

The First Name in Digital Audio

DENON

DVD VIDEO PLAYER

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DVD-5000



World's First THX Ultra DVD Player

The DVD-5000 is a reference-class DVD video player featuring Denon's latest digital technology known as AL24 Processing which produces the ultimate analog waveform fidelity to suit next-generation media. In order for AL24 Processing to perform at its maximum potential, the DVD-5000 also incorporates a 4-DAC 24-bit D/A converter section which supports up to 96 kHz sampling. With the Denon DVD-5000, the audiophile becomes enveloped in a digital sound of an order they have never experienced before. The DVD-5000 is further equipped with HDCD decoding that has been combined with Denon's digital technology to bring out the highest quality in sound that is possible with HDCD-encoded CDs. The DVD-5000 passes the strict THX Ultra specifications by Lucasfilm Inc., that have been established for best possible picture quality, audiophile sound quality and ease of operation.

■ Newly-developed AL24 Processing



AL24 Processing has inherited the technology of the original ALPHA Processing that was used in Denon's highly-successful S1 series of reference-class audio components. AL24 Processing further reduces quantization distortion and represents the ultimate analog waveform reproduction technology designed to support the higher numbers of bits and higher sampling rate of next-generation media.

AL24 Processing senses the nature of the digital data being input and interpolates the data so that it faithfully replicates the original analog waveform. AL24 Processing supports not only 16-bit digital data, but also 18-, 20- and 24-bit data, as well as input data with a sampling frequency of up to 96 kHz.

■ Multiple 24-bit, 96 kHz D/A Converter

The DVD-5000 uses a 4-DAC 24-bit, 96 kHz sampling D/A converter system in order to convert high-quality 24-bit data obtained from AL24 processing with utmost fidelity. This design achieves a signal-to-noise (S/N)



ratio of 118 dB and a dynamic range of 108 dB to bring out the beautiful sound of high-bit, high-sampling technology.



■ THX Ultra Certified

Lucasfilm, Inc. has unveiled the new THX Ultra standards for DVD players in order to recreate the exciting realism of the movie theater in one's own home. The DVD-5000 DVD player from Denon has passed those stringent standards, and is now being offered to home theater enthusiasts throughout the world.

The THX Ultra standards comprise three basic categories of tests: Audio Quality, Video Quality and User Interface. These tests ensure that the DVD player is fully capable of bringing the best visual and sonic quality out of your favorite DVD programs.

■ High-speed, Precision 10-bit, 27 MHz Video D/A Converter

The highly accurate video decoder processes the DVD video data (the component luminance and color difference signals). In order to output this high-quality digital signal with its original purity still preserved, the DVD-5000 employs a high-speed, high-precision 10-bit, 27 MHz video D/A converter. This design improves the reproducibility of extremely minute details so that the picture viewed on the screen is completely faithful to the original image in both its colors and high resolution.

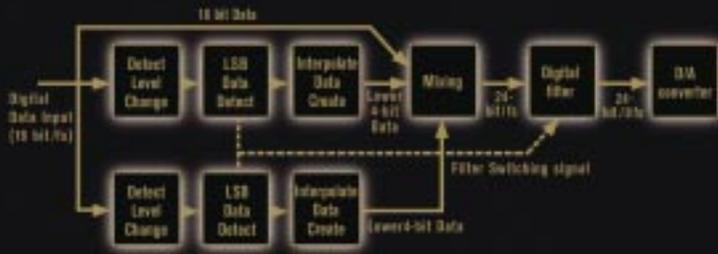
■ HDCD Decoder



HDCD technology represents encoding and decoding that drastically reduces digital recording distortion while retaining compatibility with the existing CD format. HDCD uses Peak Extension and Low-level Extension technology to convert 24-bit data to the 16-bit data format of existing CDs without sacrificing the high quality of 24-bit sound. This technology prevents the sound from becoming distorted during peak periods, and boosts the low-level



Fig.1: AL24 Processor Block Diagram



signals to improve the S/N ratio for a substantially richer dynamic range.

Since the DVD-5000 is equipped with an HDCD decoder, the Peak Extension and Low-level Extension features are accessed and combined with Denon's own 96 kHz, 24-bit 4-DAC system to fulfill the maximum potential of HDCD's remarkable sound quality.

The DVD-5000 also automatically senses the type of disc that has been loaded (ordinary CD, DVD disc, or HDCD), then processes the signals based on the type of disc detected.

■ Independent D/A Converter

The DVD-5000 can also be used as a D/A converter. The front panel Source switch directs the digital input signals coming in through one of the two digital input terminals (optical or coaxial) so that it passes through the unit's AL24 Processor and D/A converter for output as a clean, highly accurate analog signal.

■ Color Component Video Output

The DVD-5000 is equipped with a color component signal video output capability that faithfully outputs the analog signals resulting from direct and high-precision D/A conversion of the Y, Cb and Cr signals recorded on DVD. "S" and composite video outputs are also provided (2 of each).

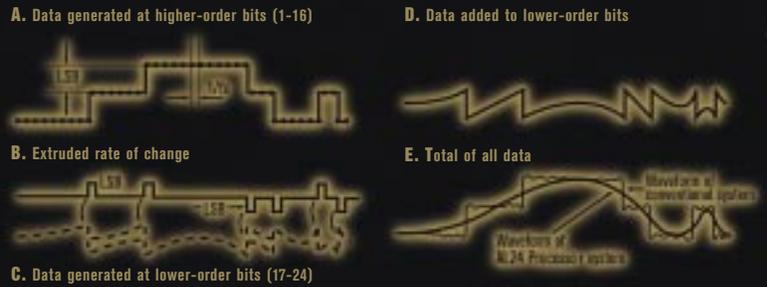


■ Vibration-resistant Construction

The DVD-5000 protects the DVD and the transport mechanism from unwanted vibrations using a centrally located holder with low center of gravity firmly secured with mechanism brackets to the unit's highly rigid, copper-plated chassis. This mechanism is further isolated from the digital, video and audio circuits which have each been mounted on their own copper-plated board so that the circuits can be thoroughly protected from mutual interference and vibrations. The overall chassis of the DVD-5000 is constructed of a 15mm thick aluminum front panel, a double-layered top cover and a quadruple-layered bottom chassis assembly. All these parts have been secured with vibration-absorbent sintered alloy insulators to produce a construction that is totally protected from both internal and external vibrations.



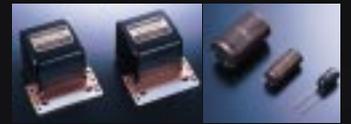
Fig.2: How AL24 Processing Works on Audio Signals



■ Easy-to-use Graphical User Interface (GUI)

■ Parts Strictly Selected for Sound Quality

Three separate transformers have been employed for the audio, video, and



control sections. Transformers specially constructed with vibration-resistant materials are used in the audio and video sections. In addition, the same strictly-selected parts whose performance has proven to be reliable during the development of Denon's S1 series of audio components -- such as the removable ultra-thick AC power cord; very low ESR electrolytic capacitors, film capacitors and carbon resistors designed for high sound quality; and the high speed operational amplifiers selected for highest sound quality -- have gone into the DVD-5000.

■ High-performance Pickup and Digital Servo Technology



In order to read the maximum 8.5 gigabytes of data that can be recorded on one side of a DVD, the DVD-5000 uses a self-excited oscillator type red laser with a wavelength of 650nm to ensure stable, low-noise performance. In addition, the pickup lens used with this laser employs an integral molding hologram that enables DVD and CD program sources to be read by the same pickup. As a result, the DVD-5000 features the shortest possible signal paths, a simplified construction and superior reliability.

■ Gold-plated Audio and Video Terminals

■ Digital Theater Systems (DTS) Compatible Digital Output

■ Easy-to-use Remote Control with Backlit Keys

ALPHA Processing and AL24 Processing

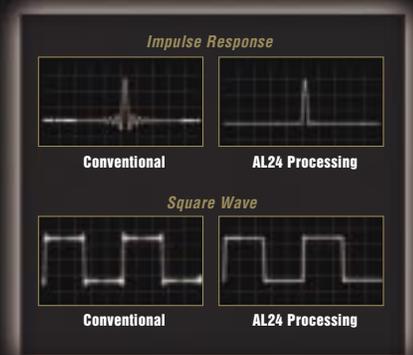
■ Expanding to Input Signal Bit Length of 24 Bits

While the original ALPHA Processing system generated four lower bits of data for the 16-bit input data to obtain data of 20-bit quality, the new AL24 Processing uses two calculating circuits in its lower data generation section to generate eight bits, to which the upper 16 bits of data is then added, producing an output signal of 24-bit quality (Figure 1).

First of all, the data reproduced from a CD is input "as is" in its 16-bit staircase form to the ALPHA processor, as shown in waveform (A) of Fig. 2. The processor then extrudes the rate of change in 1 LSB, whether positive or negative, from the portions of waveform (A) where a change in the data has occurred and produces waveform (B).

Next, the ALPHA processor uses its lower-order bit data generator to produce data for the four lower-order bits, 17-24, that should normally exist below the 16 bits as shown in waveform (C). The result is waveform (D), where lower-order bit data for each 1/16 LSB point of change is generated.

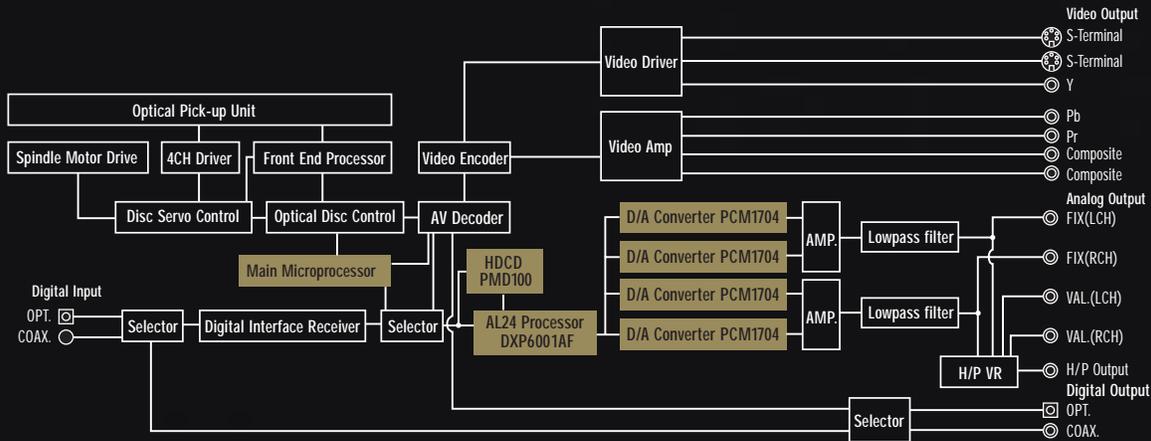
Finally, the higher-order bits of waveform (A) are added to waveform (D), producing the synthesized waveform shown in waveform (E). This waveform reflects the smooth 24-bit oversampled data that is reproduced with superb audio clarity.





Specifications

Video Section		S/N
Signal System	NTSC	DVD/CD 118 dB
Discs Played	DVD Video Disc, Video CD, Music CD	Dynamic Range
Video Output	1 Vp-p (with 75 Ω load, sync, negative polarity)	DVD 108 dB
S-Video Output Connector:		CD 100 dB
Y output	1 Vp-p (with 75 Ω load, sync, negative polarity)	Total Harmonic Distortion
C output	0.286 Vp-p	DVD/CD 0.0015/0.0018%
Audio Section		Sampling Frequency 32, 44.1, 48, 96 KHz
Audio Signal Output (Fixed)	2 Vrms (1 kHz, 0 dB)	General
Audio Signal Output (Variable)	0 - 2 Vrms	Weight 16.5 kg (36.4 lbs)
DVD Linear Audio	Frequency response: 48 kHz sampling: 2 Hz to 22 kHz 96 kHz sampling: 2 Hz to 44 kHz	Dimensions 434 (W) x 135 (H) x 374 (D) mm 17.1" (W) x 5.3" (H) x 14.7" (D) (excluding protruding parts)
CD Audio	Frequency response: 44 kHz sampling: 2 Hz to 20 kHz	Power Supply AC 120 V, 60 Hz



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