

Parasound HCA-1000A Power Amplifier

Reviewed by Charles Hansen and
Duncan and Nancy MacArthur

Parasound Products Inc., 950 Battery St., San Francisco, CA 94111, 415-397-7100, www.parasound.com. Suggested retail price: \$650 US. Power consumption: 700W. Dimensions: 17¼" W × 13¼" D × 3½" H (4 ⅛" H with feet); net weight: 22 lbs. Limited two-year warranty.

The Parasound HCA-1000A is a two-channel high-current amplifier (HCA) with a rating of 125W per channel. The power amplifier is a product of Parasound's legendary designer, John Curl, whose designs have been featured in *TAA* and *AE*.^{1,2} The HCA-1000A is certified by LucasFilm for use in Home THX® audio systems. The "A" suffix in the model number designates auto turn-on, a feature useful in home theaters and custom, multi-zone installations.

Photo 1 shows the front panel, which has the power switch and a number of LED indicators. Two LEDs are used for left and right current overload indicators. Just below them are the LEDs for AC

line, standby, and normal power status indication.

The amplifier is extremely rugged, constructed of heavy gage steel. A two-rack space mounting adapter is available. The top cover engages a slot in the 0.187"-thick front panel over its full width. This produces a very tight cover fit, requiring only six screws to secure the cover to the chassis. The top cover features cooling slots above the power transformer and the transistor heatsinks, while the bottom cover is slotted below the heatsinks.

The rear panel (Photo 2) includes the IEC power receptacle with line fuse, a 12V DC trigger terminal block, four high-quality gold-plated Tiffany-style Teflon™-

insulated RCA jacks, two 50k input level controls, a switch to select mono-bridged or stereo operation, and two pairs of high-quality gold-plated five-way speaker binding posts, which are on US 0.75" spacings, so you can use dual banana plugs. Two of the phono jacks are used for inputs, and are hard-wired to the second pair so you can output-loop the inputs to another power amplifier for bi-amplification.

Photo 3 shows the amplifier with the cover removed. A large toroidal transformer sits front and center. The main PC board is machined to clear the transformer. Two large heatsinks occupy the left and right sides of the amplifier. Each heatsink has six output

transistors, as well as additional driver transistors and thermal sensors. Four large filter caps and two power diode bridges are just behind the transformer.

A small PC board for the trigger circuit is located in the front-left corner. There are also small PC boards for the LEDs, the input jacks and gain controls, and the output Zobel networks. The relay and protection circuits on the main PC board are just in front of the input/output area.

The unit is furnished with a heavy custom-designed power cord. You can connect the power transformer primary for 115V or 230V mains by means of a line terminal block near the LEDs. A line fuse is located in a drawer in the IEC power receptacle. The third pin of the AC receptacle is connected to the chassis. There is adequate finger space under the unit to easily lift it.

TOPOLOGY

A schematic was not furnished with the unit. The 785VA toroidal power transformer has independent secondary windings for each channel, with independently rectified power supplies and a group of 10,000µF filter capacitors (40,000µF total). Three pairs



PHOTO 1:
HCA-1000A front view.



PHOTO 2:
HCA-1000A
rear view.

of Sanken beta-matched 15A, 50MHz, 130W bipolar transistors are connected in high-bias Class A/AB complementary-symmetrical operation on each side. The circuitry is direct-coupled with no capacitors or inductors in the signal path, and AD711 op amps are used in a DC servo circuit to prevent any DC component in the output. For added safety, the speaker outputs have relay time-delay start-up and protection circuits.

The input stage uses hand-matched complementary JFETs. The input jacks are looped to the output jacks for connecting multiple amplifiers to a single source. These jacks appear to be two pairs of inputs, so you must be aware of their actual function when you make connections. Resistors are 1% metal-film and 5% metal-oxide types. High-quality film caps are used throughout, with 5% silver mica caps used in the input stages.

The 12V DC automatic turn-on circuitry allows you to use one master component—typically a control preamplifier—to activate the entire audio system. The power switch on the preamplifier sends a 12V DC trigger signal to activate every auto turn-on component attached to the system. Auto turn-on allows custom audio-

video systems installers to place the amplifiers in out-of-the-way locations.

MEASUREMENTS

I operated the HCA-1000A with pink noise at 10W into 8Ω for one hour. After this run-in period, the chassis was only warm to the touch. The distortion was slightly higher in the left channel, so I present the test data here and summarize it in *Table 1*. There was a very low level of hiss and no hum with my ear against the speaker. Other than the time-delay relay, there was no noise during power-up or shutdown. While the HCA-1000A has input gain controls, I left them set at maximum during the testing.

The HCA-1000A does not invert polarity. Input impedance was 48k for both channels. The gain at 2.83V RMS output into 4Ω and 8Ω loads was 28.9dB and 29.0dB, respectively. The output impedance at 20Hz and 1kHz was a very low 0.06Ω, increasing slightly to 0.08Ω at 20kHz. DC offset at the speaker output was nonexistent.

The frequency response for the HCA-1000A was ruler flat from 5Hz to 50kHz at an output of 2.83V RMS into resistive loads of 4Ω and 8Ω and a complex load of 8Ω par-



PHOTO 3: HCA-1000A interior view.

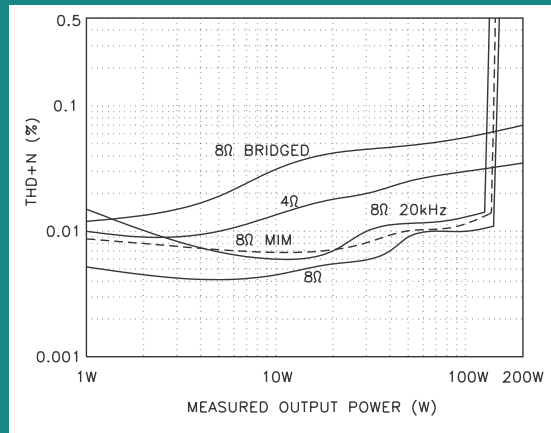


FIGURE 1: THD+N versus output.

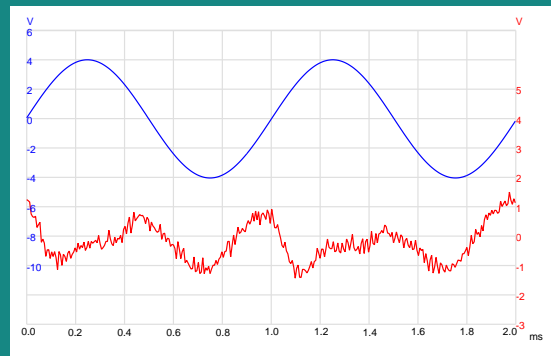


FIGURE 2: Residual distortion, 1kHz.

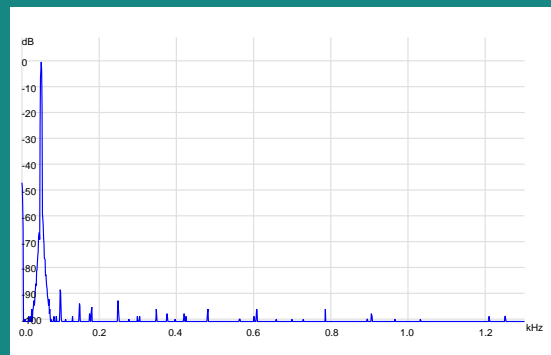


FIGURE 3: Spectrum of 50Hz sine wave.

TABLE 1
MEASURED PERFORMANCE

PARAMETER	MANUFACTURER'S RATING	MEASURED RESULTS
Power output (RMS)	125W RMS, 8Ω × 2 ch 200W RMS, 4Ω × 2 ch 400W RMS, 8Ω bridged	148W, 8Ω, 1kHz; 130W, 8Ω, 20kHz; >200W, 4Ω, bridge 8Ω
Current capacity	45A peak per channel	
Dynamic headroom	>1.5dB	
Slew rate	>130V/μs	
Power bandwidth	5Hz–100kHz, +0/–3dB at 1W	5–100kHz, +0/–2dB, 1W
Total harmonic distortion	<0.03% at full power; <0.01% typical levels	0.01%, 125W, 8Ω 0.03%, 125W, 4Ω 0.0045%, 10W, 8Ω 1kHz
IMD—CCIF (19 + 20kHz)	<0.03%	0.012%, 12V p-p
MIM (9 + 10.05 + 20kHz)	N/S	0.008%, 12V p-p
TIM	Unmeasurable	
Interchannel crosstalk	>80dB at 1kHz >60dB at 20kHz	–90dB at 1kHz –68dB at 20kHz
Input sensitivity	1V for 28.28V (28.9dB) THX ref; 1.1V for full output	28.9dB
Input impedance	33kΩ	48kΩ
Signal to noise ratio	>116dB, full power >96dB THX ref level	
Power requirements	700W maximum	
Output impedance		0.06Ω 20Hz–1kHz 0.08Ω 20kHz
Damping factor	>800 at 20Hz	

Reviewed by Duncan and Nancy MacArthur

AESTHETICS AND OPERATION

The HCA1000A arrived in a strong cardboard box with custom-cut cardboard inserts to protect the amplifier during shipping. A major advantage of solid-state amplifiers over their tube brethren is their weight: the Parasound was easy to unpack and position.

The "fit and finish" of the HCA1000A is excellent and includes a number of nice touches, such as indicator LEDs in the grooves in the front panel. The Parasound is a stylish black box. Although black boxes are practical and easy to match with other black boxes, in the end they're still black boxes. If you're looking for a fashion statement, you may wish to look elsewhere.

On the plus side, the HCA1000A exemplifies the many positive features that a solid-state amplifier in this price range can include. Switching was flawless and (with the exception of a muted relay click) soundless. Everything worked well throughout our audition; the construction quality of this amplifier inspires confidence that it will continue to work for years to come.

The Parasound has various convenience features that could simplify setup of some systems, particularly in home-theater applications. One feature we're not used to seeing on power amplifiers is output RCA jacks. The output jacks (termed loop outputs by Parasound) are connected in parallel with the inputs to allow multiple amplifiers to be fed by a single long pair of shielded cables.

In addition, on the rear panel this amplifier has separate volume controls for each channel, a mono bridging switch, and a 12V DC trigger connection for turning power on and off remotely. These features would probably aid in integration of the HCA1000A into a video system, but they are unlikely to be used in audio applications.

IN A NUTSHELL

Overall, the Parasound HCA1000A is quite listenable. Its strong points are its bass response; clear, clean mids and highs; superb imaging; and awesome dynamics. Its major weaknesses are a slightly bright sound and lack of naturalness compared to similarly priced tube amplifiers.

DETAILED LISTENING RESULTS

All our auditioning was done using Genesis 400 speakers. These three-way floor-standing systems (not bi-amplified) are rated at 89dB/W efficiency but are 4W designs with a fairly difficult impedance curve. The source for all listening was a modified Philips DAC 960 with a variable output that was used to drive the HCA1000A directly. We compared the Parasound to a pair of VTL "Tiny Triode" tube amplifiers and a Manley Stingray tube integrated amplifier. For reference purposes, the VTL amplifiers would rate about six in all four categories in the ratings box.

The sound of the HCA1000A did not change noticeably during our month-long listening period. Either this amplifier does not require an extended break-in period

or this sample had been broken in before it arrived here. Out of habit we turned on the Parasound for at least an hour before we did any serious listening.

As usual, we listened to the Hi-Fi News and Record Review disk III (track 2: Parry's "Jerusalem," track 4: Vivaldi's trumpet concerto, tracks 5 and 6: excerpts from Prokofiev's "Peter and the Wolf," track 7: Purcell's "Welcome, Welcome Glorious Morn," track 10: a Corkhill percussion piece, and track 14: Rio Napo RSS demo). We also played favorite tracks from a wide variety of musical genres ranging from jazz to classical.

The image the Parasound produced is exceptionally wide. The choral voices in "Jerusalem" extended smoothly across the stage. The Rio Napo demonstration piece gave an astonishing width of sound, extending well beyond the speakers. On some recordings, such as Blues on Bach by The Modern Jazz Quartet (Atlantic compact disk, 1652-2), this extreme width of sound produced an almost "surround sound" effect, even through a single pair of speakers.

Oddly, we disagreed as to how much image depth this amplifier offered. Duncan felt that the image depth, while excellent, fell slightly short of the astonishing standard set by the width. But on a number of tracks Nancy heard more depth, with the instruments apparently located as far back as eight or nine feet behind the plane of the speakers.

The Parasound pinpointed the location of each instrument precisely within the soundstage. The Vivaldi trumpet concerto from the test disk and "Misguided Angel" (Cowboy Junkies, The Trinity Sessions, BMG compact disk 8568-2-R) provided good demonstrations of this characteristic. Some amplifiers smear instruments and voices muddily across the soundstage, but not the Parasound.

Ambiance recovery was not one of the strengths of this amplifier. The space around the choir in "Jerusalem" and the acoustic space around the trumpets on the Vivaldi piece were not particularly extended or "spacious." This performance was acceptable and did not detract from enjoyment of the music but could have been better.

The Parasound produced an extremely strong and realistic bass. The bassoon on "Peter and the Wolf" sounded like a real bassoon being played in the listening room. The sound of the timpani was very deep and well defined. The bass response remained full and realistic even on large orchestral pieces such as Brahms Symphony #4 (The Royal Philharmonic, Fritz Reiner, Chesky compact disk CD-6).

The amplifier's midrange reproduction was very good. Each instrument in the "Peter and the Wolf" selection was well defined and easily separable from the other instruments. All the sounds on the Rio Napo track were reproduced realistically (if realistic is the right term for this recording). With our system, the upper midrange response sometimes tended towards brightness; examples included the trumpets in the

Vivaldi, the winds in the Prokofiev, and the high soprano notes in the Purcell.

As illustrated in the Rio Napo demo, the Parasound's highs were extremely clean and clear. Again, in our system this resulted in unacceptable brightness on some recordings.

The HCA1000A reproduced transients quite realistically. The individual drumbeats in the Corkhill were crisp and well defined. This amplifier also handled the dynamic range of a full orchestra very well. The Parasound never sounded compressed, even when playing complex music at earsplitting levels.

This amplifier delivered a very clean and clear sound but ultimately failed to sound completely natural, at least with our system. In the recordings of "Peter and the Wolf," "Welcome, Welcome, Glorious Morn," and the Rio Napo demonstration, the individual instruments were clear and very well defined but did not sound as fully realistic as these recordings sometimes can. The massed strings and trumpets on the Vivaldi trumpet concerto were reproduced cleanly but again sounded unrealistic and slightly bright.

FINAL THOUGHTS

NM: Before considering this amplifier, ask yourself how your other components sound. If, like ours, the rest of your system is voiced to sound best with a tube amplifier, the Parasound may not be the amplifier for you. If, on the other hand, your other components produce a relatively mellow sound, the Parasound's superior imaging, depth, and dynamic range make it well worth a listen.

Also, keep in mind when reading this review that we both give natural sound very high priority. If other qualities, such as stereophonic effect, are especially important to you, you may draw different conclusions.

DM: I guess that I just like the sound of tube amplifiers. Although the HCA1000A has a number of exceptional audio features (I wish I could keep the imaging and the dynamic response) and it appears to be very well made, I just couldn't warm up (no pun intended) to its overall sound. A thorough listening session using well-known source material and your own speakers is indicated prior to purchase.

The audio and operational strengths of the HCA1000A seem directly aimed at the home-theater market. Although we didn't test it this way, this amplifier might be just the ticket for video listening. I wouldn't hesitate to recommend an audition if this is your intended application.

		1	2	3	4	5	6	7	8	9	10
Presence	DM	█	█	█	█	█	█	█	█	█	█
	NM	█	█	█	█	█	█	█	█	█	█
Stereophonic Effect	DM	█	█	█	█	█	█	█	█	█	█
	NM	█	█	█	█	█	█	█	█	█	█
Soundstaging	DM	█	█	█	█	█	█	█	█	█	█
	NM	█	█	█	█	█	█	█	█	█	█
Ambiance	DM	█	█	█	█	█	█	█	█	█	█
	NM	█	█	█	█	█	█	█	█	█	█

alleled with a 2 μ F cap. The response was down 1dB at 70kHz and only 2dB at 100kHz. Crosstalk performance was excellent at greater than -90dB below 1kHz, rising in a straight line to -68dB at 20kHz.

THD+N versus frequency with 2W into a 4 Ω load did not exceed 0.027% from 20Hz to 20kHz. The complex 8 Ω /2 μ F load produced similar results. It was even lower with 1W into 8 Ω , not even rising to 0.01% until 12.5kHz. When I connected the HCA-1000A for bridged 8 Ω 10W output, the highest distortion was only 0.03% at 20kHz. This is the best distortion versus frequency performance I have ever seen in a power amplifier.

Figure 1 shows THD+N versus output power (top to bottom at 10W) into 8 Ω bridged load at 1kHz, 4 Ω at 20Hz and 1kHz, 8 Ω at 20kHz, and 8 Ω at 20Hz and 1kHz. I engaged the test-set 80kHz low-pass filter to limit the out-of-band noise. Due to limitations in my load resistors, I could not achieve the maximum power output with the 4 Ω or bridged 8 Ω loads. I also

plotted the 1kHz product of the multi-tone intermodulation (MIM) 9kHz + 10.05kHz + 20kHz test signal vs. output power (dashed line) into 8 Ω . This gives a better indication of the HCA1000A's non-linear response, since it is a closer approximation to music than a sine wave. There was absolutely no strain right up to the point of maximum power.

With the HCA-1000A reproducing a combined 19kHz + 20kHz intermodulation distortion (IMD) signal at 12V p-p into 8 Ω , the 1kHz IMD product was only 0.012%. Repeating the test with a multi-tone IMD signal (9kHz + 10.05kHz + 20kHz) resulted in an even lower 1kHz product of 0.008%.

Using a 1kHz signal, the HCA-1000A produced 148W into 8 Ω at 1% THD+N. The 20kHz power was a bit lower at 130W into 8 Ω at 1% THD+N. After this full-power testing, the amplifier was very hot to the touch, as you can imagine.

The distortion waveform for 10W into 8 Ω at 1kHz is shown in Fig. 2. The upper waveform is the

amplifier output signal, and the lower waveform is the monitor output (after the THD test-set notch filter), not to scale. This distortion residual signal shows mainly the third harmonic. The noise riding on the waveform is of no consequence, since the THD+N at this point is only 0.0045%.

The spectrum of a 50Hz sine wave at 10W into 8 Ω is shown in Fig. 3, from zero to 1.3kHz. The THD+N measures 0.0065%, and only the second harmonics poke above -90dB, without any visible artifacts of power-supply rectification.

The 2.5V p-p square wave into 8 Ω at 40Hz showed negligible tilt. The 1kHz square wave was just about perfect. The leading edge of the 10kHz square wave showed one barely noticeable cycle of damped ringing.

All-in-all, the HCA-1000A showed outstanding performance in every area I measured.

Manufacturer Response:

Thank you for reviewing our HCA-1000A amplifier. We are

very proud of our products here at Parasound, and I am glad to read that you have enjoyed your listening experience with the HCA-1000A. I only have one correction: In Charles Hansen's portion of the review, he mentions a "Limited two-year warranty." In fact, our amplifiers boast a ten-year parts, five-year labor warranty, a warranty rarely (if ever) seen in our industry. As I mentioned, we are very proud of our products, as you can tell by the warranty period.

Thank you again for your support, and if you have any questions or comments feel free to e-mail me. ❖

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REFERENCES

1. J. Curl, "Classic Circuitry, JC-2," TAA 3/77, p. 48 (correction, TAA 2/78, p. 49).
2. J. Curl, "Classic Circuitry, JC-3," TAA 2/81, p. 56; AE 5/97, p. 53.