carries the bass-reflex loading duct and the terminal array.

The main curved body of the enclosure is said to be partly voiced by the specific technique of layered finishing, in the manner of a violin body: "The surface of the wood is prepared for finish by first sealing it with albumin to prevent penetration of the multilayered varnish. The application of many coats of varnish is the time-honored tradition in violin-making that has a profound effect on the final sound. We assure you that the sound of 'Guarneri Homage' benefits from the special finish produced by blending natural organic substances, including Venetian larch turpentine, linseed oil, propolis, wine alcohol, gamboge, copal gum, and oliban. No fewer than ten coats of varnish are applied to each cabinet, hand-sanding then accompanying each finishing coat."

After the final polishing, which is done by hand, each Guarneri cabinet is buffed to a mirror-like finish. The finish is certainly deeper and clearer than speakers that have polyurethane or cellulose-based piano-gloss finishes.

With few exceptions, cabinet resonances are major influences on the a speaker's sound quality; it's well-known that even a speaker's finish affects its sound. "Special Edition" loudspeakers can thus prove surprising: Even a multi-coat, synthetic-lacquer finish can improve the sound, as in the case of the Monitor Audio Studio series. The Wilson Puppy woofer enclosure has a very tough plastic-laminate finish that appreciably reinforces the cabinet. Even with inexpensive speakers, the use of real-wood veneers can result in sound different from that with wood-print, vinyl-film finishes.

The Guarneri's side enclosures are between 0.75" and 1" thick, and the internal mass loading comprises nine lead-weighted copper strips of different lengths, disposed in a staggered formation to fine-tune and distribute the resonances. This technique is also applied to the top panel. Both top and bottom are made from solid, 1"-thick walnut. Internal damping is confined to one piece of acoustic foam in the lower rear section. The idea is that the speaker's irregular shape helps dissipate standing-wave energy, while the minimizing of acoustic damping helps retain a "free" sound.

The knuckle-rap test invoked an interesting result: The 10-liter (internal volume) enclosure is certainly solid, but the panels lacked the familiar knock-on-woodblock sound. The decay signature was more subtle and harmonious, reflecting the enclosure's complex structure and form.

Engineering

As befits a musical instrument, no specifications are provided for this loudspeaker—fascinating, if a tad frustrating for the reviewer. Sonus Faber intends that their dealers be accorded total responsibility for designing a complementary audio system that will bring out the Guarneri's promised performance in the owner's home. How this is achieved is not necessarily the purchaser's concern.

The review samples were loaned to me by Ricardo Franassovici of Absolute Sounds of London, who gently suggested that perhaps lab tests would be inappropriate in a "concept" speaker such as this. I see his point: It should be the sound that counts, aside from any prejudices imparted by an interpretation of lab test figures. (Reviewers know only too well that both the design of test methods and the interpretation of their results are subjective.) On the other hand, a well-designed test program can reveal not only flaws (if present), but can also help to define a product's performance envelope, and hence make it easier to obtain that product's best performance. Such information is valuable, even if it does remove some of the mystery of the product's achievement.

It's fairly easy to estimate some of the Guarneri's basic parameters: Its bass response will extend to a modest 45Hz or so, along with a probable power handling of 100W peak program, a nominal 6 ohm impedance, an average sensitivity of 87dB/W (rather higher than an LS3/5a or a Celestion SL700, for example), and a maximum in-room sound level of perhaps 102dBA. This is a good level for the peaks on classical music, but not really sufficient for disco or rock. Deep bass will be absent, but, as the Minima Amator demonstrated, this doesn't mean the speaker will be incapable of producing a well-balanced, convincing sound.

The Guarneri's bass driver, custom-made for Sonus Faber by Scan-Tech, employs a larger-than-usual voice-coil 54mm (2") in diameter. This is energized by a huge magnet with a deep, 14mm top plate. The light, polypropylene diaphragm has a decorative milled surface, and is suspended on a half-roll surround

3 While there is much the design community doesn't yet understand about loudspeaker engineering, acoustic performance, and the subjectively optimal blend of all design parameters, it's certain that, if all other aspects are held constant, an acoustically even, flat response directed at the area occupied by the listener is a positive factor. (In this context, "flat" means a uniform perceived amplitude frequency characteristic for the predominantly direct soundfield.)

Accurate tonal balance with low coloration are primary criteria, though they by no means guarantee that a speaker will be musically involving, or capable of re-creating a sense of event or performance.

4 Vol.16 No.12, p.174.

of natural rubber, with minimal loss at low frequencies. The diecast woofer frame is nominally 165mm (6.5") in diameter, and the rear port, *ca* 1.6" in diameter by 4" long, tunes the system to 52Hz.

The tweeter, also custom-built, is a version of Dynaudio's Esotar unit and features a 28mm surface-damped soft dome made of silk. The unit is fitted with a special, large, rear chamber carved from solid walnut. The two drive-units are vertically aligned on the contoured, low-diffraction front baffle, the tweeter on the top.

The hard-wired crossover networks are mounted on a solid MDF tray. All the components are dipped in resin for mechanical stabilization. Selected multistrand OFC wire is used. The filters are nominally 6dB/octave over the crossover range, augmented by additional components to shape the acoustic output. The treble high-pass section thus has three elements: two film capacitors and an air-core shunt inductor. For the woofer's low-pass section, the primary element is a large series air-core inductor with an RC Zobel network and an additional film capacitor. The multi-way binding posts allow for normal and bi-wiring, or even bi-amping.

The grille is based on two enameled castings that push-fit on stainless-steel bars mated with the enclosure. Strung like the strings of a guitar between the grille sections is a vertical array of closely spaced, woven black threads.

The Guarneris are supplied with a pair of very tall, well-proportioned pillars (see below). These stands are no less than 39" high, placing the intended listening axis a little below the bass/mid unit. The main column of each pedestal is disguised by a full-height array of threads similar to those in the grille, again strung between precision castings. With the speakers sitting on the stands, the system is heavy but stable; spikes are unnecessary, though the enthusiast might try shallow cones under the massive travertine base. These speakers thrive on free space, and don't need a nearby wall to achieve their optimum bass performance—finicky setup is not required.

System

The Guarneris sounded pretty good straight out of the box,[5] but it was obvious from the first audition that they would continue to reveal additional layers of performance subtlety, mandating lengthy experimentation. Power amplifiers used included Meridian 605 monoblocks and the Naim NAP 250, augmented by the new Krell KSA-100S and KSA-200S. The Musical Fidelity A-1000 class-A amplifier, although out of the Guarneri's price class, showed that these speakers need an amp that is sweet and harmonically balanced.

Because the Guarneri has good bass (within its natural limits) and rhythm, the power amplifier must be competent in these areas. My less-than-comprehensive list includes the Jadis Defy-7, the Acoustic Research VT130 (with BL-1 unbalanced-to-balanced converter, as required), and the Conrad-Johnson Premier series. From my electronics I expect an easy, subjective transparency; a good sense of air and delicacy; natural stereo perspectives; and, above all, harmonic neutrality. Conrad-Johnson Premier Twelve monoblocks offer all these things. The Premier Eleven can also produce civilized results, provided you don't require flat-out maximum loudness.

On the front end, I found a passive line-level controller (Audio Synthesis Passion Vishay) to have the least editorial effect on the system (my cable runs were suited to passive drive). On the preamp side, the zero-feedback Conrad-Johnson PF-2 (review forthcoming), with its MC stage, was a fine starting point. I also still favor the base-line Audio Research LS3 for its uncomplicated vitality. Toward the end of the evaluation period, I borrowed a Conrad-Johnson PV10 and found it to be a very good match—particularly with the Premier Eleven.

I used the Lingo'd Linn LP12 with the Koetsu Rosewood 2 phono cartridge mounted in a NAIM ARO unipivot tonearm. The Guarneri featured classic audiophile sound on black discs, yet also conveyed the good rhythm and timing of which the Linn combo is capable—most entertaining. Digital sources included the PS Audio Reference Link/Lambda combination connected directly to the Audio Research VT 130 in balanced mode, and in unbalanced mode to the other amplifiers listed earlier. The Audio Synthesis DAX decoder also sounded very good in this system.

Cables mattered. I found that van den Hul The First and Second carbon-fiber cables worked best. Bi-wiring the speakers maximized clarity and transparency. Heavy-duty speaker cables were unnecessary; I tried van den Hul Revelation with very good results, but they fit awkwardly to the terminals. Lighter-grade silver cables, such as Siltech and Kimber, were effective.

Sound

Once everything was in place, the Guarneri really sang. Forget mainstream hi-fi; forget head-banging levels; forget gut-wrenching bass; forget the garage-door slam! Instead, remember the purity, unmistakable sense of liveness, scale, and sense of presence of real sounds in the listening space—this is what the Guarneri is all about.

In these abilities, the speaker that comes closest to the Guarneri is the Quad ESL-63. I admire the Guarneri's ability to conjure up a Quad-like, electrostatic sound from a pair of moving-coil drivers, even if they're encased in a truly remarkable wooden enclosure. I could easily say, "If you appreciate the broad midrange fidelity of the Quad, but wish for a sensitive, beautifully crafted miniature on a tall, elegant pillar, then look no further than the Guarneri."

It's rare to find a speaker that's truly balanced—with a tonal, harmonic linearity that extends from the upper bass to the high treble. In this respect, the Guarneri eclipses the other Sonus Faber designs. The bigger models, particularly the Electa Amator and Extrema, will play louder, are more dynamic, and have better, deeper bass; but rarely is a speaker as truthful to its source as the Guarneri.

In a typical room setting—ideally one with a ceiling higher than 10'—the Guarneris disappeared acoustically, leaving a remarkably high, wide, and deep soundstage that had state-of-the-art focus. The speaker's tonal quality spoke of chamber music played in an 18th-century paneled room with polished wood floors and a few carpets, the walls hung with oil paintings and a few medieval tapestries.

Astonishingly, that character did not obscure musical detail or atmosphere. In fact, the Guarneris were very transparent, with high resolution and recovery of low-level detail and ambience. Definition was lost only when the speaker was worked hard in the bass, and the reflex port added some mild distortion.

More than anything else, the Guarneri's neutrality and low levels of coloration, born of an accurate frequency response and overall frequency balance, defined the speaker's exceptional, wholly believable performance. The sound of the Guarneri was beautifully proportioned—like its appearance. There was no deep bass, but because the speaker's sound was otherwise so complete, I didn't notice the loss.

The Guarneri's inner balance and smoothness were so good that the speaker proved unusually tolerant of a wide range of program qualities and matching ancillaries, cables, and amplification. They handled natural acoustic sounds

5 They came wrapped in red silk, cocooned in foam hollows carved into a wooden packing case with a screwed-down lid.

best; this means that, to some degree, the speaker might be less impressive on heavy rock or strongly synthesized sounds. Nevertheless, although the Guarneris were more believable on orchestral music, they still rocked better than any true miniature I know of.

Transients were excellent. Subtle sounds, such as the brushstrokes on drums and cymbals, and Airto Moreira's natural percussion repertoire (*Killer Bees*, B&W Music 041), were rendered with the startling accuracy of a good electrostatic. Vocals were articulate, unforced, and harmonically correct. This speaker could have been designed to reproduce only Vivaldi, so well did it capture the atmosphere of a string performance. And though the Guarneri is small, like its Sonus Faber brethren, it didn't show it. Without any false brightness, this speaker provided an upbeat, involving tempo, showing good timing on tight jazz combos.

Subtle and fine-grained, the Guarneri did not need a "power" amplifier, in the accepted sense of the word. Rather, it derived its finest performance from a harmonic match to a sweet, pure amplifier—preferably tubed—in the 50–100W range. (Solid-state amplifiers are by no means ruled out, but the Guarneri neither needs nor benefits from such major powerhouses as the Krell KSA-200S or -300S.) With such a combination, I found I could listen to digital sources for longer periods without fatigue.

The Guarneri also played quite loud, its good sensitivity making the most of my amplifier. Once I adjusted to its sense of natural scale and superb perspectives, I found this system wholly satisfying. Time and again, the reproduction had that ring of truth—the richness and rasp of orchestral brass, the singing quality and "edge" of violin, and the attack and pitch of xylophone and woodblock. On Steve Reich's *Music for Mallet Instruments* (Elektra 7559-79220-2), the Guarneri revealed the complex interplay of musical strands while preserving the overall structure and almost relentless flow of the compositions.

One aspect did prove worthy of experiment. In my room, the exceptional height (39") of the pillar stand placed the woofer's acoustic center close to halfway between the floor and the 110" ceiling. Such a position maximally excites the half-wave floor-ceiling mode, which in this case lies at 60Hz. The high odd-order modes—at 180Hz, etc.—are also excited by placing the speaker on such a high stand, endowing the speaker's lower midrange with a characteristic "boxiness."

If the Guarneri is custom-ordered, the customer can request moderately different pillar heights. I didn't have any other Faber pillars, so I used 31" Stone stands. These worked just fine, moderating the mild room-mode coloration. A slight uptilt corrected for the change in vertical axis—this and the degree of toe-in can be used to fine-tune the tonal balance for a particular room acoustic. I liked the Guarneris best with my ear level with the midrange/woofers (see measurements).

If the Guarneri is not used with appropriate ancillary components, it becomes simply good hi-fi. But if set up properly—taking account of its unique qualities—the Guarneri breathes music.

Measurements

The Guarneri's reflex-port tuning was set at 52Hz—a region where the power handling was enhanced for heavy mid-bass inputs on typical program material. Deep bass was beyond the compass of this system, and the -6dB bass rolloff point was at 49Hz, giving the potential for satisfactory in-room bass reproduction down to 42Hz—the lowest note of both the orchestral double-bass and 4-string Fender bass.

Fig.1 shows the overall low-frequency output in the nearfield (upper trace); to achieve the moderate bass extension, there is no need for the low-frequency response to be tapered or overdamped, and the output is maximally flat down to 54Hz. Fig.1 also shows the nearfield response for the port (lower trace). This showed a couple of minor duct resonances, at 680Hz and 1.3kHz, but at 15dB below the primary port output and rear-directed, these are not considered significant.

On-axis at *Stereophile*'s customary 45" microphone distance (fig.2), the Guarneri gave an impressively uniform output of ± 3dB from 55Hz–20kHz, either in the ⅓-octave presentation shown, or in normal high-resolution analysis mode. There were mild variations, but the golden rule, which asks for the "ups" to balance the "downs," is followed here. There were none of the usual tonal-balance aberrations, with the midrange correctly set against the bass and, likewise, the treble correctly leveled against the mid. A particularly flat response was seen in the midrange—a remarkable ± 1dB from 200Hz–1kHz.

The lower, dotted trace in fig.2 shows the pair matching—the difference between the two samples—with an expanded 1dB/division scaling. A minor irregularity can be seen near the crossover point, but the overall result was within ± 0.3dB limits—an excellent result.

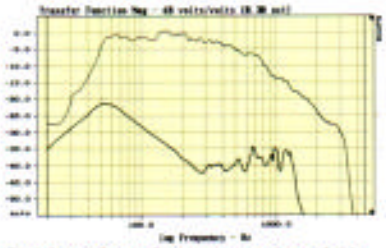


Fig.1 Sonus Faber Guarneri, overall nearfield response (top) and nearfield response of port (bottom) (5dB/vertical div.).

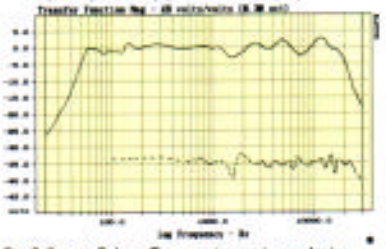


Fig.2 Sonus Faber Guarneri, quasi-anechoic response on listening axis at 45" (top, 5dB/vertical div.), with difference between the two samples (bottom, 1dB/vertical div.).

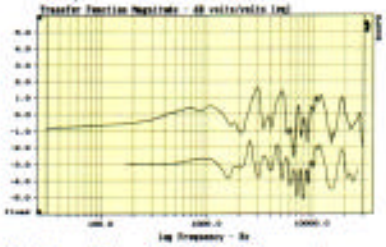


Fig.3 Sonus Faber Guarneri, differences in on-axis response made by complete grille (top) and by grille threads alone (bottom) (1dB/vertical div.).

While the unusual grille design passed muster in the listening tests, and the reference response in fig.2 was taken with the grille in place, I couldn't resist finding out the exact contribution it made. I don't exactly hate grilles, but in most cases I would have preferred a speaker's designer to have omitted them altogether. The upper trace in fig.3 indicates the change in response that occurs when the grille is fitted. The lower trace shows the effect of just the vertical threads. Remembering that the acoustic half-wavelength at 10kHz is little more than half an inch, it was extraordinary to find that the array of grille-threads was, in fact, a relatively powerful acoustic device that dominated the result. Those regular ripples between 5kHz and 10kHz are an interference or diffraction-grating effect. Careful comparison with the reference axial response suggests that most of the response ripple was grille-induced. In one sense, this is encouraging, since the fundamental response was so good and the mild grille variations would, in practice, average out over a range of listening axes.

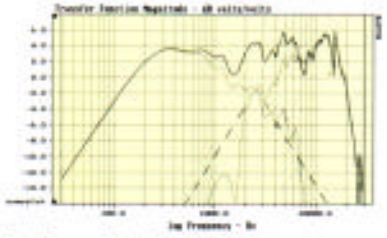


Fig.4 Sonus Faber Guarneri, quasi-anechoic response at 0.75m on listening axis, with individual responses of tweeter and woofer (2dB/vertical div.).

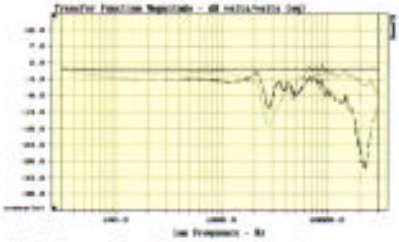


Fig.5 Sonus Faber Guarneri, vertical response family at 45°, normalized to response on listening axis (solid line); difference in response 15° above listening axis (dotted); difference 15° below listening axis (dashed) (5dB/vertical div.).

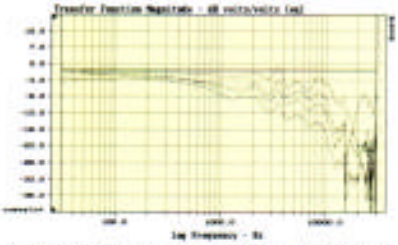


Fig.6 Sonus Faber Guarneri, horizontal response family at 45°, normalized to response on listening axis, from top to bottom: reference response (solid); differences in response (dotted) 15°, 30°, 45°, 60°, and 90° off-axis (5dB/vertical div.).

Fig.4 shows the response on an expanded vertical scale, showing the individual driver responses (ignore the premature rolloff below 250Hz, due to FFT windowing error). The dotted response shows the acoustic crossovers. This nominally blends at 2.5kHz, with initial 6dB/octave (20dB/decade) slopes. The midrange was the most successful at this, holding a gentle slope from 1–6kHz. A 2–6kHz first-order range is achieved for the tweeter, though both drive-units fall off more rapidly than the specified 6dB/octave slopes (dashed lines) more than one or two octaves away from crossover.

If the coloration is low, a monitor-like truthfulness will result—this trend was indeed maintained over a range of forward axes. Looking at the variations in the vertical plane (fig.5),[6] the output was

6 For clarity, the axial outputs of the vertical and lateral responses have been referenced or normalized to the on-axis response. The latter therefore appears as a straight line.

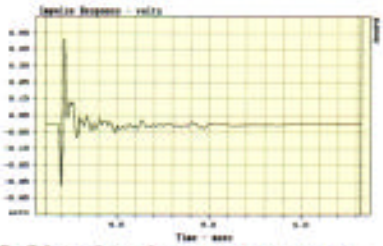


Fig.7 Sonus Faber Guarneri, impulse response on listening axis at 45° (3.5ms time window, 30kHz bandwidth).

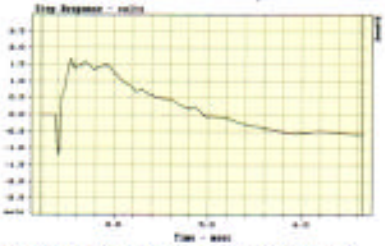


Fig.8 Sonus Faber Guarneri, step response on listening axis at 45° (3.5ms time window, 30kHz bandwidth).

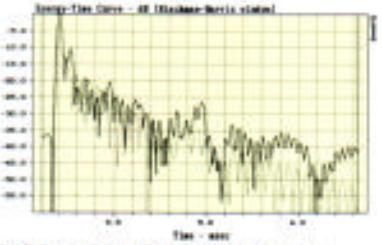


Fig.9 Sonus Faber Guarneri, Energy-Time Curves on listening axis at 45°, unwindowed (solid), Blackman-Harris windowed (dotted).

skewed in favor of the preferred below-axis response, which was quite uniform. Above the "reference" axis (actually near the tweeter axis), the output dipped in the crossover region by 17dB, while the treble output was lifted by 1.5dB, unbalancing the overall result. Graphed for 30°, 45°, 60°, and 90° off-axis angles in the lateral plane (fig.6), the Guarneri's output was quite uniform, showing very good lateral directivity and low diffraction—this undoubtedly contributing to the sharp stereo focus heard in the auditioning.

Examining the transient responses, the Guarneri's impulse response (fig.7) indicates a quick signature, the minor ringing due mainly to the grille. The infinite step response calculated from the impulse data reveals an out-of-phase relationship between high- and mid-frequency drivers, chosen by the designer to provide a well-integrated output over the designed listening window. The high-pass nature of the speaker's low-frequency response causes the step to decay to the zero line after several milliseconds—this is normal. The step's appearance was changed very little by the grille [*presumably because the necessary mathematical integration of the data boosts the low frequencies at a 6dB/octave rate, thus minimizing the influence of high-frequency effects.—Ed.*].

Two results are given in fig.9 for the manner in which energy decays with time (the Energy-Time Curve, or ETC) for a 3ms range (3.4–6.6ms): the unwindowed characteristic in bold, the Blackman-Harris windowed data dotted. These were quite similar, the Guarneri's output decaying by 35dB in the first millisecond—a good result.

The first waterfall plot (fig.10) is more sensitive to early decay problems, due to its fast 0.1ms filter risetime and an expanded scale of 5dB/vertical division. A minor dome resonance is evident at 16kHz, decaying quickly, while the large white area at the top of this graph suggests a very good performance. In practice, the treble sounded just fine. The second waterfall (fig.11) uses a 0.2ms risetime with greater resolving power in the frequency domain; the dynamic

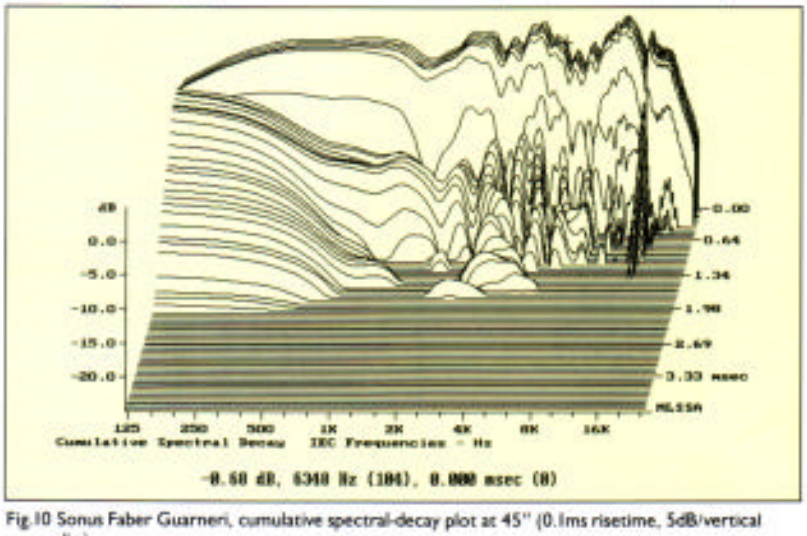


Fig.10 Sonus Faber Guarneri, cumulative spectral-decay plot at 45° (0.1ms risetime, 5dB/vertical div.).

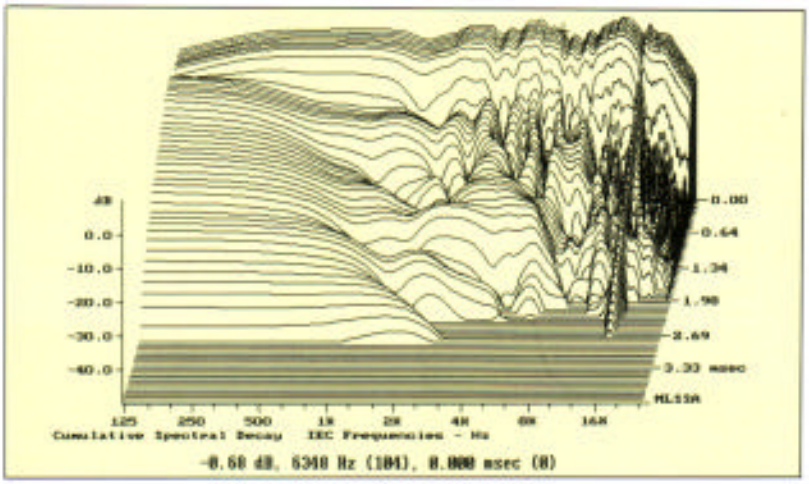


Fig.11 Sonus Faber Guarneri, cumulative spectral-decay plot at 45° (0.2ms risetime, 10dB/vertical div.).

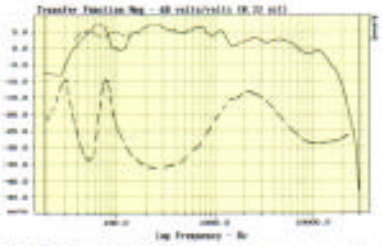


Fig.12 Sonus Faber Guarneri, room-averaged ⅓-octave response (top, solid, 5dB/vertical div.), electrical impedance magnitude (bottom, dashed, 2 ohms/vertical div.). Minimum value is 5.8 ohms at 260Hz.

range now totals 60dB, 10dB/division. Though the 16kHz mode still makes its presence known, no other significant features are evident.

Driven from both stereo positions and over the listening space, the resulting room-averaged ⅓-octave response (fig. 12, top trace) was most presentable. That flat midrange is still evident, while the bass is smoothly extended to almost 40Hz. Even in-room, the Guarneri managed ±3.5dB from 45Hz–10kHz, while the rolloff in the top octave is as expected, given a 1" dome tweeter's theoretical directivity.

At 1m on the reference axis (a few degrees below the midrange driver), the sensitivity was 86.5dB/W/m—a good result for a miniature speaker. This was not prejudiced by the impedance characteristic, and I got an average value of 8 ohms with a minimum value of 5.8 ohms (fig.12, lower trace). Many tube amps will be happy driving this load, as I found in the auditioning.

I applied various input powers to the Guarneri; it proved very capable in the mid- and treble ranges, the linear magnet and suspension systems keeping distortion down to 0.2% or better, even above 90dB spl. Below 100Hz, the system was working harder, with distortion above 2% below 70Hz, but this was of low order, and insignificant if judged subjectively. The Guarneri's power handling, like the Minima Amator's, was well above the average for its size, but you can't expect really high sound levels, especially in the bass. Nonetheless, it can play 6dB louder than a BBC LS3/5a, which will be enough for many applications. In a typical listening room, two Guarneris will raise 102dBA with 100W peak program (undistorted) per channel.

Conclusions

The Sonus Faber Guarneri Homage may be a small speaker, but it sure portrays music with style and class. How can you dispassionately place a value on its superb, fine-furniture–quality enclosure, the visual unity between the speaker and its pedestal, and the spirit and labor that have gone into the creation of this remarkable product?

Technically, the Guarneri is a very well-balanced, elegant design with a useful sensitivity, allied to a kind amplifier-load characteristic. Coloration was low, response uniformity very good, distortion moderate, and it was very easy on the ears. It doesn't have extended bass, but the bass it does produce is sufficiently weighty, articulate, and tuneful. However, this description doesn't do justice to the sheer quality of sound produced by this highly refined instrument.

When the Guarneri is driven by good tube electronics, you can forget about the mechanics of hi-fi and let the music take precedence. Though it may not be suitable for headbangers or technofreaks, the Sonus Faber Guarneri is a classic whose purchase you'd be unlikely to regret. Franco Serblin has upheld the worthy goal of honoring the great tradition of Guarneri stringed instruments. **S**