

Mini-DAC

2-Channel 24 bit/192kHz D/A Converter
(with optional USB)

User's Guide

v1.0 - June 2003



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Warnings

FCC warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to take whatever measures necessary to correct the interference at his own expense.

Copyright Notice

The Apogee Mini-DAC is a computer-based device, and as such contains and uses software in ROMs. This software, and all related documentation, including this User’s Guide contain proprietary information which is protected by copyright laws. All rights are reserved. No part of the software and its related documentation may be copied, transferred, or modified. You may not modify, adapt, translate, lease, distribute, resell for profit or create derivative works based on the software and its related documentation or any part thereof without prior written consent from Apogee Electronics Corporation, U.S.A.

Registration and Warranty Information

Be sure to register your Mini-DAC, either by filling in the enclosed Registration Card or by completing the on-line registration form at our Web site: <http://www.apogeedigital.com/register.html>. If you do so, Apogee can contact you with any update information. As enhancements and upgrades are developed, you will be contacted at the registration address. Firmware updates are free for the first year of ownership unless otherwise stated. Please address any inquiries to your dealer or directly to Apogee at:

**APOGEE ELECTRONICS CORPORATION,
3145 Donald Douglas Loop South, Santa Monica, CA 90405, USA.
TEL: (310) 915-1000, FAX: (310) 391-6262
email: support@apogeedigital.com. Web: <http://www.apogeedigital.com/>**

APOGEE ELECTRONICS CORPORATION warrants this product to be free of defects in material and manufacture under normal use for a period of 12 months. The term of this warranty begins on the date of sale to the purchaser. Units returned for warranty repair to Apogee or an authorized Apogee warranty repair facility will be repaired or replaced at the manufacturer's option, free of charge.

ALL UNITS RETURNED TO APOGEE OR AN AUTHORIZED APOGEE REPAIR FACILITY MUST BE PREPAID, INSURED AND PROPERLY PACKAGED, PREFERABLY IN THEIR ORIGINAL BOX.

Apogee reserves the right to change or improve design at any time without prior notification. Design changes are not implemented retroactively, and the incorporation of design changes into future units does not imply the availability of an upgrade to existing units.

This warranty is void if Apogee determines, in its sole business judgment, the defect to be the result of abuse, neglect, alteration or attempted repair by unauthorized personnel.

The warranties set forth above are in lieu of all other warranties, expressed or implied, and Apogee specifically disclaims any and all implied warranty of merchantability or of fitness for a particular purpose. The buyer acknowledges and agrees that in no event shall the company be held liable for any special, indirect, incidental or consequential damages, or for injury, loss or damage sustained by any person or property, that may result from this product failing to operate correctly at any time.

USA: Some states do not allow for the exclusion or limitation of implied warranties or liability for incidental or consequential damage, so the above exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Service Information

The Mini-DAC contains no user-serviceable components: refer to qualified service personnel for repair or upgrade. Your warranty will be voided if you tamper with the internal components. If you have any questions with regard to the above, please contact Apogee.

In the event your Mini-DAC needs to be upgraded or repaired, it is necessary to contact Apogee prior to shipping, and a Return Materials Authorization (RMA) number will be assigned. This number will serve as a reference for you and helps facilitate and expedite the return process. Apogee requires that shipments be pre-paid and insured — unless otherwise authorized in advance.

IMPORTANT: ANY SHIPMENT THAT IS NOT PRE-PAID OR IS SENT WITHOUT AN RMA NUMBER WILL NOT BE ACCEPTED.

Declarations of Conformity

Declaration of Conformity—FCC

Apogee Mini-DAC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Re-orient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a different circuit from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

NOTE: The use of non-shielded cable with this equipment is prohibited.

CAUTION: Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment.

Apogee Electronics Corporation, 3145 Donald Douglas Loop South, Santa Monica, CA 90405.
Betty Bennett, CEO.

Industry Canada Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Declaration of Conformity – CE

Apogee Electronics Corporation hereby declares that the product, the Mini-DAC to which this declaration relates, is in material conformity with the following standards or other normative documents:

- EN50081-1/EN55022; 1995
 - EN50082-1/IEC 801-2, 3, 4; 1992
- following the provisions of:
- 73/23/EEC – Low Voltage Directive
 - 89/336/EEC – EMC Directive

Declaration of Conformity – Japan

Apogee Electronics Corporation hereby declares that the Mini-DAC, to which this declaration relates, is in material conformity with the VCCI Class A standard.

Declaration of Conformity – Australia

Apogee Electronics Corporation hereby declares that the Mini-DAC is in material conformity with AN/NZS standard requirements.

OWNER’S RECORD

The serial number is located on the rear panel of the unit. We suggest you record the serial number in the space provided below. Refer to it whenever you call an authorized Apogee Electronics repair facility or the manufacturer. Please be sure to return your completed warranty card immediately!

Mini-DAC Serial No. _____

Purchase Date _____

Dealer _____

Phone _____

Address _____

User’s Installation Notes:

CAUTION:

Any changes or modifications not expressly approved by APOGEE ELECTRONICS CORPORATION could void your authority to operate this equipment under the FCC rules.

Mini-DAC

User's Guide

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Introduction

Apogee Electronics' Mini-DAC Digital-to-Analog Converter offers reference-quality audio performance, comprehensive monitoring features and unique USB functionality in a convenient, portable package.

- The Mini-DAC accepts AES, S/PDIF, Optical and USB digital inputs in a wide range of formats, at sample rates up to 192kHz.
- Apogee's Dual-stage clock ensures almost total immunity to jitter at the input stage.
- Monitoring facilities such as the front panel Level control, the Output activation matrix, and a powerful, wide-bandwidth headphone output make the Mini-DAC the complete monitoring solution for the Digital Audio Workstation-based studio.
- Mini-DAC's USB Format Conversion allows bi-directional communication with Apple Macintosh and Windows computers.
- With it's companion mic pre/A-to-D the Mini-Me, the Mini-DAC completes the master quality portable recording studio

Included Accessories

The following items are shipped with the Mini-DAC. Please save the box and foam to safely transport the unit.

- Universal 12-volt power supply and AC power cable
- Operation manual/warranty card
- AES IN breakout cable

Optional Accessories

- Carrying case – A rugged black nylon carrying case is available for all Mini series devices, complete with strap, extra pockets and purpose-built cable access ports.
- USB Option card – The USB Option Card may be retrofitted on any Mini-DAC delivered without this option. Please refer to the "Internal Adjustments" section of this manual for installation instructions.

Please register this unit by filling in the included registration card, or registering online at <http://www.apogeedigital.com/register.html>

Please read this manual – if you call for technical support, we'll assume that you have. There will be a quiz.

Getting Started Quickly




CONNECTING POWER

The MiniDAC operates from a high quality external switching power supply, included with the unit. Connect the power supply to the “POWER” connection on the back of the MiniDAC and to a convenient AC Outlet. As the power supply’s AC input voltage is automatically sensed, it may be connected to virtually any AC power outlet found worldwide without concern for voltage settings or fuse ratings.

Alternatively, any regulated 6-14 volt DC power supply capable of providing 1.25 amps of current will properly power the MiniDAC.

QUICKSTART

- 1) Connect the S/PDIF coaxial or optical output of a CD player to the appropriate S/PDIF or Optical connector on the Mini-DAC
- 2) Connect a pair of headphones to the front panel  output
- 3) Set the POWER switch to “ALL” (thus enabling all Mini-DAC outputs); the unit will express it’s eagerness to lock to a digital input by rapidly scrolling all LEDs in a mesmerizing pattern – quick, let’s get an input going!
- 4) Assuming that a CD player has been connected to MiniDAC’s S/PDIF coaxial input, set the INPUT SELECT knob to *S/PDIF CX*. The *W(ide)* and *N(arrow)* LOCK LEDs and the *44.1Khz* SAMPLE RATE LED should illuminate.
- 5) Adjust the LEVEL knob for a comfortable listening level.

USING THIS MANUAL

While the regularly scheduled manual runs in the adjacent text, in-depth explanations, operational warnings and other digressions will be presented in these columns.

In this manual, parameters are defined as the operational characteristics of the MiniDAC, and are capitalized in this manner: **INPUT SELECT**.

“Values” are defined as the available options for each parameter – for example, the parameter **LOCK** has the values *Wide* and *Narrow*. Values are italicized in this manner: *S/PDIF*.

“Settings” are defined as the entire set of parameters and values.

SYMBOLS:



The exclamation mark alerts the user to potential pitfalls of operation.



The musical note indicates in-depth explanations.

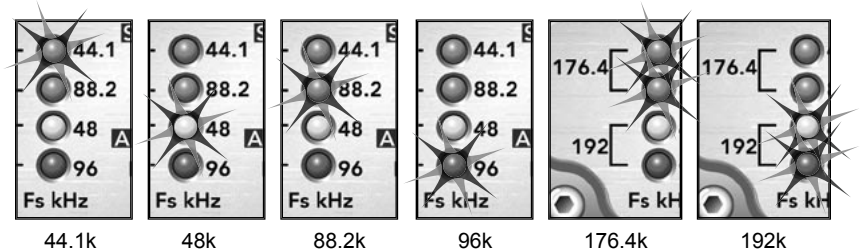
Navigating the Front Panel



The clock circuitry of a typical D-to-A converter must be designed as a compromise between the ability to attenuate input signal jitter and the ability to accept any bitstream, regardless of its stability. The more the clock is allowed to track timing variations of the input, the more jitter remains in the clock at the conversion stage, with the degradation of conversion quality as a result. The Mini-DAC’s Dual Stage Clock overcomes this compromise by employing one clock stage to accept the bitstream and store bits in a buffer, and a second stage to clock bits out of the buffer to the conversion stage. The first stage is optimized to track timing variations of the input, while the second stage is optimized to attenuate jitter and ensure that conversion takes place with the lowest jitter clock possible.



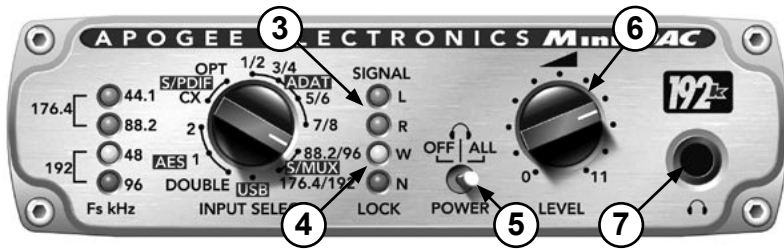
- 1) **SAMPLE RATE** - These four LEDs are used to indicate the six available sample rates at which the MiniDAC may operate. When the MiniDAC is not receiving a valid digital input, all the LEDs flash sequentially in a repetitive pattern. Once MiniDAC has received a valid input, the automatically detected sample rate is indicated as shown below.



- 2) **INPUT SELECT** – The following digital formats may be selected with the INPUT SELECT knob; for a more detailed explanation of the various digital formats accepted, please see the section of this manual entitled “About Digital Audio Formats” on pg. 12.

- 1) **USB** – input is accepted from the USB connector. Simultaneously, the first digital signal (in specific formats) detected on any other input will be converted and transmitted to the **USB Output**. Likewise, when any other format is selected as input, the signal is also transmitted to the **USB Output**. Please see “Working with USB” for more information on USB Format Conversion.
- 2) **AES DOUBLE** – input is accepted from the AES 1 & 2 connectors and treated as Double Wire format.
- 3) **AES 1 SINGLE** – input is accepted from the AES 1 connector and treated as Single Wire format.
- 4) **AES 2 SINGLE** - input is accepted from the AES 2 connector and treated as Single Wire format.
- 5) **S/PDIF CX (Coax)** - input is accepted from the S/PDIF coaxial (RCA) connector;
- 6) **S/PDIF OPT** - input is accepted from the Optical connector and treated as S/PDIF format.
- 7) **ADAT** (pairs 1/2,3/4,5/6,7/8) - input is accepted from the Optical connector and treated as ADAT format; any pair of channels (1/2,3/4,5/6,7/8) may be selected as Mini-Dac’s input.
- 8) **S/MUX 88.2/96** - input is accepted from the Optical connector and treated as S/MUX format at 88.9/96 kHz; only channels 1/2 may be selected as Mini-DAC’s input
- 9) **S/MUX 176.4/192** - input is accepted from the Optical connector and treated as format at 176.4/192 kHz.

Navigating the Front Panel - *continued*



- 3) **SIGNAL** indicators – The brightness of these LEDs displays the left (L) and right (R) signal level of the selected INPUT SOURCE. The LEDs begin to illuminate at a level of –30 dBFs and are at their brightest at 0 dBFs.
- 4) **LOCK** – These LEDs indicate the Lock status of Mini-DAC’s dual stage clock. Two levels of lock precision are displayed, *W*(ide) and *N*(arrow).
- 5) **POWER** – The POWER switch not only turns the unit on and off, but also selectively activates analog outputs according to the position of the switch. FIGURE 1 displays the outputs activated at each switch position.
- 6) **LEVEL** – This knob always controls the Output level; the knob also controls the XLR ANALOG and 1/8” LINE OUT output levels when each output’s internal jumper is set to VAR. And of course, the knob goes to 11.
- 7) – This headphone output utilizes a discrete, high slew rate amplifier stage able to effortlessly drive modern low impedance headphones. As the amplifier can generate sound levels potentially damaging to hearing, please reduce the LEVEL knob before connecting headphones.

		POWER SWITCH POSITIONS	
			ALL
O U T P U T S	Output	Output On LEVEL knob Active	Output On LEVEL knob Active
	XLR Output (XLR OUT jumper on VAR)	Muted	Output On LEVEL knob Active Trim pots Active
	XLR Output (XLR OUT jumper on TRIM)	Output On Trim pots Active	Output On Trim pots Active
	1/8” Output (1/8” OUT jumper on VAR)	Muted	Output On LEVEL knob Active
	1/8” Output (1/8” OUT jumper on FIX)	Output On Fixed Output Level	Output On Fixed Output Level

FIGURE 1

For more information on configuration of the XLR and 1/8” Outputs, see the section of this manual entitled “INTERNAL ADJUSTMENTS”.



While the POWER switch options may appear overly complicated, a commonly encountered example will demonstrate their utility.

Let’s imagine a recording session where two performers are set up in a room which serves both as control room and recording area (as is the case with most project studios) Monitor speakers are connected to the Mini-DAC’s XLR ANALOG Output (whose jumper is set to VAR), performer no. 1 connects his headphones to the front panel Output, while performer no.2 gets his headphone feed from an external headphone amp connected to the 1/8” LINE OUT (whose jumper is set to FIX).

While recording, the POWER switch is set to ; the monitor speakers are muted (to avoid bleed into the microphones), performer no.1 connects his headphone to the Output and adjusts his listening level with the front panel LEVEL control, and performer no. 2 connects his external headphone amp to the 1/8” LINE OUT, allowing him to control his listening level independently.

If both performers are using similar headphones and can agree on listening levels (which we all know is unlikely!), the 1/8” LINE OUT may be used directly as a second headphone output. Set the 1/8” Out jumpers to VAR, and control both headphone sends with the front panel LEVEL knob.

During playback, the POWER switch is set to ALL, thereby activating the XLR outputs feeding the monitor speakers, in addition to the other two outputs.

Connections on the Rear Panel



- 1) POWER input – The DC input accepts a range of voltages between 6 and 14 volts DC. The power supply employed must be capable of delivering 1.25 amps of current within the specified range.
- 2) S/PDIF input – This RCA (Cinch) connector accepts S/PDIF Coaxial Input.
- 3) OPTICAL input – This Toslink connector accepts Optical input in the format selected by the front panel INPUT SELECT knob. Please see the section entitled “About Digital Audio Formats” for detailed information on the formats provided.
- 4) AES IN – This Sub-D connector accept AES/EBU input in the format selected by the front panel AES parameter, using the supplied Sub-D 9 pin to 2 female XLR adaptor cable. When INPUT SELECT is set to AES 1 or 2, each connection accepts a discrete stereo input; when INPUT SELECT is set to AES DOUBLE, both connections used in conjunction accept one stereo input.
- 5) USB – USB Input/Output. Please see the section of this manual entitled “Working with USB” for more details concerning operation of the MiniDAC with USB devices.
- 6) LINE OUT – This 1/8” stereo connector provides an unbalanced analog output at a maximum output level of +7 dBV, for use with –10dBV equipment or as a second headphone output.
- 7) ANALOG OUT – These XLR connectors provide balanced analog outputs with a maximum output level of +24 dBu.

Working with USB

USB Format Conversion

When bi-directional interfaces such as USB are included on digital-to-analog converters, the input side of the interface is employed to accept a digital signal while the output side usually remains unused. Thanks to the unique implementation of Apogee’s USB interface, the Mini-DAC offers two USB Format Conversion configurations which employ the output side of the USB interface, thus greatly expanding the unit’s capabilities.

The first configuration utilizing USB Format Conversion is active when INPUT SELECT is set to *USB*; a digital signal is accepted from the USB input, converted to analog and transmitted to the enabled analog outputs. Simultaneously, the AES, S/PDIF and Optical inputs are scanned for another digital signal, and the first signal detected on these inputs is sent to the USB output. This second digital signal is assumed to be Single wire format if detected on either AES input or the S/PDIF input, and ADAT format (channels 1 & 2) if detected on the Optical input. Signals of any sample rate are accepted and are converted to the Mini-DAC’s sample rate, as determined by the host USB device,

With this functionality it’s possible to connect both an Apogee MiniMe and MiniDAC to a USB-equipped computer with only one USB cable and driver, as depicted in FIGURE 2. Remember that any device with a digital output may be connected as shown: an Apogee Rosetta or Trak2 A-to-D converter, a CD player or even another DAW.

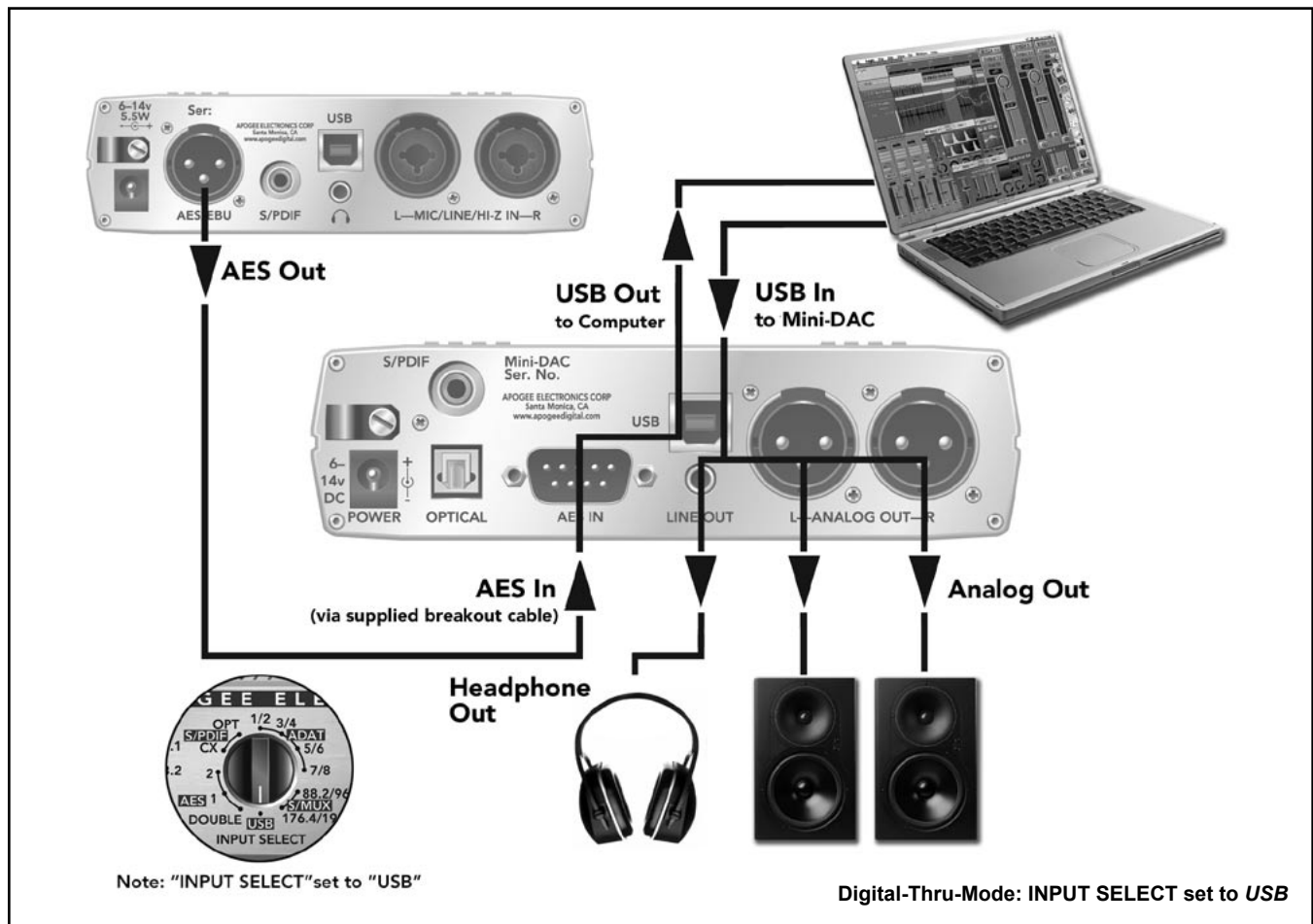


FIGURE 2

Working with USB - *continued*

The second configuration which utilizes USB Format Conversion is active when any other input is selected – a digital signal is accepted from the selected input, converted to analog and transmitted to the enabled analog outputs AS WELL AS the USB output. The Mini-DAC’s sample rate is determined by the incoming signal and the INPUT SELECT knob, while the USB output is sample-rate converted to the rate determined by the Host USB device.

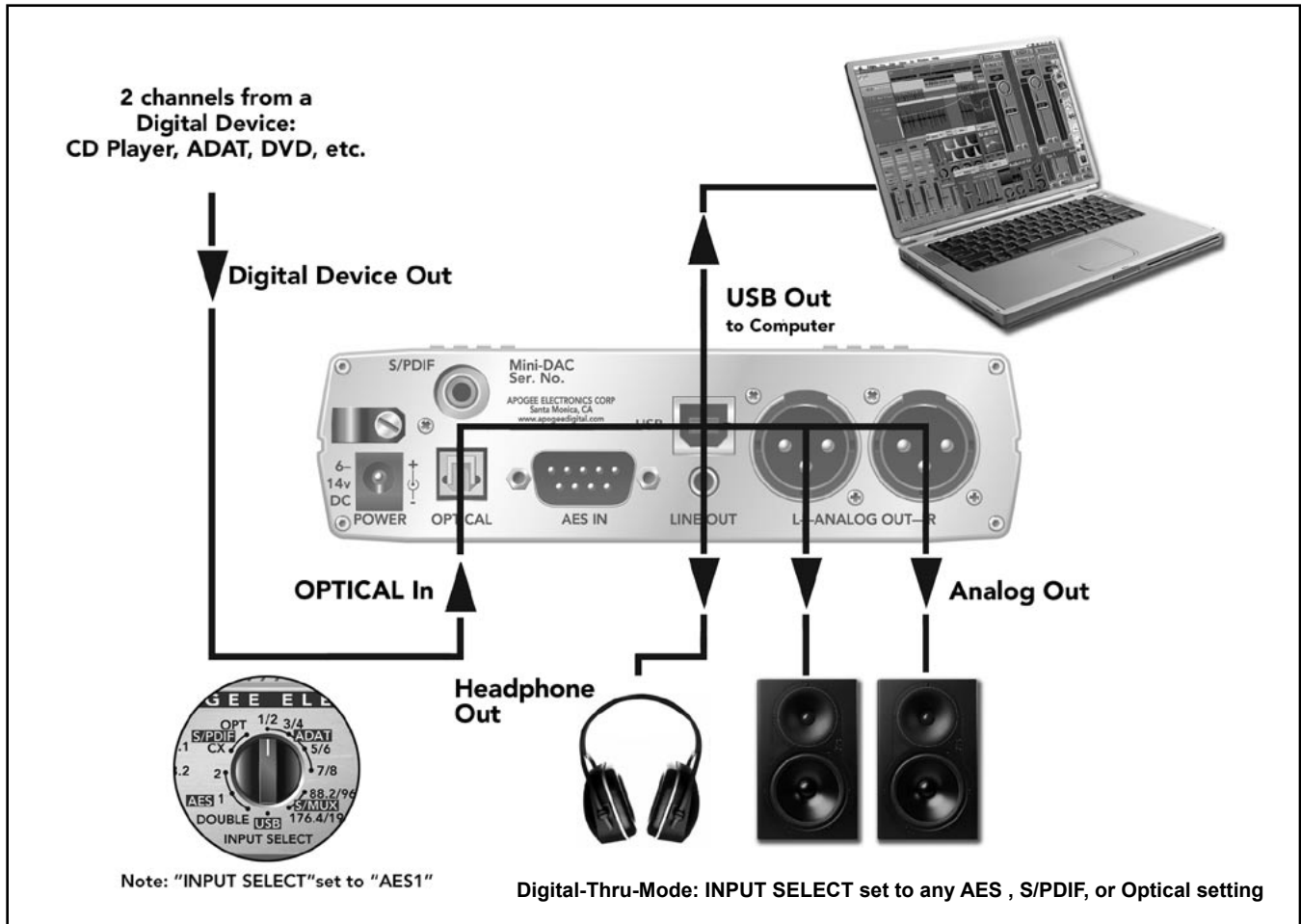


FIGURE 3

Working with USB - *continued*

Interfacing the Mini-DAC via USB

As described above, a Mini-DAC equipped with a USB Option Card offers digital input and output with recent Macintosh and Windows operating systems. While the Mini-DAC can often operate correctly with native OS drivers, in most cases the best performance is obtained with dedicated hardware drivers, available for the Mini-DAC at www.apogeedigital.com/usb. Please consult the following application notes for specific details concerning each Operating System and driver option.

Macintosh - General

Regardless of the OS version, follow these steps when connecting the Mini-DAC to a Mac:

- 1) Connect the Mini-DAC to a USB connection on the computer (i.e. not on the keyboard, screen or via a USB hub).
- 2) Power on the Mini-DAC and the computer.
- 3) Open the “Apple System Profiler” utility, choose the “Volumes and Devices” tab, and verify that the Mini-DAC appears on the appropriate USB bus.

OS 9.1 and later – Sound Manager

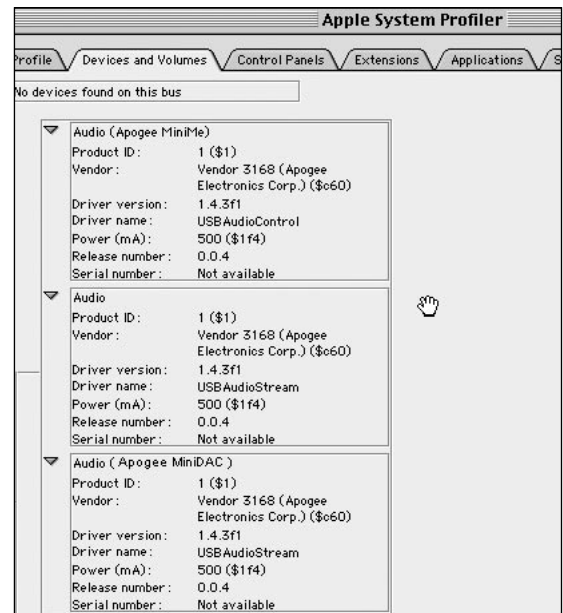
The Mini-DAC can be used with Sound Manager, though latency performance is less than ideal and resolution/sample rate is limited to 16-bit, 44.1 kHz, due to the limitations of the OS.

- 1) After connecting the Mini-DAC as specified above, open the “Sound” Control Panel, click on the “Input” tab, and select “External Mic – USB Audio”.
- 2) Click on the “Output” tab and select “USB Audio”.
- 3) If the Mini-DAC’s ASIO extension has been installed and activated, the preceding options will not appear. Disable the “PG ApogeeMiniDAC” extension in the “Extensions Manager” Control Panel and re-start the computer.

OS 9.1 and later – ASIO

For best latency performance and 24-bit recording under Mac OS 9, it’s necessary to download the MiniDAC ASIO driver from the Apogee website at www.apogeedigital.com/usb.

- 1) Download the driver and decompress the files using Aladdin Systems Stuffit Expander utility. The resultant folder will be labeled “apogee_usb_mac Folder” and will contain two files labeled “Apogee MiniDAC ASIO Driver” and “PGApogeeMiniDAC”.
- 2) Place the “Apogee MiniDAC ASIO Driver” in the ASIO folder of all applications to be used with the Mini-DAC, and the “PGApogeeMiniDAC” in the System Folder > Extensions folder. Restart the computer.



Apple System Profiler

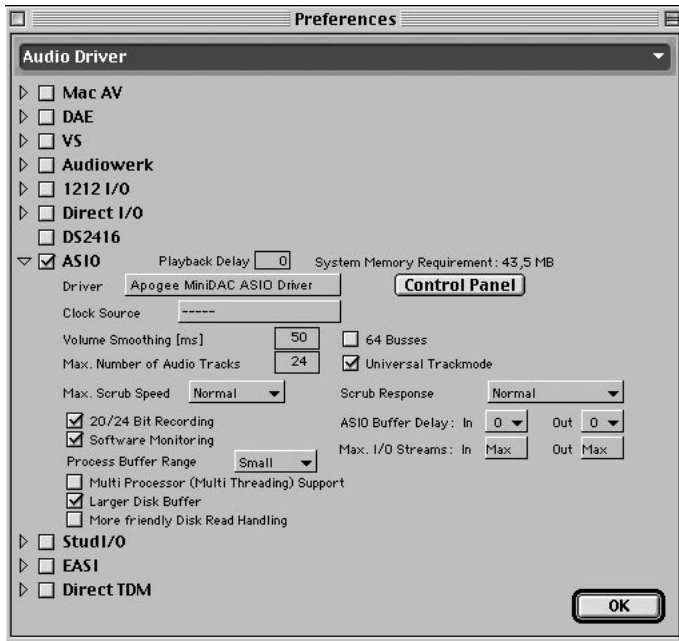


Sound Manager

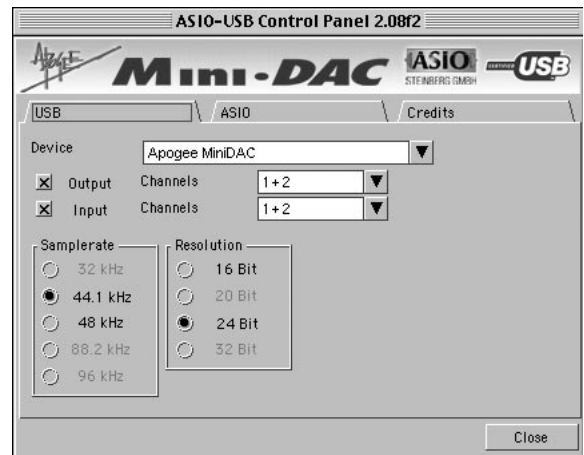
Working with USB - continued

OS 9.1 and later – ASIO (continued)

- 3) Configure the ASIO compatible application for use with the Apogee Mini-DAC ASIO Driver. For example, in Emagic Logic follow these steps:
 - a. Go to the Preferences>Audio Driver page, expand the ASIO properties and select the Apogee MiniDAC ASIO Driver. Open the Mini-DAC Control Panel to configure sample rate and bit depth.



ASIO Driver Preferences



Mini-DAC Control Panel

OS 10.1 and later (10.2.3 and later highly recommended) – CoreAudio

Whereas ASIO drivers are suggested for best performance with OS 9 and Windows, the native CoreAudio USB drivers offers the best performance with OS 10.2.3 and above.

- 1) Connect the Mini-DAC as specified above.
- 2) Configure the CoreAudio compatible application for use with the Mini-DAC.

OS 10.1 and later (10.2.3 and later highly recommended) – ASIO

As of the release date of the Mini-DAC (June 2003) there remain some OS X applications (notably Cubase SX and Digital Performer 4) which are not CoreAudio compatible, and require an OS X ASIO driver for proper operation. This driver is available at www.apogeedigital.com/usb,

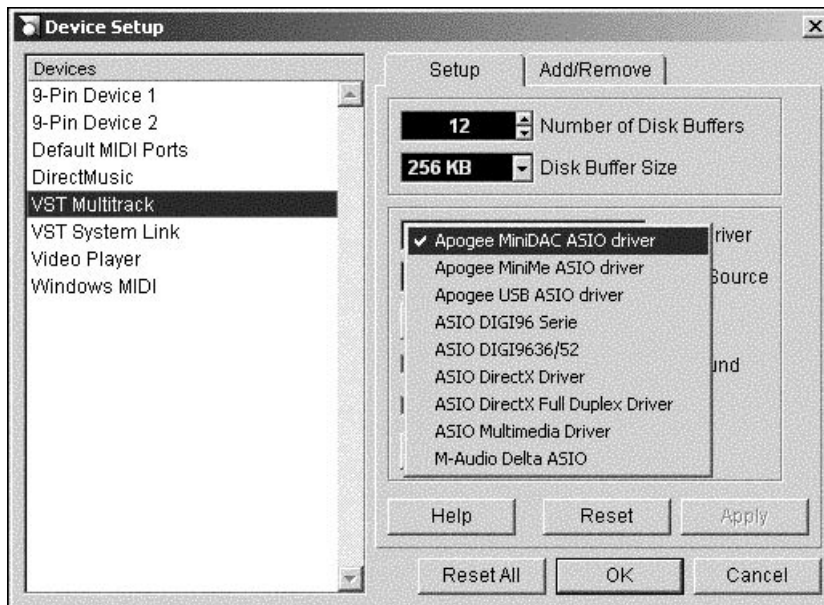
- 1) Download the driver and decompress the files using Aladdin Systems Stuffit Expander utility.
- 2) Further installation instructions are provided by the driver package.
- 3) Once installation is complete, restart the computer.

Working with USB - *continued*

Windows – General

Regardless of the OS version, it is highly recommended to install the Apogee MiniDAC USB.

- 1) Please consult the following application notes specific to each Windows version for important warnings and other information.
- 2) Download the driver and decompress the files using the WinZip utility. The resultant folder will be labeled “apogee_usb_win” and will contain several files, including a setup.exe file. Double click on the setup.exe file to begin installation.
- 3) Further installation instructions are provided by the driver package.
- 4) Once installation is complete, restart the computer.
- 5) Configure the ASIO compatible application for use with the Apogee MiniDAC ASIO Driver. For example, in Steinberg Nuendo, follow these steps:
 - a. From the “Devices” menu choose “Device Setup”.
 - b. From the list of “Devices” displayed, choose “VST Multitrack”.
 - c. Click on the “ASIO Driver” arrow to view the drop down menu of possible selections, and select “Apogee MiniDAC ASIO Driver”.
 - d. Click on the “Control Panel” button to open the MiniDAC Control Panel and configure sample rate and bit depth.



Nuendo Driver Setup

Windows 98 SE

Only Windows 98 SE (Second Edition) is supported

Windows ME, 2000

Both Windows ME and 2000 are supported

Windows XP

Due to USB Audio issues encountered with the initial release of Windows XP, installation of **Service Release 1** is highly recommended. Though most issues are resolved in this release, one issue remains concerning installation of the ASIO driver. Please consult the `usb_xp_readme.txt` file included with the driver package for important instructions.

About Digital Audio Formats

Name(s)	Connector used	Valid Sample Rates	Channels per connector	Digital Data Rate
AES Single Wire or Double Fast or Single Wide	XLR	44.1-192kHz	2	Fs x 1
AES Double Wire or Double Wide	XLR	88.2-192 kHz	1	Fs /2
S/PDIF Coaxial	RCA (coaxial)	44.1-192kHz	2	Fs x 1
S/PDIF Optical	Toslink (optical)	44.1-96kHz	2	Fs x 1
ADAT	Toslink (optical)	44.1-48kHz	8	Fs x 1
S/MUX 2	Toslink (optical)	88.2-96kHz	4	Fs /2
S/MUX 4	Toslink (optical)	176.4-192kHz	2	Fs /4

FIGURE 4

As sample rates and bit resolutions have increased, digital audio formats have been modified to handle the increased flow of data, to the point where the proliferation of format variations has led to some confusion. For example, 5 variations of the AES/EBU format have been developed to handle sample rates between 44.1kHz and 192kHz.

FIGURE 4 depicts the characteristics of the digital audio formats available on the Mini-DAC, including the names by which the format is known, the connector used, valid sample rates, the number of digital audio channels per connection, and the rate of transmission. For example, AES Double Wire format can carry only 1 channel of audio per connection, uses XLR connectors, is used only with sample rates between 88.2 and 192 kHz, and transmits data at half the sample rate – i.e., bits travel at 48kHz when transmitting a 96kHz digital audio signal.

Internal Adjustments

Jumpers P4 & P9 – These jumpers are used to configure the XLR ANALOG OUTPUTS.

- When jumpers are installed between the two pins labeled *VAR*, the output level is controlled by the Front Panel LEVEL knob and trimpots R 45 and R 71 (factory default).
- When jumpers are installed between the two pins labeled *TRIM*, the output level is controlled by trimpots R 45 and R 71 only.

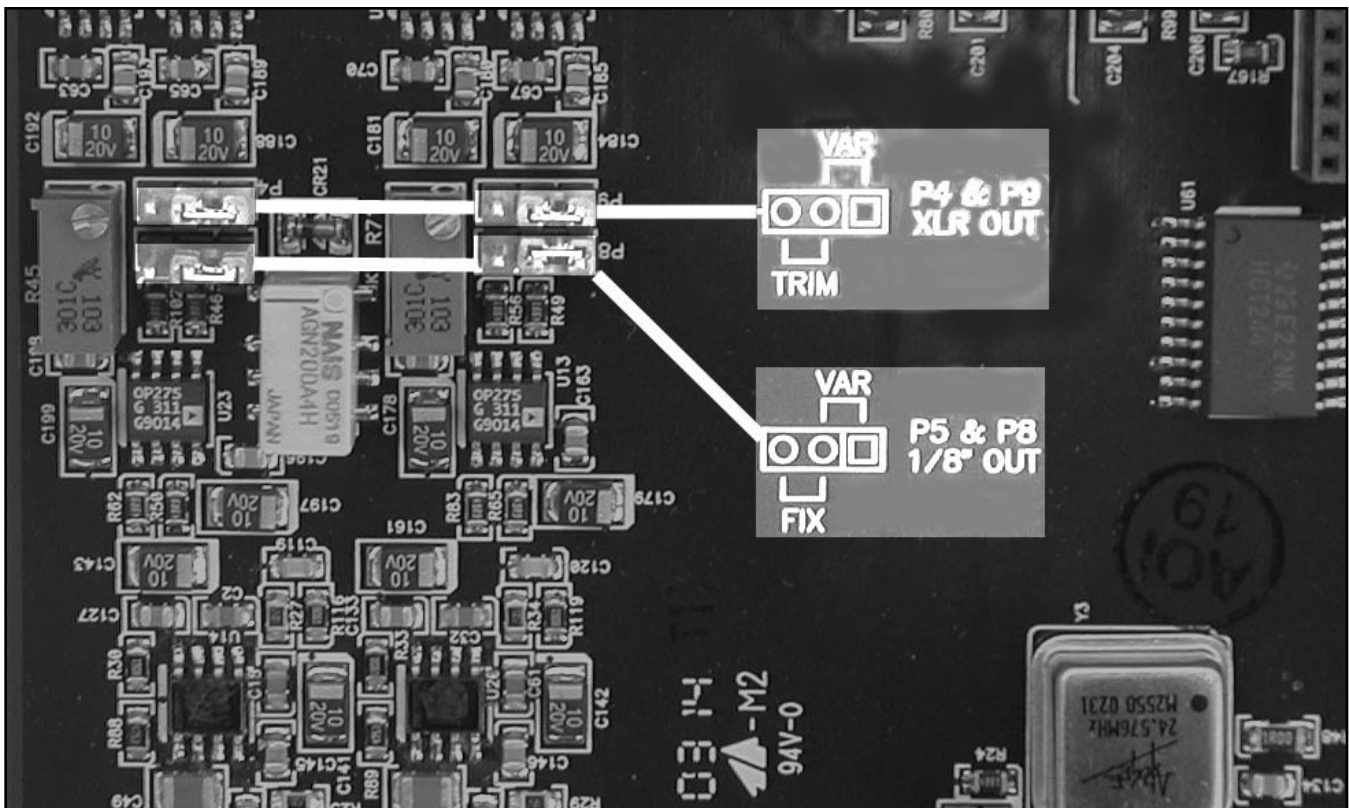
Trimpots R45 & R71 - These trimpots modify the XLR ANALOG OUTPUT level regardless of the position of jumpers P4 and P9. R45 controls the Left Output, while R71 controls the Right Output.

Calibration – From the factory, the Mini-DAC is calibrated for a maximum analog output level of +20 dBu, or -16 dBFs = +4 dBu (at the XLR ANALOG OUT connectors with the LEVEL knob fully clockwise). To re-calibrate to another conversion level, follow these steps:

- 1) Turn the LEVEL knob fully clockwise.
- 2) Input a 1kHz sine wave at the desired digital reference level (most likely between -20 and -12 dBFs). This may be most easily accomplished by connecting the Mini-DAC to a computer running an application capable of generating digital reference tones.
- 3) Turn trimpots R55 and R 71 until a +4 dBu signal is obtained at the XLR ANALOG OUT connectors. A + 4 dBu output level may be accurately determined with even the most inexpensive voltmeter; simply measure between pins 2 and 3 of the XLR ANALOG OUTPUT connector for an AC voltage of 1.23 volts.

Jumpers P5 & P8 – These jumpers are used to configure the 1/8" LINE OUTPUTS.

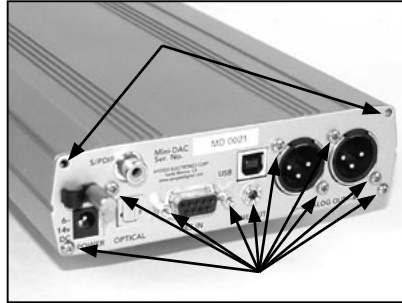
- When jumpers are installed between the two pins labeled *VAR*, the output level is controlled by the Front Panel LEVEL knob (factory default).
- When jumpers are installed between the two pins labeled *FIX*, the output level is fixed at a maximum output level of +7 dBV.



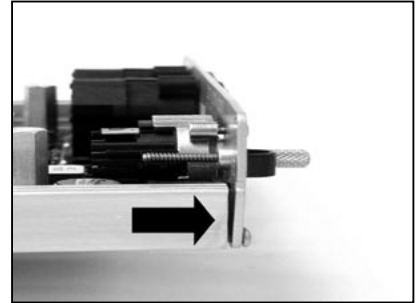
INSTALLING THE USB OPTION CARD



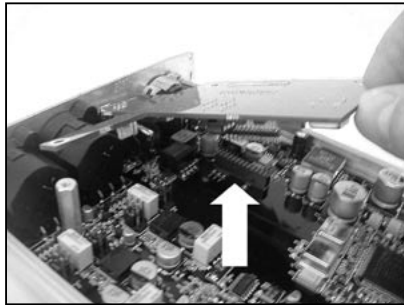
1. Remove the two TOP screws from the Mini-DAC front panel, using a 1/16" hex wrench.



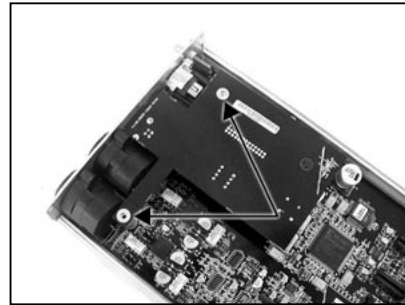
2. Remove the two TOP rear panel screws, and LOOSEN ONLY the bottom two rear panel screws and the eight connector mounting screws.



3. Pull the rear panel back (without removing it) to provide clearance for the USB Option Card connector.



4. Insert the USB Connector (on the USB Option Card) into the square cutout of the Mini-DAC rear panel, ensure that connector pins under the card are properly aligned (indicated at right), and gently press the Option Card into place.



5. Secure the Option Card by installing the two provided screws in the locations indicated. Re-install the Mini-DAC Top Cover.

Features & Specifications

- Inputs include AES (single & double wide), Optical (ADAT, S/MUX & S/PDIF) coax, & USB
- Analog Output level control for direct connection of powered monitors
- Low-current, low-voltage -ideal for location/ENG
- Digital thru mode adds USB functionality to any digital device including Apogee's Mini-Me, Trak2 and Rosetta

Inputs:

- 2 x AES-EBU on 9 pin D-Type (breakout cable to two female XLR-3 required) handling sample rates: 44.1k-192k single-wide and 88.2 k-192k double-wide.
- S/PDIF optical on TOS-LINK 44.1/48k
- S/PDIF coaxial on RCA 44/1-192k
- ADAT 44/1-48k
- ADAT/SMUX II for 88/2/96k
- ADAT/SMUX IV for 176.4/192k
- USB at 44.1/48k

Outputs:

- 2 x XLR (pin 2 – hot) for pro-audio stereo
- 1/8" jack for consumer-level stereo (standard 1/8" to RCA cable required) also able to drive headphone's
- 1/4" jack headphone
- USB

Specs:

- Output level xlr's: 24dBu max (internally or externally adjustable) ultra low impedance, high current drive balanced outputs.
- Output 1/8": +7dBV max (fixed or externally adjustable)
- Headphone out: 300mW into 30 ohm
- Sample rates: 44.1/48-88.2/96-176/192 . All +/- 10%
- Max word length: 24bit
- Frequency response: 10-20k +/- 0.2 dB (at 44.1kHz)
- THD+N: -104 dB
- Dynamic range: 119 dB weighted
- Inter channel crosstalk: -125 dB
- Power consumption: 6.5W max.
- Power source: 6-14 V DC. International (90-240V) power adapter included

Due to on-going development Apogee reserves the right to change all information and specifications without notice.

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