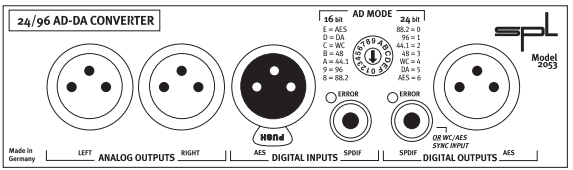
Manual



24/96 AD-DA Converter

Model 2053

Version 1.0 – 8/2000

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Security Advices

- Please consider referring the installation of the unit operating the converter the safety information in the corresponding operation instruction.
- Please carry out the self-installation only as described from page 5. In case of queries please contact an expert.

Product Description

The SPL converter module 2053 combines separately useable A/D and D/A converters, with a wordwidth up to 24 Bits, and a Sample-rate of up to 96 kHz.

The D/A converter processes up to 24 Bits automatically, as well as sample-rates from 32Bit to 96 kHz and is equipped with high-quality, balanced XLR outputs (+ 12 dBu).

The A/D converter supports 16 and 24Bit formats and works. The reduction from 24Bit to 16Bit is processed with the Dithering-method: the "missing" lower 8Bit is not cut off, but rather "included" in the 16 Bit format. This ensures that quietest passages are preserved.

Internal Synchronization: The converter module allows to choose 5 different clock sources via the AD MODE switch. The internal sample rates (96 kHz/48 kHz and 88.2 kHz/44.1 kHz) are Quartz-generated.

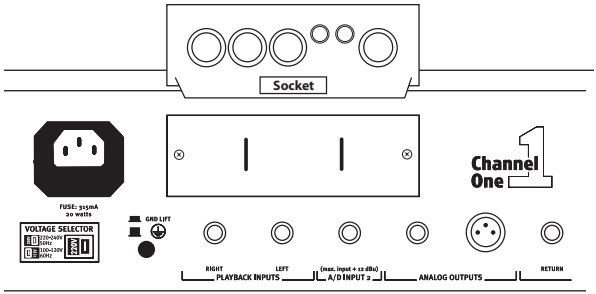
External synchronization: For synchronization with external sources, AES-data or Word-Clock signals can be used as sync sources. Alternatively the A/D converter can be synchronized to the data adjacent to the D/A converter. For internal/external synchronization please refer to the chapter "Operation", from page 11.

General Information Mounting

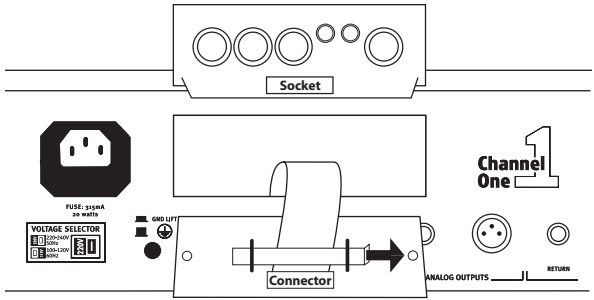
The SPL converter module 2053 is exclusively offered as an option for certain SPL units. We especially advise electronically inexperienced users to contact an expert in case of queries.

- In order to avoid static loads, please deactivate the GND-Lift switch on the back of the unit that is to be upgraded and touch its case.
- Now pull the power cord out of the socket on the back of the unit operating the converter module. Please also remove all other cable connections.
- Treat the converter carefully. Please make sure that you only touch the front panel or the sides of the circuit board in order to avoid contact with parts on the circuit board. Never force any parts when connecting unit and converter module.

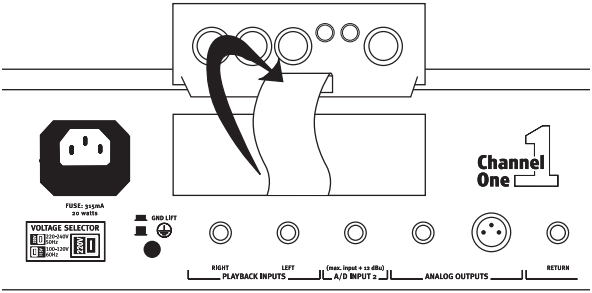
Step 1: Please put the converter module as illustrated on the unit top and remove the screws of the cover from the back of the upgrade unit.



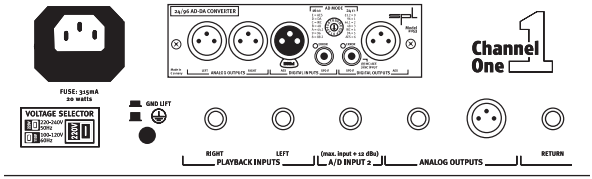
Step 2: Please remove the mounting of the wiring on the back of the cover (eventually cut off the silicon).



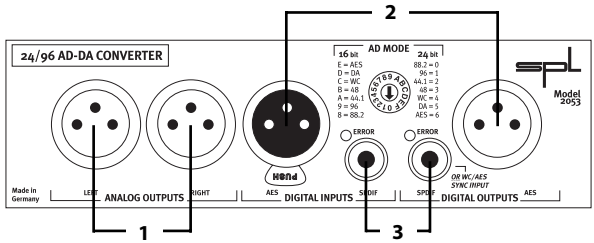
Step 3: Connect the cable carefully, without turning, to the socket of the converter. Guideways on socket and plug exclude a wrong connection.



Step 4: Put the converter, as illustrated, without lateral turning in the unit (circuit board above, connection sockets on the head) and connect it with the screws of the cover. The converter is now operational.

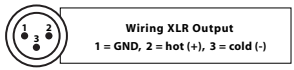


Connections



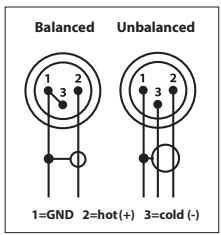
The converter module provides analog, balanced XLR outputs (**1**), digital XLR I/Os (AES/EBU) (**2**) and digital S/P-DIF I/Os (**3**). In case of using the S/P-DIF output as a WC/AES SYNC input, the S/P-DIF output is no longer available. **Important:** please never use AES- and S/P-DIF digital inputs simultaneously!

Analog XLR Outputs



The unit operating the module has to be switched off before connecting the converter via the XLR outputs with other units.

The illustration to the left demonstrates the correct wiring for unbalanced operation.



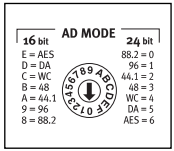
Digital I/Os

AES/EBU: Inputs and outputs according to the AES/EBU specification for the connection of all digital units specified in accordance to AES/EBU.

S/P-DIF: Alternatively to the digital XLR-sockets, the S/P-DIF I/Os can be used for the connection of digital units. The S/P-DIF output (=WC/AES SYNC INPUT) can also be used for external synchronization via external clocks (refer to "Applications, external synchronization" on page 11).

In contrast to usual concepts, the SPL converter 2053 comprises separate A/D and D/A converter stages. First of all the converter is determined for the optional equipping of the SPL CHANNEL ONE (mono channel strip). The possible applications generally described concern all future SPL units which are determined for the recording of the converter. Equipping both converter stages offers two essential advantages:

- High-quality monitoring in 24Bit/96kHz quality with simultaneous A/D conversion
- Analog processing of a digital signal



AD MODE Switch

The AD MODE switch is used to set the desired bit mode and sample rate. The following list explains the respective switch positions:

16 Bit Mode

E = AES Ext. Synchronization to AES clock
D = DA Synchronization zum D/A converter
C = WC Ext. Synchronization to word clock
B = 48 Int. Synchronization to 48 kHz
A = 44,1 Int. Synchronization to 44,1 kHz
9 = 96 Int. Synchronization to 96 kHz
8 = 88,2 Int. Synchronization to 88,2 kHz

24 Bit Mode

0 = 88,2 Int. Synchronization to 88,2 kHz
1 = 96 Int. Synchronization to 96 kHz
2 = 44,1 Int. Synchronization to 44,1 kHz
3 = 48 Int. Synchronization to 48 kHz
4 = WC Ext. Synchronization to word clock
5 = DA Synchronization to D/A converter
6 = AES Ext. Synchronization to AES clock

Error LEDs

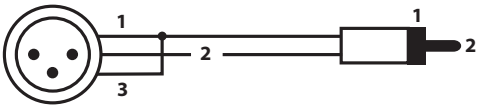
The Error-LEDs indicate faulty audio signals at the S/P-DIF input or faulty sync signals at the WC/AES SYNC INPUT (=S/P-DIF output). In this case the respective signal is muted.

External Synchronization

External Synchronization (Connection via W/C-AES SYNC INPUT) is required when several signals must be brought together within a chain of digital units, e.g. when connecting several digital units at one console. Since the sample frequencies are never exactly identical, not synchronized sample rates inevitably have different timings - samples are ignored or read twice, usually audible als cracking.

By supplying all signal sources with a common frequency, all signals are synchronized and sample faults are avoided.

The common frequency can either be transmitted via unbalanced coaxial wiring using a BNC/CINCH adapter as Word/House Clock or as AES data if connected as shown in the graphic below. In both cases the WC/AES SYNC INPUT is to be used.



AES XLR Connector
1 = GND, 2 = Signal,
3 = Signal to GND (3 to 1)

Cinch
1 = Sleeve
2 = Tip

Applications

CHANNEL ONE: Using both converters

Referring to the CHANNEL ONE, the separate use of both converters can be for example the conversion of digital signals independent from the A/D converter and to reproduce them in best tonal quality on loudspeakers or headphones.

Example: High-quality conversion of a digital console's output signal.

Another application is the high-end conversion of digital signals for the further analog processing (refer to "Operation, analog processing of a digital signal", page 13).

CHANNEL ONE: Using both channels of the converter

The CHANNEL ONE is a mono unit. Consequently only one channel of the A/D converter can be used with it. Since A/D converters usually are designed as stereo units with two channels, it is possible to convert a second mono signal via the A/D INPUT 2 on the CHANNEL ONE. If this socket is not in use, the A/D-Converter routes the mono signal of the CHANNEL ONE to both channels.

Example: During a voice recording with the CHANNEL ONE, a guitar signal can be converted at the same time.

Monitoring in 24Bit/96kHz

A high standard of monitoring is necessary for judging the recording quality. Therefore all digital signals have to be converted into analog signals to allow reproduction on loudspeakers or headphones.

The A/D converter stage is equipped with high-quality components and ensures excellent tonal results. We recommend to use the SPL converter rather than the converters found in DAT recorders, sound cards or digital consoles.

Analog processing of a digital signal

Together with the converter module, the inputs of the CHANNEL ONE can also be used for digital signals to have access to the entire processing bandwidth including the tube pre-amplifier.

Please consider the following instructions: the sockets INSTR. IN (front) and LINE (back) need not be occupied. The MIC/LINE switch has to be set to LINE. The converter signal is now routed to the preamplifying stage of the CHANNEL ONE.

The LINE socket is a switch socket - a signal connected to the LINE socket takes priority, otherwise the converter signal will be connected through.

Applications

Example 1: Processing a sampler's signal

Connect the output of the sampler via AES/EBU or S/P-DIF interface with the input of the converter. The adjustment described in the section above now allows to process the sampler's signal. If the processed signal is to be returned digitally converted to the sampler, the A/D converter has to be synchronized to the D/A converter (= external synchronization; the D/A converter is the source clock for the A/D converter). In this case, please set the AD MODE switch on the converter module to position "5" (24 Bit) or "D" (16 Bit).

Example 2: Recording on a DAT recorder

If the processed signal is to be recorded on a DAT recorder, the best Bit-format of the DAT-recorder must be chosen on the AD MODE switch (16 or 24 Bit), while the internal synchronization should be adapted to the desired sample rate. For 16 Bit operation choose one of the switch positions B, A, 9 or 8, for 24 Bit 0, 1, 2, or 3. Unless a House-Clock controls all digital units: in this case please set the AD MODE switch to position C for 16 Bit or 4 for 24Bit (compare chapter "Operation, internal and external synchronization", page 11).

A/D Converter

Wordwidth ..... 24 Bit

Reduced Wordwidth ..... 16 Bit

Dither ..... triangular

Internal sample rates ..... 44.1/48/88.2/96 kHz

External sample rates ..... 32-96 kHz

Sync sources ..... AES 11 or word clock

THD+N @-1 dBFs, 1 kHz ..... <-101 dB

Dynamic range (A) ..... 110 dB

D/A Converter

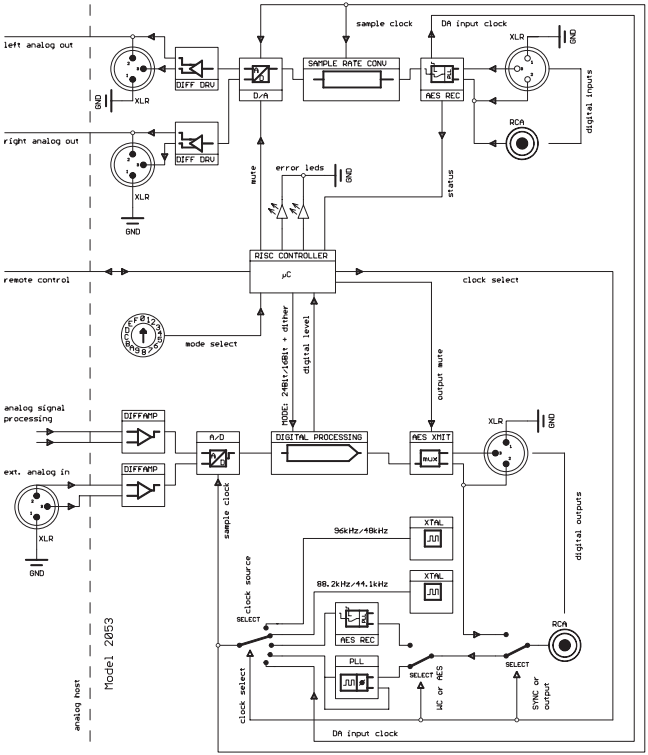
Wordwidth 24Bit

Sample rates ..... 32-96 kHz

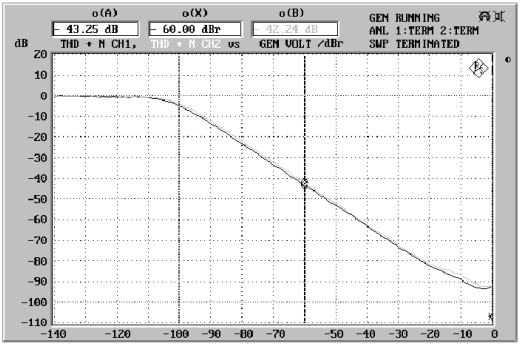
THD+N (@-1 dBFs, 1 kHz) ..... <-90 dB

Dynamic range (A, Q 96 kHz) ... 105 dB

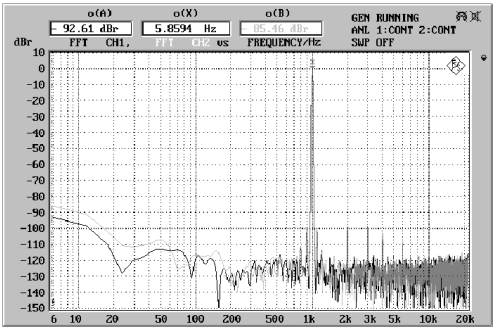
Block Diagram



D/A: THD&N above input level

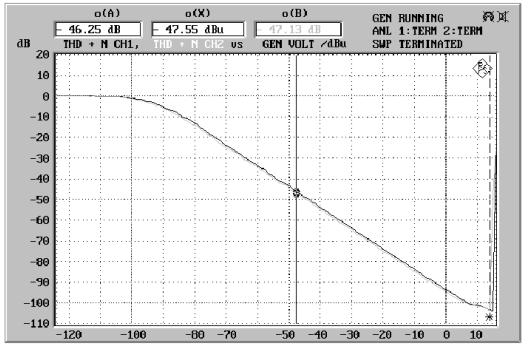


D/A: THD&N @ 1 kHz FFT

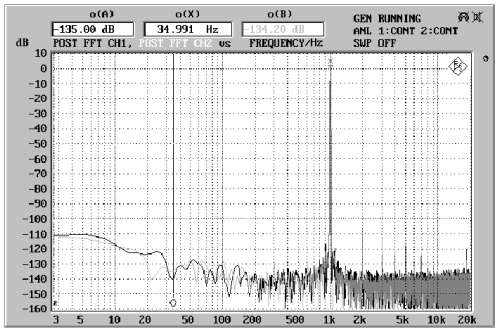


Measurements

A/D: THD&N above input level



A/D: THD&N @ 1 kHz FFT



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SPL agrees, through the applicable authorized distributor, to repair or replace defects covered by this limited warranty with parts or products of original or improved design, at its option in each respect, if the defective product is shipped prior to the end of the warranty period to the designated authorized SPL warranty repair facility in the country where purchased, or to the SPL factory in Germany, in the original packaging or a replacement supplied by SPL, with all transportation costs and full insurance paid each way by the purchaser or owner.

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This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state, country to country.

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