# Harman Kardon
## HK 990
### INTEGRATED AMPLIFIER

KALMAN RUBINSON




**DESCRIPTION** Solid-state two-channel integrated amplifier with analog/digital inputs, tone controls, bass management, and system equalization. Line-level analog inputs: 6 pairs single-ended (RCA), 1 pair balanced (XLR), processor HT bypass (RCA), 2 subwoofer (RCA). Phono inputs: 1 moving-magnet, 1 moving-coil. Digital inputs: 2 optical, 2 coax, 1 HRS. Line-level analog outputs: 2 L/R, 2 subwoofer. Digital outputs: 2 coax. Output power: 150Wpc into 8 ohms (21.75dBW), 300Wpc into 4 ohms (21.75dBW). Line-level input sensitivity: 350mV. Line-level input impedance: 43k ohms. Phono input sensitivity: 10mV (MM), 1mV (MC). Phono input impedance: 47k ohms (MM), 100 ohms (MC). Frequency response: 10Hz–170kHz, +0/–3dB at 1W; 20Hz–100kHz at half power. Signal/noise ratio: 109dB (line), 75dB (MC), IHF-A (–3dB). THD, both channels driven: <0.03%, 20Hz–20kHz, at 150Wpc (8 ohms); <0.3%, 20Hz–20kHz, at 300Wpc (4 ohms).
**DIMENSIONS** 17.312" (440mm) W by 6.5" (165mm) H by 17.125" (435mm) D. Weight: 43.1 lbs (19.6kg).
**SERIAL NUMBER OF UNIT REVIEWED** FO 0008-01066.
**PRICE** $2399. Approximate number of dealers: 6.
**MANUFACTURER** Harman Kardon, Harman International Industries, 400 Atlantic Street, 15th Floor, Stamford, CT 06901.
Tel: (800) 422-8027, (203) 328-3500.
Web: www.harmankardon.com.

The very first amplifier I bought was a Harman Kardon PC-200, aka The Prelude. It was a 10Wpc integrated, but I chose it over the competition for some of the same reasons that the HK 990 has appealed to me. Almost all amps back in the1960s had a plain cake-pan chassis with tubes, capacitors, and transformers studding the top. Integrated amps had the standard four knobs on the front for input selection, volume, bass, and treble. The HK PC-200 had an enclosed black chassis cage that formed a graceful cowl over the brushed-copper front panel and the six matte-black knobs: for Input selection (with three phono turnover settings), Volume, Bass, Treble, Loudness contour, and Treble rolloff. In addition, it had a Rumble Filter switch. The PC-200 was not only more beautiful than the rest of the push-pull competition powered by EL84 tubes, it also had more useful features. (Take that, you fans of the Grommes Little Jewel![1]). Over the decades, HK products have always been stylish and innovative, but in today's fractured marketing world, most such creative energies are applied to audio/video receivers and lifestyle products.

The HK 990 is a product for the serious audiophile: a full-fledged, analog, two-channel integrated amplifier with serious output clout (claimed instantaneous output current of ±200 amps). It also has digital inputs to handle modern source

1 See www.grommesprecision.com/grommes/assets/pdf/littlejewelreview.PDF—**Ed.**

components, and offers bass management as well as home-theater bypass for the left, right, and up to two low-frequency effects (LFE) channels. Some other integrated amps have some of these features, but the HK 990 is, as far as I know, unique in being a two-channel product that includes measurement-based room equalization. And it's gorgeous.

Clean styling, but JA found the legends above the pushbars very difficult to read.

## Out of the box

Having seen the glossy catalog sheets, I was unprepared for the HK 990's weight and solidity. My sample had been handled by other reviewers, and its volume knob had come off in the carton. But after I'd maneuvered this 43-lb baby out of its swaddling, I popped the knob back on, settled the amp in place on its four damping pads, and plugged it into the AC line.

A thin black line divides the HK 990's front panel into upper and lower halves. On the upper half are the large alphanumeric display and illuminated volume knob; while on the lower half are only the Harman Kardon logo and a headphone/microphone jack. Close examination reveals that much of the thin black line comprises eight thin pushbars whose labels are dim and small. The reticence of this concession of convenience to design leaves the front panel looking cool and clean, and anyway, the most common controls also appear on the



## MEASUREMENTS

To measure the Harman Kardon HK 990, I used, as always, *Stereophile*'s loan sample of the top-of-the-line Audio Precision SYS2722 system (see the January 2008 "As We See It," www.stereophile.com/content/measurements-mark-precision, and www.ap.com). Before performing any measurements, I ran the HK 990 at one-third its maximum power into 8 ohms for one hour, which maximally stresses an amplifier's ability to shed heat. At the end of the hour the front panel was cool, but the exposed heatsinks on the top panel were at 130°F (54°C). My only problem measuring the HK 990 was the tiny legends above the front-panel pushbuttons, which I found very difficult to read. Fortunately, almost every function is duplicated on the remote control.

Kal Rubinson auditioned the HK 990's phono inputs only briefly, but I performed a full set of measurements on them, assessed at the Pre Out jacks with the volume control set to 0dB and the speakers muted. Fig.1 shows the phono stage's RIAA error. The two channels match very well, with a slight shelving down of the low bass, a relative lack of mid-treble energy, and a small ultrasonic peak. In absolute terms, the error is low at ±0.15dB. While the moving-magnet input preserved absolute polarity, the moving-coil input inverted polarity. The MC input impedance measured 82 ohms across the band. I got anomalous results with the MM input: it was an appropriately high 43k ohms at 20kHz and 81k ohms at 1kHz, but at 20Hz, instead of a voltage drop when I switched the generator source impedance from 20 to 600 ohms, I got a voltage *rise*, which implies a *negative* input impedance. The gains at 1kHz were on the low side, at 29.8dB (MM) and 50.8dB (MC), though the latter figure was affected by the low input impedance.

The MM wideband signal/noise ratio was okay, at 62dB left and 64dB right, ref. 1kHz at 5mV input; the MC ratios, ref. 1kHz at 500µV, were about 10dB worse. A-weighting improved these ratios to 73.5 and 75.5dB, respectively. Overload margins were very good across the audioband, at typically 24.5dB (MM) and 26.9dB (MC), with the minimum THD+noise at around 0.043%. The primary distortion harmonic was the subjectively benign second harmonic,

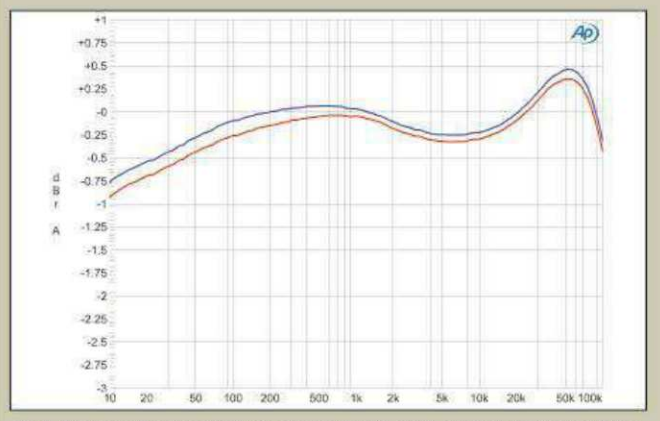


Fig.1 Harman Kardon HK 990, phono input, RIAA error (left channel blue, right red; 0.25dB/vertical div.).

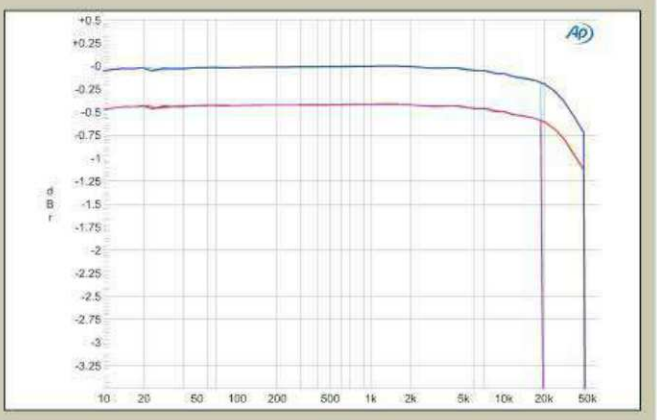


Fig.2 Harman Kardon HK 990, digital input, frequency response at −12dBFS into 100k ohms with data sampled at: 44.1kHz (left channel cyan, right magenta), 96kHz (left blue, right red). (0.25dB/vertical div.)

multifunction remote control, where they're more handy, and more easily differentiated by shape and position.

The rear panel's many connectors are grouped into analog inputs (including XLR, moving-magnet, and moving coil), digital inputs, and HT processor bypass inputs, to be directly connected to the HK 990's power amp stage. A look inside the HK 990 revealed that these groups reflect the array of specialized circuit cards on the main chassis. One input, looking curiously like an RJ-45 Ethernet jack, is labeled HRS, for High Resolution Synchronization, a proprietary HK connection with which the HK 990 can be linked with the digital outputs of HK CD players, such as the matching HD 990. The HRS link carries both the system and data clocks of the amplifier and the datastream from the CD player, which locks itself to the amplifier's clock to ensure a jitter-free connection. (I am not a fan of proprietary interfaces.)

The only modern input sources the HK 990 seems to lack are Ethernet and USB. While I would certainly welcome their inclusion, I sidestepped the omission by plugging a Logitech Squeezebox Touch music server into one of the HK's digital coax jacks. The HK 990 also offers L/R analog and dual subwoofer RCA outputs, and a digital output jack for recording. In addition to power, RS-232, and trigger and IR ins/outs, there are two sets of multiway speaker binding posts for each channel's output, these selectable via front-panel switches.

## Setup for the new millennium

I hooked up the HK 990 to my Sony XA-5400ES SACD/CD player, Oppo BDP-95 universal Blu-ray player, and Squeezebox Touch, and to a pair of Aerial 7T speakers and my trusty JL Audio Fathom f113 subwoofer. When I touched the On/Off bar in the left corner of the HK 990's front panel, next

THE ONLY MODERN INPUT SOURCES THE HK 990 SEEMS TO LACK ARE **ETHERNET AND USB.**



### measurements, *continued*

which lay at –66dB (0.05%) with a 1kHz signal at 5mV. Intermodulation distortion was also relatively low; a combination of 19 and 20kHz tones with a peak level of 360mV gave rise to a 1kHz difference tone at –60dB (0.1%).

Turning to the HK 990's digital input, also assessed at the Pre Out jacks with the volume control set to 0dB, a 1kHz tone at 0dBFS gave a level of 1.88V. This gave a level of 16.75V at the speaker outputs, equivalent to a power of 70Wpc into 8 ohms, which meant that the volume control couldn't be set higher than "7dB" with its digital inputs without the HK 990 clipping. The digital input preserved absolute polarity.

I could get reliable locking via TosLink only with sample rates up to 96kHz. The coaxial inputs did lock to 176.4 and 192kHz datastreams, however. Fig.2 shows the digital input's frequency response with sample rates of 44.1kHz (cyan and magenta traces) and 96kHz (blue and red). Note the level mismatch in this graph: the right channel is 0.4dB lower in level than the left. The response follows the same basic shape with both sample rates, but with a sharp cutoff at just below half of each rate. The Direct Path is locked out with digital inputs and the DSP Path appears to be limited to 96kHz. So while the Analog Devices AD1955 DAC chip used in this amplifier will decode data with sample rates of up to 192kHz, the frequency response with 192kHz data was identical to that with 96kHz. Channel separation via the digital input was good, at 100dB in both directions below 300Hz, though this decreased to 65dB at 20kHz, due to the usual capacitive coupling between channels.

Fig.3 shows my usual test for resolution, performed by sweeping a ⅓-octave bandpass filter from 20kHz to 20Hz while the DAC decodes dithered 16-bit data (top pair of traces) and dithered 24-bit data (middle traces) at –90dBFS, each data set representing a 1kHz tone. The increase in bit depth drops the noise floor by 10dB or so in the treble, but there are peaks evident in the left channel at the power-supply–related frequencies of 60 and 180Hz. These obscure the left channel's reproduction of a dithered 24-bit tone at –120dBFS, but the tone is resolved only in the right channel (bottom solid and dotted traces, respectively). FFT analysis confirms these results (fig.4), and makes visible some very

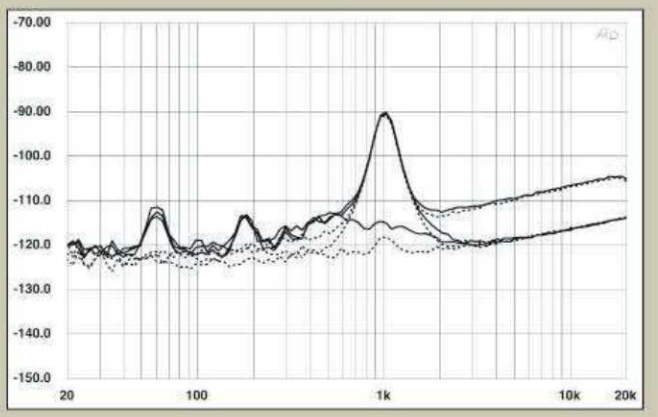



Fig.3 Harman Kardon HK 990, digital input, ⅓-octave spectrum with noise and spuriae of dithered 1kHz tone at –90dBFS, with: 16-bit data (top), 24-bit data (middle), dithered 1kHz tone at –120dBFS with 24-bit data (bottom). (Right channel dashed.)

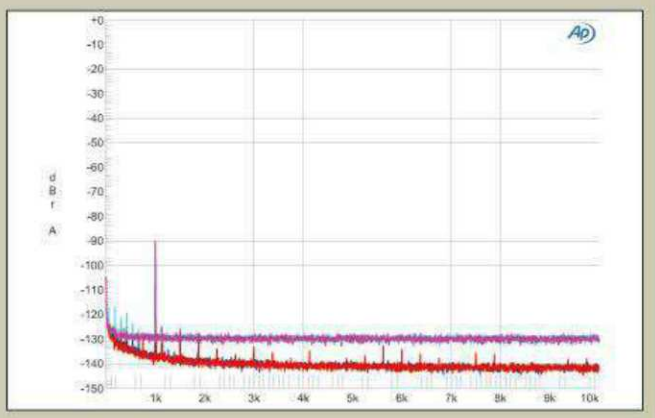



Fig.4 Harman Kardon HK 990, digital input, FFT-derived spectrum with noise and spuriae of dithered 1kHz tone at –90dBFS, with: 16-bit data (left channel cyan, right magenta), 24-bit data (left blue, right red).

to the amber standby indicator, both that indicator and the rim of the volume knob glowed a soft blue. Gracious in demeanor as well as appearance, the large blue display said, "Setting up, please wait," and in a few seconds the HK 990 was ready to go.

That's the simplest way to get the HK 990 up and running, but it bypasses what makes this product special. Its proper setup is a procedure akin to setting up an AVR. First, you choose which input jacks to associate with which input selection name; *eg*, balanced analog, unbalanced analog, optical or coaxial digital. For the phono selection, it's MM or MC.[2] Next, you need to choose between Manual or Automatic setup of bass management. This is easy. With Manual, you inform the HK 990 whether you're using one or two subwoofers, then pick a single crossover frequency from 20 to 200Hz, in increments of 10Hz.

More wisely choose Automatic and you enter HK's EzSet/EQ mode. This begins with the same enumeration of subs, and you can specify a crossover frequency or let EzSet/EQ do it. From there, the Automatic route opens up a series of measurements and calculations that result in the system being equalized in three bands. Plug the calibration microphone (provided) into the mike/headphone jack on the front panel and follow the prompts on the HK 990's display (or in the owner's manual):

1) With the mike at the primary listening position, the HK 990 sends a sweep tone to each speaker, and uses the information it collects to apply a Far Field mid-frequency (20Hz–1kHz) correction to the main speakers.

2) Place the mike 60cm in front of each main speaker, and the HK 990 emits a sweep tone that it uses to apply a Near Field, high-frequency (>1kHz) correction to the main speakers.

3) Place the mike back at the primary listening position. The HK 990 sends a low-frequency sweep of considerable power through each subwoofer, then applies a BassQ correction to the subs.

EzSet/EQ also sets channel levels and crossover frequency, but these can be easily tweaked afterward. HK also gives the user considerable freedom in applying the EQ. You can switch, on the fly, with the remote control among DSP (no EQ), EQ1 (BassQ only), EQ2 (BassQ and Far Field), and EQ3 (BassQ, Far Field, and Near Field). In

2 I didn't really test the HK 990's phono inputs, but I did dust off and hook up my Heybrook turntable to determine that they at least worked. For what it's worth, they sounded better than my Audiolab 8000PPA phono preamp.



## measurements, *continued*

low-level enharmonic products with 24-bit data. Linearity error with 16-bit data was minimal to below –105dBFS, and the HK 990's combination of low noise and high resolution allowed the three DC voltage levels that describe an undithered tone at exactly –90.31dBFS to be readily resolved (fig.5). With 24-bit data at the same level, the Harman Kardon provided a good facsimile of a sinewave (not shown).

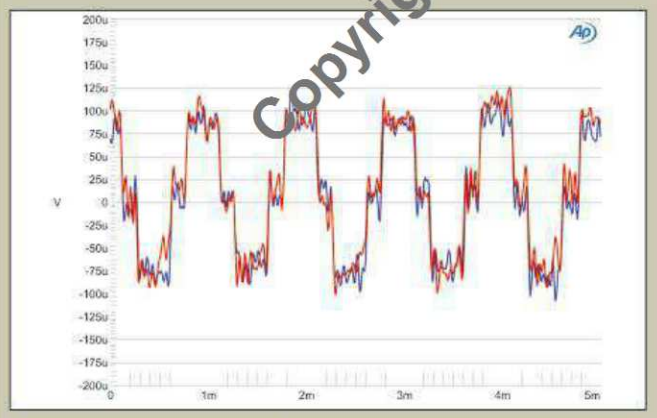



Fig.5 Harman Kardon HK 990, digital input, waveform of undithered 1kHz sinewave at –90.31dBFS, 16-bit data (left channel blue, right red).

Commendably, the HK 990's digital decoder was free from noise modulation. However, fig.6 shows that there was a little more harmonic distortion than I was expecting, a 50Hz tone at 0dBFS being accompanied by second-harmonic distortion at –80dBFS (0.01%) and third-harmonic at –87dBFS (0.04%). These figures were for the right channel (red trace), again assessed at the Pre Out jacks. The left channel (blue) had a little less second harmonic, but overall these levels of distortion are still low. Intermodulation distortion was also low, and the HK 990 offered good rejection of jitter, any sidebands accompanying the Fs/4 tone with the J-Test signal lying at the residual level of the odd-order harmonics of the Fs/192 squarewave (fig.7).

Moving on to the HK 990's measured performance as a conventional integrated amplifier, the volume control oper-

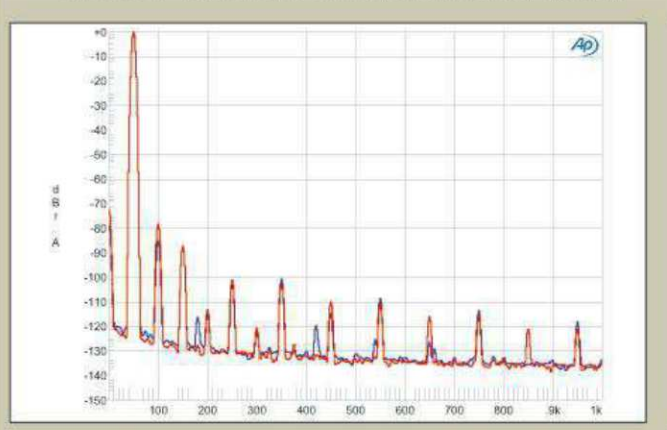



Fig.6 Harman Kardon HK 990, digital input, spectrum of 50Hz sinewave, DC–1kHz, at –0dBFS into 100k ohms (left channel blue, right red; linear frequency scale).

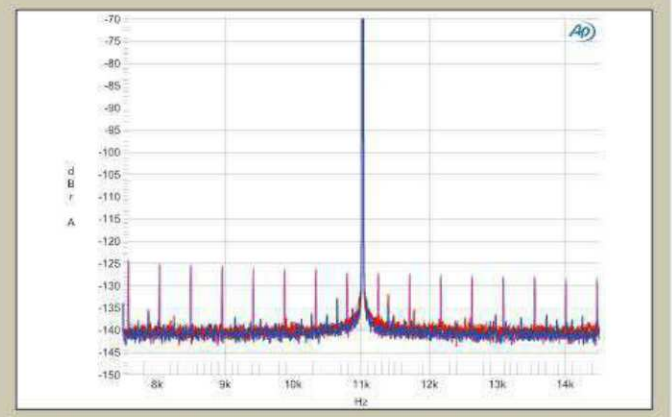



Fig.7 Harman Kardon HK 990, digital input, high-resolution jitter spectrum of analog output signal, 11.025kHz at –6dBFS, sampled at 44.1kHz with LSB toggled at 229Hz: 16-bit data via 15' TosLink S/PDIF from AP SYS2722 (left channel cyan, right magenta), 24-bit data (left blue, right red). Center frequency of trace, 11.025kHz; frequency range, ±3.5kHz.

fact, since the HK 990 can digitize analog inputs, the list of options is longer and runs from Direct Path, DSP Path, EQ1, and EQ2 to EQ3.

## It's only an amplifier

For all its bells and whistles, the HK 990 is a stereo amplifier and must be judged as such. With either the Sony XA-5400ES or Oppo BDP-95 connected to its balanced XLR analog input and the input mode set to Direct Path, the sound coming out of the Aerials was uncompromised. The bass in *Pipes Rhode Island* (CD, Riago 101), a compilation of pipe-organ recordings engineered by our own John Marks, was clean and taut and loaded the room well. Inner voices were exquisitely delineated. With the divine Lorraine Hunt Lieberson singing *Neruda Songs*, composed for her by her husband, Peter Lieberson (CD, Nonesuch 79954-2), there was an eerie sense of a lively, balanced presence to her voice and a good presentation of the Boston Symphony (led by James Levine) in their home venue, Boston's Symphony Hall. The power—for example, with Messiaen's brilliant and massive *Turangalîla-Symphonie*, in the recording by Hans Vonk and the St. Louis Symphony (SACD/CD, Arch Media Archives/Pentatone PTC 5186 340)—was almost staggering. The same was true with Dead Can Dance's *Into the Labyrinth* (CD, 4AD 45384-2): the HK 990's impressive bass imposed no limitations, either on more delicate instrumentals or on Lisa Gerrard's soaring melisma. The sound from the same source components via the HK's unbalanced analog RCA inputs was marginally less secure but not disappointing. I listened to a wide range of other recordings, and the HK 990 offered eminently satisfying performance through the Aerial and the B&W speakers. If I could settle for listening to music in *only* two channels, I could live happily with the HK 990.

WITH THE DIVINE LORRAINE HUNT LIEBERSON SINGING *NERUDA SONGS*, THERE WAS AN EERIE SENSE OF A **LIVELY, BALANCED PRESENCE TO HER VOICE.**



### measurements, *continued*

ated in accurate 1dB steps, with a maximum gain of 9.8dB measured at the Pre Out jacks, and 40.65dB into 8 ohms measured at the speaker terminals. These were for unbalanced signals; the maximum gain for a balanced input was 34.3dB. Both preamp and speaker outputs preserved absolute polarity (*ie*, were non-inverting). The unbalanced input impedance was 42k ohms at low and mid frequencies, dropping slightly to 30k ohms at 20kHz. The balanced impedance was twice this value, as expected.

The output impedance from the Pre Out jacks was a low 169 ohms at all frequencies. The output impedance from the speaker terminals, including 6' of cable, was a very low 0.085 ohm, rising slightly at 20kHz to 0.13 ohm. The modification of the amplifier's frequency response due to the Ohm's Law interaction between this impedance and that of our standard simulated loudspeaker (see www.stereophile.com/reference/60/index.html) was very small, at ±0.1dB (fig.8, gray trace). The HK 990's response in its Direct Path mode rolls off gently above the audioband, but its reproduction of a 10kHz squarewave featured short risetimes and an absence of overshoot or ringing (fig.9). The 1kHz squarewave was essentially perfect (not shown).

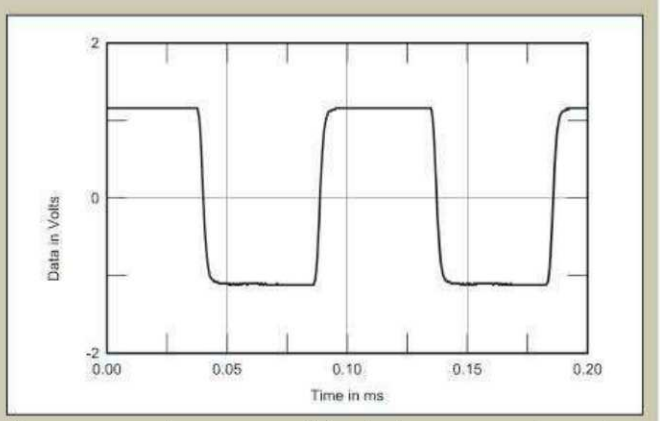



Fig.9 Harman Kardon HK 990, small-signal 10kHz squarewave into 8 ohms.

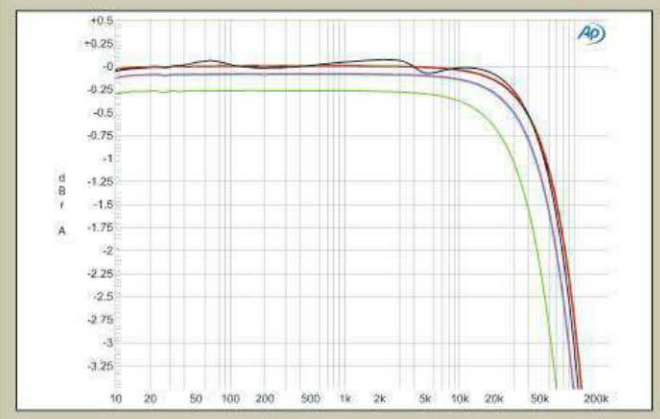



Fig.8 Harman Kardon HK 990, balanced input, Direct Path, Subwoofer Off, frequency response at 2.83V into: simulated loudspeaker load (gray), 8 ohms (left channel blue, right red), 4 ohms (left cyan, right magenta), 2 ohms (green). (0.25dB/vertical div.)

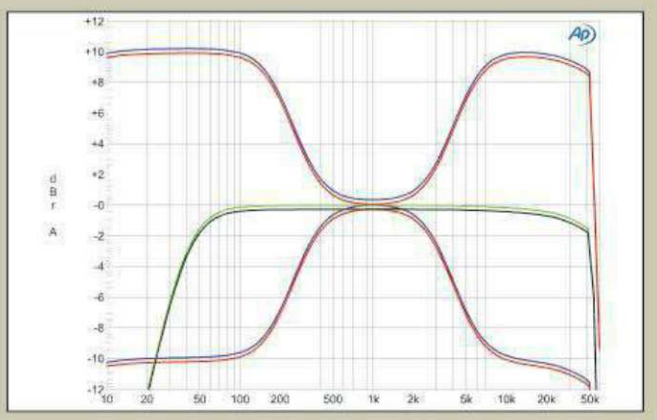
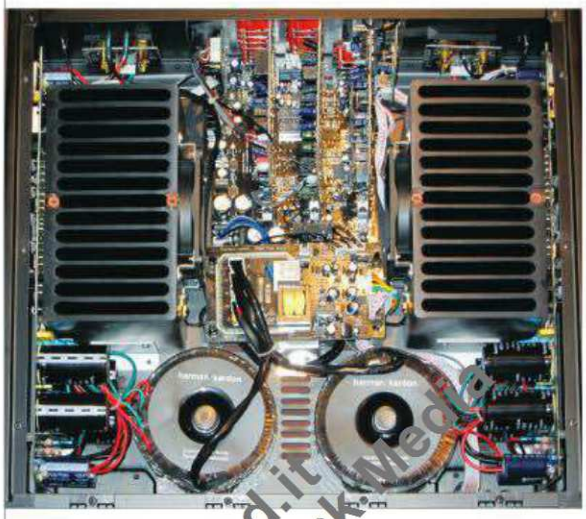



Fig.10 Harman Kardon HK 990, balanced input, DSP On, Subwoofer Off, frequency response at 2.83V into 8 ohms with Treble and Bass controls at ±10dB (left channel blue, right red), and with tone controls at 0dB but Subwoofer On (left green, right gray). (2dB/vertical div.)

Now it gets messy. To enjoy the HK 990's bass-management and EQ capabilities, you must choose a digital source or—*horrors*—redigitize an analog source. I figured the best way to decide how to proceed would be to compare the above sources Direct Path *vs* "DSP Path," and then each against the HK 990's coax S/PDIF feed, which accepts signals up to 24-bit/192kHz. I was told by HK that the 990's D/A "bit depth is 24-bit . . . up to 96kHz without truncation." Even with instantaneous switching, I found it all but impossible to distinguish between Direct Path and S/PDIF; each mode was transparent to the particular player's sonic personality. That attests to the quality of the HK 990's D/A conversion, which is based on a pair of AD1955 chips, a two-channel DAC capable of 24/192 operation; and while HK provides only sketchy technical data, I was assured that the bandwidth of the HK 990's analog outputs extends cleanly to 45kHz.



The HK 990 uses a separate power transformer for each channel.

What about redigitizing the source? Here my HK sources told me only that redigitization is 24-bit, and offered no information about the sample rate. Audibly distinguishing between Direct Path and S/PDIF via the DSP Path route was hard to do. I could *just* barely distinguish the "DSP" mode for the analog inputs from the other options, and even then, only when I forced myself to attend to such niggling details as the decay of cymbals or, indeed, Hunt Lieberson's voice. It required an almost surgical vivisection of the music. I restricted my listening to DSP Path mode for a week and heard nothing lacking, though a re-



## measurements, *continued*

The DSP Path offers Bass and Treble controls; the effects of these, set to their maximum and minimum ±10dB positions, are shown in fig.10. These are shelving controls rather than usual Baxandall type, and the maximum boost and cut are each exactly 10dB (blue and red traces). The sharp cutoff above 40kHz in the graph indicates that when the DSP Path is invoked, the HK 990 digitizes analog input signals at 96kHz or so. The green and gray traces in fig.10 show the response with the subwoofer crossover switched into circuit; the output is now –3dB at 40Hz, and the ultimate slope of the high-pass filter is 12dB/octave.

Channel separation for line-level inputs was good at 90dB or greater below 4kHz, and still 80dB at 20kHz. The wideband, unweighted S/N ratio, measured in Direct Path mode with the input shorted but the volume control at its maximum "10dB" setting and ref. 1W into 8 ohms, was good, at 67dB. A-weighted, this improved to 77.6dB in the right channel and 75.9dB in the left. The main noise components were supply-related spuriae at 60Hz and its odd harmonics (fig.11), which suggests that these arise from magnetic interference from the twin AC transformers.

Specified as delivering 150Wpc into 8 ohms (21.75dBW), the HK delivered 190W at clipping into 8 ohms with both channels driven (22.8dBW), with clipping defined as 1%

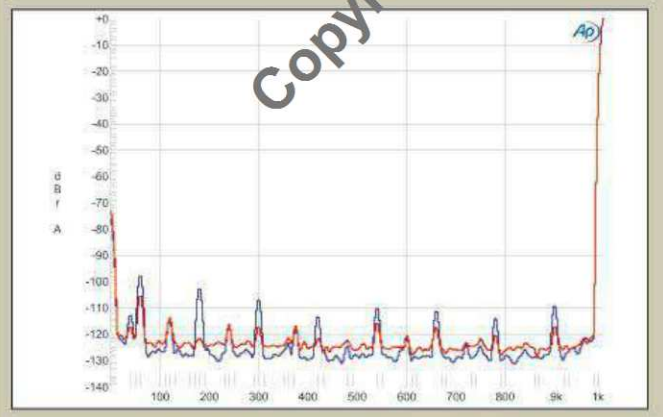



Fig.11 Harman Kardon HK 990, Direct Path, spectrum of 1kHz sinewave, DC–1kHz, at 60W into 8 ohms (left channel blue, right red; linear frequency scale).


Fig.12 Harman Kardon HK 990, Direct Path, distortion (%) *vs* 1kHz continuous output power into 8 ohms.

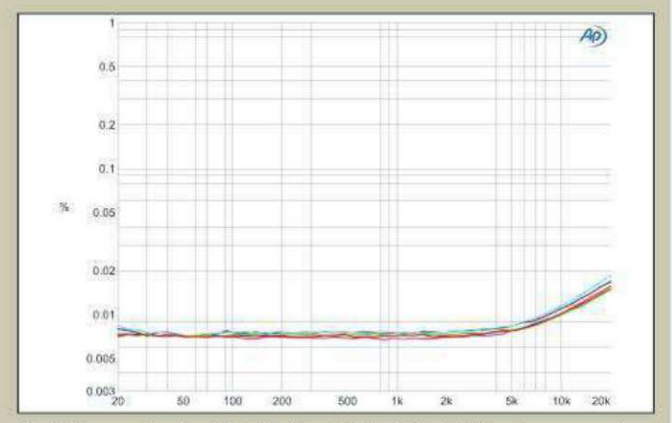



Fig.13 Harman Kardon HK 990, Direct Path, THD+N (%) *vs* frequency at 10V into: 8 ohms (left channel blue, right red), 4 ohms (left cyan, right magenta), 2 ohms (left green).

turn to the A/B/C comparison had the same outcome as before. No biggie!

## But it's more than an amplifier

The above observations are preamble to saying that a digital source component should be used as such with the HK 990, but that analog sources won't suffer if you redigitize them. Either option opens the door to the blandishments of bass management and/or room EQ. Switching an analog source (albeit from a digital player) between Direct Path (without bass management or EQ) and DSP Path (with bass management but no EQ) was another subtly strenuous task. That there was no apparent change in balance or voicing validated the success of the HK 990's Automatic setup routine: The chosen crossover was at 40Hz and the Fathom f113 sub's output was set to +3dB relative to the Aerials'. On the other hand, the Aerials seemed to gain nearly an octave of low-end extension. I say that because the sub was completely unlocatable by ear. I kept going over to touch the Fathom f113's cone to confirm that it, and not the Aerials, was producing those deep shuddering sounds.

I then tried the EQ results from Ez-Set/EQ. I did some quick measurements using Dayton Audio's OmniMic (see "Music in the Round" in the November issue) and found that the equalization did not change the overall nature

### ASSOCIATED EQUIPMENT

**DIGITAL SOURCES** Sony XA-5400ES SACD/CD player, Oppo BDP-95 universal BD player, Logitech Squeezebox Touch networked music player.
**PREAMPLIFICATION** Parasound Halo JC 2 BP preamplifier, Meridian HD621 HDMI audio processor & 861 Reference V6 digital surround controller.
**POWER AMPLIFIERS** McIntosh Labs MC303 (three-channel), Bel Canto Design REF1000 Mk.II (monoblocks).
**LOUDSPEAKERS** Aerial 7T, B&W 800 Diamond.
**CABLES** Digital: Black Cat Veloce. Interconnect: Kubala-Sosna Fascination (XLR, RCA), QED Silver Anniversary XT. Speaker: Kubala-Sosna Fascination. AC: JPS Aluminata.
**ACCESSORIES** APC S-15, Environmental Potentials EP-2450 power conditioners.

—Kalman Rubinson



### measurements, *continued*

THD+N (fig.12). Again with both channels driven, the HK 990 met its 300Wpc specification into 4 ohms (21.75dBW). With one channel driven, the amplifier clipped at 450W into 2 ohms (20.5dBW). Fig.12 shows that the HK 990's THD+N figure is dominated by noise below 40W or so. Fig.13 plots the THD+N percentage against frequency at 10V; the distortion starts to rise out of the noise only in the top octave.

With an analog input signal, even at high powers into 4 ohms, the distortion spectrum is predominantly the subjectively innocuous second and third harmonics (figs. 14 and 15). The third is the highest in level, at –90dB (0.003%), which is still very low in absolute terms. Intermodulation distortion is also extremely low; fig.16 shows the spectrum of the amplifier's output when it drove an equal mix of 19 and 20kHz tones at 120Wpc into 4 ohms. The 1kHz difference product lies below –100dB, and the higher-order products at 18 and 21kHz are almost 90dB down from peak level.

Harman Kardon's HK 990 is a powerhouse of an amplifier with, overall, superb measured performance. While high-quality outboard phono stages and D/A processors will give better measured performance than the HK 990's equivalents, there is no other sign of any aspect of its performance having been compromised to include so many versatile features. I am impressed.

—John Atkinson

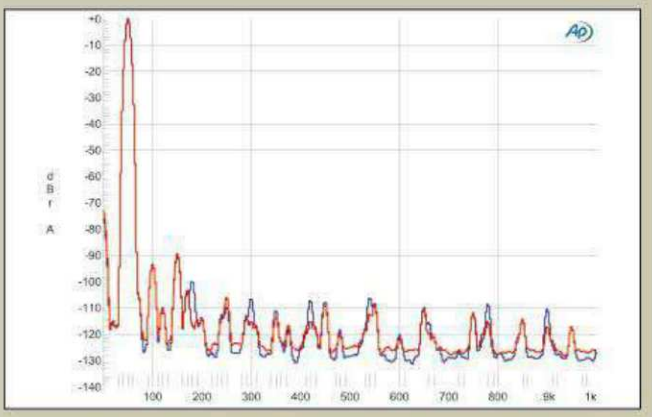



Fig.15 Harman Kardon HK 990, Direct Path, spectrum of 50Hz sinewave, DC–1kHz, at 120W into 4 ohms (left channel blue, right red; linear frequency scale).

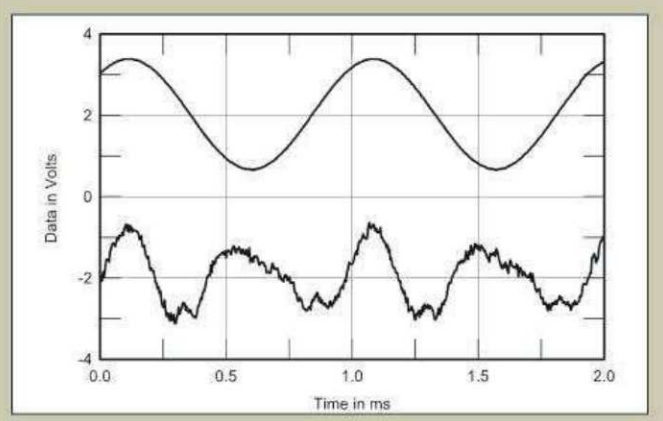



Fig.14 Harman Kardon HK 990, Direct Path, 1kHz waveform at 133W into 8 ohms (top), 0.0054% THD+N; distortion and noise waveform with fundamental notched out (bottom, not to scale).

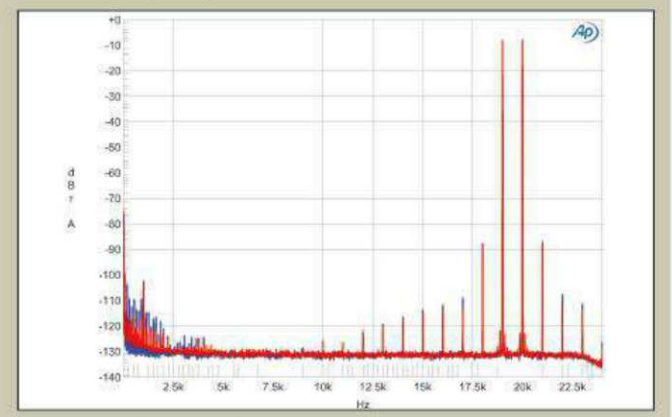



Fig.16 Harman Kardon HK 990, Direct Path, HF intermodulation spectrum, DC–24kHz, 19+20kHz, at 120W peak into 4 ohms (left channel blue, right red; linear frequency scale).

of the in-room frequency response, which, measured at the listening position, gently trended down 6–7dB from 50Hz to 18kHz. Looking at the effects of each variant of EzSet/EQ, it was apparent that BassQ (EQ1) made for a smoother transition from sub to main speaker in the 50–100Hz range. Adding the Far Field EQ (EQ2) reduced the variability below 500Hz, and Near Field EQ did something similar for the range above 1kHz. The audible effects were quite subtle. The tonal characteristics of the Aerials and the room were unchanged, but BassQ (subwoofer) and Far Field (below 1kHz) enhanced overall clarity and expanded the soundstage, particularly in width. The effects of adding Near Field (above 1kHz) correction (EQ3) were elusive; I tended to stick to EQ2. I got similarly satisfying results when I swapped, the B&W 800 Diamonds for the Aerials. It was not so much an "Ah-ha" experience as "Ah, that's really better."

Overall, I was able to accomplish with the single-box HK 990 almost everything that I could with the combination of Meridian Reference 861, Parasound Halo JC 2 BP, and McIntosh Labs MC303. Was the HK less potent than the Mac? Yes, but I had to force myself to listen at volume levels high enough that I could hear a difference—much higher than I would ever actually listen to music for pleasure. Was it less transparent than the Halo JC 2? Yes, but my ability to hear that difference depended on the recording. Was it less capable than the Meridian? Yes, the Meridian provides more channels and more processing options. Still, I could go from one setup to the other and not feel that the HK 990 was any less satisfying . . . with two-channel music.

## Conclusions

I found that Harman Kardon's HK 990 delivered on all its promises. Its power amp is very strong and agile. Its purely analog performance, from input to speaker, is worthy of the highest-quality sources and signals. Digital sources are handled cleanly and at high (24-bit/96kHz) resolution. But most important, the HK 990 brings modern audio features to a two-channel system by providing useful bass management and effective room/system equalization. I've always believed that, given adequacy in all components, speakers and room acoustics will be the biggest determinants of a system's overall sound. The Harman Kardon HK 990 integrated amplifier not so much refutes as confirms that belief. Unlike purely analog amplifiers, it can actually improve the sound of your speakers in your room. At less than $2399, the HK 990 should be on every audiophile's shopping list.

UNLIKE PURELY ANALOG AMPLIFIERS, **THE HK 990 CAN ACTUALLY IMPROVE THE SOUND OF YOUR SPEAKERS** IN YOUR ROOM.