



Spectral Audio, Inc.  
442 Oakmead Parkway  
Sunnyvale, California 94086  
408.738.8521 Fax: 408.738.8524

## Bulletin 0620

### Technical Overview

# The Spectral DMA-500SV Monaural Reference Standard

*Keith O. Johnson, Director of Engineering*

The DMA-500SV Monaural Reference Standard amplifier is a state of the art instrumentation design created and crafted for use in the most demanding component audio systems. Its quickness, instantaneous accuracy and unrestricted maximum power are second to none in the industry. The remarkable audio components from Spectral have always evolved from much careful listening and from developing new technical designs that were auditioned during live music recording sessions and production. The best - those accurately conveying robust dynamics and transparency along with superlative detail and staging have become part of the Spectral legacy. The DMA-500SV represents our most advanced thinking and sophistication in these areas.

### **Evolution of the Ideal Spectral High-Speed Amplifier**

Music technology continuously advances or progresses and some parts chosen to build the DMA-500AR have favorably evolved to deliver even better performance. State of the art speakers have become more demanding and now they are more dependent on amplifier control

and capability. To address these challenges the new DMA-500SV has a revised power transformer design capable of higher surge output to improve musical dynamics. Improvements to the driver circuits of the DMA-500SV also come from the use of new technology parts including our unique custom TA technology array capacitors. These super precision Teflon parts allow feed-forward circuits to precisely anticipate and apply small corrections so internal amplification and perceptual listening become effortless. More cascode shield circuits and greater power isolation constructions have also been added to reduce cable dependency and noise propagations to other parts of the music system. These features create a subtle but very rewarding support to ease of listening and the ability to reach in and hear fine micro-details that enhance realism and the listening experience.

A combination of unrestricted power and instantaneous accuracy are a superlative feature of the DMA-500 architecture. To be agile, precise and fully committed, each selected output device, the largest of their kind, has its own transformer powering, a very large filter and an optically coupled analog computing safety circuit. This functional grouping is configured with field folding and noise cancelling layouts that are far more effective than mechanical shielding and massive metalwork to prevent electrical and magnetic disturbances to other parts of the amplifier. Should a loudspeaker component fail, a cable short or a power line surge, any of the computers that are monitoring and responding to device conditions can instantly place the DMA-500 into a safe protection mode. This technique allows unimpeded output device performance right up to the protection event, a much superior method compared to signal distorting current limits that gradually shut down the amplification before a protection is really needed. With computed safety, the combined outputs of all devices in the DMA-500 can be as high as 90 Amps. This power capability is unprecedented in a high-speed amplifier.

Since these parts groups operate independently, they do not interact or crosstalk or couple their activities, acting as if each output device were operating in its own individual amplifier. The result is extraordinarily low distortion and noise. Waveform tracking can be of precision acquisition quality with one-part-per-million accuracy, an assurance of absolute transparency and neutral tonality.

Driver circuits for the high-speed output section of the DMA-500 have floating power architecture. Their signal amplification parts operate as if battery energized so amplification activities are blocked from propagating from one section to another. Additional cascode shield circuits create further barriers to isolate AC power and grounding noises from circulating and creating subtle distortions. Spectral instrumentation techniques effectively use this stealth or silent support technology to reveal inner detail by preventing energy storage effects and transient distortions after a musical event. Our fully discrete custom semiconductors are used in these circuits and unlike conventional low speed and IC circuits, which switch internal state conserving power, Spectral's amplification paths up to the output devices are always operated in continuous Class A. Like vacuum tubes they are always drawing substantial power so the audio activity is not broken up by switched states but instead the action is smooth, small and effortless, requiring only a very small part of the driver's full capability.

Other circuits in the DMA-500 respond to music and operating conditions. They anticipate and directly nudge corrections that would otherwise propagate through feedback paths to stress the entire amplification path. This feed-forward technique combined with high current drivers and stealth floating power reduce the need for sound damaging excess feedback, a burden placed on other amplifiers by designers opting for the lowest steady-state distortion measurements that rarely correlate with the ability to faithfully reproduce music. Without circuit stress, which cover up delicate music signals, the relaxed operation of the DMA-500 is evident by its extraordinary transparency, ability to delineate subtle detail, and its lack of technical intrusion or distraction. All are mandatory for timbral neutrality, staging precision and full dimensional realism.

The DMA-500SV monaural reference amplifier further advances the sophisticated topology and design features introduced in our limited production DMA-500AR anniversary amplifier. The DMA-500SV also completes the development of our "super veloce" circuit technology that will be translated throughout the Spectral line of high performance, high-speed instrumentation amplifiers.