COPLAND

CDA825

CDA825 CD-PLAYER

As a result of our quest for refining the musical capabilities of the CD-media, and our constant efforts to understand and taget the underlying technological requirements, we believe that the introduction of the CDA825 is offering significant improvements of sound reproduction from CD-media.

Obviously the CD-media is a digital representation of an initially analog event, and the design of the CDA825 is therefore determent by an ambition to reconstruct the complex and delicate harmonic structure of the original analog waveform. This objective adheres to all details of the design, as well as their integration into the whole.

Starting with the power supply, the following paragraphs offers some insight into the various design considerations.

Power supplies

The routing and grounding scheme of the CDA825 power supply provides effective isolation between the digital- and analog- parts of the CD-player. Furthermore, the power supply has been designed to ensure constant low output impedance towards the power consuming electrical circuits. The numerous individual power supplies in CDA825 are designed to operate with a constant power, thereby eliminating reverse modulation towards the transformers and the AC supply grid.

Error correcting capability

The servo/error correction circuit is a prime source of ensuring error-free extraction of the data from the disc. These circuits are designed by a few select semiconductor manufacturers. Extensive testing was performed in order to select the best chip-set available, and then to provide optimum operation conditions for these devices.

Inherently to the red-book CD standard, is an 8 -14 modulation, interleaving and Reed- Solomon error correction. Due to cost reasons, not all available decoder chip-sets include a full implementation of these powerful error- correcting capabilities.

The Philips chip-set used in the CDA825 provides full implementation of all error-correcting schemes of red-book CD and hence, guarantees that the extracted data from the CD-Pro2LF mechanism are recreated correctly.

Buffer circuitry

In order to provide further isolation between the data-extraction parts (drive, servo and error correction) and the reproduction parts (DAC, analog and output filtering), a digital buffer containing two seconds of musical data has been included in the signal path between the drive mechanism and the DAC's. The purpose of this digital buffer is to isolate the drive from the DAC's.

The data, as they are extracted from the drive, are not completely equidistant in time; there are slight variations (jitter) imposed in the time domain. By absorbing these slight time variations at the input side of the buffer, the memory of the buffer is used as a data-pool from which the extracted data are clocked out towards the DAC's at an absolutely constant rate (completely equidistant in time) - and consequently the jitter in the data is eliminated.

The DAC's are feed digital data arising from the registers of the memory device and so the modulations in time and electrical energy (drive variations in power consumption) are completely eliminated; the DAC's are fed data from an environment that do not comprise any moving parts.

Digital filter

In the field of psychoacoustics it is a well known fact, that when modelling the human hearing, the perception of sound exhibit masking effects - both in the time- and frequency domain. The time domain masking effect (temporary masking) can roughly be explained as, the ear being less sensitive to noise immediately after an impulse than before. This fact has been exploited in the design of the digital up sampling filter for the CDA825.

As the bandwidth of CD replay is limited to approx. 20 KHz, the low pass filters used to up sample the CD data exhibit a pass band up to this frequency. A conventional linear phase up sampling filter has an impulse response that is symmetrical in time - i.e. equally much 20 KHz "ringing" before and after an impulse. The up sampling filters for the CDA825 has been designed in such a manner that the pre-"ringing", the "noise" prior to an impulse is reduced under consideration of the temporal masking of the human hearing. This filter design yields a stable and "quietness" to the sound of the CDA825; transients arise out of a silent background and transients are perceived to be very clean and well defined. These sorts of filters have lately become known as apodizing filters.

Clock circuit

The clock circuit is responsible for providing the correct data for conversion into analog voltage at the correct instant in time. If the clock phase has variations in time (phase modulation: the phenomena known as jitter) the data will not be converted into analog voltages at the correct instant in time. The net-effect of these timing errors correspond to the introduction of amplitude errors - i.e. that the analog voltages are not the correct analog voltages for recreating the analog waveform with high signal integrity and high fidelity. For this reason the jitter performance of the clock circuit as well as the layout of the clock-distribution lines are very critical. The clock oscillator of the CDA285 is meticulously designed for optimal jitter performance. The clock oscillator has its own regulated power supply.

Digital to analog converters

The CDA825 uses the Wolfson WM8741 24bit, 192 KHz DAC. Two of these devices are used - one for each channel. Each DAC consist of two Digital to Analog converters each providing an in-phase signal and an opposite phase signal. By combining two in-phase and two opposite-phase signals per channel, the statistical properties of the signals are taken to advantage; the signal power of the phases correlate and add-up in constructive addition, whereas the noise power of the phases are decorrelated in a manner that improves on the signal to noise ratio of the resulting analog waveform.

Analog circuitry and post filtering

Due to the high degree of over sampling, the undesirable aliasing energy at the output of the DA converters is minimized. This has allowed a design of a high bandwidth analog output stage and a lower order analog filtering.

Sound quality

The hallmark of the Copland sound philosophy, the deep, tight and free flowing bass reproduction, seamless mobility of musical energy and authentic recreation of the time dimension from the original recording session, are inherent virtues of the CDA825.

The dynamic resolution of the CDA825 is extraordinary in the sense that musical energies related to complex amplitude modulations appears to flow with an unconstrained mobility and acceleration.

Whether it's a small acoustical trio or a large orchestral outburst, the complexity of the harmonics and the fidelity of the time-dimensions remain intact. Everything remains in place and with exceptional resolution. The individual instruments are reproduced with absolute unconstrained musical flow. In fact, it could be a challenge for other components in the reproduction chain to reveal these aspects of the CDA825's capabilities.