

User's Guide



ADI-1

High Quality
20 Bit / 48 kHz Stereo
AD/DA Converter

Contents

1	Introduction	2
2	Supplied Contents.....	2
3	Power Supply	2
4	Brief Description and Characteristics.....	3
5	Technical Specifications	
5.1	Digital Specs	3
5.2	Analog Specs	3
6	Usage	
6.1	Analog to Digital	4
6.2	Digital to Analog	5
7	Special Features of the Digital Connectors	5
7.1	Digital Output.....	5
7.2	Digital Input	6
8	TECH INFO	6
9	Controls and Connectors	7
10	Warranty	8
11	Addendum	8

1. Introduction

RME's combined analog to digital and digital to analog converter **ADI-1** offers highly precise conversion from analog to digital and vice versa. Newest circuit technology combined with modern integrated circuits resulted in a unique and outstanding device, meeting highest quality standards. The **ADI-1** will excite you even after many years of usage.

2. Supplied Contents

Please ensure that all the following parts are included in **ADI-1**'s packaging box:

- **ADI-1**
- Short info
- RME Driver-CD
- Power supply

3. Power Supply

The supplied wall-wart AC adapter provides 12 V AC to the **ADI-1**. Therefore the polarity doesn't matter.



Using the ADI-1 with common universal (DC) power supplies is not possible! The device won't be damaged, but will not operate. Please use only the supplied adapter from RME.

4. Brief Description and Characteristics

The **ADI-1** is a compact 2-channel analog to digital and digital to analog converter in a half rackspace enclosure. AD- and DA-circuit can be used completely independent from each other. Newest 20 bit converters using 128 times oversampling result in more than 100 dB dynamic ratio. We guarantee: this value is not only printed in the brochure, it is available with every sold unit.

The servo balanced inputs use Neutrik's well known combi jack (XLR / 1/4" TRS jack). The servo balanced outputs are fitted with both XLR and 1/4" TRS jacks separately. The digital inputs and outputs both support the SPDIF format and have coaxial and optical (TOSLINK) connectors.

One of the main issues in using an AD-converter with its full dynamic range is the use of the best operating level. Because of this RME's **ADI-1** is fitted with a level switch on the back, offering perfect adaption to the most used levels -10 dBV and +4 dBu. An additional super low noise amplifier stage provides 20 dB of adjustable gain using two hi-precision potentiometers on the front panel.

The clear structured front panel is easy to understand. The level meters are precision LED meters with reliable Over detection. The level display is based on our experience in meter technology found in RME's **DAM-1**. The AD-converter will sample in 32, 44,1 or 48 kHz, and the DA-converter accepts every frequency between 20 kHz and 55 kHz at its input. An error LED shows the status of the actual incoming signal.

5. Technical Specifications

- Power supply: external wall-wart AC adapter, 12 V AC, 850 mA
- Dimensions: 214 x 44 x 105 mm

5.1 Digital Specs

- Super Low Jitter Design: < 2 ns in PLL mode (DA)
- Input PLL works without dropouts even at more than 40 ns jitter (DA)
- High sensitive input stage (< 0,2 Vpp input level) (DA)
- Output voltage cinch 0,5 Vpp
- Output format 'Consumer'
- Supported sample frequencies AD: 32 kHz, 44,1 kHz, 48 kHz
- Supported sample frequencies DA: 25 kHz - 60 kHz
- Resolution AD/DA: 20 bit
- Input optical (TOSLINK), cinch (RCA)
- Input format SPDIF, AES/EBU (Consumer and Professional)
- Output optical (TOSLINK), cinch (RCA)
- Output format SPDIF (Consumer)

5.2 Analog Specs

- Dynamic AD: 102 dBA
- Dynamic DA: 108 dBA
- THD+N AD: -89 dB / 0,003 %
- THD+N DA: -88 dB / 0,003 %
- Maximum input level AD: +20 dBu
- Maximum output level DA: +10 dBu
- Frequency response AD/DA, -0,1 dB: 10 Hz - 21 kHz
- Input AD: XLR / TRS, servo balanced
- Output DA: XLR / TRS, servo balanced

6. Usage

6.1 Analog to Digital

Connect your analog signal source with the ADI's XLR or TRS input jacks. First adjust the knobs fully counter clockwise and try to achieve an optimal input level by toggling the 'operating level' switch. Fine adjusting the input level can easily be done by watching the level meter while turning the knobs. The best input level is present when all LEDs except the Over LEDs are lit at the loudest parts of the signal.



The highest signal to noise ratio is achieved by turning the knobs fully counter clockwise (0). Whenever possible the level of the source itself should be adjusted (for example when a mixing desk is used).

The analog inputs use Neutrik's combi jack, thus providing XLR- and 1/4" TRS jacks, both useable in balanced or unbalanced mode. The input stage is built in a servo balanced design that handles monaural and stereo jacks correctly. When used unbalanced it automatically corrects the gain by 6 dB.

Adapting the working level to the most common values, +4 dBu and -10 dBV, is done by pushing a switch on the rear panel. The potentiometers on the front panel provide additional 20 dB of gain variation.

The desired sample frequency of the AD-converter is set to 32 kHz, 44,1 kHz and 48 kHz by pushing the switch 'Sample Frequency' on the front panel several times.

When using unbalanced cables with XLR jacks we recommend to short pin 3 of the cable's jack to pin 1 (ground). Otherwise noise may occur, caused by the unconnected negative input of the ADI-1's input jack.

At the cinch and optical digital output a SPDIF signal with channel status *Consumer* is available. Connecting the output to professional devices using their XLR inputs (AES/EBU) requires a cable adapter cinch/XLR, please ask your local dealer. Some professional devices don't accept Consumer format at their professional inputs at all and won't accept the digital signal from the ADI-1.

Transferring digital data into a PCI bus equipped computer is best done using RME's digital interface cards of the DIGI96 Series. These cards with highest reputation are the ultimate solution for master and multitrack tasks. Drivers are available for Windows 95/98 and NT, MacOS, and shortly for Linux, Unix, Solaris and BeOS.

6.2 Digital to Analog

The digital input of the **ADI-1** works fully self adjusting and needs no setting of bit resolution, format (Professional/Consumer) or sample frequency. Only the active input has to be chosen (optical or cinch). Use the switch 'Select Digital Input' on the back.

Receiving signals according to the AES/EBU standard via **ADI-1**'s cinch input requires a cable adapter (available at your local dealer). Pins 2 and 3 of an XLR connector have to be single connected with the two pins of a cinch (RCA) plug. The shielding of the cable is connected only to pin 1 of the XLR connector.

The sample frequency of the DA-converter is automatically extracted out of the incoming signal. Three LEDs on the front panel display the actual sample rate (32 kHz, 44,1 kHz, 48 kHz). As the **ADI-1** is able to sync to any signal in the range of 25 kHz to 60 kHz (including varispeed operation) no LED might be active in case the actual sample frequency has a deviation of more than $\pm 4\%$ of 32 kHz, 44,1 kHz, 48 kHz. The Error LED will tell whether a valid input signal exists or not, no matter which sample rate is present.

A digital full level signal (0 dBFS) results in an analog output level of +10 dBu at the analog outputs of the **ADI-1**. Those outputs work in a servo balanced manner, so when using unbalanced jacks or cables the level will be adapted automatically. To guarantee this level correction on unbalanced XLR connections pin 3 of the cables XLR connector should be shorted to pin 1 (ground).

The outputs are of low impedance type. Therefore, even loaded with 200 ohms and maximum level, distortion (THD) will not rise, clipping or other limiting effects won't occur.

7. Special Features of the Digital Connectors

7.1 Digital Output

Digital audio signals in SPDIF or AES/EBU format include the audio information and a header (Channel Status), transferring further information. Wrong channel status data often lead to misfunction. The outgoing status data of the **ADI-1** has been fixed according to its SPDIF format, but also been optimized to the largest compatibility possible with regard to other digital appliances:

- 32 kHz, 44,1 kHz, 48 kHz according to the sample frequency
- Audio use
- No copyright, copy permitted
- Format Consumer
- Category General, Original Material
- 2-Channel, No Emphasis

Connecting the output to professional devices using their XLR inputs (AES/EBU) requires a cable adapter cinch/XLR, please ask your local dealer. Some professional devices don't accept consumer format at their professional inputs at all and won't accept the digital signal from the **ADI-1**.



Only a few professional products don't accept Consumer format at their professional inputs. In this case special format converters which change the channel status data are necessary.

Both digital outputs are driven parallel and carry an identical signal.

7.2 Digital Input

The digital input of the **ADI-1** accepts all common digital sources as well as SPDIF and AES/EBU. Channel Status (Consumer/Professional) and copy protection will be ignored.



The ADI-1 also ignores all Emphasis information. As Pre- and Deemphasis hasn't been used for years by anyone in the recording industry this should not result in any problem. In case recordings done with Emphasis are played back using the ADI-1 they will sound very crispy, as treble is boosted for more than 6 dB.

Receiving signals according to the AES/EBU standard via **ADI-1**'s cinch input requires a cable adapter (available at your local dealer). Pins 2 and 3 of an XLR connector have to be single connected with the two pins of a cinch (RCA) plug. The shielding of the cable is connected only to pin 1 of the XLR connector.

Thanks to a lightning fast PLL **ADI-1** is able not only to operate with common (fixed) sample frequencies, but with every frequency in the range of 25 kHz to 60 kHz. The digital input serves as synchronisation source. Because of this the **ADI-1**'s DA converter will work flawlessly even at changing sample frequencies (varispeed operation).

8. TECH INFO

RME provides more and very detailed information about all products on the TECH INFO pages in the web (<http://www.rme-audio.com/techinfo/index.htm>), and on our Driver-CD in the directory \rmeaudio.com\techinfo. The following documents are currently available:

Synchronisation (06/05/98)

Digital audio synchronisation: technical background, problems

Problems with Installation (05/03/98)

List of Driver Updates (08/15/98)

ADI-1 Inside (05/08/98)

Interesting technical description of our 20 bit AD/DA converter

Configuration of Samplitude, Cubase and Logic using DIGI32/96 Series (06/06/98)

Step by step instructions

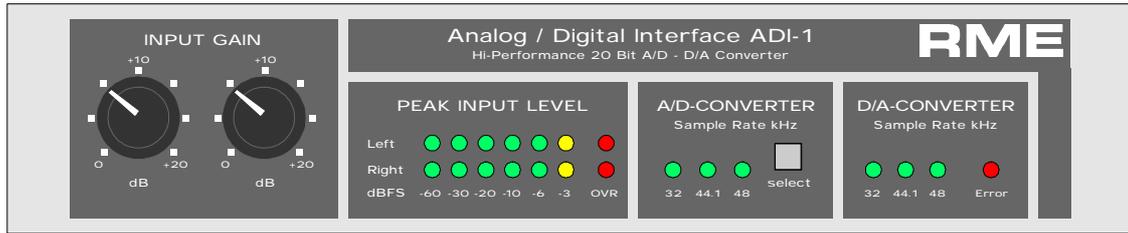
Configuration of Cakewalk 7.0 and SAWPlus32 using DIGI32/96 Series (07/27/98)

Step by step instructions

DIGICheck™ : Test, Measurement and Analysis Tool for the DIGI96™ Series (10/10/98)

9. Controls and Connectors

Front panel



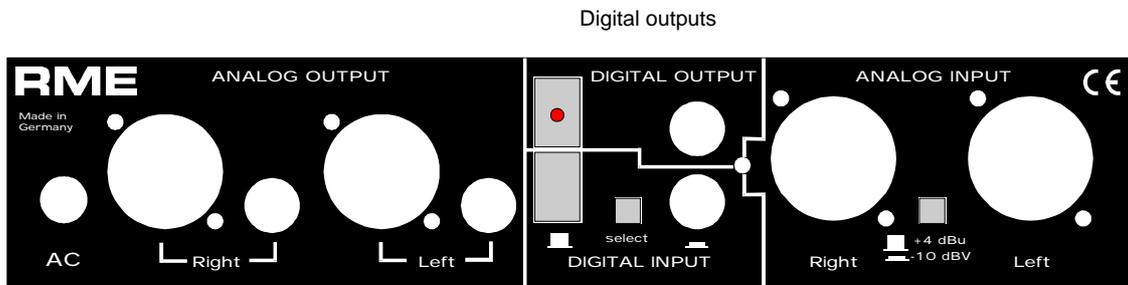
Pots for adjusting gain
0 to +20 dB

Precise level meter
incl. Peak Hold

Select the sample
frequency of the
AD converter

Display of sample
frequency and error
state at digital input

Rear panel



Jack for
power
supply

Servo balanced
analog inputs

Digital inputs and
switch for selecting
the active input

Servo balanced
analog inputs
Switch for selecting the
input sensitivity

10. Warranty

Before shipping each **ADI-1** is tested by RME in a complete test sequence. Using only the best hi-grade components allows us to offer two years of warranty. The copy of the sales receipt or the Bill of Sale is your warranty legitimation.

In case of any error or defect please contact your local dealer. The warranty does not cover damage due to abuse, incorrect installation or incorrect handling.

RME's liability is limited to the repair or the replacement of the product, and does in no way include the liability for incidental or consequential damages resulting from using the **ADI-1**.

11. Addendum

RME News, updated drivers and many informations around our products can be found on our website:

<http://www.rme-audio.com/english>

A copy of the complete website is available on the RME Driver CD, located in the directory *\rmeaudio.com\english*. This allows to read and browse it offline, directly from the CD.

Distributor in Germany:

Synthax, Am Pfanderling 62, D-85778 Haimhausen, Tel.: (49) 08133 / 91810

Manufacturer:

Ingenieurbüro Müller, Goethestr. 22, D-09648 Mittweida

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Trademarks

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CE

This device has been tested and found to comply with the limits of the European Council Directive on the approximation of the laws of the member states relating to electromagnetic compatibility (89/336/EEC) according to EN 55022 class B.

FCC Compliance Statement

Certified to comply with the limits for a Class B computing device according to subpart J or part 15 of FCC rules. See instructions if interference to radio reception is suspected.

FCC Warning

This equipment has been tested and found to comply with the limits for 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 device complies with part 15 of FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

However, there is no guarantee that interference will not occur in a particular installation. 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:

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

In order for an installation of this product to maintain compliance with the limits for a Class B device, shielded cables must be used for the connection of any devices external to this product.