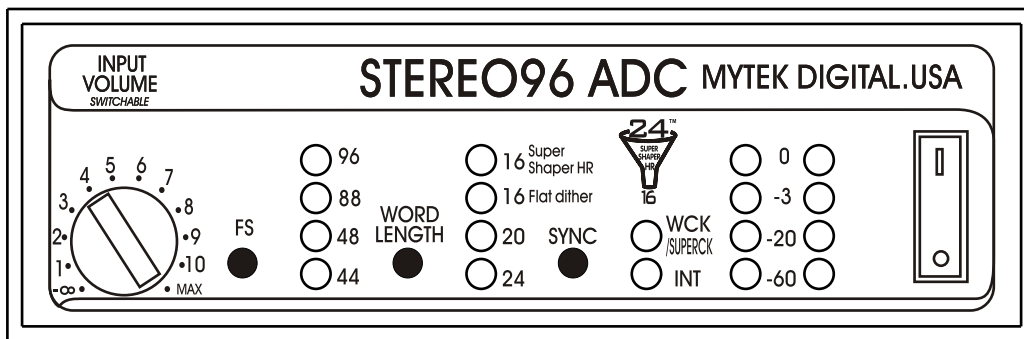# MYTEK DIGITAL.USA

MASTERING ANALOG TO DIGITAL CONVERTER

USER MANUAL

VER.7/sep 2010

Use ver.5 manual for earlier units (without toslink)

This manual may be updated

Download the newest version at:

http://www.mytekdigital.com

For technical support, technical tips and support check:

Http://www.mytekdigital.com/

or contact Mytek tech support at:

highend@mytekdigital.com

or at:

tel. (646)-613 1822
fax.(212)-202 5331

Mytek
211 Centre Street
New York NY 10013
USA

Input volume knob sets the input sensitivity with range from mute to +4dB=-10dBFS. This is factory default. The knob can be disabled with internal jumpers which can select either the knob or internal precision 10 turn trimpots. Refer to

Sample rate selection. Sets the desired sample rate. When used with external clock select FS closest matching that of supplied external wordclock.

Peak meter in -dBFS. The red LED marked "0" corresponds to 1 sample overload.
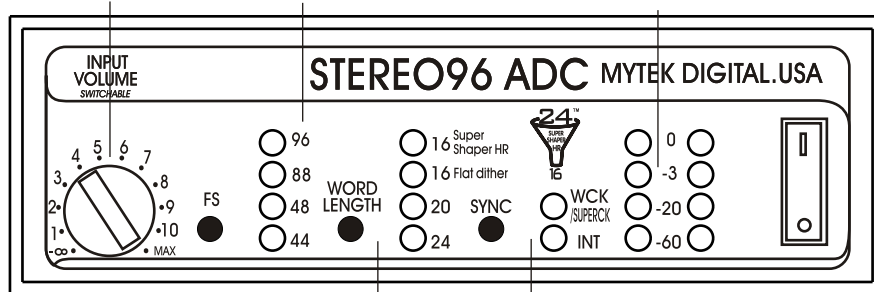
Selects output wordlength as stated. The 20 and 16 bit "flat dither" setting corresponds to signal dithered with flat dither. Supershaper HR is a high performace wordlength reduction algorithm similar to Pow-r(tm). Flat dither is recommended for multitracking, while Supershaper can be used for printing final mix to CD-R.

Internal sync provides the best clock stability (10ps) and thus the best conversion. External sync is intended for complex systems. It can be a standard wordclock signal or Protools (tm) 256X superclock. Refer to "Internal jumper settings" for details. Since internal clock

Line power is 115VAC/50/60Hz (factory default) or 230VAC/50/60Hz switchable by internal switch accessible after removing the top cover. 1 Amp slow blow 20mm fuse is also accessible under the cover.

Optical Toslink output can output both SPDIF and ADAT formats. SPDIF format allows to interface with Mac computers including Powermac laptops (up to 96kHz). ADAT format is enabled and assigned by internal dip switch.

Analog inputs accept a range of signals from +4dB balanced and consumer unbalanced. Connect pin 3 to ground
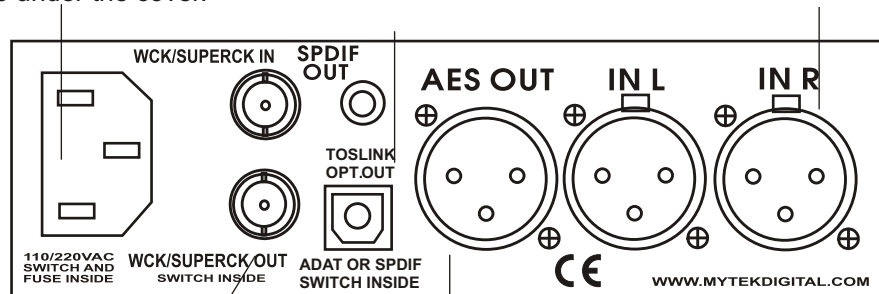
Wordclock output provides high current drive and a very stable low jitter clock. It can be used as a superior house clock to clock or synchronize other digital equipment. Running Stereo96ADC on internal clock and slaving the rest of equipment to Mytek clock is the recommended setting for best sonic performance. WCK IO can also be set to 256 "superclock" format used in older Protools systems. Superclock/wck is selected using

AES/EBU,SPDIF and OPTICAL outputs are simultaneous. They operate in "single wire" mode for all sampling frequencies. These outputs can be used to externally clock other equipment with the same effect as wordclock output. Clocking via AES/EBU line is recommended especially when cables are very long (over 20ft).

Introduction to
Stereo96 Series Converters

The MYTEK Stereo96 series consists of two 1/3 rack units- the Stereo96 ADC and the Stereo 96 DAC. They are also a part of an extended family of 1/3 rack units which also includes 192kHz capable converters, SRC and Studio Clock. Stereo96 converters can be used as stand-alone devices for a variety of studio applications such as mastering, recording and playback, whenever the highest quality conversion is required.

Users choose Mytek converters primarily for their outstanding sound quality. The sound of Mytek converters can be described as "transparent". We design our converters to be as faithful to the signal as possible, rather than follow a philosophy of some other manufacturers who offer "analog" or "tube" sounding converters. Mytek converters are closest to a straight wire, which is especially evident when used at full 24/96 resolution. Sonically they are equal or better than the most expensive mastering converters. Even when used in 16 bit mode, the Stereo96 converters produce 20dB (10 times) less distortion than typical converters found in budget recording equipment. On the Mytek website you can find and download various sound samples to evaluate the Stereo96 series sound quality and compare it to the sound of other high end converter units. To download samples log onto:

http://www.mytekdigital.com/compare/listening_tests.htm

Stereo96 ADC features include:

- 44.1, 48, 88.2 and 96kHz internal sampling frequencies
- Ext. wordclock sync 25-100kHz or 256x Superclock(tm)
- 120dB Dynamic Range
- 24 bit resolution
- High performance SuperShaper-HR™ psychoacoustic noiseshaping algorithm for 16 bit output
- Switchable precision 10 turn-trimpots or input gain knob
- Wordclock output can be used as a hi-end house clock.

Stereo96ADC internal trimpots and jumper assignments
(remove top cover to access)

Labels in diagram: TR1, JP7, Default, Terminated, SW5, G3, F1, FT1, FT2, G2, G1, SW4, Off, On, 6 5 4 3 2 1, Trimpot, Fixed Gain, Front Pot Inserted (Default), JP6, JP5, JP4, JP3, JP2, JP1

115VAC/230VAC power switch

T1 Amp 20mm Slow Blow fuse

L/R INPUT TRIMPOTS

FIRMWARE EPROM USER UPGRADEABLE

JP7 - inserts 75 ohm termination resistor parallel to wordclock input. Termination is not required if cable is short (6 ft or less) and it's not recommended if the wordclock source cannot drive low impedances.

Connect this jumper when Stereo96 ADC is the last destination in a chain fed by external wordclock source and the cable is long (above 6ft). For short cables and wordclock sources with unknown drive capability Jp7 should be left unconnected (unterminated) (retain the jumper on one pin

DIPSWITCH SW4 :

dipsw1 WRDCK DIVIDED BY 2
    ON: WCK=FS/2 FOR 88.2/96K AND =FS FOR 44/48K
    OFF: WCK ALWAYS=FS

dipsw2 WRDCK/SUPERCK SELECT (overrides dipsw 1)
    ON: IO=SUPERCLOCK 256
    OFF:IO=WCK

dipsw3 OPTICAL ADAT/SPDIF
    ON: ADAT 44/48K
    OFF:SPDIF

dipsw4 ADAT_OUT0 -ADAT CHAN ASSIGN 0
dipsw5 ADAT_OUT1 -ADAT CHAN ASSIGN 1
    ADAT_OUT1, ADAT_OUT0
    OFF, OFF -> output assigned to chan 1-2
    OFF, ON -> output assigned to chan 3-4
    ON, OFF -> output assigned to chan 5-6

Internal input gain jumpers:

JP1, JP4 - insert front stereo potentiometer as the input gain control- used typically for most applications. Turn it all the way up for unbalanced consumer -10dBV sources.

JP3, JP6 - set gain at fixed -15dBFS=+4dBm (1.228VRMS measured btwn pins 2 and 3) - provides precision matching of L/R sensitivity at standard fixed gain.

JP2, JP5 - insert front two internal 10 turn trimpots as the input gain control- use requires input calibration with a sinewave generator.

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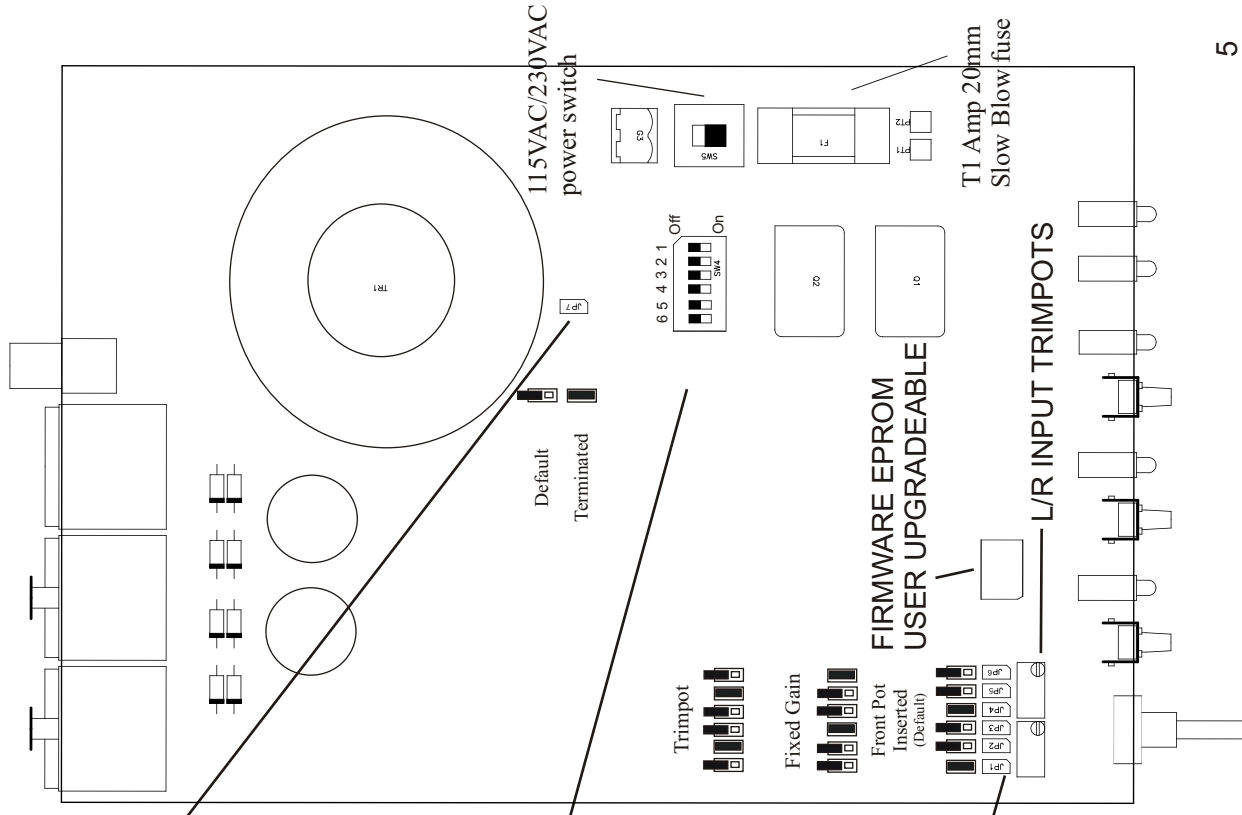
Typical Setup
Balanced signal source

Stereo96 ADC is equipped with 2 XLR analog inputs. For best signal to noise performance it is recommended the signal source has a typical low impedance output with standard +4dB line level balanced signal. Alternatively a weaker unbalanced signal source can be used as described in subsequent paragraph.

In typical setup the ADC is running on its internal clock with the rest of equipment synchronized to Mytek clock either through digital output signal or wordclock. In this configuration Mytek ADC serves as a very stable low jitter house clock which increases the integrity and robustness of the rest of the system. Because of careful design this clock is as good or better than dedicated studio clock generators. Unlike in lesser quality equipment there is no sonic benefit in clocking Mytek ADC externally. In case of such operational need refer to "Sampling frequencies and external synchronization".

Setup for typical balanced operation includes following steps:

1. Setup all other connections.

2. Select desired clock source (sync), either internal or external. If external wordclock or superclock source is required for systemic reasons, setup its mode using the DIP switch as described in "Internal jumpers".
The wordclock source can be terminated with internal 75 Ohm resistor inside the Mytek unit (see: "Internal jumpers"). The termination is recommended when using long wordclock cables (above 10 ft) and when the wordclock source is capable handling such termination. Do not terminate if the source is not capable of high current drive or cable is short.

3. Select sampling frequency. If wordclock/superclock is used the sampling frequency has to correspond to external clock frequency (can be multiple, see: "Internal jumpers")

4. Select output wordlength- 24 bit full output is recommended. 16 and 20 bit output are meant to be used when the destination (recorder such as CDR, ADAT tape machine) limits the wordlength. 20 bit output is dithered with flat dither. 16 bit output can either be dithered flat (recommended for multitrack recording) or 16 bit noiseshaped (recommended for final masters, printing to CDR or DAT machine). The Supershaper HR (tm) used for 16 bit wordlenght reduction is a sophisticated 9th order noise shaper with dither, similar in operation to Pow-r #3 (tm) noise reduction algorithm (see: "Supershaper HR...").

5. Synchronize the destination either to digital input sync or to wordclock sync, depending on system configuration. The quality of recorded signal does not depend on how the digital destination is synchronized with Mytek AD converter.

6. Record- adjust input level with knob or by adjusting level at the source. Unless you are printing final CD master, we do not recommend recording too hot. There is no sonic benefit of pushing the level up to 0dBFS. A healthy 1-2-3 dBs headroom allows more freedom in later processing and mixing of recorded tracks. The red peak light is triggered digitally when 1 or more samples are overload. It's not recommended to peak frequently although occasional overloads might be acceptable.

Analog Input Alignment

When using internal trimpots analog input level needs to be aligned using an approx 1kHz sinewave fed from +4dB balanced source. The alignment does not affect audio quality, only input sensitivity. The alignment is performed using 10 turn trimpots inside the unit (see: "Internal Jumpers"). A small tweaker or screwdriver is necessary.

You have to arbitrarily decide what will be your studio "0 VU" analog/digital reference level. It is usually between -20 and -14dB. It defines how much headroom you have left over the normal operating "0 VU" level. You may set it at the same level as other piece of equipment in your studio. For example Panasonic 3700 is fixed at -18dB (which is low for most rock and roll recordings). ADAT is fixed at -15dB which is a typical optimal level.

1. Set the oscillator in your console at 1kHz and "0 VU". Send the oscillator to the ADC analog input."0 VU" at + 4dB   corresponds to 1.225 Volts RMS measured between pin 2 and 3 of the output XLRs. If you do not have an analog oscillator, you can use a calibrated analog out of a DA converter and generate the sinewave inside the DAW.

2. Connect a digital PEAK meter to a digital output. If you don't have a dedicated digital meter use the most precise meter available in you existing digital recording equipment or DAW.

3. Adjust the analog input level to get appropriate reading of the meter (for example -15dB).

The alignment has to be performed with accuracy of 0.1dB to be considered accurate.

Similar alignment procedure with 0.1dB accuracy is required for valid A/B listening comparisons between different pieces of equipment. A slightly louder source is typically perceived as "better" sounding.

Unbalanced Signal Source
Operation

Stereo96ADC can be operated with weaker consumer level unbalanced signal sources. Follow these steps in such case.

1. Unbalanced cable used to feed the unit must have signal connected to pin 2 of XLR, ground (shield) connected to pin 1 and 3.

2. Setup all other connections.

3. Select desired clock source (sync), either internal or external. If external wordclock or superclock source is required for systemic reasons, setup its mode using the DIP switch as described in "Internal jumpers".
The wordclock source can be terminated with internal 75 Ohm resistor inside the Mytek unit (see: "Internal jumpers"). The termination is recommended when using long wordclock cables (above 10 ft) and when the wordclock source is capable handling such termination. Do not terminate if the source is not capable of high current drive or cable is short.

4. Select sampling frequency. If wordclock/superclock is used the sampling frequency has to correspond to external clock frequency (can be multiple, see: "Internal jumpers")

5. Select output wordlength- 24 bit full output is recommended. 16 and 20 bit output are meant to be used when the destination (recorder such as CDR, ADAT tape machine) limits the wordlength. 20 bit output is dithered with flat dither. 16 bit output can either be dithered flat (recommended for multitrack recording) or 16 bit noiseshaped (recommended for final masters, printing to CDR or DAT machine). The Supershaper HR (tm) used for 16 bit wordlenght reduction is a sophisticated 9th order noise shaper with dither, similar in operation to Pow-r #3 (tm) noise reduction algorithm (see: "Supershaper HR...")

6. Synchronize the destination either to digital input sync or to wordclock sync, depending on system configuration. The quality of recorded signal does not depend on how the digital destination is synchronized with Mytek AD converter.

7. Record- adjust input level by adjusting level at the source. Unless you are printing final CD master, we do not recommend recording too hot. There is no sonic benefit of pushing the level up to 0dBFS. A healthy 1-2-3 dBs headroom allows more freedom in later processing and mixing of recorded tracks. The red peak light is triggered digitally when 1 or more samples are overload. It's not recommended to peak frequently although occasional overloads might be acceptable.

Sampling frequencies
and External Synchronization

In typical setup the ADC is running on its internal clock with the rest of equipment synchronized to Mytek clock either through digital output signal or wordclock. In this configuration Mytek ADC serves as a very stable low jitter house clock which increases the integrity and robustness of the rest of the system. Because of careful design this clock is as good or better than dedicated studio clock generators. Unlike in lesser quality equipment there is no sonic benefit in clocking Mytek ADC externally. Mytek internal clock generator is situated within inches of converter chip and it will always provide a better jitter performance (approx 10ps) than any external source which is inherently compromised by cable connections. If external wordclock or superclock source has to be used for systemic reasons, the Stereo96ADC clock generator will lock to external source and use a stabilizing PLL circuit to reduce incoming clock jitter before it reaches the actual AD circuit.

Stereo96ADC can be operated with any of 4 standard sampling frequencies or at any frequency between 30k-100k when supplied with external clock source. The measurable audio band performance (Dynamic Range) stays virtually the same within all these frequencies.

44.1k will be typically used for printing final master. 48k is recommended for digital video production.

The two higher sampling rates are recommended for discerning users requiring uncompromised sound quality. In this mode the ADC features a 40kHz bandwidth (instead of 20k) which allows for improved transient response of recorded music as well as minimizing the impact of brick wall antialiasing digital filters on the upper audio band. The end effect of hi-sampling recording is a more "analog feel" and easiness of sound and more natural sounding instruments especially percussion or cymbals.

A decision of choice between 88.2k or 96k should be made based on the project flow- there might be arguments for one or the other. For example 88.2k may convert to 44.1k with less damaging SRC process, if such process is available. Most ubiquitous software SRCs are not very good

and must not be used for critical projects downsampling. Some such as Faulkner Downsampler (http://www.audiosignal.co.uk/freeware.html) provide excellent results for 88.2>44.1 but don't work for 96k. 88.2k is also easier to upsample to DSD.

96k sample rate, has in our opinion, a marginally better perceived sound quality than 88.2k but the difference is very small and difficult to perceive for most people. If the record is going to be mixed in analog domain, 96k might be a desirable choice for tracking.

Mytek "SuperShaper-HR" ™
Noise Shaping and Dither

The Stereo96 A/D converter employs SuperShaper-HR ™ - a sophisticated psychoacoustically optimized noise shaping and dithering algorithm. SuperShaper-HR ™ uses 9th order high resolution noise shaping filters with proprietary filter coefficients developed by Mytek Inc. The appropriate noiseshaping curve is programmed into noiseshaping filters. This feature allows for preserving most of 24 bit performance in 16 bit data output.
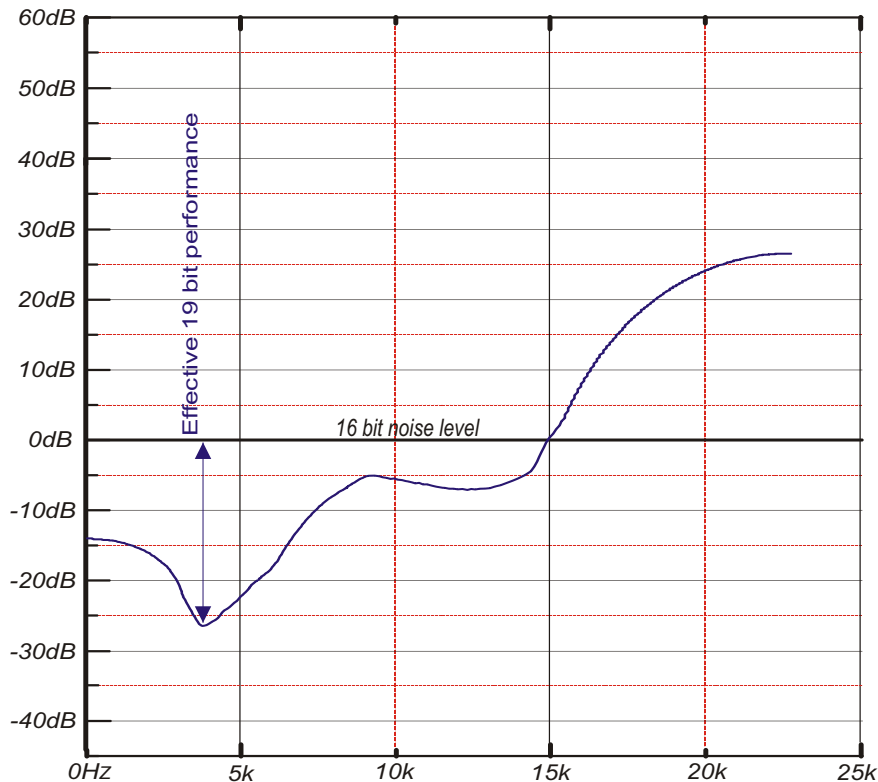
Noise shaper performance graphs at 16 bit output

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When noise-shaping processing is on, the quantization noise is removed from the audio band, where the noise floor is kept as close as possible to the 24 bit level, and moved to the 20-22 kHz range.

The noise-shaping filters are automatically engaged at appropriate levels when 16 bit output marked "Supershaper HR" is selected. If 24 or 20 bit bit output is selected, the noise-shaping filter is off.

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More information about use of noise shaping in high resolution recording can be found in the following Audio Engineering Society Preprints (http://www.aes.org):

"Coding Methods for High Resolution Recording Systems"

Preprint Number: 4639   Convention: 103 1997-09
Author: J. Robert Stuart

This paper reviews the recording and reproduction chain from the viewpoints of digital audio engineering and psychoacoustics. It also attempts to define the audio requirements of a transparent digital audio channel. The theory and practice of selecting high sample rates such as 96kHz and word lengths of up to 24 bits are examined. The relative importance of sampling rate and word size at various points in the recording, mastering, transmission, and replay chain is discussed.

"Dynamic Range Enhancement Using Noise-Shaped Dither at 44.1, 48, and 96 kHz"

Preprint Number: 4236   Convention: 100 1996-05
 Author: J. R. Stuart
 Author: R. J. Wilson

This paper presents an overview of the work done on noise shaping, summarizing how noise shapers are designed, implemented and measured, and outlining the hearing model used to evaluate the various designs achieved.

"Dynamic Range Enhancement Using Noise-Shaped Dither Applied to Signals with and without Preemphasis"

Preprint Number: 3871   Convention: 96 1994-03
Author: Robert Stuart
Author: Rhonda J. Wilson

This paper presents new noise-shaped dithers designed to give increased subjective dynamic range when applied to signals with and without pre-emphasis.

"Optimal Noise Shaping and Dither of Digital Signals"

This paper discusses optimizing noise shaping, with or without dither, using filtered error-feedback round a quantizer.

"Psychoacoustically Optimal Noise Shaping"

This paper examines the design of psycho-acoustically optimal noise shaping filters for requantization in non-oversampling digital audio applications.

Rack Mount Shelf

The Stereo96 ADC is 1/3 rack space wide and 1U tall.
Mytek provides a 1U rack mount shelf as accessory to mount up to 3 of 1/3
rack units. The units are attached to shelf with small screw connecting the
shelf to bottom through a threaded hole on the bottom of the unit.

When mounting the unit to the rack, you must follow these procedures to
ensure that you do not cause any damage to your unit:

     1. Remove the rubber feet. If the feet are left on then you run the risk
of bending the chassis and/or the circuit board.

     2. Use the supplied 1/4" 440 threaded screw _only._ Any longer and you
can cause permanent damage to the circuit board!

If you want to leave the rubber feet on then you have to be extra careful to
not overtighten the screw past the point of bending the chassis. 1/4" will
possibly work with the feet on but 3/8" 440 thread is recommended, although
there is a higher risk of circuit board damage with a longer screw.
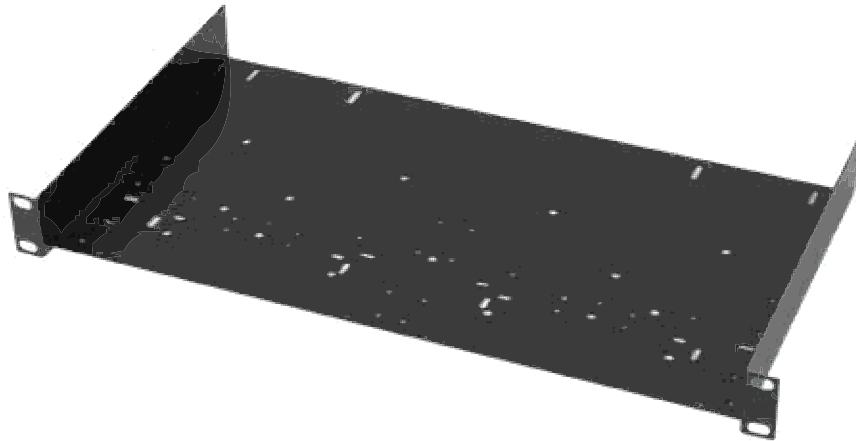
Companion Stereo96 DAC

Stereo96 DAC is a two channel hi-end Digital to Analog converter for recording and mastering applications. The main feature of this converter is its outstanding sound quality which makes it suitable for the most demanding projects when preserving the original signal quality is required.

Specifications

Conversion: Linear,
                        128x oversampling at 44.1/48kHz
                        64x oversampling at 88.2/96kHz

Resolution: 24 bit

Sample rates: 44.1kHz, 48kHz, 88.2kHz, 96kHz
                        or wordclock 25-100kHz

Dynamic Range: 120dB A-weighted, 117dB Total

THD+Noise: -105dB (<0.0005%)

Internal clock jitter:<10picoseconds

Analog Inputs: +4dBm balanced or unbalanced, 10kOhm

Digital outputs: Hi-speed (25-100kHz) AES/EBU and SPDIF
                        Optical TOSLINK SPDIF/ADAT

External Sync.:   Wordclock in and out.
                        or 256x Superclock

Wordlock Out
as house clock: 15 LS TTL loads max. Can be terminated.

Input Gain.:   Fixed -15dBFS or format potentiometer
                        or 10 turn precision trimpots adjustable

Mains: 100/115V-220/240V 50/60Hz switchable

Dimensions: 1/3 rack space wide x 1U high x 8" deep
                        (5.5"x 1.6"x 8")

Weight: 4 pounds

Warranty

This Stereo96ADC digital audio converter is warranted by Mytek to the original purchaser against defects in workmanship and materials used in manufacture for a period of one year from the date of purchase. Faults due to customer misuse, unauthorized modifications or accidents are not covered by this warranty.

No other warranty is expressed or implied.
Any faulty unit should be sent, shipping prepaid, to the manufacturer service center. Prior to shipping the client should obtain from Mytek an RMA# for warranty services. Units sent without RMA# will not be accepted.

Mytek extends affordable repair service for all units manufactured to date that are not covered by this Warranty.