



PROCEED® series 3
digital components

Madrigal Audio Laboratories original Proceed® digital components (the PCD, PDT, and PDP) were favorably compared to many higher-priced products, and set standards for cost-effective high-end performance. The subsequent Proceed Series 2 components enhanced this enviable reputation. Now, Proceed Series 3 benefits from knowledge and experience gained from earlier Proceed products and, for the first time, from the engineering expertise that produced the world-renowned Mark Levinson® N°30 Reference Digital Processor and N°31 Reference CD Transport.

The PCD 3 compact disc player is the most cost-effective entree to true high-end CD reproduction. The PDT 3 transport and PDP 3 processor offer even higher performance, due to the additional mechanical and electrical isolation of separate chassis and completely independent power supplies. Further, the separate components' multiple inputs and outputs permit flexible integration into complex systems incorporating other digital sources (such as Digital Audio Tape, LaserVision, and Direct Broadcast Satellite).

Owners of earlier Proceed components benefit from Madrigal's ongoing research through a factory update program. We're committed to maintaining the value of our products, new and not-so-new, by providing the benefits of developing technology without forcing the purchase of entirely new units.

Mechanical Considerations: A Firm Foundation

While a certain level of CD performance is possible with little concern for mechanical stability (after all, people go jogging with portable CD players), superior musical reproduction requires exceptional attention to mechanical details. The internal structure of the PCD 3 and PDT 3 consists of a rigid aluminum frame designed to absorb and dampen vibrations. The addition of lead mass to the base of the mechanism further reduces vibrations. Machined-aluminum feet may be used in either padded or spiked mode for ideal installation on a variety of surfaces.

Our extensive research provided measurable and audible proof that significant timing errors can be cumulatively introduced into digital music signals, beginning with the mechanical operation of the laser mechanism. As with analog equipment, a stable mechanical foundation is needed to recover the fine details of music stored in digital media.

Power Supplies: The Electrical Foundation

Clean power and ground are critical to the performance of all audio electronics. Noise from other electrical appliances and from the AC power source itself must be eliminated, and various sections within a component must not distort a musical signal by modulating power rails or ground paths.

The basic power supply in each Series 3 unit uses top-quality components to isolate it from the AC mains and to produce steady and noise-free DC. Extensive use of *distributed* regulation further filters the power and provides isolation between different elements of the component's circuitry. Electronic regulation, rather than the simple capacitive decoupling typical in less sophisticated products, is used for this function. This provides a superior basis for the accurate reproduction of music.

Going a step further, the completely separate power supplies for the PDP and PDT contribute to their ability to outperform the PCD.

Analog to Digital: The Decoder Board

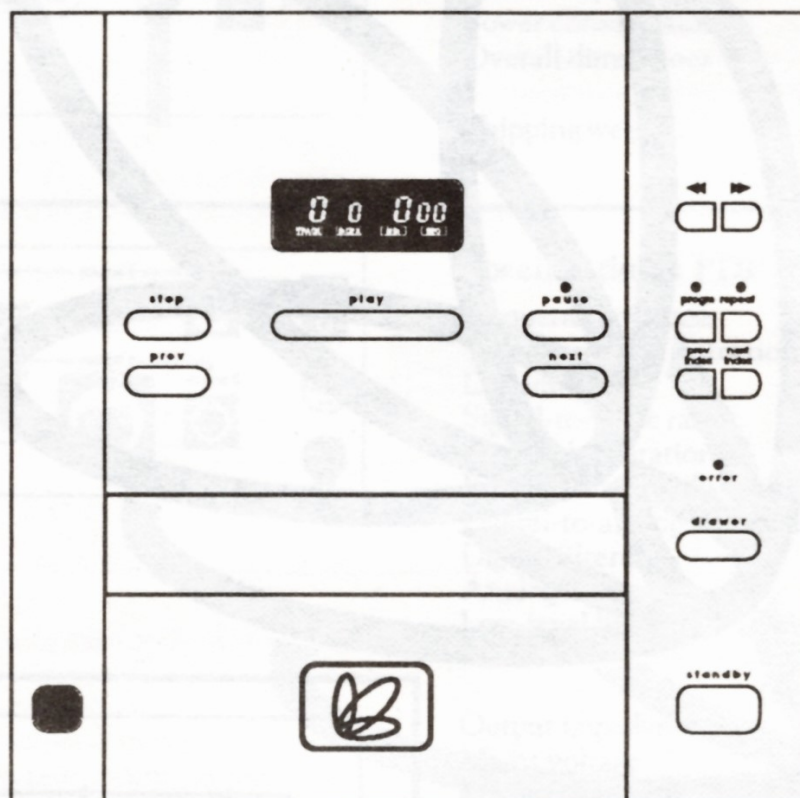
The laser light reflected off of a CD modulates a light-sensitive diode, resulting in a frequency-modulated (FM) analog signal containing the digital musical signal. As an FM radio converts radio waves into music, a CD player's decoder circuitry must convert this analog signal into a digital data stream. This is also where error-correction ensures the accuracy of the digital numbers being recovered. For

all practical purposes, this data recovery is virtually perfect — but the precise timing of the data isn't so perfect, and there's no further error correction in the CD playback system. Errors introduced to the data after this decoding are there to stay, and will affect the music.

We designed a completely new decoder board for the PCD 3 and PDT 3, taking advantage of the latest decoding technology. Along with the refinement of the mechanical sub-assembly, the attention to details of the decoding process yield more accurate timing of the digital signal, allowing the ultimate conversion to an analog signal to be more musically faithful.

Filtering

Just above the 20kHz audio bandwidth, digital audio signals contain significant noise and distortion that must be filtered. A technique called "oversampling," implemented in a digital filter, effectively shifts the bandwidth of this noise to higher frequencies that can be easily filtered without affecting the



signal below 20kHz. Because a mathematical analysis of oversampling shows that more information is being generated, some suggest that higher rates of oversampling in the filtering process will result in more accurate music reproduction. The additional samples, however, don't contain additional information: only assumptions about what *might* have happened between the samples of the original A-to-D conversion when the recording was made. Further, very high rates of oversampling actually *add* noise and distortion because it's impossible to achieve accurate enough timing to support these rates. Eight-times oversampling of 16-bit digital audio signals requires the timing of the data to be within a few picoseconds — barely achievable with the best circuitry available, and much more accurate than all but the *very best* (read *very expensive*) digital audio products.

The PCD 3 and the PDP 3 use the finest digital filter available. Its monolithic implementation is superior to the "DSP computers" with variable software found on some products.

Back to Analog: The DAC

The new audio board in the PCD 3 and PDP 3 uses the highest-grade 20-bit DACs from Burr-Brown. These ICs are among the finest components of their type. The *implementation* of a given component, however, is as important as its intrinsic capabilities. (Give the ingredients for a soufflé to a young child and to a great chef: one will produce an inedible mess, while the other will create a culinary delight.)

A DAC modulates a reference voltage into an analog copy of the original musical signal. If the reference voltage varies, *even slightly*, the finest DAC will be unable to perform well. The PCD 3's and PDP 3's separate electronic regulation for each rail of each channel of the converter circuitry is *just one* technique that enables the new Proceed designs to draw the best performance from these components.

Another area that limits the performance of converter circuitry is timing inaccuracies within the digital interface receiver (DIR). A new DIR implementation gives the Series 3 approximately *100 times greater timing accuracy* than before, resulting in better reproduction of the fine details of the music.

Audio Outputs

The PCD 3 and PDP 3 each provide both single-ended and balanced analog output. The fully biased (Class A) output circuitry utilizes a highly refined voltage-gain buffer with a high-current output device, achieving an output impedance under 1Ω. The electronic power regulation to the output devices has even greater current capacity than that used in other sections, to enhance performance with reactive interconnect cables and passive volume controls.

In complex installations, the balanced and single-ended outputs may be used simultaneously without sonic degradation. Balanced interconnection of both analog and digital signals (as implemented by Madrigal) is preferred with the finest audio equipment.

Digital Interconnections: A Weak Link, Stronger

Whether connecting the decoder section to the audio section inside an integrated CD player, or interconnecting a separate transport and processor, it's common for the digital signal to be distorted in the time domain; in extreme cases, data errors may be induced. Series 3 components are highly refined in this respect. Improved digital-signal-transmission circuitry is incorporated on the decoder board in the PCD 3 and PDT 3, and the internal cable in the PCD 3 is optimized.

The PDT 3's digital outputs and the PDP 3's inputs and outputs benefit from our extensive research into digital audio interconnection. Each supports four formats, two electrical and two optical: SPDIF single-ended electrical via RCA connectors; AES/EBU balanced electrical via XLR

connectors; EIAJ-standard optical (often called Toslink™); and ST™ optical.

With Madrigal MDC-1 Pro digital interconnect cable, the best performance is possible with the professional audio standard AES/EBU balanced interconnection. Depending on associated equipment, the SPDIF electrical and ST optical

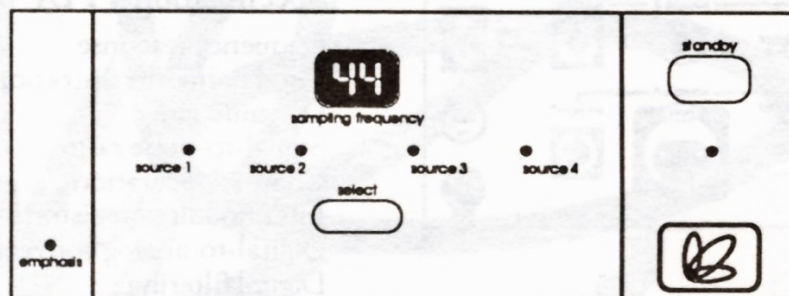
interconnections are also capable of good musical performance. The bandwidth limitations of the EIAJ optical standard limit its performance (even with the superior Hewlett-Packard components used in the Series 3 products); we provided this option only for compatibility with products that don't offer a better option.

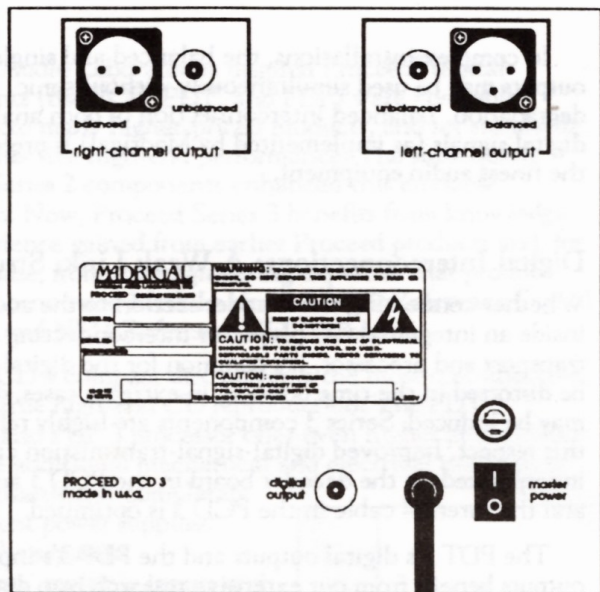
Most consumer digital audio products have so neglected the implementation of digital interconnection circuitry that, in many cases, this has been the limiting factor in their performance. With Proceed Series 3 components, you're assured of the best possible connection with any associated equipment.

Conclusion

The third-generation Proceed digital components uphold Madrigal's commitment to enhancing the reproduction of music in your home. Their synergy of advanced digital and analog techniques offers sonic performance that wasn't considered possible a short time ago — at any price.

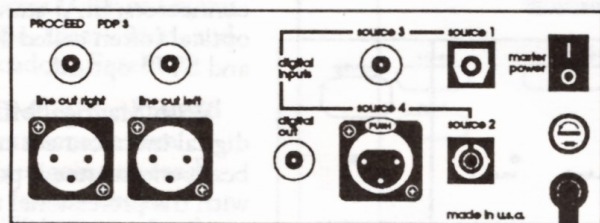
Those who invested in earlier Proceed products can benefit from advancing technology through our factory update program. For details on these updates, or to hear the new Series 3 components for yourself, visit your nearest Proceed dealer.





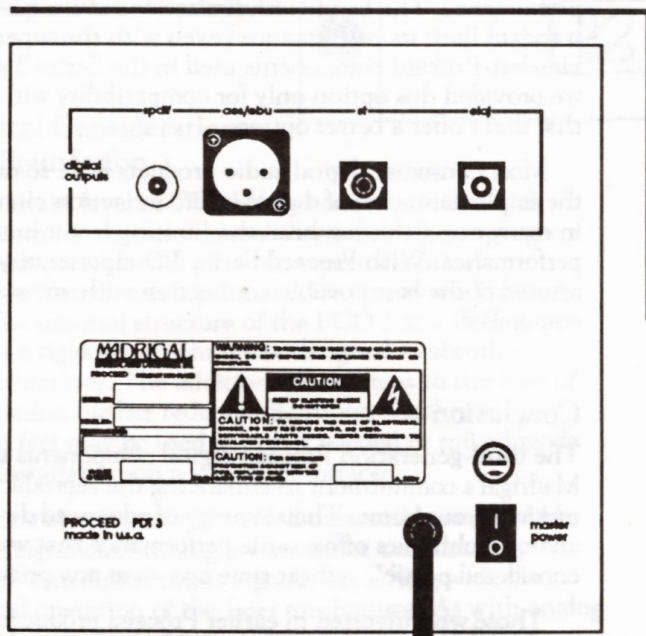
Specifications: PCD 3

Frequency response	10Hz – 20kHz +0dB, -0.2dB
Total harmonic distortion (THD)	0.004% @ 1kHz, 0dB
Dynamic range	104dB (or better)
Signal-to-noise ratio	107dB
Channel separation	120dB
Intermodulation distortion (SMPTE)	0.008%
Digital-to-analog conversion	Two precision 20-bit DACs
Digital filtering	8x oversampling digital filter
Analog filter	Linear phase to 40kHz
Low-level linearity	Deviation unmeasurable to below -70dB Approximately +1.0dB below -90dB (undithered, referenced to 0dB @ 1kHz)
Output impedance	Less than 1Ω
Mains voltage	100V, 120V, 200V, 220V, 240V
Mains frequency	50/60Hz
Power consumption	25W @ 120V, 60Hz
Overall dimensions	8.4" (214mm)W x 8.9" (227mm)H x 13.25" (337mm)D
Shipping weight	35 lbs. (15.88kg)



Specifications: PDP 3

Frequency response	10Hz – 20kHz +0dB, -0.2dB
Total harmonic distortion (THD)	0.004% @ 1kHz, 0dB
Dynamic range	104dB (or better)
Signal-to-noise ratio	107dB
Channel separation	120dB
Intermodulation distortion (SMPTE)	0.008%
Digital-to-analog conversion	Two precision 20-bit DACs
Digital filtering	8x oversampling digital filter
Analog filter	Linear phase to 40kHz
Low-level linearity	Deviation unmeasurable to below -70dB Approximately +1.0dB below -90dB (undithered, referenced to 0dB @ 1kHz)
Output impedance	Less than 1Ω
Mains voltage	100V, 120V, 200V, 220V, 240V
Mains frequency	50/60Hz
Power consumption	25W @ 120V, 60Hz
Overall dimensions	8.4" (214mm)W x 3.4" (87mm)H x 15.625" (397mm)D
Shipping weight	22 lbs. (9.98kg)



Specifications: PDT 3

Direct digital output, RCA	SPDIF-standard format
Direct digital output, XLR	AES/EBU-standard format
Direct digital output, ST	ST-standard format
Direct digital output, TOSLINK	EIAJ-standard format
Power consumption	21W @ 120V, 60Hz
Overall dimensions	8.4" (214mm)W x 8.9" (227mm)H x 13.25" (337mm)D
Shipping weight	35 lbs. (15.88kg)

Madrigal Audio Laboratories is the designer and manufacturer of Proceed products. Research and development, and the evolution of new technology, can give rise to the need for change. We reserve the right to incorporate changes in this product without notice.

For Proceed components purchased in North America, Madrigal provides a limited warranty; outside of North America, warranty policies are established by the local Proceed Authorized Distributor. Owners of Proceed components requiring service or update must, at their own expense, return them to the place of purchase.

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PROCEED® products are designed and manufactured by **MADRIGAL AUDIO LABORATORIES**
P.O. Box 781, Middletown, CT 06457 FAX (203) 346-1540

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PREISLISTE

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**empf. Verkaufspreis
DM/Stück inkl.MwSt**

**PROCEED
CD 3****Der audiophile CD-Player.****7.500,00**

Ausgerüstet mit resonanzmindernden Blei-Aluminium-Einlagen und Sorbothane-bedämpfem Disc-Niederhalter. Selektierte 20-Bit D/A-Wandler, 16 geregelte Versorgungsspannungen, und stromstarke Ausgangsstufen für die symmetrischen und unsymmetrischen Ausgänge. Ein Digitalausgang wurde natürlich nicht vergessen.

**PROCEED
Wandler 3****Der D/A-Wandler.****6.000,00**

Kann alle vorkommenden Samplingfrequenzen (32kHz, 44,1kHz und 48kHz) verarbeiten. 4 Digital-Eingänge: Digitalcoaxial, Digitalsymmetrisch, Toslink-Lichtleiter und ST-Profi-Lichtleiter. Symmetrische und unsymmetrische Analogausgänge, sowie ein Digitalcoaxial-Ausgang. Wer bietet mehr fürs Geld?

**PROCEED
Transport 3****Das CD-Laufwerk.****6.000,00**

Liefert perfektes Digital-Signal. Besitzt Digital-Ausgänge für alle Normen: Digitalcoaxial, Digitalsymmetrisch, Toslink-Lichtleiter und ST-Profi-Lichtleiter.

PROCEED-Geräte werden bei Madrigal von den selben Ingenieuren entwickelt und konstruiert, die auch den Mark Levinson Produkten weltweit zu einer Spitzenposition verholfen haben. Gefertigt werden Sie nach MIL-Spezifikationen mit ausgesuchten Bauteilen und Materialien.

Hofkamp & van
Droffelaar

Jan G. Hofkamp

Hoornsedijk 9
9752 XJ Haren

info@dehofkeuken.nl

050 - 534 15 06

06 - 38 18 34 64

