The Cutting Edge

The Perfect Realization of a Vision

Spectral Audio SDR-4000 Professional CD Processor, DMC-30SS Preamplifier, and DMA-360 Monaural Reference Amplifier

Robert Harley

In Spectral Audio's view, a music-playback system is one piece of engineering that happens to be housed in different chassis—the CD player, preamplifier, power amplifier, and the cables that connect them. Consequently, the company strongly urges that its products be judged and enjoyed within the context of an entire Spectral system. The "mix-and-match" approach that most audiophiles take to assembling a music system is, in Spectral's opinion, "hit-and-miss" at best.

This truth was driven home when I heard the Spectral SDR-4000 Professional CD Processor for the first time with Spectral's DMC-30SS preamplifier and DMA-360 Monaural Reference Amplifiers. I'd been listening to the SDR-4000 Pro feeding other preamplifiers and power amplifiers, and quickly came to the conclusion that this player was nothing less than the state-of-the-art in CD playback, at least in my experience. Two months after receiving the SDR-4000 Pro, Spectral was able to send me its DMC-30SS preamp and DMA-360 monoblock power amplifiers. Upon installing those two new components, I instantly understood why Spectral insists that its products be heard as a complete system.

I remember the moment vividly. I'd been listening to the Magico V3 loudspeaker for the previous six weeks, blown away by its resolution, dynamics, timbral accuracy, and musical palpability. I installed the DMC-30SS and DMA-360s in the system and the V3s lit up like I'd never heard them light up before. It was like taking a lid off the system's performance: The music seemingly expanded spatially and dynamically, with a sense of top-octave air, transparency, and clarity that was staggering. And this was with the DMC-30SS and DMA-360s cold out of the box.

It's not that Spectral components have some individual idiosyncrasies that somehow balance out when used together, but rather that the special qualities inherent in each component can be destroyed if the signal goes through a component that doesn't preserve aspects of the musical waveform that Spectral has taken such pains to recover. I felt that I was really hearing the SDR-4000 Pro for the first time—and more importantly, the music on the CDs it was spinning.

I'll therefore approach this review as an assessment and description of these three components as a single system, with some observations on the individual products.

SDR-4000 Professional CD Processor

The SDR-4000 Pro is only Spectral's third digital playback system—an astonishment given that the CD format is 26 years old. Its first CD player, the SDR-1000 introduced in 1989, was innovative in that it contained unique "conjugate" circuitry that "undid" some of the damage caused by early analog-to-digital converters. The SDR-2000 digital-to-analog converter (1994) and matching SDR-3000 transport (1997) advanced upon the 1000's innovations. It took a full seven years of development to realize designer Keith Johnson's latest thinking on CD playback via the new SDR-4000 Pro reviewed here.

The $17,500 SDR-4000 Pro is straightforward in appearance, connection, and operation. Large rectangular buttons control the most-used functions, with a row of smaller buttons allocated to the less-used. The "Operate" button switches between Operate and Standby modes; the latter keeps the circuits warmed up for optimum sound quality, but turns off the power to the transport's laser for longer life. A hefty metal remote duplicates all the front-panel controls.

The rear panel is quite Spartan; the analog output is unbalanced on RCA jacks, and digital output is via an RCA jack (SPDIF). A Spectralink data bus is provided for possible future use. It is not possible to feed the SDR-4000 Pro's DAC section with an external digital source. An IEC AC jack and master power switch round out the back panel.

DMC-30SS Preamplifier

The DMC-30SS is essentially a rethinking of the implementation of the circuits in Spectral's DMC-30 preamplifier. It is also the first Spectral preamplifier to offer remote control, made possible by a new volume control described in the technical sidebar as well as in the accompanying interview with Spectral founder Richard Fryer and designer Keith Johnson. Functionally, the $9999 DMC-30SS is similar to its predecessors, with six unbalanced inputs and one balanced input. The output appears on both balanced and unbalanced connectors. Input selection, volume control, balance control, and all other functions are controlled by push-button switches. A dimmable dual-LED bar-graph display shows the volume and balance settings, respectively. The remote volume control can be adjusted for faster or slower operation. One of the inputs (Input 3) can be set to unity gain as a "theater pass-through" mode when you're using the DMC-30SS as part of a multichannel system. A front-panel indicator ("Surround") illuminates in this mode. Each input can be attenuated by 10dB via internal switches, and the output level can be attenuated by 6dB, again via an internal switch. Another nice touch is the muting control's ramp-up and ramp-down function, which is less jarring than a step function that drops then increases level by 20dB.

DMA-360 Reference Monaural Amplifier

This latest version of the DMA-360 has evolved from earlier generations, although the model number has remained unchanged. The price is $17,990 per pair. The DMA-360 still outputs 300W into 8 ohms (and 533W into 4 ohms) with a peak current capability of a whopping 90 amperes. Despite this high output power, the DMA-360 is relatively small and lightweight. It also runs quite cool, suggesting that the output stage isn't heavily biased. Its heatsinks are confined to the rear panel, giving the amplifier a streamlined rather than a "dreadnought" look. Balanced inputs are provided on XLR jacks and single-endeds on RCAs, with a toggle switch selecting between them. Note that the balanced inputs use the older convention of Pin 3 "hot" (non-inverting), which means the DMA-360 will invert absolute polarity when driven by a balanced connection that uses the modern Pin 2 "hot" convention.

See the sidebars for details on each product's design and technology.

Listening

As I mentioned, I heard this complete Spectral system briefly with the Magico V3 just before I replaced that speaker with the Wilson Alexandria X-2 Series 2. I thought I knew the V3's capabilities, but putting the DMC-30SS and DMA-360 into the system elevated its performance to another level. There was a newfound sense of life and vitality, of being in the presence of music-making with all its visceral intensity. It was like opening heavy drapes and allowing sunlight to flood the room. The sound was open, detailed, dynamic, lively, and had a sense of unlimited top-end extension and air.

As I got to know the Spectral electronics during this short time with the V3 and later, in more depth during extended listening with the Wilson X-2 (a setup I've listened to nearly every day for the past six months), several salient sonic characteristics emerged. First, no other electronics I've heard reproduced a soundstage like this Spectral system. The sense of three-dimensional space and of tangible instruments populating that space was staggering. It wasn't just that the soundstage was wide and deep; I had the distinct and unique impression that the air was "charged" and alive. Even before the first note of music, as the hall sound fades up, this quality was unmistakable. I attribute this perception to the system's extraordinary ability to reach down and present the finest spatial cues, fostering a more convincing impression of being in the presence of the live event, surrounded by the hall's acoustic signature.

The Spectral's recreation of an orchestra's sheer size and scale was unmatched, in my experience. In addition, the soundstage had

INSIDE THE SDR-4000, DMC-30SS, AND DMA-360

SDR-4000 Professional

The SDR-4000 starts with an Esoteric P3 Vibration-Free Disc Clamping System (VRDS) transport mechanism, a device that has no equal. Rather than securing the CD at the center hole, the VRDS transport clamps the disc against a die-cast alloy turntable the size of the CD to prevent vibration or wobble. (See my review of the Esoteric D-03 transport in Issue 171 for a full description of VRDS.)

Based on five independent fully discrete power supplies (no IC regulators except for the non-audio subsystems such as the transport, display, and control), the SDR-4000 employs a number of current-source shunt regulators that provide extremely clean and quiet DC as well as noise isolation from the player's other subsystems. Spectral calls this "Floating Power" because the individual supplies essentially "float" in isolation from the other supplies and the rest of the player. Much effort went into creating a quiet environment for digital-to-analog converters and the signals that control them, particularly the clock. Keeping stray noise to a minimum was a high design priority, realized with this power-supply innovation.

The player reviewed here is the "Pro" version of the original SDR-4000. The difference is the digital filter; the SDR-4000 used a Pacific Microsonics PMD-200 HDCD filter chip; the "Pro" version uses custom software running on an Analog Devices SHARC digital-signal-processing platform. This so-called "Long Filter" takes advantage of the SHARC's high "horsepower" to implement more filter poles as well as to anticipate and correct time dispersion. Time dispersion is a distortion that occurs in digital filters in which the energy in a transient musical signal is spread out in time. Bizarrely to our analog-accustomed minds, some of a transient's energy occurs *before* the actual transient, making its absence highly audible as a lack of clarity and articulation, particularly on instruments like percussion. Digital audio at 176.4kHz sounds better than 44.1kHz digital audio (everything else being equal) because the digital filters for 176.4kHz can have a relatively slow and gentle roll-off, and consequently, have less time dispersion than the steep "brick wall" filters required by 44.1kHz sampling. The Long Filter reportedly makes CDs sound more like high-resolution sources by reducing this time-domain distortion inherent in digital filters.

The filter's 8x oversampled output is fed to a pair of Analog Devices AD1853 DACs. The AD1853 is a multi-bit, sigma-delta device with two channels and two differential outputs per channel. Some of the DAC's unneeded functions have been disabled to reduce noise. The word clock controlling when the DAC converts the input samples to an analog output (the point where jitter matters) comes from an optically isolated precision clock that reportedly results in 1 picosecond of jitter at the DAC. This is a phenomenal specification. To put this number into perspective, light travels at the rate of an inch per 100 picoseconds.

The DAC's current output must be converted to a voltage, a process performed by a circuit called a current-to-voltage (I/V) converter. This is a crucial stage in a digital-reproduction system, and one that designers have wrestled with for a long time. In 99% of CD players and digital-to-analog converters, the I/V converter is a monolithic op-amp—even in products with a fully discrete output amplifier. Op-amps are relatively simple to implement and don't consume much circuit-board real estate.

a crystalline-like clarity that made quiet instruments at the back of the stage vividly palpable rather than murky or indistinct. The placement of instruments within the surrounding acoustic was razor-sharp, with a tangible sense of air between them. The layering of instruments was super-resolved, with no blurring of images or ambiguity of placement. This quality was most apparent on naturally miked classical recordings, but also served other types of music. I heard a clarity of arrangement, of separate musical lines contributing to the whole, that no other electronics have equaled. Instruments were presented as separate objects spatially as well timbrally, in the way that we hear in live music. The presentation was the antithesis of flat or congealed. This made it much easier to hear how the individual instruments contributed to the larger composition—and thus the composer's intent. Hearing the music resolved in this way was immensely involving and rewarding.

The second quality in which the Spectral electronics was unsurpassed was their sense of speed and dynamic agility. Transients seemed to jump out of the soundstage as if from nowhere, and then to disappear just as quickly. This was true not just of very high-level transients, but also of smaller-scale dynamics. Hand-held percussion instruments, for example, had the almost spooky vividness and immediacy that one hears in life. And on big orchestral climaxes, the Spectral system was completely effortless and composed, with no sense of strain, dynamic compression, or congealing of the soundstage. The system's dynamics served all

A design priority for the SDR-4000 was to avoid using any monolithic devices in the signal path. Analog Devices suggested that it would be impossible to make a discrete I/V converter that would work with its AD1853 DAC. Nonetheless, Spectral spent two years on the problem and came up with a fully discrete current-to-voltage converter. The high-speed, fully balanced, pure Class A circuit uses its own circuit board, 8" x 2.5" in size. The I/V converter is essentially four discrete Class A amplifiers powered by the discretely regulated floating power supplies. This circuit represents an extraordinary effort.

The analog output filter is a passive design that reportedly delivers perfect transient performance (unlike active equalization realized with an op-amp). It is built around small coils handmade from silver Litz wire and bulk metal precision resistors. Trimmers in the filter section suggest that each unit is individually hand-adjusted.

The filter is followed by the line-output amplifiers. These are discrete modules contained on separate circuit boards for the left and right channels. Spectral calls them SHHA (Spectral High-Speed Hybrid Amplifier). In fact, the output amplifiers, and the power supply that feeds them, are identical to those in Spectral's preamplifiers. (I've written in the past that the line amplifier in products that use one—the active high-pass filter in a subwoofer, for example—must be built to the same standard as a stand-alone preamplifier.) The SDR-4000's modules are high-speed, with fast settling time (see the description of the DMC-30SS for more on this aspect of the line-amplifier design). Unusually, the last transistors within the module are cooled by heatsinks, suggesting they can deliver lots of output current. In fact, the output amplifiers look like miniature power amplifiers.

DMC-30SS Preamplifier

The "SS" in the DMC-30SS's model number stands for "Studio Standard." This new preamplifier is a ground-up re-engineering of the company's DMC-30. Most of the changes center on the Floating Power power-supply regulation and on a wildly ambitious new volume control (see the accompanying interview for a detailed discussion of the volume control).

The DMC-30SS's circuits are the culmination of the more than 50 years of amplifier development Keith Johnson has spent in his recording work. Johnson evaluated refinements in the amplifier designs with microphone feeds, with only the most transparent-sounding developments surviving into the succeeding generation. This process reminded me of Darwin's summary of natural selection: "Descent with variation."

The DMC-30SS's major advance is in the Floating Power power-supply regulation, first developed for the SDR-4000. In fact, I suspect that the success of this power-supply advancement in the SDR-4000 spurred the new interpretation of the DMC-30's fundamental amplifier circuits. The Floating Power design supplies the audio circuits with DC power as if from batteries, independent of the rest of the supply. In addition, the technique isolates each DC supply from outside noise, as well as prevents noise coupling between amplification stages.

The second innovation that distinguishes the DMC-30SS from its predecessor is the volume control. That might not sound like a key element of a preamplifier, but it is a significant source of sonic degradation. Spectral experimented with DAC-based volume control systems (which are widely used in high-end preamplifiers) as well as with discrete-resistor stepped-attenuators, and was dissatisfied with both. The third method of controlling volume is with a traditional potentiometer—a resistive element with a wiper attached to the volume knob. The wiper's position along the resistive element determines the resistance to current flow, and thus types music; rock drummers locked into the groove, snare pops grabbing my body in a visceral way.

Despite the system's extraordinary dynamics, the presentation had absolutely no sense of etch, of hyped transients, or other artifacts that quickly become fatiguing. This combination of ease with seemingly unlimited dynamic contrasts was extraordinarily satisfying musically.

I felt fortunate to have the Wilson Alexandria X-2 Series 2 loudspeaker with which to evaluate the Spectral electronics. The X-2's qualities in many ways parallel those of the Spectral electronics, particularly in the area of transient fidelity. The X-2 provided a window through which I could fully appreciate the Spectral's capabilities. Incidentally, Wilson Audio uses a pair of DMA-360s in its loudspeaker development work and evaluation. The MIT Oracle MA-X interconnects and Oracle MA loudspeaker cables, reviewed in this issue, were also vital to achieving the sound I've described. They were not just important technically, but also because their sonic characteristics allowed the system to reach its ultimate performance.

I'll comment on the SDR-4000 Pro's performance in isolation because it represents a real breakthrough in CD sound quality. The SDR-4000 sounds different than every other CD player I've heard in two important areas. First, it lacks the classic "CD signature" of a hard and synthetic quality overlaying instrumental timbres. Instead, the music has an ease and warmth reminiscent of analog and high-resolution digital. CD has a kind of flatness of timbre and of spatial presentation that the SDR-4000 Pro goes a long way toward ameliorating. I compared the sound of the same CD through the SDR-4000 Pro and other digital front ends, and then against the high-resolution 176.4kHz/24-bit version of the same discs played from a music server through the Berkeley Audio Design Alpha DAC. The SDR-4000 Pro had a dimensionality, an ease, and a lack of synthetic hardness overlaying timbres that were similar to the high-res source and that the other digital front ends didn't approach. The SDR-4000 didn't sound quite like the high-res, but neither did it sound like conventional CD. The SDR-4000's ability to play the huge library of CD titles without these characteristic flaws of CD is cause for celebration.

Second, the SDR-4000 Pro has absolutely unprecedented resolution of fine detail. This isn't the kind of detail that calls attention to itself as detail. Rather, it's the kind of resolution that more deeply involves one in the performance instead of in the sound. The presentation is gentle, relaxed, and understated sonically, yet musically vivid. This combination of ease with resolution from CD is unique in my experience. Moreover, the effect of this quality on the depth of listener involvement cannot be overstated. The physical relaxation engendered by the lack of hardness and glare, coupled with the

the volume. But the resistive element itself degrades the signal, and the point of contact between the wiper and resistive element introduces an unwanted junction in the signal path. In addition, the device simply wears out over time. (Incidentally, if you've ever heard a scratching sound when adjusting the volume on a radio, you're hearing intermittent contact between the potentiometer's wiper and resistive element.)

The potentiometer developed for the DMC-30SS is the result of a two-year collaboration with an aerospace contractor. The moving parts are machined from solid blocks of precious metals. The multiple wipers are spring-pressured to contact the resistive elements, which are micro-polished to be optically flat. The device is motor driven, which allows it to be located in the circuit at the optimum point, with no traces running to the front panel. The motor-drive also provides for remote volume control with no compromise. As mentioned earlier, this is the first Spectral preamp to offer remote control, which was made possible by the new potentiometer.

Johnson has identified a number of phenomena that degrade the performance of an audio amplifier. One of them is the circuit's speed—how fast it responds to input signals, and how long it takes to "settle" to its previous state after processing a transient signal. Consequently, a fundamental aspect of all Spectral products is their very wide bandwidth and fast settling time. The conventional thinking is that if an audio product has a flat frequency response to 20kHz, any additional bandwidth is superfluous. Johnson believes that faster is better, not because we want to reproduce frequencies above 20kHz, but because extraordinarily fast circuits more accurately reproduce signals within the audio band. The DMC-30SS's response extends to an astonishing 4MHz (-3dB). The preamp has a slew rate (how quickly it can swing voltage) of 1000V per microsecond. These are amazing numbers, and unprecedented in an audio product. It takes quite a bit more engineering depth to design and build a circuit with 4MHz of bandwidth than it does to make a traditional audio circuit.

A related phenomenon addressed in Johnson's circuits is "thermal tails." When a transient is amplified by a transistor, the transistor heats up and then cools down to its nominal operating temperature—the thermal tail. Just after amplifying a transient, the hotter-than-nominal transistor behaves differently, and thus sounds different when operating on subsequent signals. Johnson's circuits try to minimize this effect, as well as other disturbances of the circuit that result from the dynamics of the audio signal. Ideally, the circuit should be perfectly unperturbed and perform identically from moment to moment regardless of the nature of the signal it is amplifying.

Judging from Johnson's work in this area, as well as in inventing the various processes that make up HDCD, he thinks that transient performance is crucial to a sense of musical realism. HDCD takes a 176.4kHz/24-bit datastream (or other high-resolution file), identifies aspects of the waveform that will be lost in the downconversion to 44.1kHz/16-bit, and then inserts a code hidden in the 16-bit word's least significant bit. This HDCD code then tells the decoder in your CD player to restore those parts of the waveform that were lost in the downconversion from the high-resolution file. The result is a preservation of important aspects of the musical waveform in the 44.1kHz/16-bit signal.

The HDCD patent application is fascinating; it's like a Rosetta Stone of what aspects of the waveform are most important. One of the key processes of HDCD is a restoration of the steepness of attack of transient signals. It's important to note that "transient" doesn't just mean high-level attacks like a loud percussion instrument. Much of the timbre of musical instruments is contained within the extraordinarily fine structure of sense of ease and overlaid by the highest resolution I've heard from CD, all adds up to a listening experience that is unlike that delivered by any other CD player, in my experience.

This is especially true of poor-quality CDs. Much of the music I like was converted to CD in the 80s and 90s before A/D converter technology matured. The SDR-4000 Pro simply transforms these discs from flat, hard, sterile, and unpleasant-sounding to rich, warm, smooth, and dimensional. (I also heard this improvement in older CDs from the Berkeley Audio Design Alpha DAC reviewed in the previous issue. It is perhaps no coincidence that the digital filter in both the SDR-4000 Pro and Alpha DAC run custom software on an Analog Devices SHARC DSP chip.)

I'll also comment independently on the DMA-360 amplifiers—I had experience with them when driven by the music server and Berkeley Audio Design Alpha DAC decoding 176.4kHz/24-bit files. These amplifiers are unmatched in transient speed, dynamic range, ease, and grace during loud and complex passages, and in recreating a three-dimensional space. The high-resolution source, along with the Wilson X-2, really revealed the DMA-360's capabilities. The DMA-360 is also "colorless" in that it has very little sonic signature. The Pass Labs XA100.5 I reviewed in Issue 185, by comparison, is warmer in the midband and has a tube-like quality that contrasts with the DMA-360's leaner, more incisive sound. Timbres are "fatter," "rounder," and more saturated in color though the Pass. The DMA-360 has a pristine clarity of timbre, scalpel-like precision in the rendering of spatial detail, and sense of hearing the music through a huge and perfectly clean picture window.

Conclusion

A review by necessity must dissect the sound in order to describe the sonic characteristics of the product under review. But such dissection can be misleading—leaving the impression that the listening experience was nothing more than an intellectual exercise in cataloging specific sonic attributes. I'd like to make clear that the qualities I described in the SDR-4000 Pro, DMC-30SS, and DMA-360 contributed to a profound sense of immersion and involvement in the musical performance.

One way to judge a product under review (or in this case, a system) is how quickly and how often I slip into a state of total connection with the musical expression to the exclusion of all else. Or the number of times I go into the listening room planning to listen for an hour and staying five. The Spectral electronics excel at this fundamental level, conveying a sense of music-making happening not somewhere in the past but being created *right at this moment*, spontaneous and alive. It's an elusive quality that elevates a music-reproduction system from just delivering "good sound" to delivering a transcendental experience.

micro-transient information. An example is a reed instrument; the vibrating reed's dynamic nature underlies the instrument's timbre. We don't hear this transient structure directly, but removing it from the waveform dilutes the sense of palpability, of vividness, of realism. In addition, psychoacoustic research suggests that steepness of transient attack helps in image localization. That is, if a transient's attack is slowed, we perceive a loss of image specificity within the soundstage.

All these technical and psychoacoustic insights are reflected in the DMC-30SS's amplifier circuits. These very high bandwidth circuits, however, create challenges. The preamp has the capability of outputting 36V at 4MHz—not something a conventional amplifier wants to see at its input. Using the wrong interconnect could cause the DMC-30SS to oscillate. Fortunately, the DMC-30SS has a protection circuit that shuts down the output if oscillation is detected.

This brings up the subject of Spectral's insistence that its products be used with Spectral interconnects (made for Spectral by MIT), or with MIT interconnects. MIT's terminated interconnects low-pass-filter the preamplifier's output to prevent an unstable condition.

DMA-360 Monaural Reference Amplifier

As with the rest of Spectral's designs, the DMA-360 employs extremely fast circuits. This 300W amplifier can deliver its full output power well past one megahertz (the -3dB point is 1.5MHz). Again, this wide bandwidth requires terminated loudspeaker cables for the amplifier to perform correctly, and to avoid the possibility of oscillation. A protection system shuts down the amplifier in the case of a short or oscillation—a comforting fact given that the DMA-360 can deliver a whopping 90 amperes of current. The protection circuit is completely outside the signal path, and in fact, has no electrical connection to the audio circuit. Instead, the amplifier is monitored by optical and thermal detectors.

The input impedance is a low 10k Ohms, which puts demands on the preamplifier driving it. This is another reason why Spectral insists that its products be used together; many preamps don't have the output current to adequately drive a 10k Ohm input impedance.

Much attention was paid to preventing electro-magnetic interaction between the amplifier's stages. The chassis is divided into isolated compartments, with the low-level discrete FET input stage sequestered in a sub-chassis. Another sub-chassis contains the large magnetic field generated by the power transformer. The output stage consists of eight FETs, each with its own large reservoir capacitor. The amplifier is inherently balanced, although Spectral suggested that I use single-ended connection from the DMC-30SS to the DMA-360.

A Final Note

These three products are designed and built to an extraordinary standard, but without superfluous embellishments. They exude efficiency, but not in the sense of cutting corners. Rather, they give the impression of no wasted effort. The chassis are sturdy, but not lavish. Looking at these products in detail reminded me of an athlete in top form, graceful and powerful, with absolutely no wasted motion. Or of a Stanley Kubrick film in which every frame serves a purpose. Nothing could be added or subtracted without diminishing the result—the perfect realization of a vision. **RH**

The good news is that these state-of-the-art components are extremely reasonably priced. No, they are not entry level or even mid-priced, but they are not lavishly expensive, either. The bad news is that Spectral's production capacity is limited, with demand exceeding supply. Give these electronics an audition, and if you respond to the same qualities that inspired me, put your name on the list. It will be worth the wait, because I suspect this will be the last CD player, preamplifier, and power amplifier you'll ever buy. **TAS**

SPECS & PRICING

SDR-4000 PRO CD PROCESSOR
Outputs: Unbalanced on RCA jacks
D/A conversion: Four custom 24-bit DACs in double-balanced configuration
Digital filter: Custom 8-x oversampling HDCD "Long Filter" software running on a SHARC DSP
Transport mechanism: Modified Esoteric VRDS
Dimensions: 19" x 4.25" x 16"
Weight: 46 lbs.
Price: $17,500

DMC-30SS PREAMPLIFIER
Inputs: Five unbalanced, one balanced, one tape monitor
Outputs: Unbalanced, balanced, tape
Dimensions: 19" x 4.2" x 12.5"
Weight: 22 lbs.
Price: $9999

DMA-360 MONAURAL REFERENCE AMPLIFIER
Inputs: Unbalanced, balanced
Power output: 300W into 8 ohms (533W into 4 ohms)
Output current: 90 amps peak
Dimensions: 20" x 7.23" x 19.6"
Weight: 67 lbs.
Price: $17,990 per pair

SPECTRAL AUDIO, INC.
P.O. Box 4475
Mountain View, CA 94040
(408) 738-8521
spectralaudio.com