Alpha DAC™

TWO-CHANNEL AUDIO DIGITAL-TO-ANALOG CONVERTER

User Guide Rev.70

Berkeley Audio Design™

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User Guide Revision

Revision	Date	Description
.70	March 2009	For software Rev .70

Warranty Notice

The Alpha DAC is warranted to be free from defects in materials, parts, and workmanship. **For the specific terms of the warranty, refer to the warranty page or contact the dealer the Alpha DAC was purchased from.**

The warranty for the Alpha DAC will not apply to units subjected to:

- Physical abuse or use not consistent with the operating instructions or product specifications.
- Modifications by other than Berkeley Audio Design authorized personnel.
- Repair by other than Berkeley Audio Design authorized personnel.
- Removal of the Berkeley Audio Design serial number.
- Damage due to improper packing for shipment.

Shipping the Alpha DAC in unauthorized packaging may damage the unit and void the warranty. Refer to the packing instructions on page 4-2.

If the Alpha DAC develops problems, contact your dealer. Do not void the product warranty by allowing unauthorized personnel to attempt repairs. See “Service”on page 4-3 for details.

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CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

TO REDUCE THE RISK OF ELECTRIC SHOCK,

DO NOT REMOVE COVER.

NO USER-SERVICEABLE PARTS INSIDE.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

IMPORTANT SAFETY INSTRUCTIONS

NOTE

All safety and operating instructions should be read before the product is operated, and retained for future reference.

POWER REQUIREMENTS AND PROCEDURES

This product should be operated only from the type of power source indicated on the back of the unit. If you are not sure of the type of your mains power supply, consult your product dealer or local power company.

Only use the power cable provided with this product or a manufacturer's authorized replacement power cable.

The power cable has a three-wire grounding type plug (a plug having a third pin for grounding). It will only fit into a grounding type power outlet. This is a safety feature. If you are unable to insert the plug fully into the outlet, contact your product dealer. Do not defeat the safety purpose of the grounded type plug.

This product is designed to power on and off without producing output noise that could damage power amplifiers or loudspeakers. However, the following power on and off sequence should be followed for maximum protection of associated components:

If the product's signal outputs are connected directly to power amplifiers the product should be powered on for 15 seconds or longer before the power amplifiers are powered on. Before disconnecting power to the product the power amplifiers should be powered off first.

CLEANING

Clean only with a soft, dry cloth.

HEAT

Do not install this product near any heat sources such as radiators or other apparatus (such as amplifiers) that produce heat.

SERVICING

Do not attempt to service this product yourself. Opening or removing covers may expose you to dangerous voltage. Refer all servicing to authorized service personnel. See "Service" on page 4-3.

Contents

1

Introduction

Alpha DAC Overview

Berkeley Audio Design was founded by alumni of Pacific Microsonics, developer of the HDCD process and the Pacific Microsonics Model Two. When designing the Model Two they became familiar with the amazing fidelity of 24-bit Model Two recordings made at 176.4kHz and 192kHz sampling rates.

The Berkeley Audio Design Alpha DAC was designed to bring that level of audio fidelity into the home with high resolution 24-bit recordings - a level of fidelity "closer to the microphone feed" than even first generation open-reel analog tapes.

The Alpha DAC also up-samples 44.1kHz CD's almost 176.4kHz quality and uses proprietary interpolation technology to provide the highest possible fidelity at all sampling rates from 32kHz to 192kHz.

IR remote control of Alpha DAC preamplifier functions including volume and balance is provided to allow direct connection to power amplifiers.

Features include inputs for up to three digital sources plus a proprietary BADA input for future expansion, HDCD decoding, selectable output phase, both XLR balanced and RCA unbalanced analog outputs and digital display of sample rate and output level.

In sum, the Alpha DAC provides unsurpassed audio fidelity and ease of use. Please take a few minutes to familiarize yourself with this User Guide before connecting power to the Alpha DAC. Doing so will help ensure the best possible performance as well as safe operation.

About this Guide

The following chapters contain step-by-step instructions for using the Alpha DAC. The Installation chapter covers system setup. The Operation chapter discusses system configuration and operating procedures. The Maintenance chapter describes techniques for keeping the Alpha DAC in good operating and cosmetic condition. Appendix A contains the Alpha DAC's technical specifications and Appendix B covers troubleshooting.

2

Installation

Unpacking

What's in the Box

Please confirm that the following items are in the box with the Alpha DAC:

- Remote control with AAA batteries installed
- Power cable
- User Guide
- Warranty

Unpacking the Alpha DAC

Be sure to retain the Alpha DAC's original shipping carton and all packing materials.

Physical Placement

Ventilation

The Alpha DAC should be installed in a space with at least one inch of clearance above, behind and on both sides of its enclosure to provide adequate ventilation. Avoid placing it directly above other equipment that produces heat.

If a number of Alpha DAC's are rack mounted together, ample airflow should be provided around them.

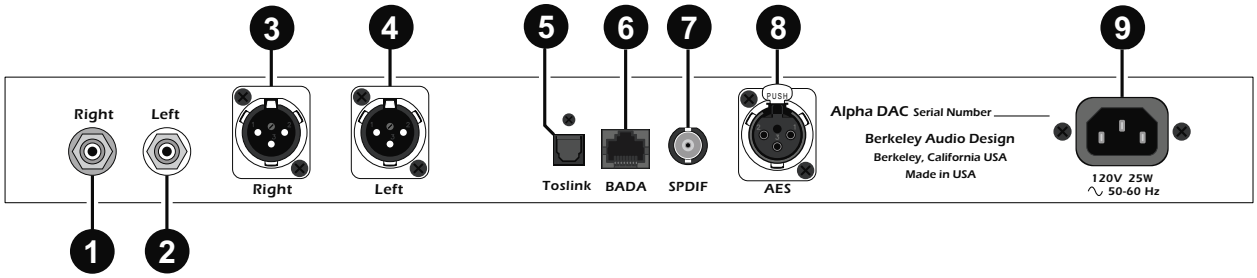
High operating temperatures can adversely affect the Alpha DAC's audio quality.

The Alpha DAC dissipates up to 25 Watts of power.

Rackmount Option

The Alpha DAC can be mounted in a standard 19 inch rack using optional rack mount brackets. Contact your dealer for information.The Alpha DAC occupies a single rack space (1.75").

Cabling and Interconnects



		Page
1	Right RCA Unbalanced Output Connector	2-4
2	Left RCA Unbalanced Output Connector	2-4
3	Right XLR Balanced Output Connector	2-4
4	Left XLR Balanced Output Connector	2-4
5	Toslink Optical Input Connector	2-4

		Page
6	BADA Port RJ-45 Connector	2-4
7	SPDIF BNC Input Connector	2-4
8	AES XLR Input Connector	2-4
9	Power Cord Socket	2-3

Cable Recommendations

High quality cables with the correct impedance for each digital input should be used.

If oversized input or output cables are used, especially those that are very stiff or heavy, care should be taken to properly support them to avoid putting excessive stress on the panel connectors.

Powering the Alpha DAC

The Alpha DAC is designed to run continuously when connected to AC mains power.

If the Alpha DAC's signal outputs are connected directly to power amplifiers the Alpha DAC should be powered on for 15 seconds or longer before the power amplifiers are powered on. Before disconnecting power to the Alpha DAC the power amplifiers should be powered off first.

Digital Inputs

The Alpha DAC has four stereo digital signal inputs:

- AES — 110 ohm balanced, XLR connector. This signal format is recommended for the highest conversion quality.
- SPDIF — 75 ohm coaxial, BNC connector. This signal format allows high conversion quality and is found on many types of devices.
- Toslink — optical. This signal format allows good conversion quality and permits connection to devices with Toslink optical outputs.
- BADA encrypted — RJ-45 connector. The BADA encrypted signal format allows future support of HDMI and other DRM signal formats.

For the best possible audio quality only one input at a time should be fed with an active signal

Analog Outputs

The Alpha DAC has two sets of Right and Left analog signal outputs:

- Balanced via XLR connectors, pin 2 positive
- Unbalanced via RCA connectors

The Alpha DAC's balanced XLR outputs are wired as follows:

Pin 1 = cable shield (chassis ground)

Pin 2 = positive polarity ("hot") (+)

Pin 3 = negative polarity ("cold") (–)

All outputs are always active and may be used simultaneously.

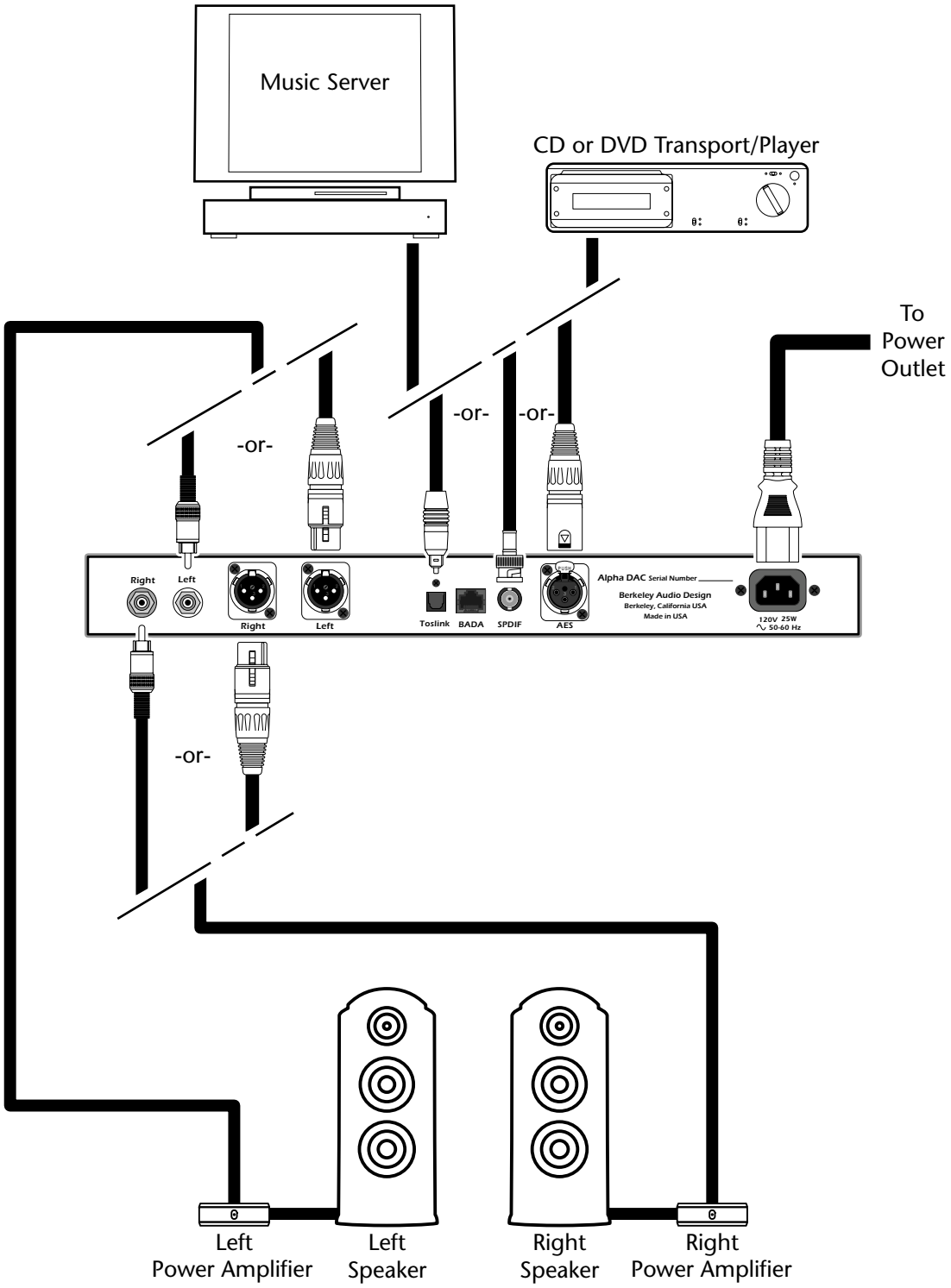
The Alpha DAC provides remote control of level and balance to allow direct connection to power amplifiers. Directly connecting to power amplifiers avoids any potential loss of fidelity resulting from connecting through a preamplifier.

For best performance, the use of balanced outputs is recommended. Use a high quality 3 conductor shielded cable to connect the Alpha DAC to the balanced input of each power amplifier. When unbalanced connections are used, both the Alpha DAC and the power amplifiers should be connected to the same AC circuit and preferably to the same outlet.

Typical Installations

Direct to Power Amplifiers

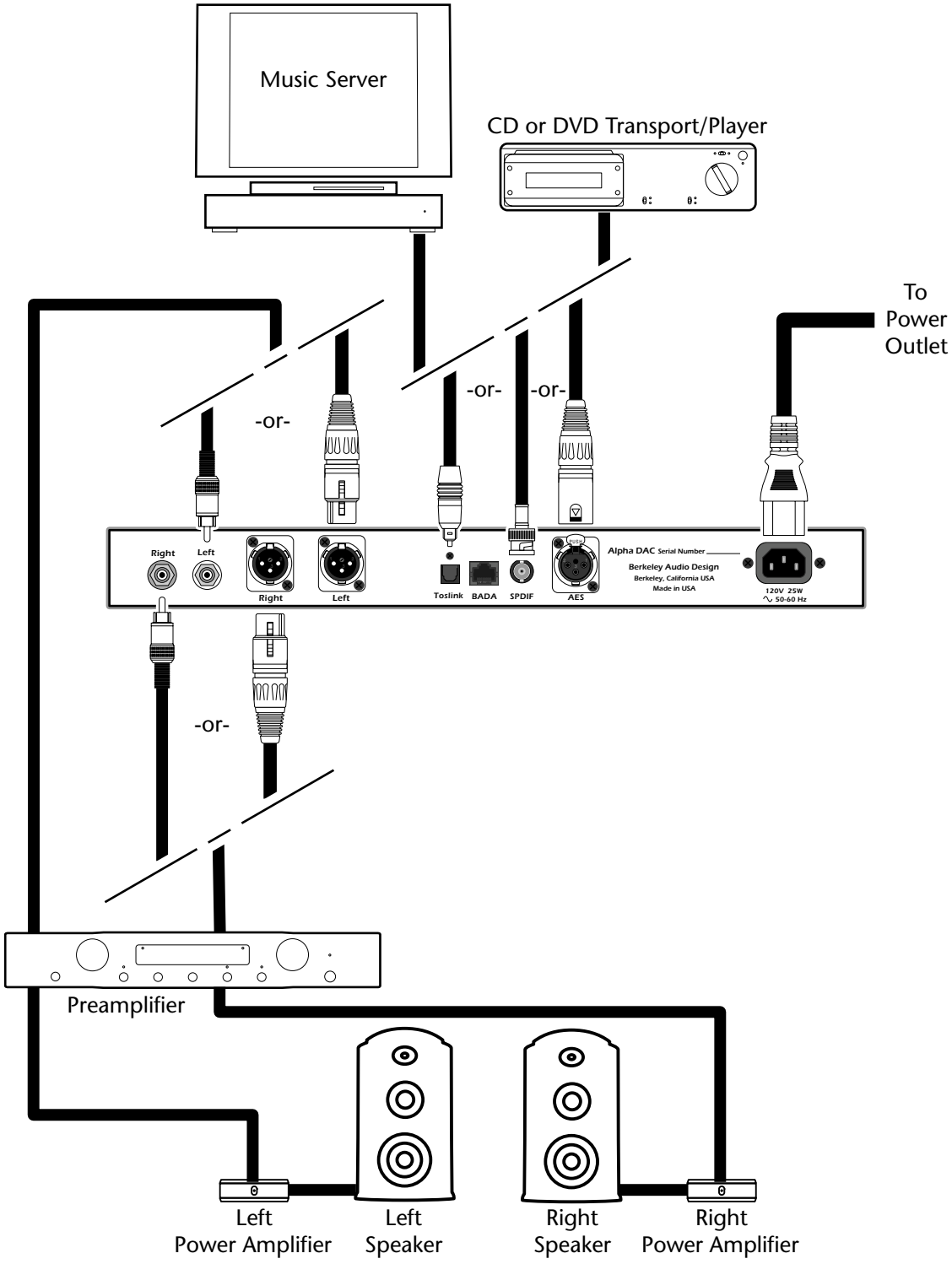
This diagram illustrates direct connection of the Alpha DAC to power amplifiers.



Typical Installations

Through a Preamplifier

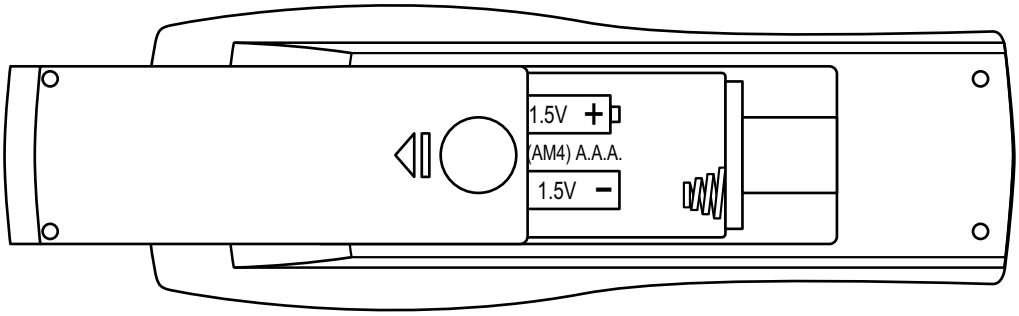
A Preamplifier is typically used when there are other analog sources, such as a tuner or a turntable, that will be played through the same power amplifiers as the Alpha DAC.



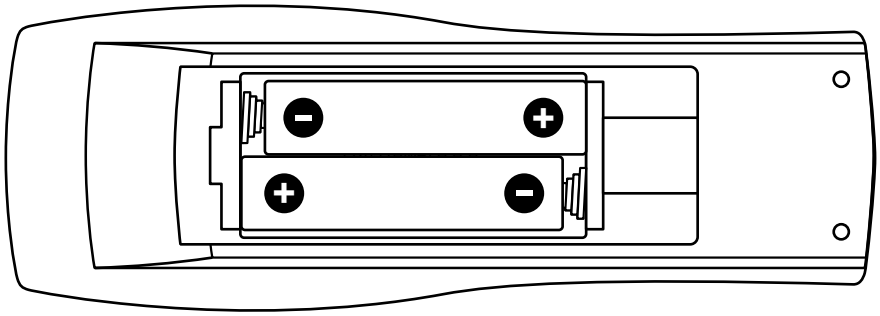
Remote control

Batteries

The Alpha DAC remote control uses two AAA 1.5 V batteries. Slide off the battery compartment cover on the back of the remote control to remove batteries from the battery compartment.



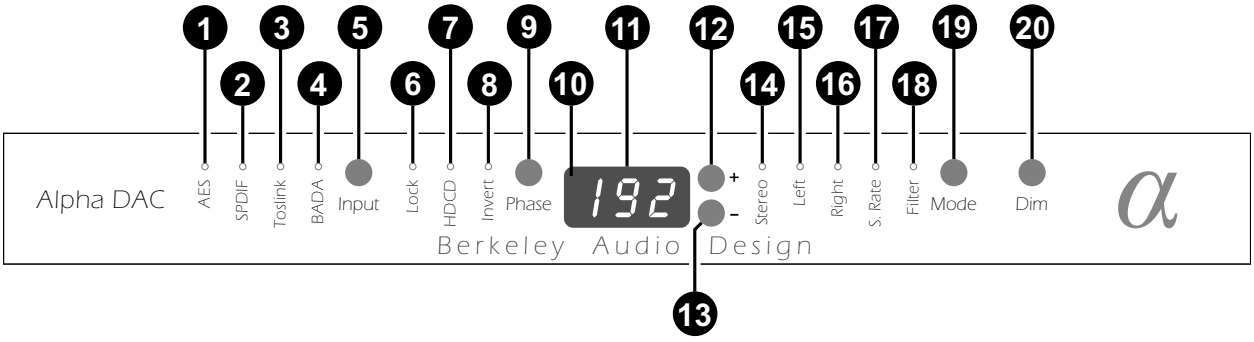
Insert fresh batteries by matching the + and – on the batteries to the diagram inside the battery compartment. Then replace the battery compartment cover.



3

Operation

Front Panel Layout



		Page
1	AES Input Selected LED	3-3
2	SPDIF Input Selected LED	3-3
3	Toslink Input Selected LED	3-3
4	BADA Input Selected LED	3-3
5	Input Select Pushbutton	3-3
6	Signal Lock Indicator LED	3-3
7	HDCD Format Indicator LED	3-3
8	Inverted Phase Indicator LED	3-6
9	Phase Select Pushbutton	3-6
10	Remote Control IR Receiver	B-1

		Page
11	3 Digit Numeric Display	3-4
12	+ Numeric Value Pushbutton	3-3
13	– Numeric Value Pushbutton	3-3
14	Stereo Level Mode Selected LED	3-3
15	Left Level Mode Selected LED	3-4
16	Right Level Mode Selected LED	3-4
17	Sampling Rate Mode Selected LED	3-5
18	Filter Select Mode Selected LED	3-5
19	Mode Select Pushbutton	3-3
20	Display Brightness Pushbutton	3-6

Power On/Off

The Alpha DAC is designed to run continuously when connected to AC mains power. The following power on and off sequence should be followed for maximum protection of associated components:

If the Alpha DAC's signal outputs are connected directly to power amplifiers the Alpha DAC should be powered on for 15 seconds or longer before the power amplifiers are powered on. Before disconnecting power to the Alpha DAC the power amplifiers should be powered off first.

When the Alpha DAC is powered on the current firmware version is displayed

Set Up

Input Select

The front panel Input button selects the digital input: AES, SPDIF, Toslink or BADA.

For the best possible audio quality only one input at a time should be fed with an active signal

The AES, SPDIF, Toslink and BADA LEDs indicate the currently selected input. The Lock LED indicates that the selected input has a valid signal and is clocking correctly. The HDCD LED indicates whether HDCD code is detected in the selected input signal.

Display Mode

Pushing the Mode button on the front panel steps through five different display modes: Stereo Level adjust, Left Level adjust, Right Level adjust, Sampling Rate and Filter select. Pushing and holding down the Mode button steps through the selections more rapidly.

Stereo Level

When either the Stereo or S. Rate LED is illuminated, stereo level can be adjusted in 0.1 dB steps using the front panel + and – buttons. If neither the Stereo or S. Rate LED is lit, press the front panel Mode button repeatedly until either the Stereo or S. Rate LED is lit.

Pushing and holding down either of the + or – buttons adjusts the level more rapidly.

The three-digit display shows stereo level in relative decibels. Maximum level is 60.0 corresponding to full output level, and its minimum is 0.1 (59.9 dB lower). A setting of 0.0 mutes the output.

Note that adjusting stereo level when the S. Rate LED is illuminated will momentarily display the level. After the adjustment has been performed the display will revert to displaying the incoming sampling rate.

If a preamp or level control is used after the Alpha DAC, 54.0 is a good operating level.

The stereo level resets to 25.0 when AC power is removed.

Left and Right Level

When either the Left or Right LED is illuminated, the indicated channel's level can be adjusted in 0.05 dB steps using the front panel + and – buttons. If the desired LED is not lit, press the front panel Mode button repeatedly until it lights. Pushing and holding down either the + or – buttons adjusts the level more rapidly.

Left and right level is shown on the three-digit display in decibels in a 3½ digit format. A decimal point is added to the right of the third digit to indicate 0.05 dB. A level of 54.15 is displayed as

while a level of 54.10 reads

Left and right level balance offsets remain constant when stereo level is adjusted or inputs are changed. This allows compensation for fixed system imbalances due to the sensitivity of loudspeakers or amplifiers or listening position.

Left and right levels are fine resolution system setup adjustments and are not reset when inputs are changed. However, when AC power is removed the left and right levels reset to 25.0.

If Left and Right levels are different, the louder channel's level is displayed when adjusting Stereo level.

Sampling Rate

The sampling rate is displayed in a 3½-digit format: a decimal point is added to the right of the third digit if the sampling rate rounds to .5 in the fourth digit. Thus a 44.056 kHz sampling rate is displayed as

and a 176.4 kHz sampling rate is displayed as

Sampling Rate is the default display mode. However, adjusting Stereo Level or Balance momentarily displays the stereo level or balance value. See “Balance” on page 3-9.

Filter Select

When the Filter LED is illuminated, digital interpolation filters 1, 2, 3 or 4 can be selected using the front panel + and – buttons. If the Filter LED isn’t lit, press the front panel Mode button repeatedly until it lights.

The displayed filter value consists of the filter number (1, 2, 3, or 4) followed by a period and then the HDCD code detection bit value. For example, when the display reads

it indicates that filter 1 is selected and HDCD code detection takes place in the 16th bit.

Filter selections are stored independently for each major sampling rate (32, 44.1, 48, 88.2, 96, 176.4, and 192 kHz). 1.16 is the default filter setting for 44.1kHz CD playback. 1.24 is the default for all other sample rates.

At 44.1kHz sampling rate, both 16-bit and 24-bit HDCD code detection versions of each filter are available (see “HDCD Decoding” on page 3-7). All other sampling rates have only 24-bit HDCD code detection versions. The only difference between the .16 and .24 filter versions is the HDCD code detection bit.

For highest audio quality, filter 1 (1.16 or 1.24) is strongly recommended. Filter choices 2 through 4 are intended for professional use to determine how a particular recording will sound when played through more typical commercial products.

Filter 1 is the highest quality filter and is intended for critical listening. The Alpha DAC by default automatically selects Filter 1.16 when playing a Red Book CD and 1.24 for all higher sampling rates.

Filter 2 is the same filter used in the Pacific Microsonics PMD-100 and PMD-200 HDCD decoder IC's. Filters 3 and 4 are primarily for professional use to determine how non-HDCD filters sound.

Phase Select

Pushing the *Phase* button on the front panel toggles absolute phase on the analog outputs. When absolute phase is inverted, the *Invert* LED lights and phase is inverted on both the unbalanced RCA outputs and the balanced XLR outputs.

When the *Invert* LED is off, the center conductor is positive on the RCA connectors and pin 2 is positive on the XLR connectors. When the *Invert* LED is on, the center conductor is negative on the RCA connectors and pin 3 is positive on the XLR connectors.

Phase inversion is useful for correcting program sources that have been recorded with incorrect absolute phase. While rare, incorrect phase can be identified by switching the phase and listening to the recording; the correct phase will have more impact and better imaging.

Phase inversion also provides correct polarity for balanced connection to amplifiers or preamplifiers with an XLR pin 3 positive input polarity. Consult your amplifier's instruction manual to determine which pin is positive polarity.

Display Brightness

Pushing the *Dim* button on the front panel steps the Alpha DAC front panel through four different display brightness levels.

At the lowest brightness setting, most of the front panel displays are switched off, with the exception of the *Lock*, *HDCD*, and *Invert* LEDs, which are never completely extinguished.

Note that at any brightness setting, all front panel displays will light for about two seconds whenever a control button is pushed.

HDCD Decoding

The HDCD LED lights when HDCD code is detected in the LSB of the digital input signal. The Alpha DAC decodes HDCD recordings automatically.

Note that some DVD transports output a 24 bit digital signal even when playing a 16 bit Redbook audio CD. In that case, if the disc is HDCD encoded, the CD may not decode properly and the HDCD light may flash.

At 44.1kHz sampling rate, 16 bit HDCD code is detected by default (in Filter mode, a filter value of 1.16 will be displayed). However, 24 bit 44.1kHz HDCD code can be detected by using a Filter value of 1.24. See “Filter Select” on page 3-5 for more information regarding filter selection.

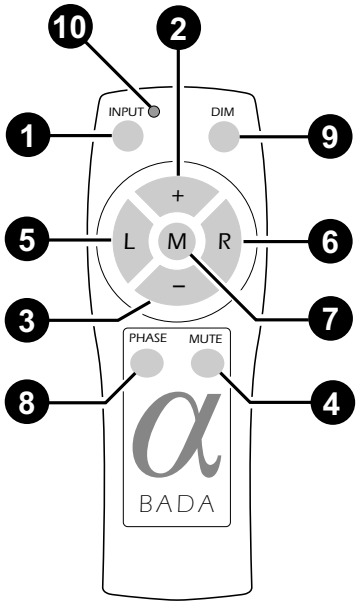
The 24 bit code detection option at 44.1kHz is intended for professional use and is not the default. If it is selected, HDCD amplitude decoding is not performed, and the output level is set 6 dB higher.

At sampling rates other than 44.1kHz only 24 bit HDCD code is detected.

Selecting 24-bit HDCD code detection at 44.1 kHz turns off HDCD amplitude decoding and increases output level by 6 dB.

44.1kHz is the only sampling rate that uses HDCD amplitude encoding. Amplitude encoding may use reversible limiting called “Peak Extend” that can reproduce peaks 6 dB higher than normal 16 bit data. To reproduce those peaks, the output level to the DAC must be decreased by 6 dB, or 1 bit, to allow for peak reconstruction if an HDCD encoded source is played. Since the Alpha DAC has 24 bit resolution, this doesn t have any negative effect on the reproduction of non-HDCD encoded CD s.

Remote Control



		Page
1	Input Select Pushbutton	3-8
2	+ Stereo Level Pushbutton	3-8
3	– Stereo Level Pushbutton	3-8
4	Output Mute Pushbutton	3-9
5	Balance to Left Pushbutton	3-9

		Page
6	Balance to Right Pushbutton	3-9
7	Level Display Mode Pushbutton	3-9
8	Phase Invert Pushbutton	3-9
9	Display Brightness Pushbutton	3-8
10	IR Transmit LED	3-9

Input Select

The remote control Input button selects the digital input: AES , SPDIF, Toslink or BADA. See “Input Select” on page 3-3.

Stereo Level

The stereo level can be adjusted in 0.1 dB steps via the remote control’s + and – buttons. See “Stereo Level” on page 3-3.

Display Brightness

Pushing the Dim button on the remote control steps the Alpha DAC front panel through four different display brightness levels. See “Display Brightness” on page 3-6.

Balance

Balance is adjusted in 0.1 dB steps using the remote control's L and R buttons. Pushing the L button decreases the right channel's level and pushing the R button decreases the left channel's level. Pushing and holding down either the L or R button adjusts balance more rapidly.

If the M button is pushed and held for approximately 2 seconds, balance is reset to 0.

Maximum balance range is 9.9 dB.

Balance is meant to be used as a content dependent setting rather than a system setup adjustment. It is for correcting program material imbalances that can change from one track or album to another. Selecting a different input resets balance to 0.

If Balance is offset, the louder channel's level is displayed when adjusting Stereo level

When AC power is removed Balance resets to 0.

Balance adjustment is available only on the remote control.

Output Mute

Pushing the MUTE button on the remote control mutes the analog outputs. When the Alpha DAC is muted, the display will show a dot following the leftmost digit:

Pushing the MUTE button again or pushing the + button on the remote control unmutes the outputs. Pushing the + button on the front panel when in Stereo or S. Rate Display Modes also unmutes the outputs.

Output muting is available only on the remote control.

Phase Select

Pushing the Phase button on the remote control toggles absolute phase. See "Phase Select" on page 3-3.

Level Display Mode

Pushing the M button momentarily displays any balance offset followed by the stereo level in all display modes and at all display brightness levels.

IR Transmit LED

The red LED flashes with each remote control button push to indicate IR transmission and adequate battery level.

4

Maintenance and Service

Maintenance

The Alpha DAC does not require regular maintenance in normal use. However, there are a few things that will help to keep it in good operating and cosmetic condition.

Cleaning

Only clean the Alpha DAC with a soft, dry cloth.

Extended Nonuse

Disconnect the Alpha DAC from mains power and remove batteries from the remote control when they will be left unattended or unused for an extended period of time.

Firmware Upgrade

When the Alpha DAC is powered on the current firmware version is displayed.

Alpha DAC firmware is dealer upgradable. Please contact an Alpha DAC dealer or Berkeley Audio Design for more information.

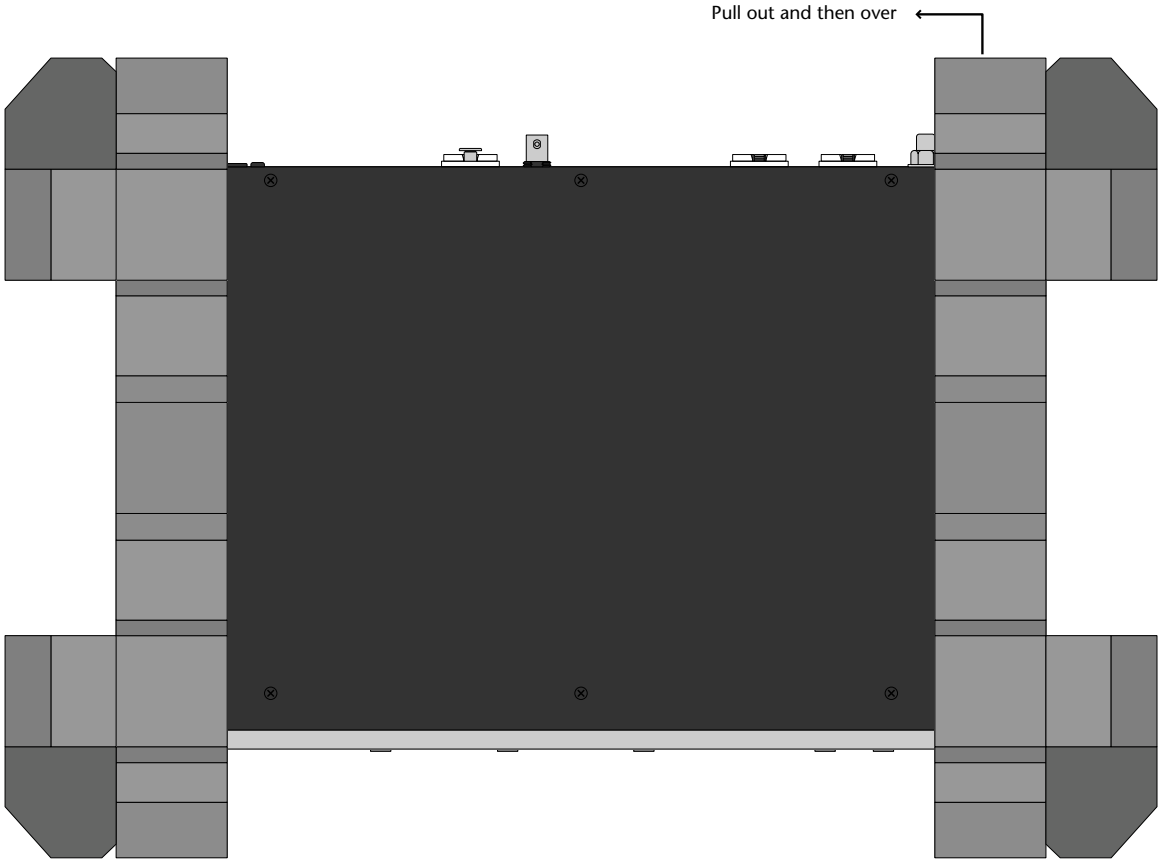
Packing Instructions

Only ship the Alpha DAC in its original packing.

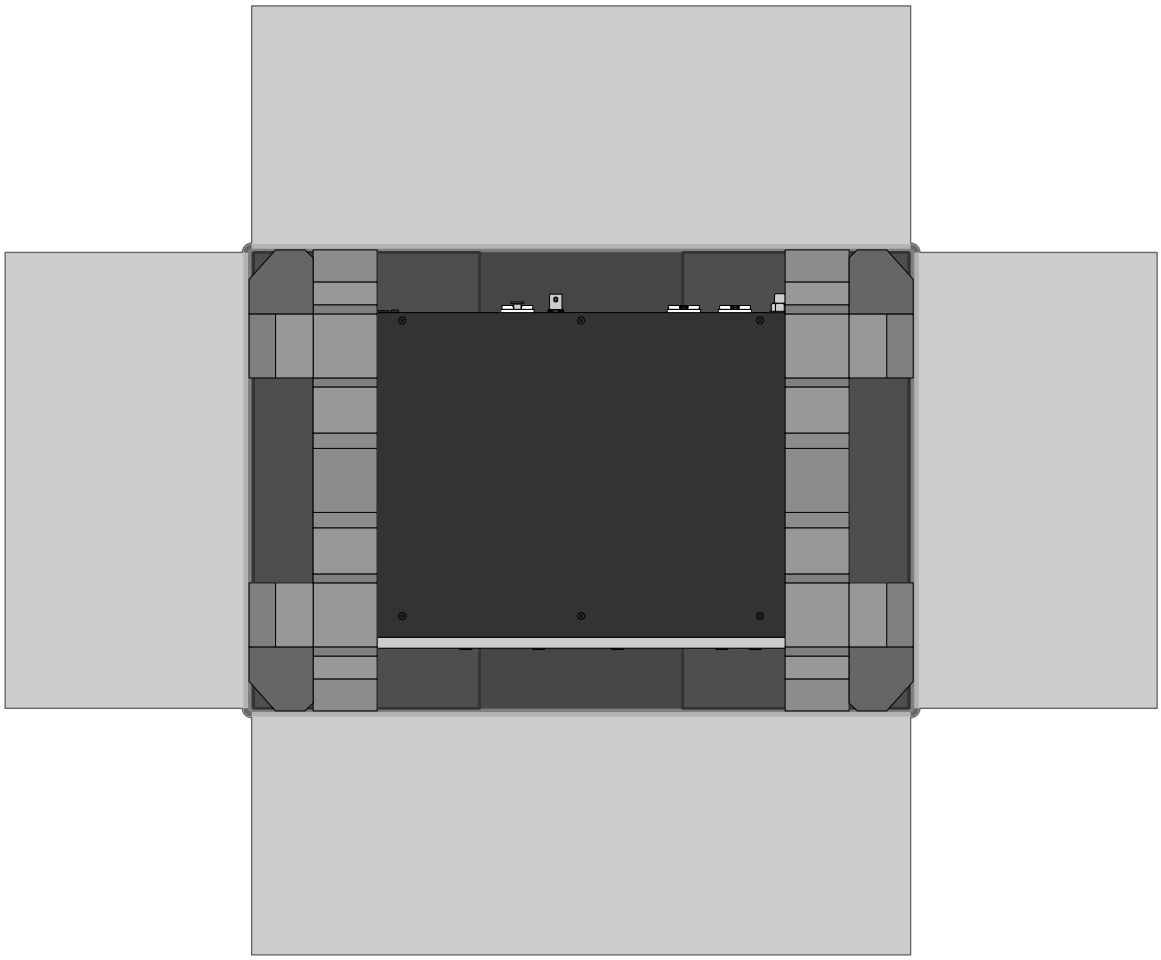
If rack ears are installed on the Alpha DAC, remove them. K eep them with their mounting hardware to reinstall when the Alpha DAC is returned.

After putting the Alpha DAC in its plastic bag, fit the two gray foam inserts on its sides. Note that each foam insert has bottom cutouts for the Alpha DAC's feet.

You may need to pull slightly on the back side of the right-side foam insert to fit it over the right RCA output jack on the rear of the unit. The Alpha DAC should seat fully into both foam inserts.



Place the Alpha DAC with its foam inserts into its box, top side up:



Service

If your Alpha DAC develops a problem, contact your dealer. Do not void the warranty by allowing unauthorized personnel to attempt repairs. Do not attempt to service the product yourself. Opening the cover may expose you to dangerous voltage, as well as void the warranty.

Before the Alpha DAC can be returned for service an RMA (Return Material Authorization) number must be issued by Berkeley Audio Design. Contact your dealer or Berkeley Audio Design for further information. Units without an RMA number will not be accepted for service.

Appendix A

Specifications

Input Sampling Rate	32 kHz to 192 kHz
Input Word Length	24 bit
Balanced Analog Outputs (two channel stereo)	XLR, pin 2 positive
Unbalanced Analog Outputs (two channel stereo)	RCA
Digital Inputs	AES - XLR, 110 Ω SPDIF - BNC, 75 Ω Toslink – Toslink optical BADA encrypted - RJ-45
HDCD Decoding	Detects 16 bit flag at 44.1 kHz, or 24 bit flag at all sampling rates
Balanced Analog Output Level	+18 dBu maximum into ≥ 5kΩ load +12 dBu or lower recommended
Unbalanced Analog Output Level	3.25 V_{rms} maximum into ≥ 5kΩ load 1.6 V_{rms} or lower recommended
Level & Balance Control	0.1 dB/step with 0.05 dB/step L/R level trim, 60 dB range

Frequency Response at ≥ 88.2 kHz Sampling Rates	± 0.1 dB from < 0.1 Hz to 35 kHz, -3 dB at 59 kHz for 176.4 kHz and 192 kHz Sampling Rates
Distortion at Recommended Levels	All Products ≤ -120 dBFS
THD+N at Maximum Level	< -110 dBFS
Mains Voltage	100/120/240 V_{AC}, 50/60 Hz (Factory Set)
Power Consumption	25 W
Enclosure Dimensions	1.75″H X 16.5″W X 10.4″D (45mm X 419mm X 264mm) 19″ Rack Mount Option
Weight	6.5 lbs (3 kg)

Appendix B

Troubleshooting

If you think your Alpha DAC has a problem check the following tips - you may find the cause without sending the unit in for service.

Symptoms

No Power

- Examine the power cord to be sure that it is connected to both the AC mains connector and an AC wall outlet.
- Examine the AC circuit breaker to determine that power is supplied to the AC wall outlet the Alpha DAC is connected to.
- Try substituting another power cord.

No Remote Control Operation

- Eliminate any obstructions between the remote control IR transmitter and the front panel remote control IR receiver. Refer to "Front Panel Layout" on page 3-2 for the location of the remote control IR receiver.
- Make sure the remote control is positioned within 25 feet (7.5 m) of the front panel IR receiver. If the Alpha DAC is placed inside a glass cabinet, tinted glass will reduce the remote control range.
- Make sure the remote control signal is received at the front panel IR receiver at an angle within ±45° perpendicular to the front panel.
- Make sure the front panel IR receiver is not exposed to strong sunlight, halogen light or fluorescent light. They can cause IR reception to become unreliable.
- Replace the remote control batteries.

No Sound or Low Output

- Examine all cables to ensure a solid connection between the Alpha DAC and associated components.
- Make sure the Alpha DAC's stereo level is set to an audible volume.
- Make sure the Alpha DAC has not been muted.
- Make sure the Alpha DAC's output connectors are connected to a functioning power amplifier, and that the power amplifier is connected to functioning loudspeakers.
- Make sure all associated components are powered on.
- Make sure the associated component connected to the selected input is producing an audible input signal.
- Try rebooting the Alpha DAC by cycling the power (power the Alpha DAC off, then back on again).

Distorted or Partial Sound

- Check the output cables between the Alpha DAC and the power amplifiers, making sure all connections are good and sound.
- Make sure that all speaker connections are tight and that there are no stray strands of wire shorting across the speaker terminals.

Noise/Hum

- Check the output cables between the Alpha DAC and the power amplifiers, making sure all connections are good and sound.
- Make sure the output cables between the Alpha DAC and the power amplifiers are not routed near AC cables, power transformers, or other EMI inducing devices.
- If there is a light dimmer, battery charger or other SCR based device on the same AC circuit as the power amplifiers, use an AC line filter or plug the power amplifiers into a different AC circuit.
- If a cable TV connection is present, disconnect the cable from the wall outlet. If this eliminates the humming sound, a ground loop isolation device is required. Contact an authorized Berkeley Audio Design dealer for assistance.
- It may be helpful to plug all associated components into the same AC circuit in order to share a common ground.