KRELL DIGITAL

Reference 64

Digital-to-Analog Processor

Few names convey an impression of a product's significance. The title REFERENCE 64 was not so much a decision as it was a realization. When project research neared completion and listening sessions began, immediately apparent was a comprehensive restatement of digital audio reproduction. More than a name, REFERENCE 64 states a fact about the hardware behind the front panel.

THE HEART OF THE MATTER

Preservation of data integrity from disc to processor is essential to sonic quality. For initial input decoding, Krell has developed the proprietary Data Recovery and Jitter Reduction Module to insure that no jitter will be introduced to the decoding process. Krell programmed components are installed on a four layer board designed to minimize critical trace lengths and provide uncontaminated power supplies and ground. The entire assembly is encapsulated for thermal stability. So effective is the decoder that jitter is virtually unmeasurable at its output.

Krell has also developed a feature termed "TimeSync" to synchronize the transport and processor clocks. When used with an appropriate Krell CD transport, timing errors are completely eliminated.

Data processing is performed by two Motorola DSP-56001s per channel, operating in series at a 34MHz clock rate. Series operation allows the most efficient processor use and extremely sophisticated data processing. Each pair of processors outputs data to the DAC modules at the 64 times sampling rate, a total of 2.8 million 24 bit words per second.

Entirely new software was developed to take advantage of the increased processing power described above. Initial processing occurs in the first DSP. This conditioned data is further processed in the second processor. The extraordinary precision gained by this processor/software combination is realized in transparency and reproduction of subtle detail evident in no previous designs.

Output from the processor section is routed to proprietary Krell DAC modules. Entirely new circuits were developed to handle the extremely high speed data without corruption or loss of sonic quality. Production of these DAC modules is a remarkable feat. After initial test and adjustment procedures, the modules undergo an extensive burn-in. Next is encapsulation, further burn-in, and installation in a Reference 64. Final adjustment is a proprietary multi-bit trimming process performed at operating temperature.

BACK TO ANALOG

The analog output subassembly is a completely separate entity within the Reference 64. Power is received from a separate set of connectors within the power coupling conduit. Contamination of the analog power supply by digital processing artifacts is not possible.

The analog circuits are classic Krell in concept, no-compromise in execution. A simple count of the parts utilized - over 300 - gives an indication of the sophistication employed. All circuits are discrete and fully complementary, operating in high-bias Class A with very high supply

Input selection is made with positive touch pushbuttons. The EXT CLOCK input is used to join the clocks of the Reference 64 and a Krell CD Transport.

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LEDs indicate input sampling frequency and proper operation of the three individual power supplies. Circuits within each supply monitor for fault conditions and will cause the LED to blink in the event of a problem.

The DAC modules can be seen coupling the digital board at left to the analog board at right. The Data Recovery module is seen at the extreme left of the chassis. Also seen are the two multi-pin power supply inputs located behind the rear DAC module.

voltages. The entire section is direct-coupled, with DC offset nulled by high speed servo amplifiers. In all respects, the analog outputs are the appropriate complement to the processing stages. The full dynamic power, wide bandwidth, graceful resolution, and spatial holography generated is provided intact at the analog outputs.

The power supply necessary to support the functions described above required a full size chassis, mounted beneath the processor chassis. Three independent supplies are employed: one each for the digital processing, DAC and analog subassemblies. Custom wound 50VA toroidal transformers and multiple stages of regulation prevent contamination of one circuit family by another.

GENERAL DESIGN CONSIDERATIONS

Advances in modular construction techniques are employed in the Reference 64. Major individual circuit families are built on distinct circuit boards. The external power supply, input decoder, digital processing, DAC section and analog output stage are unique subassemblies. Further, software containing the critical processing algorithms is contained in user-changeable EPROMS. In brief, all portions of the Reference 64 that might evolve are isolated, and joined with gas-tight connectors to avoid signal degradation.

The Reference 64 provides five inputs in four formats. Discrete inputs exist for coax, AT&T/ST fibre optics and the balanced AES/EBU formats. A fourth input position accommodates either coax or Toslink, with Toslink having priority over coax. The Monitor switch provides a fifth input, and accepts both coax and ST. Also included in the Input section is switching for the TimeSync function. This input must be individually activated when used to couple the clocks of a Krell CD transport and the Reference 64.

Intense discussions have taken place regarding digital cables and formats. Equally important are the switching techniques employed within a processor's input section. Extensive test and listening sessions were required to finalize the proprietary circuits used in the Reference 64. As a result, all formats are switched via sonically neutral circuits, enabling each to perform at its optimum.

One coax digital record output delivers the selected input to a digital recording device. Analog outputs are provided in balanced and single-ended configurations.

STIMULATION VISUAL & AUDIBLE

The Reference 64 excites and captivates the senses on many levels. Not to be overlooked is the union of function and aesthetic impact in its chassis design. Custom extruded heatsinks that frame the processor and supply chassis provide superb heat stability for the multiple regulation stages. Gray and black front panel components are hard anodized to resist wear and corrosion for a lifetime. The power coupler that connects the two chassis electrically and mechanically is a self-sufficient subassembly composed of a PC board, shielding frame and captive mounting hardware. Collectively the Reference 64 presents a visual interpretation of the Krell sonic signature: refined, authoritative and substantial.

Reference 64. Its name sets the stage. Proof is in the listening.

The Reference 64 power supply is vintage Krell. High current, low impedance TO-3 output drivers are used to guarantee an unwavering reservoir of current to the processor under all conditions.

The power supply and processor chassis are joined by a unique power coupler. A shielded circuit board transfers power and ground from the three supplies in a highly controlled manner. Eliminated by this technique are contaminations caused by conventional cables.

SPECIFICATIONS

PERFORMANCE

Frequency Response
–.1dB @ 4Hz & 20KHz

Signal to Noise
100dB A weighted

Channel Separation
>111dB @ 1KHz

THD+N
.011%

Linearity
±.3dB @ –90dB

DIGITAL INPUT DECODING

Proprietary Data Recovery, Jitter Reduction Module using Krell programmed components and custom timing circuits to reduce jitter.

DIGITAL PROCESSING & DAC

Krell written software. 2.8 million, 24 bit data words per second (64 times rate) calculated through 4 Motorola DSP-560001- 1 pair operating in series per channel at 34MHz.

Digital circuits are situated on a custom 4 layer, mil-spec glass epoxy PC board.

Encapsulated Krell DAC modules, featuring proprietary multi-bit trimming and associated circuitry.

POWER SUPPLY

Full size, separate external chassis. Dedicated digital, DAC, analog power supplies. 50VA custom toroidal transformers use discrete, multiple stage regulation to provide adequate power to the high consumption processing and output stages.

INPUTS

1 - AT&T/ST Optics
1 - XLR AES/EBU balanced (Professional or SPDIF)
1 - Coaxial via RCA
1 - Toslink optics or 2nd Coaxial
1 - TimeSync synchronous clock input (AT&T optics)
1 - Digital Tape monitor input (RCA or AT&T optics)

OUTPUTS

1 set - Digital coax record outputs
1 set - Analog via balanced XLR
1 set - Analog via single-ended RCA

DIMENSIONS

Width: 19"; Height: 5.625";
Depth: 14" unit only; 18" with cables

WEIGHT

39 lbs., unit only

WARRANTY

5 years, limited and transferable

Krell Digital Inc. reserves the right to change this product's features and specifications without notice.

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