

Stereophile

Meridian 508.24 CD player

Wes Phillips • May, 1998

My wife's cousin Steve used to sell antiques. Whenever he would display in his shop's window an impeccable (and expensive) item such as a Colonial pie safe, someone would inevitably walk into the shop and demand to know its price. He'd quote a staggering figure, and the browser would get excited. "Why, I have a piece at home *exactly* the same as that one! Do you think I could get that



sort of money for it?" Steve, having learned his lesson the hard way, would be noncommittal.

"Yes, it's *exactly* the same..." continued the customer, "only mine has new hinges and latches, and it's not natural pine, it's been decoupled. One of the legs got knocked off the last time we moved—and so did some of the decorative molding around

the top, but mine is even better, because I cut a slot in the back so we could hide the TV in it."

After several years of this, Steve formulated an incredibly useful philosophical construct: the Same-But-Different theorem. It can be used to explain almost anything. For instance, in last month's review of the Audio Research CD2, I postulated that Stephen J. Gould's theory of evolutionary convergence had kicked in in a big way among high-end CD players: each has a strength or strengths that distinguish it from the others, but the actual differences have become minute. You see? The same, but different.

Which brings us to the Meridian 508.24 CD player, a beautiful design with impeccable technical credentials—a CD player that belongs, with only a few others, at the very sharpest portion of the leading edge, and that joins them in producing sound that is highly musical and hard to criticize. The same, but *very* different.

Little boxes...and they all look just the same

Meridian just doesn't do things the way other audio companies do them. Take the box itself, for instance—designed by Alan Boothroyd. The 508 is compact (12 5/8" W by 3½" H by 13" D) and subdued in appearance. The top-plate and front display are black glass—the rest of the case is textured black enamel. The disc drawer occupies the left side of the 508's face, while the right has a row of broad buttons separated by eight thin raised strips—or so it seems. In reality, the wide "buttons" are the spacers and the raised strips are the controls. There's no real confusion, however, as the functions are clearly labeled. The whole package is quite elegant.

Which is not to say that functionality has suffered. The rear panel features a mains assembly that includes a power switch, fuse-holder, and IEC power-cord socket; two five-pin Meridian Comm ports (to enable the 508 to communicate with other Meridian kit); balanced XLR and single-ended RCA analog outputs; S/PDIF output on RCA; as well as accommodation for optical EIAJ. Yet despite the unit's compact size, the rear panel isn't cramped—there's lots of room for making connections. Would that this were always true!

The 508.24 isn't a totally new design, but grew out of the 508.20 that Sam Tellig wrote about back in June 1996 (Vol.19 No.6). The major change is its use of direct-coupled Crystal CS4390 delta-sigma converters in dual-differential mode. According to the player's designer, Bob Stuart, the

4390 "is an evolution of the Crystal 20-bit part (CS4329), which we used in the 508.20 player. Its development took quite a long time and was a collaboration between Meridian and Crystal. We helped them out with the 20-bit DAC as well as with this one. We were all very pleased with the way it worked, and they gave us the first shot at using it. It's a nice DAC—a delta-sigma type with digital filtering. It's very smooth. The two DACs are pin-compatible, which is nice, but we didn't just drop the new chip in—we can't just swap them for customers who own the 508.20, unfortunately."

That's because the new DAC is far from the only difference in the unit. Stuart also changed the CD mechanism. "We were using the Philips CDM12.4, now we're using the CDM12.5—it's more reliable, tracks better, and it has a Hall-Effect spinning motor—a separate drive motor always gives you a smoother spin and finer control. CDs don't spin at the same speed throughout the disc, of course, they're constantly changing rotational speed, and the more precisely you can control that speed and stability, the better the performance.

"We also changed the software related to our adaptive servo system, which recalibrates itself for every disc you put in—things like the reflectivity of each disc change, and our servo system will optimize itself to ensure its capacity to play all the way through a disc, to play through defects. It gives an improvement in sound quality—although the tradeoff is in its ability to withstand shocks. You can't go jogging with it."

For all the differences, some things in the 508.24 remain the same. "It still uses the same analog-domain pre-dejittering that we developed in earlier models of the 500 series. And it still employs a three-beam laser tracking system and our Foucault focus arrangement."

Analog-domain pre-dejittering is a pretty slick trick. The RF signal coming from the laser pickup is analyzed, and if its parameters seem degraded, the servo is adjusted for better tracking.

Stuart is emphatic that not everything newer is better. Take the player's CD decoder, for instance. He's not happy with the newer parts he's tried—which seem to be built to cost less, not perform better—so he continues to use a model he's tried and found true. "Ours is very low-jitter and very low-noise...they don't make it any more, but we bought years and years' worth of stock."

The same...but different!

The Meridian 508.24 player is superb. Like the Mark Levinson No.39 and the Audio Research CD2, it is *extremely* hard to fault. It worked flawlessly throughout my audition—perhaps even better than flawlessly, as it tracked several discs that gave the other two some trouble. (I don't know how I scratched my copy of Johnny Hodges' *Used to be Duke*, Verve 849 394-2; I just know the Meridian didn't force me to skip "Warm Valley" like the others did.)

The 508 does take longer to read a CD's Table of Contents than do many other players, which I assume has to do with the adaptive servo system, and it's a trifle slow tracking up and down through the selections—but I can't see why anyone would refuse to buy a player that sounds this good simply because it takes a few fractions of a second longer to change tracks. That's the level of nit-picking I'm reduced to with this unit.

In terms of sound, what's not to like? The player had incredibly natural, balanced sound. Given a good recording, it sounded unbelievably open and free from artifice. I relaxed into its sonic presentation the way a fat man with sore feet kicks off his shoes at the end of a hike—totally, without reservation.

Of course, CD players are supposed to feed you back what was on the disc in the first place, and to properly hear how good the Meridian is, you must feed it natural, ungimmicked recordings—most particularly, simply recorded acoustic instruments in real spaces. These, of course, always *do* seem to sound good, but through the Meridian they didn't just sound good, they sounded *right*.

This shouldn't have surprised me, I suppose. Last September, after attending the UK's Ramada hi-fi show, I visited Stuart in Cambridge and listened with him in the Meridian listening room for the better part of a day. Most of what we heard on that occasion was unamplified music—much of it recorded in or around Cambridge. But don't think that made it simple. Several discs were recorded in Kings College Chapel, which has an acoustic so rich that Sir David Willcocks said of it, "It can make a fart sound like a sevenfold amen."

Bits may be bits, but Stuart told me that he listens actively as part of his tuning process. "There's a lot you can do to change the sound—the tightness of the power supplies in the analog components around the DAC in the output stage can change its sound."

Tight like that!

Interestingly, tightness was one of the first things I noticed about the Meridian's sound. Although it indicates a tendency toward lazy thinking that I'm not particularly proud of, I have to confess that I just *knew* the Meridian would sound polite and, perhaps, a tad distant.

Wrong again. The first notes that came out of the player—from Steve Earle's *El Corazón*, Warner Bros. 46789-2—were so tightly focused and alive with tonal color that I was a goner for the next 45 minutes. I was *forced* to listen closely by the "thereness" of it all. But the 508 didn't take this too far—it never sounded in-your-face or aggressive, it just didn't recede politely into the background. But then, neither does Steve Earle.

Another thing: Earle tends to mumble a bit, y'know? The Meridian didn't cure that—as it shouldn't have—but the honesty of its presentation didn't obscure any of the information that was there. I found myself straining far less to hear what Earle was singing. Which, given the quality of his lyrics, is a very good thing.

As with the Audio Research CD2 that I reviewed in April (Vol.21 No.4), I found little to fault in the 508.24, so after a lengthy solo audition I settled in to some level-matched comparisons with the Mark Levinson No.39 (December '97) and the CD2. The sound was remarkably good from all three sources—perhaps the convergence theory is correct. Certainly, the three units were all admirably close to one another in performance, their differences slight. That's not to say they were nonexistent, however. While I would never claim to be able to identify any one of them blind, when auditioned side by side they were certainly not identical. Compare them, by all means—but once you've made a choice among these three, I can't imagine you'll have any regrets.

First, I listened to *Serenade* (Stereophile STPH009-2), mostly because it was on top of the stack of CDs growing by the players. The CD2 and the Meridian sounded remarkably similar to one another, although I felt that Carol Wincenc's flute had a tad more sparkle through the 508. On the other hand, the 508's presentation bunched Yasushi Toyoshima, Michelle Kim, and Peter Wyrick closer and tighter around the flutist. The CD2 had them spaced farther apart from one another, but not as far apart as with the No.39, which also seemed to pinpoint all four more firmly in space. On the other hand, the Levinson seemed to separate direct sound from hall sound to a greater degree. It was better integrated through the ARC and the Meridian.

Last Christmas Robert Baird turned me on to Buddy Miller's *Poison Love* (Hightone HCD8084), and since then it's never been far from whichever CD player I'm nearest. Miller's a rockin' country boy, and he's joined on the record by Emmylou Harris, Steve Earle, and Sam Bush—all participants in my fantasy all-star band. I auditioned "100 Million Little Bombs," Miller's stinging indictment of US involvement in the international market in land mines: "What can you do with what's left behind / What can you grow when the fields are mined? / ...From China to Angola and Cambodia where they lay / With chips from Motorola, made in the USA." Yeah, it's protest music, but with a heavy rock beat.

Here, I was stunned by the Meridian's slam and deep-bass extension. Darryl Johnson's loping bass line was best articulated by the 508—especially such telling details as his changes in attack and fingering throughout the song. The Levinson was very close, but the overall sound was slightly less robust, and the pace was not quite as full of "lope."

"Fool in the Rain," from Led Zeppelin's *In through the Out Door* (*The Complete Studio Recordings*, Atlantic 82526-2), again seemed to have more intense drive through the Meridian, and the slam factor was cranked to "11"—the very qualities that have always given this song its appeal. But the overall sound was hazier through the 508.24 than through the Levinson or the ARC. Perhaps this better represents the signal—despite the fact that the tapes were "digitally remastered by Jimmy Page," they don't sound all that great—but I should be used to that by now: Atlantic hasn't done right by Zep for at least 20 years. The biggest disappointment in the boxed set is how lackluster Bonham's drums sound. Even so, "Fool in the Rain" captured his relentless drive and power, especially the Samba school section, which is all-out, arms'n'legs a-churnin', syncopated brilliance.

All three players handled the pacing well, though I'd give a slight nod to the Meridian. But the No.39 and the CD2 seemed to create a bigger stage upon which the foursome played.

As I said, a very close call—with no loser. But perhaps, just perhaps, the Meridian catered more toward *my* particular prejudices. Overall, the Meridian and the Audio Research were quite similar in tonality and presentation, while the Mark Levinson had a closer perspective on the music and tended to highlight details ever so slightly more. But listened to separately, none of these players seemed very different in the ways they remained true to the music. The Audio Research and the Meridian are essentially the same price, while the Levinson is quite a bit more expensive—but it offers adjustable analog outputs, multiple digital input capability, and digital source switching, features neither of the others possesses.

We all boil at different degrees

I liked the Meridian 508.24 player very much, but that doesn't mean I don't also like the Levinson No.39 and the Audio Research CD2. If I haven't gotten that across, then I know how Pooh felt—after all, "when you are a Bear of Very Little Brain, and you Think of Things, you find sometimes that a Thing which seemed very Thingish inside you is quite different when it gets out into the open and has other people looking at it."

The fact is, CD players are reaching a point in their evolution where the differences between the very best are verging on the minute—they exist, but only you can decide how much they matter. And make no mistake, the Meridian 508.24 CD player is unquestionably one of the very best. I enjoyed having it in my system, and eagerly look forward to my next listening session with it—and the one after that, and the one after that.

That's something that seems very Thingish inside me, and is not likely to change.

Specifications

Description: CD player with Crystal 24-bit DACs and class-A analog output stage. Conversion: dual-differential 24-bit delta-sigma. Mechanism: 3-beam laser. Analog outputs: 1 pair balanced XLR, 1 pair single-ended RCA. Digital outputs: coaxial S/PDIF, optical EIAJ. Communications: two 5-pin DIN sockets. THD: <-93dBFS. Noise: <93dBFS. Maximum audio output level: 2V fixed.

Dimensions: 125/8" W by 31/2" H by 13" D. Weight: 14 lbs.

Finish: black textured enamel and glass.

Price: \$3495. Approximate number of dealers: 120.

Manufacturer: Digital Gramophone and Wireless Ltd. Distributed by: Meridian America Inc., 3800 Camp Creek Parkway, Building 2400, Suite 112, Atlanta, GA 30331. Tel: (404) 344-7111. Fax: (404) 346-7111. Web: www.meridian.co.uk .

Associated Equipment

LP playback: Linn LP12 with Naim Armageddon Power Supply, Naim ARO tonearm, van den Hul Frog cartridge; LP12/Lingo/Cirkus, Ekos tonearm, Arkiv phono cartridge.

CD playback: Audio Research CD2, Mark Levinson No.39.

Phono preamplifiers: Conrad-Johnson Premier Fifteen, Linn Linto, Naim Prefix.

Power amplifiers: Conrad-Johnson Eleven A, Krell FPB 600, Mark Levinson No.33H.

Loudspeakers: B&W Silver Signature, Dynaudio Contour 3.0, EgglestonWorks Andra, ProAc Response One SC; REL Studio II subwoofer.

Cables: Kimber KCAG and WireWorld GEI interconnects, Kimber Black Pearl and WireWorld GEI speaker cables.

Accessories: Audio Power Industries Power Wedge 112, Magro Stereo Display Stand.

Sound treatment: ASC Tube Traps, Studio Traps, Bass Traps; RPG Abffusors; Moliminous moggie.—**Wes Phillips**

Measurements

Checking the Meridian player's error correction with the Pierre Verany test disc, which has deliberate data dropouts engraved on its surface, revealed a good ability to deal with missing data. The CD2 could play up to track 32 (a 1.25mm gap in the data) without the sound muting, and didn't fail catastrophically until track 34 (a 2mm gap). This is considerably better error correction than required by the official CD standard, but it is interesting to note that Meridian machines from the early '90s actually did better than this.

At 2.54V, the player's output level at 0dBFS from its single-ended jacks was a very audible 2.1dB higher than the CD-standard 2V, while a healthy 5.07V was available from the balanced XLR jacks. The player was noninverting from either output, the XLRs being wired with pin 2 hot. The output impedance didn't vary significantly with frequency, the single-ended outputs averaging a low 47 ohms and the balanced twice that, as expected, at 94 ohms.

The 508.24's frequency response at full level, measured from its balanced outputs, is shown in fig.1 (top traces). It is basically flat from 10Hz to 20kHz, with a hint of droop in the top octave. But at -0.1dB at 20kHz, this is negligible. The unbalanced output was identical, and the lower pair of traces in fig.1 are the response with de-emphasis engaged. This maps the unemphasized response exactly, implying a perfect de-emphasis implementation—commendable, given that I understand Meridian performs de-emphasis in the analog domain. The Meridian's channel separation (not shown) was superb, at better than 100dB below 1kHz, rising to a still excellent 86dB at 20kHz.

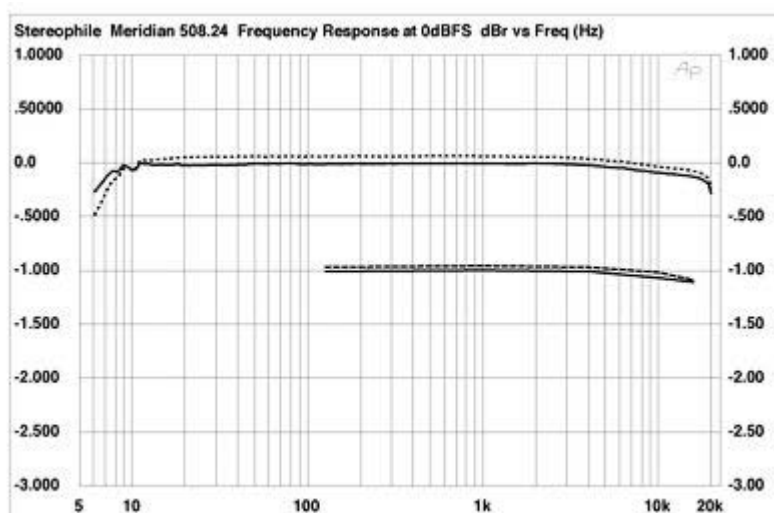


Fig.1 Meridian 508.24, frequency response at 0dBFS (top) and de-emphasis response (bottom) (right channel dashed, 0.5dB/vertical div.).

Fig.2 shows a 1/3-octave-smoothed spectrum of the 508.24's output while it decoded data representing a dithered 1kHz tone at -90dBFS. The trace is completely free of power-supply components, harmonic distortion, and idling pattern noise. This is one heck of a quiet CD player! Note that the traces don't quite reach the -90dBFS line, implying a small amount of negative linearity error.

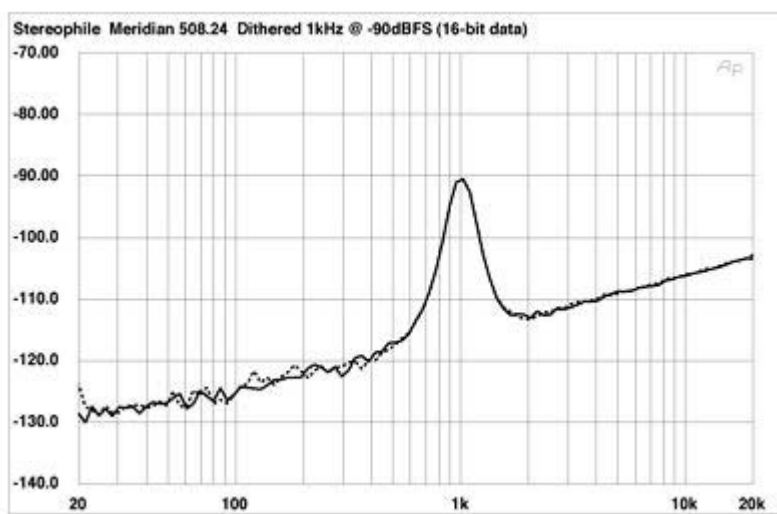


Fig.2 Meridian 508.24, spectrum of dithered 1kHz tone at -90.31dBFS, with noise and spurs. (16-bit data, 1/3-octave analysis, right channel dashed.)

Repeating the spectral analysis but extending the measurement bandwidth to 200kHz and driving the player with code representing "digital black" gave the bottom pair of traces in fig.3. The DAC appears to mute its output when it detects this signal, so this trace effectively shows the ultimate noise floor of the player's analog electronics. This is below -130dBFS over most of the band, and is 10dB quieter than that in the power-supply hum region! (Ignore the small peaks at 2kHz and 20kHz, which might well be measurement artifacts.)

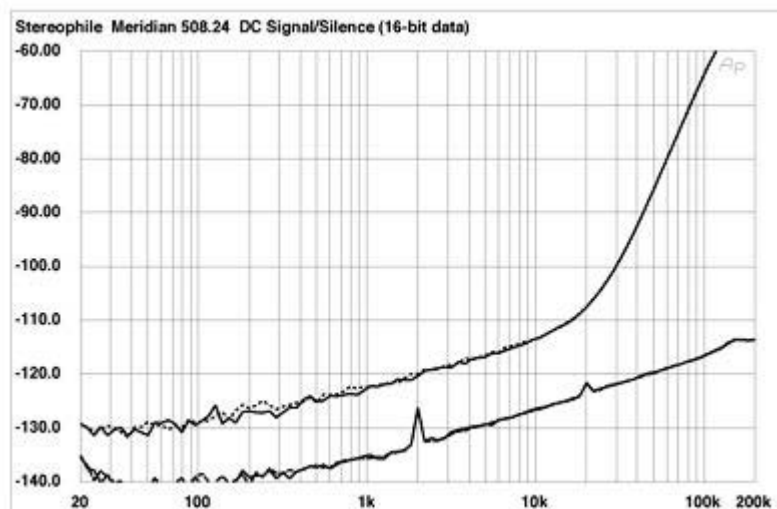


Fig.3 Meridian 508.24, spectrum of digital silence, with noise and spurs (bottom) and spectrum of DC signal (top). (16-bit data, 1/3-octave analysis, right channel dashed.)

The top two traces in fig.2 show the player's noise floor in the presence of a signal—in this case, data representing a DC signal from a JVC test CD. Note now the rise of around 12dB in the noise floor in the audio band, and the huge increase in the noise above 20kHz. This is due to the high-order noise-shaping used in the Crystal delta-sigma DAC to achieve as high a resolution as possible below that frequency. While this is not 24-bit performance given the 16-bit CD code used to feed the DAC, the shortfall is academic. And in any case, the "24-bit" nomenclature Crystal uses for its DAC more truthfully reflects the fact that the DAC will accept 24-bit data without truncation, which has positive consequences for sound quality.

Plotting the 508.24's measured output level against theoretical level using a dithered 500Hz tone gave the linearity plot shown in fig.4. The left channel is shown, and any error is inconsequential in subjective terms. The linearity is smooth, and pretty accurate down to below -115dBFS or so, where the player's very low noise floor finally starts to intrude.

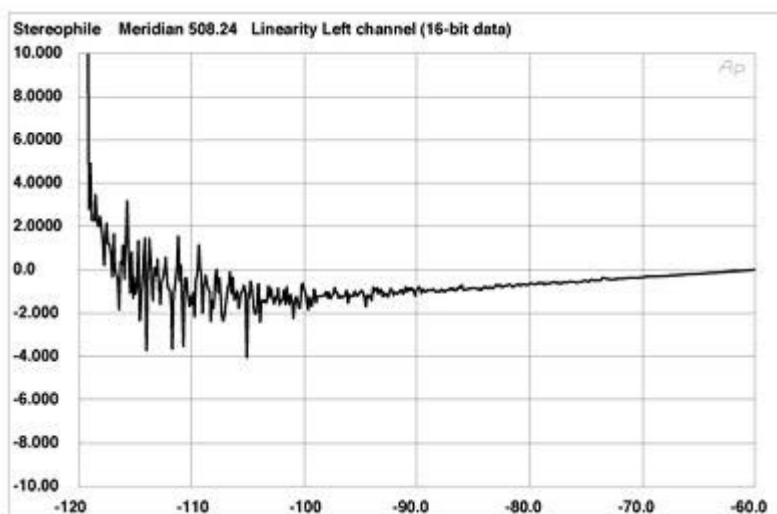


Fig.4 Meridian 508.24, left channel, departure from linearity (2dB/vertical div.).

Confirming the implication that this is a very-high-resolution machine, the waveform of an undithered 1kHz tone at -90.31dBFS was reproduced with an almost perfect shape (fig.5): there was very low noise, almost equally spaced level steps, and even more than a hint of the Gibbs Phenomenon "ringing" due to the CD standard's 22kHz band-limiting.

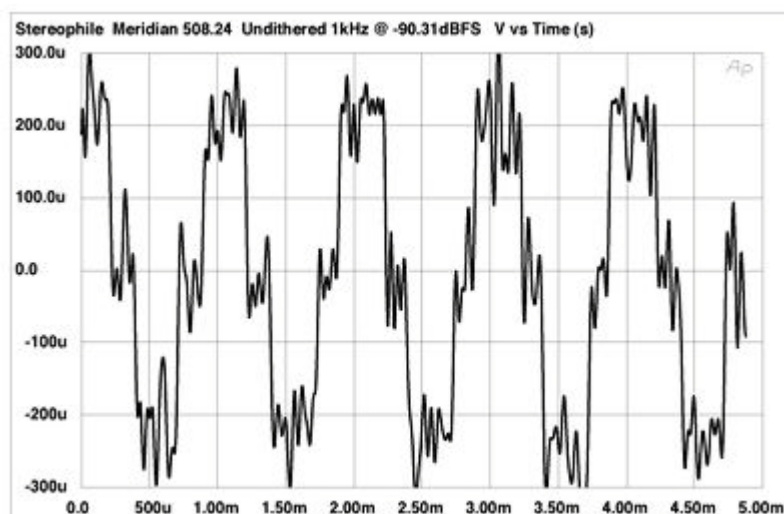


Fig.5 Meridian 508.24, waveform of undithered 1kHz sinewave at -90.31dBFS (16-bit data).

Driving the CD player with data representing a high-frequency "torture" signal—19kHz and 20kHz, each at -6dBFS, which gives a waveform peaking at 0dBFS—gave the spectrum shown in fig.6. All the intermodulation products are extremely low in level; even the highest, the 1kHz difference component, is at -96dB (0.0015%).

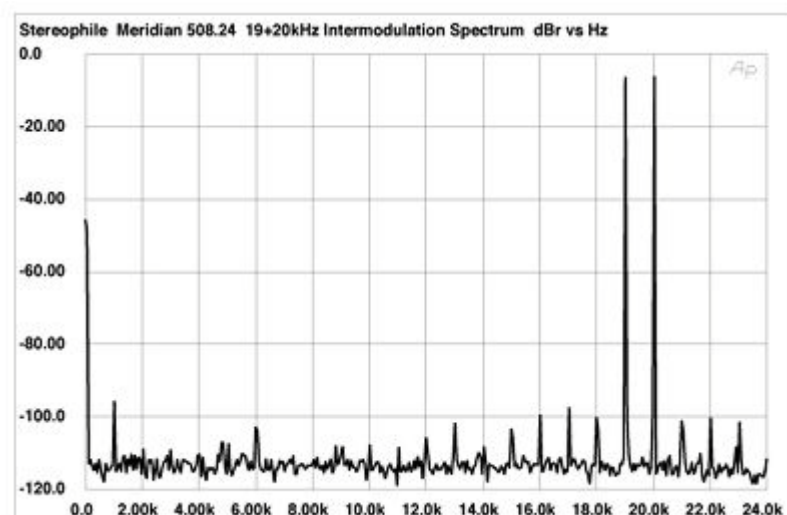


Fig.6 Meridian 508.24, HF intermodulation spectrum, DC-22kHz, 19+20kHz at 0dBFS (linear frequency scale, 20dB/vertical div.).

I used the Miller Audio Research analyzer to look at the Meridian's jitter performance. This drives the CD player under test with data representing an 11.025kHz tone at -10dBFS, a 229Hz tone toggling the LSBs on and off while it performs a high-resolution FFT analysis—32,768 points, with 64 FFTs averaged—to examine the noise floor in the analog domain. *Stereophile* used to examine jitter at the DAC's wordclock pin, using the Meitner LIM analyzer; while this produced consistent

results, it is the effect of jitter in the analog domain that really matters. We have therefore switched to using the Miller analyzer.

The absolute timebase error in the Meridian's performance was just +9 parts per million! The black trace in fig.7 shows an analysis of the 508.24's noise floor for a $\pm 3.5\text{kHz}$ span around the central tone. For comparison, the grayed-out spectrum is the noise floor of the Audio Research CD2, which WP reviewed in the April issue. Both players are excellent, but the Meridian's noise floor is 2dB lower overall, digging close to the theoretical -96.3dBFS limit of a 16-bit linear-PCM system. (While the individual elements of the noise-floor "grass" are close to -130dBFS, it is their root-mean-square sum that gives the noise figure typically expressed as a Signal/Noise Ratio.)

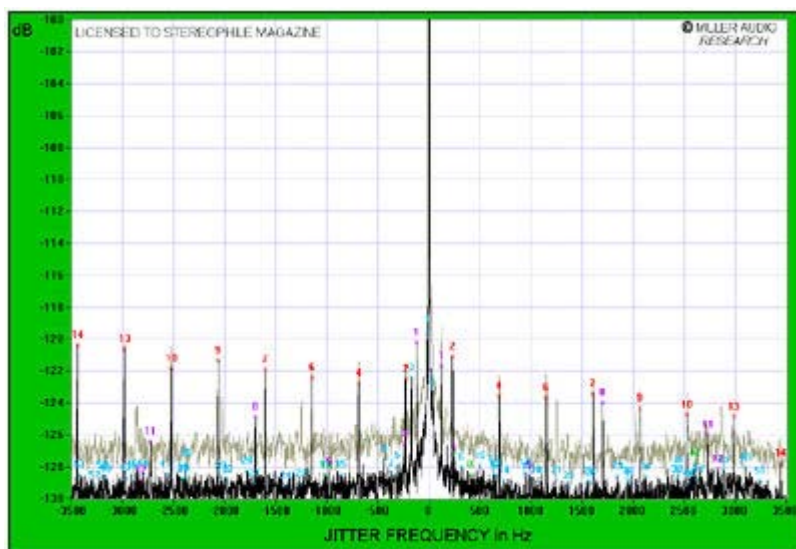


Fig.7 Meridian 508.24, high-resolution jitter spectrum of analog output signal (11.025kHz at -10dBFS with LSB toggled at 229Hz). Center frequency of trace, 11.025kHz; frequency range, $\pm 3.5\text{kHz}$. Grayed-out spectrum is that of the Audio Research CD2.

The Miller Analyzer searches among the noise components for symmetrical pairs of sidebands; these will be due to word-clock jitter. The Audio Research has very low jitter, at 168.6 picoseconds peak-peak. But the Meridian is even lower, at 144.2ps peak-peak. You can see that its data-induced $\pm 229\text{Hz}$ sidebands, marked with red "2s," are around 10dB lower than the equivalent sidebands with the CD2, and contributed just 47.4ps to the total. Only with the higher-order data-induced sidebands, again marked with red numbers, does the Meridian's jitter rise to equal the Audio Research's performance.

As with the Audio Research, note the slight spreading of the central peak; this *may* be due to low-frequency, random-noise jitter. The Mark Levinson No.39, for example, whose jitter measured with this test is of the same order as the Meridian's, has a clean, narrow peak rising from the noise floor. And there are also some low-frequency sidebands in the 508.24's spectrum, marked with blue "1s" and "3s," that are jitter-related. The "1" sidebands, totaling 52.2ps, are spaced at 120Hz, meaning that they are related to the power supply. But the Analyzer's software engine labels the "3" sidebands "of unknown origin."

It is fashionable in some audiophile circles to deride measurements as not having any connection with sound quality. But when you get a player such as the Meridian 508.24, which measures so close to the theoretical ideal in so many ways, it's hard to resist the temptation to point to its superb sound quality and say, "There!" At minimum, the 508.24's measured performance reveals

that Bob Stuart and his talented digital design team at Meridian have done a fabulous job.—**John Atkinson**