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Bulletin 0516

Design Overview

The DMC-30SC Reference Preamplifier

It required years of painstaking research and development and exhaustive listening trials to create the renowned DMC-30SV 'Super Veloce' Reference Preamplifier. The DMC-30SV succeeds the classic DMC-30SS reference preamplifier, for eight years our most popular product and one of the most highly regarded audio components in the high-end audio industry. Developed over the course of three years, the DMC-30SV is the fourth generation of the DMC-30 family which music enthusiasts worldwide have come to regard as the gold standard in state-of-the-art performance and top value. The DMC-30SV utilizes new Spectral exclusive technologies and componentry to raise the bar in signal control and amplification to a new level of precision.

With the stunning success of the DMC-30SV reference preamplifier, Spectral customers have clamored for a simplified preamplifier utilizing the new SV technology. To meet this challenge, Spectral engineers have devised a new 'straight-line' DMC-30 which utilizes single-ended operation for inputs and outputs. This single-ended DMC-30 is called the DMC-30SC. It offers the singular performance of the benchmark DMC-30SV in a new ultra high-value preamplifier.

Since the establishment of our company in the 1970s and the introduction of our very first audio component, high performance preamplifier design has occupied the highest engineering priority at Spectral. Our special

focus on high-end preamplifier development over the years is based on the major design challenges which low-level amplifier and control circuitry can represent. At these critical signal levels minute amplifier distortions and signal control colorations are passed on and magnified by power amplifiers to dominate the sonic signature of the best audio systems. Spectral engineers have spent the last four decades pursuing ideal performance and signal transparency in audio preamplifiers to realize ultimate fidelity in high-end music systems.

The Super Veloce Technology

In the DMC-30SV and DMC-30SC preamplifiers our engineer have evolve the renowned DMC-30 topology with our most advanced amplification circuits to date. Utilizing recent breakthrough understanding in high-speed transistor behavior, new semiconductor designs exclusive to Spectral address historic limitations in amplifier linearity and banish low-level distortions to previously unattainable levels. These devices are utilized in our new generation high-speed, wide-band preamp output sections with unprecedented results.

Thermal Memory and Super Transistors

For years Spectral engineers have investigated the fleeting signal memory distortions found in certain semiconductor devices known as "thermal tails". These elusive non-linearities occur at high speeds in transistors during switching as junction behavior changes as a function of heating and cooling. This change in semiconductor switching behavior affects amplifier circuit linearity until the device recovers from transient heating. This "thermal memory" distortion has long been a recognized phenomena in high tech amplifiers circuits for RF and microwave but is ignored by conventional audio engineers. In high resolution audio amplifiers, however, we find low-level

transistor distortions problematic as they compromise signal linearity and transient settling. Having isolated and observed these distortions in our own high-level driver circuits, Spectral engineers first addressed their elimination in our reference standard amplifier designs. Solving these subtle distortions which blur transient waveforms requires uniquely precise test and measurement systems and specific semiconductor designs which do not change their linearity under transient signal conditions. The results of this development are the finest performing amplifier circuits we have designed. Now our goal in Spectral preamps is to successfully apply the benefits of the new semiconductor technology for the first time.

The SHHA Generation 3 Analog Line Modules

Just as the preamplifier is the essential heart of the finest music systems, the 'Spectral High-speed Hybrid Amplifier line module is the essential heart of our high resolution preamplifiers. For this reason, the modular architecture of Spectral preamps has been developed to accommodate the design evolution of our SHHA technology with convenience and ease. Now the new SHHA G3 line module takes our wideband, fast-settling discrete circuitry to a new level of refinement and signal resolution. Spectral engineers have continued to optimize the dense surface-mount Fet topology of the SHHA module with new ultra premium custom semiconductor devices and new circuit innovation and refinement.

The input cascode of the SHHA G3 module utilizes our own proprietary Fet technology. These new dual J-Fet devices developed for Spectral, provide higher gain with ultra-fast transient settling. In addition, Teflon SMT precision film capacitors provide ultimate signal transparency in critical circuit locations. Custom ultra low value polystyrene film capacitors and Teflon film trimmers adjust each module for ideal transient response and wideband stability. These and other advances in the SHHA G3 module assure uncompromising sonics and extended reliability. Musical results include higher resolution, greater dynamics and improved

harmonic structure. Vastly improved imaging and focus have resulted from the elimination of these transistor thermal-tail distortions.

The Case for Uncompromising Attenuation

Certain devices in a high-end preamplifier fundamentally determine the ultimate performance possible in the component. Since a preamplifier basically amounts to an adjustable line amplifier, the role of the volume control or gain attenuator system is especially critical and will have a strong influence over the final sonics of the component. Most of today's high-end preamps incorporate various digital and IC based attenuator systems to control gain, while a minority still use mechanical controls, potentiometers, switches or relay arrays. In our experience, all these approaches have serious compromises which limit signal transparency, dynamic range, step resolution or reliability.

Today, digital based IC attenuators are ubiquitous in modern audio design. But even the most exotic of these digital and solid-state attenuators color the sound in various ways. Since digital attenuators are not sonically transparent and stepped resistor attenuators have step size, contact life and dynamic range limitations, the ultimate gain control would have to be a variable potentiometer or fader. Unfortunately, no pot or fader currently available is transparent or linear enough for the most critical gain adjustment applications in audio.

The Spectral Super Fader Technology

To solve the problems of existing gain control systems Spectral engineers work with a leading aerospace contractor. Out of a multi-year design effort comes an extraordinary ultra-precision gain control. The Spectral 'Super Fader' combines mechanical precision, advanced materials science and unrestricted use of exotic materials to create a level control that behaves like an infinite number of theoretically ideal resistors. Inside, the critical moving parts are precision machined from solid precious metals. These wipers have many surfaces that contact micro-polished optically flat resistance elements. Exemplary mechanical design and alignment is used to prevent localized heating from

circulating currents. Ultra-pure contact metal eliminates solid-state or junction distortions which occur from plated parts in other controls. When such precision and material commitment are combined, noise and error is unmeasurable and performance is very near to ideal thermal accuracy limits. The 'Super Fader' potentiometer outperforms all existing gain control systems with virtually infinite service life. We hear a transparency, as if a wire has been substituted for the control.

The DMC-30 Floating Power System

Key to the performance of the DMC-30 is a most advanced powering system and regulator topology we call the 'Floating Power' system. It offers extreme isolation from environmental and ac line interferences while powering sensitive signal circuits in a remarkable silent envelope. This floating power or battery-like regulator was developed for the SDR-4000 Reference CD Processor and it has demonstrated a superior isolation of noises that occur from power line, audio/video and digital switching sources. Its combination of dense physical size and electrically open circuit design, can out perform batteries and other devices to provide pure floating power. Amplifier circuits within the DMC-30 receive highly regulated voltages as if from many small batteries. But unlike batteries, the floating shunt regulator isolates both low and high frequency noise contamination so circuits are not subject to outside noise, nor pass residue from amplification of audio signals. This environmental isolation improves performance from complex sound systems as well as assuring unhindered performance from the DMC-30 itself. The Spectral 'Floating Power' regulator is a superior approach to powering and noise isolation. By integrating supply regulation with noise suppression it outperforms ac line isolation products which impose their own colorations.

The DMC-30SC Reference Preamp - Uncompromising Performance and Value

We are pleased to see more and more music enthusiasts are coming to understand that no music system can be any better than the performance of its preamplifier. There is growing sophistication in regards to absolute performance and price. At a time when ultra high price preamplifiers are routinely introduced at several times

the cost of Spectral, the thoughtful music enthusiast is left to wonder exactly what benefits these lofty prices bring? We believe the sophisticated customer will find the answer in the uncompromising DMC-30SC. Few preamplifiers at any price can boast the designer credentials and unrivaled component quality of the DMC-30SC. Edge-of-the-art amplifier technology and advanced custom component design are utilized throughout the DMC-30SC to a degree rarely seen in stratospheric components. This is because Spectral engineers have identified those key components that most determine instrument stability and sonic transparency and have invested aggressively. When careful investment in superior circuit performance and signal path components becomes the design priority over elaborate metalwork sculpture, state-of-the-art clarity and signal resolution can be achieved with affordably and high value.

The world renowned Spectral DMC-30SV has redefined preamplifier performance and signal resolution in the most ambitious music systems. Now the DMC-30SC reference preamplifier offers enthusiasts the advanced 'Super Veloce' amplifier technology introduced in the DMC-30SV in a remarkably affordable single-ended DMC-30 design.

The stunning clarity of DMC-30 preamplifiers is not achieved by accident but was accomplished through painstaking engineering and listening care based on our forty years of preamplifier design experience. The DMC-30SC brings the breakthrough performance and instrumentation quality of the DMC-30 family to a wider audience, offering a new level of musical realism and exceptional value previously unknown in the audio industry. Compare our new DMC-30SC reference preamplifier against the most costly and ambitious high-end preamps. We are confident you will discover the important musical difference Spectral's superior engineering and design innovation can make in your listening experience.