

# Test Bench

BY Mark Fleischmann

## Rotel RSX-1560 A/V Receiver

**PRICE:** \$2,599 **AT A GLANCE:** High-end implementation of Class D amplification • Among first Rotels with HDMI 1.3, lossless surround decoding • Faroudja video processing but no auto setup

# It's Not Easy Being Green



**E**nergy will likely be the defining challenge of our lifetimes. We use a lot of it but need to use less, so the ways in which we use it must become more responsible, creative, and resourceful. Will home theater continue to add to the quality of life in an energy-scarce future by bringing us closer to music and movies? Or will we write it off as just another accessory of sprawl, soon to be ruthlessly un-supersized? Is it possible to enjoy big pictures that are accompanied by big sound, while using less energy? This is the stage onto which the Rotel RSX-1560 A/V receiver walks,

before an audience that is holding its breath.

Forget easy solutions, like swapping surround for stereo. With all other things being equal, five to seven channels use more power than two. But in real life, all things are rarely equal. A surround speaker package with a high efficiency rating, fed by an energy-saving Class D receiver, may use far less power than one of those two-channel dinosaur systems you see at audiophile trade shows, with doghouse-sized Class A monoblocks feeding a pair of speakers that were kidnapped from Stonehenge. The elevated temperature that drives you out of the room, diffused with

the funk of lonely-guy audiophile sweat, tells you exactly how much power such a system wastes in the form of heat, as opposed to generating music. In energy efficiency, audio for home theater already occupies the high ground. As energy supplies peak and dwindle, this would be a good time to stake out even higher ground.

What right do I have to lecture you? Believe me, I'm no puritan. One of the various audio systems that's strewn throughout my home uses a 6-watt-per-channel Class T amp. That's a cousin of Class D, but it's my rarely used kitchen system. I upgraded all my most oft-used lamps with

ROTEL RSX-1560 A/V RECEIVER  
**PERFORMANCE** ★★★★★  
**FEATURES** ★★★★★  
**ERGONOMICS** ★★★★★  
**VALUE** ★★★★★

compact fluorescents, but only after they became available in a variety of color temperatures (I prefer 4100K). I also swapped out my old PC for an ENERGY STAR model that uses a quarter of the power, but I simultaneously upgraded my monitor from 17 to 24 inches. I use air conditioning for fewer than 30 days (and three nights) per year, and only in one room at a time. However, when I need it, I crank it up gratefully, even if the local grid is burning



# HT Labs Measures

## ROTEL RSX-1560 A/V RECEIVER

Five channels driven continuously into 8-ohm loads:

- 0.1% distortion at 86.4 watts
- 1% distortion at 109.5 watts

Seven channels driven continuously into 8-ohm loads:

- 0.1% distortion at 86.1 watts
- 1% distortion at 109.0 watts

Analog frequency response in Bypass mode:

- 1.83 dB at 10 Hz
- 0.54 dB at 20 Hz
- 0.66 dB at 20 kHz
- 4.51 dB at 50 kHz

Analog frequency response with stereo signal processing:

- 2.04 dB at 10 Hz
- 0.61 dB at 20 Hz
- 0.74 dB at 20 kHz
- 58.97 dB at 50 kHz

This graph shows that the RSX-1560's left channel, from CD input to speaker output with two channels driving 8-ohm loads, reaches 0.1

percent distortion at 87.1 watts and 1 percent distortion at 109.8 watts. Into 4 ohms, the amplifier reaches 0.1 percent distortion at 166.9 watts and 1 percent distortion at 211.6 watts.

Response from the multichannel input to the speaker output measures -1.80 decibels at 10 hertz, -0.53 dB at 20 Hz, -0.66 dB at 20 kilohertz, and -4.54 dB at 50 kHz. THD+N from the CD input to the speaker output was less than 0.017 percent at 1 kHz when driving 2.83 volts into an 8-ohm load. Crosstalk at 1 kHz driving 2.83 volts into an 8-ohm load was -77.78 dB left to right and -77.55 dB right to left. The signal-to-noise ratio with 2.83 volts driving an 8-ohm load from 10 Hz to 24 kHz with "A" weighting was -95.46 dB.

From the Dolby Digital input to the loudspeaker output, the left channel measures -0.41 dB at 20 Hz and -0.79 dB at 20 kHz. The center channel measures -0.41 dB at 20 Hz and -0.69 dB at 20 kHz, and the left surround channel measures -0.41 dB at 20 Hz and -0.72 dB at 20 kHz. From the Dolby Digital input to the line-level output, the LFE channel is -0.00 dB at 20 Hz when referenced to the level at 40 Hz and reaches the upper 3-dB down point at 108 Hz and the upper 6-dB down point at 115 Hz. —MJP

Visit our Website for a detailed explanation of our testing regimen, plus a list of our reference gear.



**Connections** **INPUTS:** VIDEO: HDMI 1.3 (4), component video (3), S-video (3), composite video (3) **AUDIO:** Coaxial digital (3), optical digital (4), 7.1-channel analog (1), stereo analog (7) **ADDITIONAL:** Ethernet (1), remote (4), AM (1), FM (1) **OUTPUTS:** VIDEO: HDMI 1.3 (1), component video (1), S-video (6), composite video (6) **AUDIO:** Coaxial digital (1), optical digital (1), stereo analog (6), 8.2-channel preamp (1) **ADDITIONAL:** Remote (2), 12-volt trigger (6)

setup, room correction, satellite radio, and iPod docking. SACD enthusiasts will be irked to discover that the RSX-1560 doesn't include DSD decoding, so the receiver won't accept these signals via HDMI. You'll need to keep using the cumbersome multichannel analog interface. But Rotel has its own idea of what's important. One priority is a PC application that smooths the rigors of setup by giving the dealer, installer, or advanced user a spreadsheet that lays out all the options. You can keep a settings file with all of your goodies in case something happens and the receiver needs a full reset. To download this, go to [www.bwgroup-support.com/rotelsetup.html](http://www.bwgroup-support.com/rotelsetup.html).

**Tall Cool One**  
At the heart of the RSX-1560 is ICEpower amp technology that's licensed from a subsidiary of Bang & Olufsen and extensively modified by Rotel. If you think this receiver is expensive at \$2,599, consider the fact that the same amp module (modified differently) sells for a lot more in other products.

At 34 pounds, the receiver is heavy, but not as heavy as the 54-pound pure Class AB model it replaces, the RSX-1067. Because a Class D amp converts less power to heat than a Class A or Class AB design with the same power rating, it eliminates the huge metal heat sinks altogether. It also functions with a smaller power transformer and capacitors. (I can't disguise the fact that I'll miss my RSX-1067 reference receiver's huge front-mount heat fins. Still, given how much heat they threw

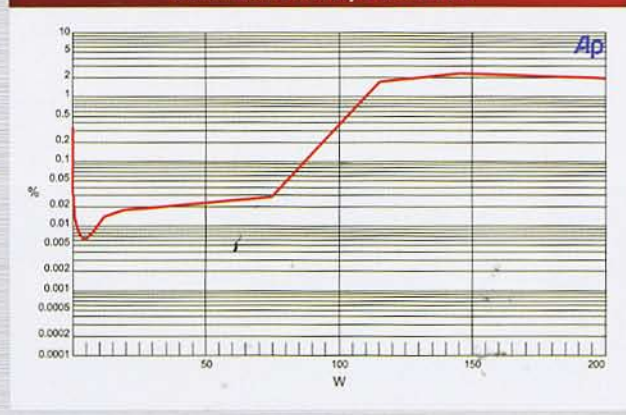
off, and the fact that coal and nukes generated much of that wasted power, perhaps it was time to say goodbye. I am almost sobbing as I write this.)

Most receivers are Class AB, which means they keep each device in their output stages running part of the time. This delivers power to the speakers when the signal dictates and dissipates the remaining power in the form of heat. The Class A amps that some audiophile two-channel systems use are even less efficient. They run their output stages all the time, burning power even when there's no input signal at all. In contrast, this Class D receiver achieves about 80 percent efficiency at full power, compared with the roughly 30 to 60 percent efficiency of the all-analog designs it replaces. Many Class D amps are even more efficient, at about 90 percent at full power, but Rotel's audio-savvy design sacrifices a smidgen of that energy savings.

How does a Class D amp achieve that greater efficiency? Like any kind of amp, it starts with an analog input signal. It then creates a replica of that signal as a train of pulses, a process called pulse width modulation (PWM). The train of pulses is then amplified by a rapidly switching output stage, which is always either on or off. The switching frequency is 384 kilohertz, about 20 times as high as anything that the human ear can detect. Finally, the amp low-pass-filters the amplified pulse train to recover the analog waveform and eliminate the ultrasonic switching noise. What



ROTEL RSX-1560 A/V RECEIVER



up. I live in a small space in a big city and get around on trains, buses, and shoe rubber, but I still end every year with the ultimate carbon indulgence, a trip to Europe. So I'm not exactly a model citizen. I consider the possibilities, but I don't spring for all of them at once.

Enter the RSX-1560. Yes, it is a Class D receiver, which uses a switch-mode power supply to efficiently feed high-current output devices. At \$2,599, this receiver offers an opportunity to make a substantial investment in the future of home theater.

For me, this review was especially interesting, since the RSX-1560 is the direct replacement for a model line I revere, which includes the RSX-1067 and the RSX-1065. I've used the latter as my reference receiver since I reviewed it in 2001.

**1.3 for Me, Please**

The RSX-1560 and its little sister, the RSX-1550, are the first Rotel receivers to enter the HDMI 1.3 and lossless surround eras. Each has onboard decoding for Dolby TrueHD and DTS-HD Master Audio, as well as Dolby Digital Plus and DTS-HD High Resolution Audio. (However, they are

not Rotel's first HDMI receivers. That distinction belonged to the RSX-1057 and RSX-1058, which used earlier versions of HDMI and have no lossless surround decoding.)

Both new models are available in either a matte black or bright brushed-aluminum finish, which Rotel, following industry custom, calls silver. The front panel has a rigorously symmetrical control layout, with two groups of 16 buttons flanking a central volume knob. At the top right are two knobs for quick on-the-fly bass and treble corrections. This adds a pleasingly old-fashioned bit of functionality for finicky listeners who hate menus. At the top left is a power on/standby button that's encircled by blue LED lighting bright enough to read by.

Rotel's customary user interface has almost completely evaded innovation. The GUI continues to be as black and white as *Casablanca*. It persists in a Rotel



• The convenient knobs for bass and treble adjustment add a nice touch to the RSX-1560's front panel.

idiosyncrasy: When you press the Menu button, a System Status screen comes up a pokey few seconds later. This shows the input, listening mode, active speakers, and other miscellaneous information. You then must press the Enter button to go into the main setup menu. There's no one-button entry to the main menu.

An advanced speaker setup menu lets you selectively override the master sub crossover and speaker size settings for the front, center, surround, and back-surround channels. It has separate adjustments for Dolby, DTS, stereo, and DSP. HDMI Audio mode has two adjustments. The Amp mode uses the receiver's onboard surround processing, while the TV mode operates as an HDMI audio passthrough, allowing the display to do the audio decoding. A contour control adjusts the high and low frequencies. Rotel continues to offer a Cinema EQ mode that acts somewhat like the THX re-EQ feature (without certification). You may

reconfigure the front channels for a second zone, substituting a two-channel museum piece for the front left and right. "We find a lot of audiophiles with 'large' loudspeakers favor this configuration," Rotel notes.

The RSX-1560 includes a couple of welcome tweaks from previous generations: The front-panel power button now switches between on and standby (versus on and hard power-off in older Rotel receivers). And the receiver now remembers the status of the multichannel analog input. If you switch it on, it stays on through future power off/on cycles. While the remote is smaller, the control layout is similar to its 2001-era predecessors. It works fine on axis, but it lacks the RSX-1065's supernatural ability to accept infrared codes regardless of where you aim the remote.

As an audiophile product, this receiver omits some features that would otherwise be standard at this price. They include auto

**Features**

**ROTEL RSX-1560 A/V RECEIVER**

- AUDIO DECODING:**  
DOLBY: TrueHD, Digital Plus, Digital 5.1, EX, Pro Logic IIx  
DTS: DTS-HD Master Audio, DTS-HD High Resolution Audio, DTS, ES, 96/24, Neo-6  
OTHER: Cinema EQ, contour, DSP modes
- THX CERTIFICATION:** No
- NUMBER OF AMP CHANNELS:** 7
- RATED POWER (WATTS PER CHANNEL):**  
100 into 8 ohms, all channels driven
- SPECIFIED FREQUENCY RESPONSE:**  
10 Hz to 120 kHz +/-3dB
- VIDEO PROCESSING:** Faroudja DCDI
- AUTO SETUP/ROOM EQ:** None
- DIMENSIONS (W X H X D, INCHES):**  
16.97 x 7.4 x 16.61
- WEIGHT (POUNDS):** 34.17
- PRICE:** \$2,599

ROTEL RSX-1560	3:2 HD	2:2 HD	MA HD	3:2 SD	2:2 SD	MA SD	VIDEO CLIPPING	LUMA RESOLUTION	CHROMA RESOLUTION	SCALING
DIGITAL	N/A	N/A	N/A	N/A	N/A	N/A	PASS	PASS	PASS	N/A
ANALOG	FAIL	FAIL	FAIL	PASS	FAIL	PASS	PASS	FAIL	FAIL	GOOD

**VIDEO TEST BENCH** The Rotel will upconvert analog inputs to an HDMI output. However, it won't process incoming HDMI signals; it merely passes them through without degradation. The same goes for component in to component out—no upconversion, just passthrough. The Digital test results in the table are the only ones that are applicable in this situation: a 1080p HDMI input and a 1080p HDMI output.

The analog luma resolution was particularly poor. The second highest frequency HD burst pattern (18 megahertz) had

Visit our Website for a detailed explanation of these video tests.



a reduced output, and the highest (37.1 MHz) indicated no visible output at all. Other HD test patterns, analog in to HDMI out, were clearly softened as well. There was also noticeable added edge enhancement to lines in a sharpness pattern with a 1080i component input to a 1080p HDMI output. I don't recommend using the Rotel's video switching to cross-convert important component sources. (The component in to component out HD resolution was good.)—TJN



emerges is a gush of analog power fit for your speakers—of course, conventional speakers are always analog devices.

Perhaps counterintuitively, the conversion of the analog input signal to a pulse train is not considered a form of digital encoding. This is how Rotel puts it: "This process seems digital but is in fact analog in nature. The signal is not digitized, i.e., assigned a numerical value. The pulse train is an analog of the input audio signal."

Sounds like a piece of cake. But although it's elegant, the process is not simple. To prevent the on/off process from pumping the power supply, Rotel's designers added an adaptive circuit. Since loudspeakers' impedance varies with frequency, the output stage must provide a low output impedance and a high damping factor to contend with the real-world loads that speakers present. The final act of filtering must remove high-frequency noise, which is inherent in the switching process. Both the switching stage and the filter use feedback to control the PWM process' side effects. This is not an off-the-shelf chip amp in a fancy metal box.

Associated gear included five Paradigm Reference Studio 20 v.4 speakers, running full range without a sub. The main signal sources were a Panasonic DMP-BD55 Blu-ray player, Rega Planar 25 turntable, Shure V97xE cartridge, and NAD PP-1 phono preamp. All movie selections were Blu-ray Discs with lossless Dolby TrueHD surround.

**Crazy Cool**

Quarantine plunged the Rotel into the deep end of the pool with a hyperaggressive soundtrack. The bombardment of sound reflects the confusion of potentially violent people who are confined

to an apartment building by the health authorities—the kind of health authorities that use helicopters and machine guns. Muffled but loud copter and siren noises revolved crazily around the soundfield, slowly driving the occupants mad, and some of that rubbed off on me. Overall, the soundfield was murky and uniformly loud, not unduly fatiguing, but relentless. It occasionally offered moments of startling realism. At least once, I paused the disc to verify that the sirens weren't outside my building. In this and future selections, I set the master volume at a minimum of 60 increments out of a total of 99, and often up to 65, so the receiver was

operating at just under two-thirds of its maximum gain. The sensitivity of the Paradigms is about average, at 88 dB.

*Made of Honor* is a gentle comedy about a guy who becomes the maid of honor as the woman he loves—the always delightful Michelle Monaghan—is about to marry another guy. It's predictable in a nice way, and it's apparently mixed for TV speakers, as so many comedies are. Reproducing dialogue was a piece of cake for the receiver.

*Coach Carter* stars Samuel L. Jackson as the coach of a wayward ghetto basketball team. It's full of action and inspirational acting from a charismatic young cast. Here the old Rotel personality I've known and loved

for so long finally asserted itself, with a civilized but communicative top end and a big feel-good midrange, which made some sense out of voices echoing from a basketball court. Bass response was modest, but apart from that, this receiver was clearly some kind of blood relation to my old reference piece. It showed the same ears at work and worked toward the same goals.

**Yes, Yes, Yes**

Throughout my listening sessions, I wondered if Rotel had really pulled an audiophile rabbit out of the Class D hat. My movie demos suggested that the answer might be yes. But the music demos were more conclusive.

Orchestral strings are among the toughest listening tests. The violin has an inherently nasty sound—but if you put a bunch of them in a great hall, record them well, and play them back through a great system, you should be as near to heaven as human life allows. For this test I picked a vinyl edition of Bernard Herrmann conducting the National Philharmonic Orchestra in *Music From Great Shakespeare Films*, works written for *Hamlet*, *Richard III*, and *Julius Caesar* by Shostakovich, Walton, and Rózsa. Those old London Phase 4 LPs could sound fabulous. Viols: yes, with the right feel. Cellos: dark and chocolatey, another yes. Bases: surprisingly full and tuneful, another yes. This was a fully developed string sound, not a tizzy facsimile or dumbed-down fake.

Only with the most metallic instruments—some brass and a relentlessly shaken tambourine—did I detect a difference between Rotel's Class D sound and its Class AB sound, which I know and love so well. It was a tiny difference in flavor and had nothing to do with discomfort. It was more like looking at the *Mona Lisa* under incandescent light and then looking at it again under a high-quality compact fluorescent with the same lumens and color temp. Same painting, same colors, slightly different light.

You'll laugh, but let the record show that my appreciation for the RSX-1560 was considerably heightened when, while flipping the Herrmann LP, I treated myself to a Guinness. Once I stopped fretting, the Rotel sounded much better. I did all the other demos sober (my normal practice, of course), but I thought this might be worth noting. If you get all uptight about listening to anything, you listen differently, and perhaps not as well.

Richard & Linda Thompson's *Hokey Pokey* is their best-recorded album. Using the Universal/Island CD re-release, I enjoyed a solid drum sound with pleasing mid-bass fullness. Linda's emotionally

potent soprano is like a canary in a coal mine. It has a strong treble content and is hardwired into my heart. This receiver didn't make me turn her down, and I listened at a high volume level suitable for foreground listening. When I switched between the Dolby Pro Logic II Music mode and stereo, I preferred the former for the way it highlighted the layering of voices and guitars, with better separation of harmony vocals.

Dave Frishberg's *Songbook Volume 1* is yet another of my sidewalk LPs. The Rotel lovingly projected the comic jazz singer's slightly nasal voice. His piano, which is recorded close up, sounded as if it were in the room with me. The string bass and light drums were pitch-perfect. With this highly natural recording, stereo was the only way to go—DPLII actually bent the soundstage out of shape in an obvious way, which surprised me, because that rarely happens. The difference between this pristine piece of vinyl and the CD release of Frishberg's *Classics*—which contains many of the same songs—was night and day. The LP has far more vivid textures and increased spatiality. Audiophiles and people who run trade-show demos should track down this piece of wax and put it in heavy rotation. By the time I was done with it, I was convinced that I was listening to a great receiver, one that deserves a spot on our Top Picks list.

The Rotel RSX-1560 is not just a science experiment in Class D amplification. It is a fine-tuned product that maintains the manufacturer's effortlessly musical personality while projecting it onto a new amplifier topology. If I agonized over this receiver, I can only imagine how many sleepless nights Rotel's designers spent trying to make it sound as good as its shiny front panel looks. With Mother Nature giving us dirty looks, it's nice to know that such a thing is possible. ☞

\* Audio editor Mark Fleischmann is also the author of the annually updated book *Practical Home Theater* (www.quietriverpress.com).

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