



Development Overview

The Spectral SDR-4000SV Reference CD Processor System

The SDR-4000SL Reference CD Processor is a limited edition reference instrument crafted in the Spectral engineering department and individually programmed and calibrated by its designer Keith Johnson. Relatively unlimited time and resources have been utilized to achieve our ultimate objective: Engineer the most sophisticated and sonically accurate CD player in the audio industry. Those that are familiar with Keith Johnson's credentials and previous achievements in digital design know this objective is not taken lightly.

As with previous editions of our SDR components from the 1980s and 1990s, such as the SDR-1000 and SDR-2000 reference digital components, it takes our engineers multiple design generations to arrive at an ultimate model. The SDR-4000 has been previously produced in three highly regarded versions, the original SDR-4000S, the revised SDR-4000Pro which incorporates the exclusive HDCD "Long Filter" technology and the SDR-4000SL with our Ultradrive system. It has taken Spectral engineers five additional years to develop our most uncompromising generation, the SDR-4000SV. In the SDR-4000SV, Keith Johnson and the design team address the continuing performance objective to create the ultimate SDR-4000 and again redefine the possibilities of the compact disc medium for the most demanding musical applications.

The Spectral SV Technology Delivers Superior Analog Performance

Constant research in our fundamental technologies drives component advancement at Spectral. When we introduced our recent SHHA Generation 3 line section modules in the DMC-30SV reference preamp, they proved to be a game changer. Our customers and our dealers proclaimed the DMC-30SV a "revelation", redefining preamplifier performance in the finest music systems. Now the "Super Veloce" technology is adopted for the high-level output section of the new SDR-4000SV CD processor with exceptional results.

In reality, all digital source components are a complex combination of systems and as much dependent on the quality of analog circuits as digital. This awareness of analog's critical role has driven Spectral digital design practice to focus the same demanding performance criteria we use in developing our preamplifier line sections. In the SDR-4000SV the line amplifiers and power supplies are replicated from the uncompromising DMC-30SV reference preamp. In all probability, there may not be a more sophisticated analog output section in a digital component today! However, there is more that is required to surpass our previous analog efforts. A newly designed DAC summation I/V amplifier is optimised to support the higher speed and gain of the the SV output section. The hand-calibrated passive equalizer filter section is also realigned. Taken in total, the fully discrete high-speed class A amplifier topology of the SDR-4000SV takes analog performance to a new level in a digital component.

Spectralock 2 Delivers Superior Clocking

The analog amplification improvements are not the only advances made in the SDR-4000SV, a new proprietary clocking system reduces jitter and clock



error to previously unattainable levels. Our new Spectralock 2 system employs custom cut VCXO crystal reference oscillators and redesigned master clock system to lower clock jitter and reduce fields which can induce jitter. This extreme precision has resulted in virtually unmeasurable peak jitter using the finest existing instrument test systems. The ultra-precision Spectralock 2 master clock is joined by new drive control software which increases data cache rate and suspends data transmission from the drive to DAC for longer periods of zero activity. This silent transport running lowers noise and field emissions. The results of these changes are lower clock interference and lower electrical activity which can effect the internal timing of the DAC.

Spectral SDR-4000SV is the Industry's Finest CD Playback System

The industry leading performance achieved by the first SDR-4000 twelve years ago continues with the advancements of the SDR-4000SV today. No other digital component for CD playback approaches the challenges of 44.1 digital with the technical and design superiority realized in the SDR-4000SV. This superiority starts with a fundamental architecture dividing 4000 structure into eight fully independent and powered digital and analog sub-systems. Each sub-system has been realised with breakthrough technology and componentry using "best practices" employed in SOTA high-technology instrumentation. With zero cost-cutting and the finest components in existence, benchmark performance in 44.1 reproduction has been achieved. The addition of the new SV technology and Spectralock 2 master clock reference to the SDR-4000 result in the finest performing CD playback system in the industry, delivering unrivaled performance of music recorded on compact disc.



Q/A: The SDR-4000SV Reference CD Processor

1) What is it?

The SDR-4000SV is the next generation of the SDR-4000 Reference CD Processor designed by Keith Johnson and originally introduced in 2004.

2) Why was it created?

The original intent for the 4000 program was to redefine the possibilities of 44.1k reproduction of compact disc recordings and create the ultimate CD playback system. To achieve this the research program for the 4000 successfully targeted the established compromises and performance failings of traditional CD systems with our advanced engineering solutions. The SDR-4000 addressed virtually all of the classic problems of 44.1k reproduction with edge-of-the-art engineering in both digital conversion and analog systems. The SDR-4000 has redefined the compact disc as a serious high-resolution medium, with each successive generation pushing sonic performance higher. The newest member of the SDR-4000 family, the SDR-4000SV, has been designed to incorporate Spectral's innovative SV amplifier topology as well as additional improvements in clocking performance and control software.

3) What is the difference from the SDR-4000SL?

The SDR-4000SV features new design work in two areas; the redesign of the analog sections incorporating the SV technology used in the DMC-30SV and revision of the master clock system and control software. The other systems and mechanicals of the SDR-4000SL continue unchanged since they already represent absolute best possible performance at this time.

4) What does the SV technology do for the SDR-4000SV?

The SDR-4000 has always used a version of the DMC-30 line section and power supply. The new DMC-30SV preamplifier is a ground-up amplifier design using generation 3 SHHA modules. The DMC-30SV has been universally acclaimed as a new performance benchmark. In the SDR-4000SV we design new power supplies and output board to support the G3 line modules just as used in the 30SV preamp. To compliment the new output section, the DAC amplifier and passive equalizer filter section are also revised to improve performance with the G3 modules.



5) What do the clocking and control software changes accomplish?

In the last several years, we have worked on refinements to the 4000 master clock system and control software for our Ultra Drive optical disc drive. We call this new clocking and interface system Spectralock 2. In our revised master clock system, we utilize new stabilized VCXO precision crystal oscillators with extreme accuracy. This has resulted in virtually unmeasurable peak jitter using the finest existing instrument test systems.

The new control software increases data cache rate and suspends transmission from the drive for extended periods of zero activity. The silent transport running lowers noise and emissions. The results of these changes are lower clock jitter and lower electrical field activity which can effect internal DAC timing.

6) What are the sonic results of these improvements?

The sonic improvements using the SV line section follow the experience we see in the DMC-30SV, with greater speed and lower distortion, improving clarity and musicality. The clocking and control system improvements are lowering jitter and noise still further for cleaner, more natural sound.

7) Is it possible to upgrade the earlier SDR-4000SL?

Because the 4000 is 100% modular it is entirely possible but probably impractical due to the extensive revisions and high cost. The entire analog section of the 4000SV is new or revised including power supplies. In addition, the master clock board and control translator board are also revised. In total, the SDR-4000SV is an extensive redesign, not a simple modification of the SDR-4000SL.

8) Who will be offering the SDR-4000SV?

As in the past, the SDR-4000 is a limited production specialty instrument which will be offered only by selected Spectral Reference and Spectral RS dealers.

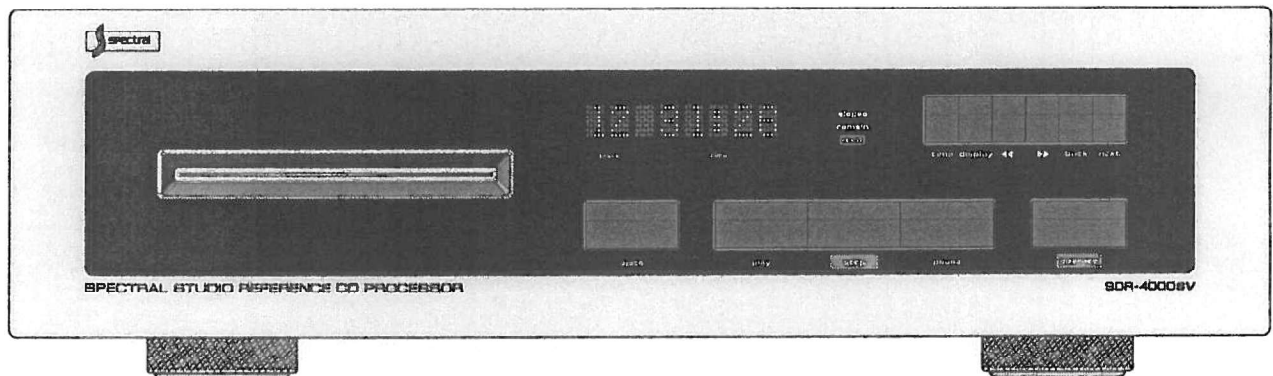
PRELIMINARY SPECIFICATIONS



SDR-4000SV REFERENCE CD PROCESSOR

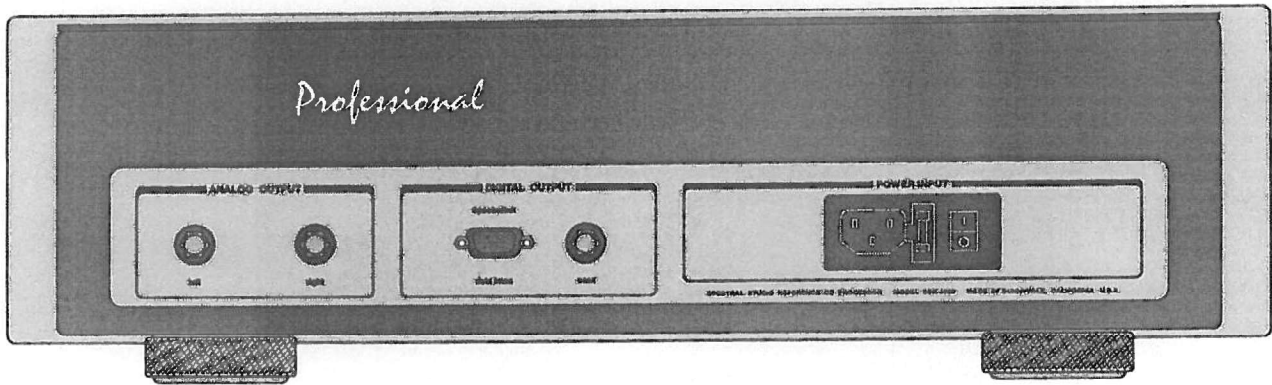
SELECTED DESIGN HIGHLIGHTS:

- * Exclusive HDCD™ 'Long Filter' high performance decoding software.
- * Custom 20 bit balanced DACs with fully discrete Class A high current summation amplifiers.
- * Spectralock 2™ ultra-low jitter master clock reference.
- * All discrete wideband topology totally eliminates integrated circuits from the analog signal path.
- * Discrete passive equalization is individually tuned.
- * High speed, Class A SHHA G3 line module output section derived from DMC-30SV preamplifier.
- * Independent ultra-isolated 'Floating Power' supplies for all nine player sub-systems.
- * Better than one part per million data precision.



MECHANICAL FEATURES:

- * UltraDrive custom built mil-spec avionics optical drive.
- * Ultra-premium construction beltless design.
- * Extended cycle life and precision glass optics laser.
- * Fully modular drive packaging accommodates full field servicing and updating.



SDR-4000SV DIGITAL SPECIFICATIONS

Sample Rate:	44.1kHz
D/A Conversion:	Four custom 24 bit DACs in double balanced configuration
Digital Filter:	8x oversampling, 56 bit math 64 bit accumulator HDCD
Analogue Filter:	Passive type, linear to 28 KHz
Frequency Response:	DC to 22KHz \pm .3 db
DAC Step Resolution:	Better than 120 db
Digital Noise Output:	100uV peak to peak or less
Transient Overshoot:	8% or less
Transient Settling Time:	100uS or less @ 1%
Intrinsic Jitter:	Less than 1 picosecond rms, 3-4 picoseconds peak

SDR-4000SL ANALOG SPECIFICATIONS

Outputs:	RCA single ended
Output Impedance:	100 Ohms
Frequency Response:	DC to 1.2 Mhz -3 db
Harmonic Distortion:	Less than .001
Intermodulation (SMPTE):	Less than .001
Nominal Output:	.75 Volt rms
Output Voltage Swing:	2.5 Volts rms Maximum
Signal to Noise Ratio:	Greater than 120 db
Channel Separation:	Better than 115 db
Slew Rate:	400 V/uS

SDR-4000SV MECHANICAL SPECIFICATIONS

Dimensions:	48 cm (19") W, 10.5 cm (4.25") H, 40 cm (16") D
Weight:	20.9 kg (46 lbs) net.

SDR-4000SL POWER REQUIREMENT

Voltage:	Factory set 120, 220, 240 VAC @ 47.5 to 440Hz
Continuous Dissipation:	65 Watts

