OPERATING MANUAL

MC-4

ADAT™–AES3 DIGITAL AUDIO FORMAT AND SAMPLING RATE CONVERTER

MUTEC

WWW.MUTEC-NET.DE

SAFETY INSTRUCTIONS

General instructions
To reduce the risk of fire or electrical shock, do not expose this appliance to rain or moisture, direct sunlight or excessive heat from sources such as radiators or spotlights. No user serviceable parts are inside. Repair and maintenance must be carried out by qualified personnel authorized by MUTEC GmbH! The unit has been designed for operation in a standard domestic environment. Do NOT expose the unit and its accessories to rain, moisture, direct sunlight or excessive heat produced by such heat sources as radiators or spotlights! The free flow of air inside and around the unit must always be ensured.

Initial operation
Prior to the initial operation of the unit, the appliance, its accessories and packaging must be inspected for any signs of physical damage that may have occurred during transit. If the unit has been damaged mechanically or if liquids have been spilled inside the enclosure, the appliance may not be connected to the mains or must be disconnected from the mains immediately! If the unit is damaged, please do NOT return it to MUTEC GmbH, but notify your dealer and the shipping company immediately, otherwise claims for damage or replacement may not be granted.

If the device is left in a low-temperature environment for a long time and then is moved to a room-temperature environment, condensation may occur on the inside and the exterior. To avoid short-circuits and flashovers, be sure to wait one or two hours before putting the device into operation.

This symbol, a flash of lightning inside a triangle, alerts you to the presence of uninsulated dangerous voltage inside the enclosure - voltage that may be sufficient to constitute a risk of shock.

This symbol, an exclamation mark inside a triangle, alerts you to important operating or safety instructions in this manual.

Power supply
The device contains a self-adapting wide-range power supply supporting the majority of global standard line voltages within a range of 90…250 V, with no need for making adjustments. Make sure that your line-voltage source provides a supply voltage within the specified range. In addition, make sure that the device is properly grounded via the local electric installation.

Please use the enclosed power cord (see packaging) to connect the unit to the mains. Switch the unit off before you attempt to connect it to the mains. Connect the power cord to the unit, then to a standard 3-pin mains outlet. To draw the power cord, never pull on the cable but on the mains plug!

The unit must be grounded during operation!

For information on the power-inlet wiring, refer to the »Wiring of connectors« section in the appendix. Disconnect the device from the mains when not using it for an extended period!

Declaration of Conformity
We herewith confirm that the product complies with the European Commission's standards on electromagnetic compatibility.

Interference emission:	EN 50081-1, 1992
Resistance to interference:	EN 50082-1, 1992

Presupposed as operation condition is that all clock outputs are connected with high-quality and good shielded BNC 75 ohms cable.

WARRANTY REGULATIONS

§1 Warranty
MUTEC GmbH warrants the flawless performance of this product to the original buyer for a period of two (2) years from the date of purchase. If any failure occurs within the specified warranty period that is caused by defects in material and/or workmanship, MUTEC GmbH shall either repair or replace the product free of charge within 90 days. The purchaser is not entitled to claim an inspection of the device free of charge during the warranty period. If the warranty claim proves to be justified, the product will be returned freight prepaid by MUTEC GmbH within Germany. Outside Germany, the product will be returned with the additional international freight charges payable by the customer. Warranty claims other than those indicated above are expressly excluded.

§2 Warranty transferability
This warranty is extended exclusively to the original buyer who bought the product from a MUTEC GmbH specialized dealer or distributor, and is not transferable to anyone who may subsequently purchase this product. No other person (retail dealer, distributor, etc.) shall be entitled to give any warranty promise on behalf of MUTEC GmbH.

§3 Waranty regulations
The return of the completed registration card, or online registration on one of the websites specified below, is a condition of warranty. Failing to register the device before returning it for repair will void the extended warranty.

- The serial number on the returned device must match the one stated on the registration card or entered during online registration. Otherwise, the device will be returned to the sender at the sender's expense.
- Any returned device must be accompanied by a detailed error description and a copy of the original sales receipt issued by a MUTEC dealer or distributor.
- The device must be returned free of shipping expenses and in the original package, if possible; otherwise, the sender has to provide comparably protective packaging.
- The sender is fully responsible for any damage or loss of the product when shipping it to MUTEC GmbH.

§4 Limitation of warranty
Damages caused by the following conditions are not covered by this warranty:

- Damages caused by every kind of normal wear and tear (e.g. displays, LEDs, potentiometers, faders, switches, buttons, connecting elements, printed labels, cover glasses, cover prints, and similar parts).
- Functional failure of the product caused by improper installation (please observe CMOS components handling instructions!), neglect or misuse of the product, e.g. failure to operate the unit in compliance with the instructions given in the user or service manuals.
- Damage caused by any form of external mechanical impact or modification.
- Damage caused by the user's failure to connect and operate the unit in compliance with local safety regulations.
- Damage caused by force majeure (fire, explosion, flood, lightning, war, vandalism, etc.).
- Consequential damages or defects in products from other manufacturers as well as any costs resulting from a loss of production.

Repairs carried out by personnel which is not authorized from MUTEC GmbH will void the warranty. Adaptations and modifications to the device made with regard to national, technical, or safety regulations in a country or of the customer do not constitute a warranty claim and should be set with MUTEC GmbH in advance.

§5 Repairs
To obtain warranty service, the buyer must call or write to MUTEC GmbH before returning the unit. All inquiries must be accompanied by a description of the problem and the original buyer's invoice. Devices shipped to MUTEC GmbH for repair without prior notice will be returned to the sender at the sender's expense. In case of a functional failure please contact:

MUTEC Gesellschaft fuer Systementwicklung und Komponentenvertrieb mbH
Siekeweg 6/8 • 12309 Berlin • Germany • Fon 030-746880-0 • Fax 030-746880-99 • Tecsupport@MUTEC-net.de • www.MUTEC-net.de

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INTRODUCTION

Thank you very much for purchasing MC-4, Digital Audio Format and Sampling Rate Converter, from MUTEC!

General Function Description

The MC-4 is an extremely flexible, high-performance digital audio format and sampling rate converter for ADAT™, AES3 and S/PDIF. All digital audio signals can be processed with 8 channels and sampling rates up to 192.0kHz, whereas unidirectional and bidirectional conversion modes are available. Based on latest FPGA designs, the MC-4 achieves levels of performance regarding its signal quality, unique flexibility, clocking features and the 16 channel sampling rate conversion engine (SRC), which are outstanding in today's industry!

Various operation modes enable the use of the MC-4 in many studio set-ups. Generally, incoming digital audio signals are converted to all three audio formats simultaneously, with or without SRC functionality. The SRC engine can be locked to Word Clock, AES11 and any digital audio input in both, unidirectional and bidirectional operation modes.

As further unique feature, the MC-4 offers an internal, Ultra low-jitter clock base with outstanding accuracy to which the SRCs can be locked to, if no external reference is available. This enables to run the MC-4 in set-ups where no separate master clock system is available. Furthermore, in this operation mode the MC-4's Word Clock output supplies an Ultra low-jitter reference clock signal which is of same high accuracy as the internal clock basis. This can be used e.g. as master clock reference for the whole studio.

This all makes MC-4 for sure a unique and the most flexible digital audio multichannel converter in a 9.5" case currently available in the market!

The grey boxes contain supplementary informationen for the corresponding sections in the text columns. The content of the individual box refers to the description in the text column beside the box.

Boxes which contain a triangle with an exclamation mark inside should be read carefully! These include additional information which are of major importance for the functional descriptions in the text column.

MC-4 Features

- **ADAT™, AES/EBU and S/PDIF interfaces in one box.**
- **Bidirectional format and sampling rate conversions from 32.0kHz to 192.0kHz.**
- **Converts standalone and bidirectionally with different sampling rates: X-SRC**
- **Supports ADAT™ SMUX2 and SMUX4 standards.**
- **Signal improvement through low-jitter clock recovery.**
- **AES11, Grade 1, internal reference clock (0.5ppm).**
- **Word Clock output can be used as master clock reference.**
- **Runs standalone without needing an external clock source.**
- **16 channel SRC engine for bidirectional conversions.**
- **Extremely flexible synchronization options.**
- **Continuous signal supply in absence of the reference audio or clock signal**
- **Separate AES11 reference clock input.**
- **Simultaneous conversions to all output formats.**
- **Easy configurable.**
- **User's settings will be stored after switching-off.**
- **Rack space saving 1/2 19" housing allowing for mounting two devices in one rack unit.**
- **Built-in international power supply.**

MC-4 Applications

- Interconnection of consumer and professional digital audio devices.
- ADAT™ + SMUX2/4, AES3 and S/PDIF format and sampling rate conversions.
- Integration of non-synchronizable devices into digital studio environments.
- Clock recovery and digital audio signal regeneration.
- Realtime bidirectional signal transfer between send/returns of digital mixing consoles and effect processors.
- Unidirectional or bidirectional interconnection of computer-based sound cards with professional digital audio equipment.
- ADAT™ signal splitting and distribution.
- Usable within small studio set-ups up to broadcast installations.

Peripheral MUTEC Products

Reference Clocks and Master Clocks for Synchronization:

- iCLOCK + iCLOCKdp
  iCLOCK and iCLOCKdp are synchronizable, high-precision clock generators which are designed to be the reference in digital audio and video studios as well as broadcast and television stations. For further details please visit:

  www.iCLOCK-NET.de

- MC-3
  The MC-3 SMART CLOCK is an universal digital audio master clock generator. The unit provides different high-stable and Ultra low-jitter clock signals for synchronization of various digital audio devices.

- MC-3.1
  The MC-3.1 SMART CLOCK SD is an universal digital audio and SD video sync master clock generator. The unit provides different high-stable clock signals for simultaneous synchronization of digital audio and SD video devices.

- MC-3.2
  The MC-3.2 SMART CLOCK HD is an universal digital audio and SD/HD video sync master clock generator. The unit provides different high-stable clock signals for simultaneous synchronization of digital audio and SD/HD video devices.

- MC-2
  The MC-2 is a high-performance digital audio and reference clock signal distribution amplifier and format converter for AES3/11 and AES3/11id signals.

- MC-7
  The MC-7 is a flexible, high-performance 8-channel Word Clock distribution amplifier and audio clock converter.

Cables for Digital Audio:

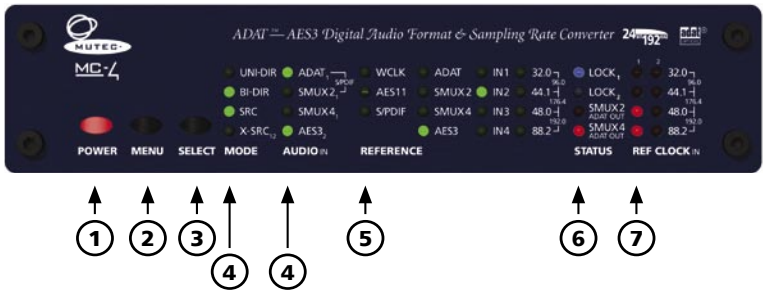
- Optical cables in different lenghts from 0.5 m to 20 m for ADAT™ transfers.

- Multicore cable adaptors with 110Ω cable impedance and Neutrik™ XLR connectors from 0.6m to 5m.

For all peripheral products please have a look on our website:
www.MUTEC-NET.de !

CONTROL ELEMENTS AND TERMINALS

MC-4 Front Panel



1 POWER
This red LED lights up when the unit is switched on with the rear panel POWER switch.

2 MENU
The push-button selects one of the available function menus.

3 SELECT
Use this push-button to select a function within a specific function menu.

4 MODE + AUDIO IN
This function menu allows to adjust all available conversion modes (LED line »MODE«) in combination with the corresponding digital audio formats (LED line »AUDIO IN«) .

5 REFERENCE
This function menu allows to select the master clock reference for synchronization of the format conversion sections as well as the SRCs.

6 STATUS
This menu indicates various signal statuses of the incoming master clock reference signal and the digital audio signal as well as the SMUX coding of the ADAT™ output signal.

7 REF CLOCK IN
This menu indicates the clock rates of the incoming digital audio signal or of the master clock reference signal.

Refer to the OPERATIONS chapter for more information.

MC-4 Rear Panel

1 AES11 REF IN
This input receives a balanced digital AES11 blank frame signal in compliance with AES11–1997/2003 as master clock reference for the SRCs. Alternatively, an AES3 digital audio signal in compliance with AES3–1992 (R1997) or a S/PDIF digital audio signal aligned to IEC60958 can be input as well. The input impedance is 110Ω (XLR connector, female).

2 AES3 IN + OUT CHAN 1–8
This interface receives and transmits 8 channels of AES3 digital audio signals each in compliance with AES3–1992 (R1997). Alternatively, the 8 inputs can also be feeded with S/PDIF digital audio signals aligned to IEC60958. The input and output impedances are 110Ω. The pin assignment of the 25pin D-Sub connector complies with Yamaha, AKAI, Mackie and others, too.

For detailed specifications on all terminals, refer to the »Pin Assignment of the Connectors« and »Technical Data« in the chapter »APPENDIX«.

3 IN WCLK OUT
The left hand side connector (IN) receives a Word Clock or so-called »Super Clock« signal as master clock reference for the SRCs. The right hand side connector (OUT) transmits an Ultra low-jitter Word Clock signal based on the internal clock basis or the selected external clock reference signal. The impedances of both connectors are 75Ω (BNC connectors, female).

4 ADAT™ IN
These two optical inputs receive digital audio multichannel signals incompliance with the Alesis ADAT™ format. Input »A« alone accepts ADAT™ signals up to 50.0kHz. For receiving ADAT™ signals with higher clock rates up to 192.0kHz, both inputs »A« and »B« are used simultaneously (Toslink™ connector, EIAJ standard).

5 S/PDIF IN/OUT
These interfaces function as receiver and transmitter for S/PDIF digital audio signals in compliance with the IEC 60958 standard. Their function depends on the selected operation mode, which is displayed on the front panel. The impedance of all connectors is 75Ω (Cinch connectors, female).

6 ADAT™ OUT
These two optical outputs transmit digital audio multichannel signals incompliance with the Alesis ADAT™ format. Output »A« alone transmits ADAT™ signals up to 50.0kHz. For transfering ADAT™ signals with higher clock rates up to 192.0kHz, both outputs »A« and »B« are used simultaneously (Toslink™ connector, EIAJ standard).

7 MAINS IN, Power Switch + Power Inlet
This is the main switch for switching the device on and off. Be sure to make all connections (especially the supplied power cable) properly before turning on the switch. Heed the SAFETY INSTRUCTIONS at the beginning of this manual.

Connect the supplied power cable here. Make sure that the power switch is turned off before connecting the power cable to this inlet and to the power outlet. Line voltages within the range of 90…260V with a frequencies between 47...440Hz can be applied. The internal power supply will automatically make all necessary adjustments.

INSTALLATION

Content of the Box

The unit was packed carefully. Nevertheless we recommend to check the content directly after opening the package:

1 x MC-4
1 x Power cable
4 x Rubber feet
1 x Manual
1 x Registration card

The condition of the packaging material and the device should be checked carefully additionally. If there are any damages please refer to SAFETY INSTRUCTIONS, Initial Operation, and WARRANTY REGULATIONS.

Placing the Device

The unit should be set up as closely as possible to the devices to which it will be connected, so as to avoid excessive cable lengths. Use the 4 rubber feets enclosed with the appliance and stick them symmetrically on the bottom side of the unit to protect the enclosure and supporting surface from being damaged.

The device can be mounted into a standard 19" rack and will require 1 unit. In this case, the rubber feet cannot be attached. Install the device so that one unit of rack space is left free both above and below the device to allow for sufficient ventilation! The mounting depth including the terminals is 160 mm/6.7". Another 60 mm/2.4" should be added for the required cables.

Additional slide-in rails on the rack inside are recommended for safe installation. This will also avoid long-term mechanical deformation of the housing.

Before installing the unit the section SAFETY INSTRUCTIONS located at the beginning of this manual should be read carefully.

Never expose the device and accessories to rain, moisture, direct sunlight, or excessive heat produced by radiators, heaters, or spot lights! Sufficient air circulation in the environment of the device must be ensured!

Wiring the ADAT™, AES/EBU and S/PDIF interfaces

ADAT™
Connect the optical ADAT™ interfaces with the help of TOSLINK™-compliant optical fiber cables. Here, you can use both plastic and glass fiber-based cables. When using plastic fiber cables, lengths of 10 meters should not be exceeded, so as to ensure the reliable transmission of signals. Glass fiber cables can transfer data reliably even over greater distances.

MUTEC offers optical cables of various lengths that have been specifically tested for the transmission of ADAT™ signals. Ask your local dealer for those cables!

AES/EBU
Connect the AES/EBU interface with the help of an electrical 25-cond. cable equipped with 25-pin D-Sub connectors. The specifications stipulate a specific cable resistance of 110Ω. When purchasing the cable ask your retailer for a confirmation that the cable will perform flawlessly in your specific application.

Connect the coaxial S/PDIF interfaces with help of unbalanced electrical cables equipped with cinch connectors on both ends. The specifications stipulate a specific cable resistance of 75Ω. Ask your retailer for a confirmation of this value when purchasing the cables.

We advise you not to buy 25pin D-Sub cables from your computer retailer! Even though such cables may look similar to 25pin D-Sub AES/EBU cables, they may be wired differently!

MUTEC assumes no liability for damages resulting from the use of improperly wired cables!

Especially when working with high AES/EBU clock rates well shielded cables are imperative to avoid increased radiation! Standard cables are normally useable for clock rates up to 50.0kHz. Special shielded cable material should be used for transfer of higher clock rates.

Wiring the Word Clock Interfaces

To allow for the synchronization of signals, the interfaces of all devices involved must be properly connected to each other, so as to ensure a logical signal flow. Always be sure to connect the Word Clock output of the MC-4 to the corresponding input of the device you wish to synchronize. Cable lengths should be kept as short as possible to minimize signal losses and/or interferences!

For the transmission of Word Clock signals electrical, unsymmetrical cables with a resistance of 75Ω and BNC connectors on both ends are used. Typically, such cables are marked »RG-59U, RG59B/U«.

Additionally, you should make sure that the Word Clock input to be connected to the MC-4's output have a 75Ω terminating resistor! Most Word Clock inputs allow for enabling/disabling the termination with a so-called »termination-switch«, which may be located on the outside or inside of the device.

Please make sure that the cable used has a resistance of 75Ω! If a cable with a different resistance is used, a dramatic deterioration of the signal quality can be the result! In this case, the perfect synchronization could be impaired.

We recommend using high-grade cables with a good shielding. A length of max. 10 meters (approx. 30 feets) should not be exceeded!

For devices which have no termination of the Word Clock input, e.g. RME Hammerfall with Word Clock i/o, Alesis BRC or M-Audio ProFire Lightbridge, you can use an additional BNC-T piece to terminate the input. Plug the T piece with its center connector into the input of the receiving device. Then, connect the cable coming from the MC-4's Word Clock output to one of the lateral connectors, and the other connector of the BNC-T piece to a 75Ω resistor forming the BNC termination.

Basically, you should avoid »looping through« Word Clock leads by means of passive BNC-T pieces to preserve the signal quality, as level drops will be the result. If there is no other way to wire your set-up, please make sure that all Word Clock inputs (except for the last device in the chain) have their terminations disabled! In a serial Word Clock chain only the last clock input should have a termination! Never connect more than three devices in series to one output!

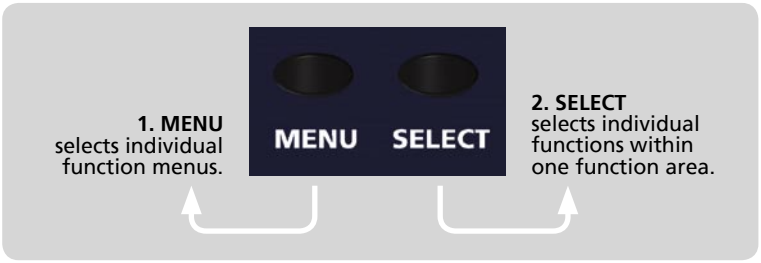
GENERAL OPERATION

Selecting Function Menus and setting Functions

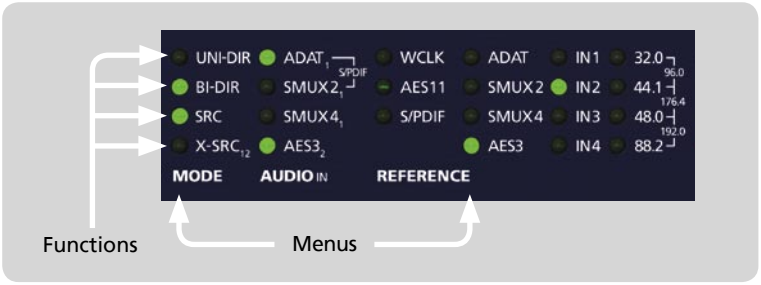
The device is fully operated using the two toggle switches at the front panel.

1 Switching the MENU key toggles between different basic function menus.
2 Switching the SELECT key activtes individual functions within one function menu.

For safety reasons, be sure to read the SAFETY INSTRUCTIONS and INSTALLATION chapters before first powering-up!
We also recommend reading the CONTROL ELEMENTS AND TERMINALS chapter for information on how to connect MC-4!



MENU + SELECT operation



Function Areas + Functions

Steps of Operation

1 First press on MENU or SELECT key enables the last selected function within the last selected function menu. The corresponding LED is beginning to flash.
2 Every press on SELECT key will select a new function within a menu. The LED of every selected function will flash accordingly and the corresponding function is vailable at once.
3 When the needed function is selected, do not press the switches again! After a period of approx. 4 seconds the LED in front of the selected function will stop flashing.

The STATUS area is not accessible by using the MENU and SELECT switches, because it only informs about different conditions of incoming signals.

All user-specific function settings are available furthermore when power is restored.

OPERATING THE MC-4

MODE / AUDIO IN + REFERENCE Menus

These both menus are offering access to the whole functionality of the MC-4.

The »MODE« menu in combination with the »AUDIO IN« menu are offering generally all available conversion modes together with the corresponding digital audio formats. The system makes sure that only useful combinations of conversion modes and proper audio formats are accessable. Therefore both menus act together in different combinations.

The REFERENCE menu supplies all necessary synchronization options for the corresponding conversions modes and the use of the internal sampling rate converters (SRC). Due to the fact that both menus act together, regardless if only format conversions or format and sampling rate conversions need to be done, we will have a look on both together for any function which is being described in the following.

The menus »STATUS« and »REF CLOCK IN« are for control of the MC-4's operation status only. They are not accessable for adjustments.

General Operation Procedure

The MC-4 menu is strictly organized aligned to generally usual handling procedures when inserting such a box into your studio's data stream. So, you can split up all of the necessary adjustments in three steps, which leads to the following three questions for the basic operation of your MC-4:

1) What kind of conversion should be executed → MODE?

○ **UNI-DIR**	= unidirectional conversion, from one format to all others
○ **BI-DIR**	= bidirectional conversion, between two formats only
○ **SRC**	= above mentioned conversions with SRC
○ **X-SRC$_{12}$**	= crosswise conversion between two formats and clock rates

MODE

2) Which digital audio format(s) should be involved as source(s) → AUDIO IN?

○ **ADAT$_1$** (S/PDIF)	= ADAT up to 50.0kHz*
○ **SMUX2$_1$** (S/PDIF)	= ADAT between 50.0kHz and 100.0kHz*
○ **SMUX4$_1$**	= ADAT between 100.0kHz and 200.0kHz
○ **AES3$_2$**	= AES3 between 25.0kHz and 200.0kHz

AUDIO IN

* If both LEDs light in front of the ADAT and SMUX2 options, the S/PDIF inputs function as audio sources for conversion.

3) Which clock source do I need for my prefered operation → REFERENCE?

○ **WCLK**	○ **ADAT**	○ **IN1**	○ **32.0** (96.0)
○ **AES11**	○ **SMUX2**	○ **IN2**	○ **44.1** (176.4)
○ **S/PDIF**	○ **SMUX4**	○ **IN3**	○ **48.0** (192.0)
	○ **AES3**	○ **IN4**	○ **88.2**

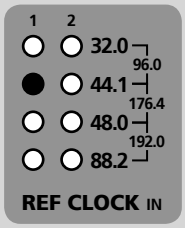
REFERENCE

After these general decisions are made, your MC-4 is configured for optimal operation in your set-up! Due to the fact that the system monitors for useful function combinations, maloperation is not possible.

So, let's have a look to the individual functions on the next pages.

Continuous Clock Supply

When setting up your MC-4 for the first time, you will recognize that within the »REF CLOCK IN« menu the LED at »44.1«, under »1« lights constantly. This is due to the MC-4's continuous clock supply function.



When no input signal is available, the MC-4 supplies at all digital audio outputs blank frame signals, the Word Clock output carries a corresponding Word Clock reference signal. Thus, connected devices receive immediately valid clock signals at their appropriate inputs after starting up the whole studio set-up. The initial clock rate of all outputs is 44.1kHz.

When loosing the external clock reference signal during operation, the MC-4's PLL synthesizers lock the internal reference clock oscillator on the clock rate which is nearest to the lost one to provide stable reference signals to the connected devices.

The equal channel number assignment of the multichannel audio streams is guaranteed in all operations modes of the MC-4.

To allow for the ADAT™ format conversion without SRC into AES3 and S/PDIF, the MC-4 needs to derive a valid clock signal from the incoming audio source. Therefore, the corresponding reference option is activated in the »REFERENCE« menu automatically.

SMUX2 + SMUX4

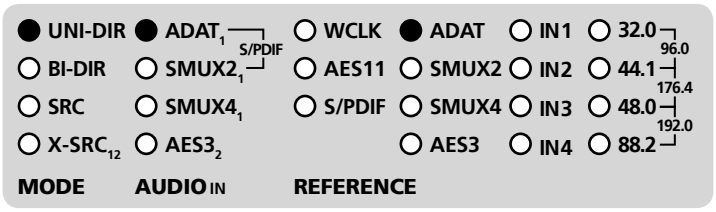
The standard 8 channel ADAT™ format, which uses one optical connector is limited to sampling rates up to 50.0kHz. To enable the use of the ADAT™ format with higher clock rates, it is necessary to activate the SMUX2 or SMUX4 processing additonally because SMUX2 and SMUX4 are not decoded as status in the ADAT™ data stream for automatic detection.

The SMUX2 process splits the ADAT™ stream into two 4-channel blocks. Thus, both optical inputs »A« and »B« must be used to input the ADAT™ stream, whereas input »A« receives the channels 1–4 and input »B« receives the channels 5–8.

The SMUX4 principle is basically the same as described above for SMUX2. But due to the higher sampling rates, not all channels of a standard 8 channel ADAT™ stream can be received. Only four channels in total can be processed, whereas the optical input »A« receives the channels 1+2 and input »B« receives the channels 3+4. The channels 5–8 can not be processed with the high clock rates of ADAT™/SMUX4.

Please make sure that you connect the optical lines correctly from your ADAT™/SMUX2 source!

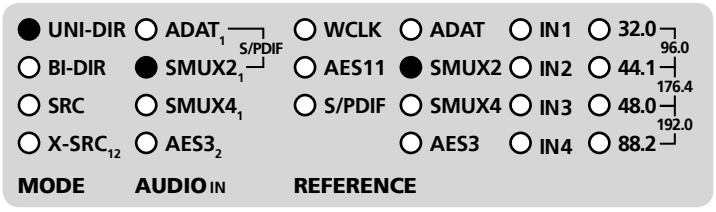
Unidirectional Format Conversion from: ADAT™ to AES3, S/PDIF, ADAT™



This setting allows to convert an ADAT™ source signal (see »AUDIO IN«) with up to 50.0kHz sampling rate unidirectionally (see »MODE«) into AES3, S/PDIF and ADAT™ simultaneously. The sampling rate will be displayed in the »REF CLOCK IN« menu. Both optical outputs transmit the same ADAT™ source signal. Thus, the MC-4 functions as ADAT™ signal splitter, too.

Under »REFERENCE« the »ADAT« option is selected automatically. Please see the grey box on the left hand side for more information.

Unidirectional Format Conversion from: ADAT™/SMUX2 to AES3, S/PDIF, ADAT™/SMUX2

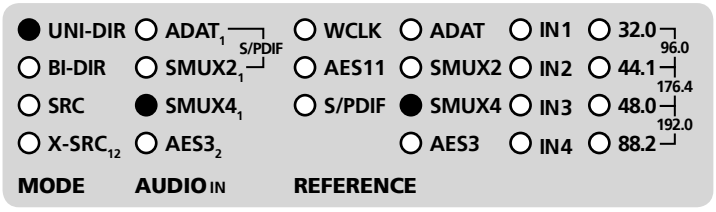


This setting allows to convert an ADAT™/SMUX2 source signal (see »AUDIO IN«) with sampling rates between 50.0kHz and 100.0kHz unidirectionally (see »MODE«) into AES3, S/PDIF and ADAT™/SMUX2 simultaneously. The sampling rate will be displayed in the »REF CLOCK IN« menu.

The ADAT™/SMUX2 input signals are re-clocked and transmitted to both optical outputs. The channel splitting is equal to this one of the ADAT™/SMUX2 input signals. The AES3 and S/PDIF outputs transmit every ADAT™ audio channel on one output.

Under »REFERENCE« the »SMUX2« option is selected automatically.

Unidirectional Format Conversion from: ADAT™/SMUX4 to AES3, S/PDIF, ADAT™/SMUX4

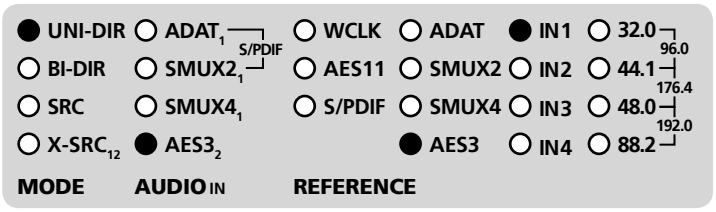


This setting allows to convert an ADAT™/SMUX4 source signal (see »AUDIO IN«) with sampling rates between 100.0kHz and 200.0kHz unidirectionally (see »MODE«) into AES3 and S/PDIF simultaneously. The sampling rate will be displayed in the »REF CLOCK IN« menu.

The ADAT™/SMUX4 input signals are re-clocked and transmitted to both optical outputs. The channel splitting is equal to this one of the ADAT™/SMUX4 input signals. The AES3 and S/PDIF outputs transmit with their first four channels the ADAT™/SMUX4 audio channels. Each AES3 or S/PDIF output runs up to 200.0kHz clock rate as the maximum.

Under »REFERENCE« the »SMUX4« option is selected automatically.

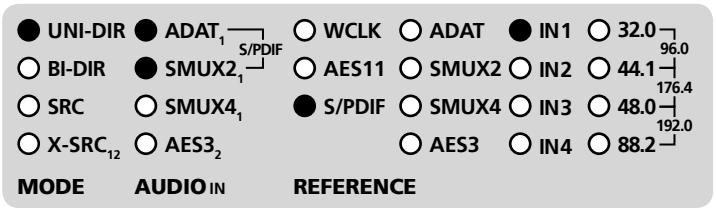
Unidirectional Format Conversion from: AES3 to ADAT™ or ADAT™ / SMUX2 + 4, S/PDIF and AES3



This setting allows to receive an 8-channel (as maximum) AES3 source signal with sampling rates between 25.0kHz and 200.0kHz. The signal's audio format will be converted into ADAT™, ADAT™/SMUX2, ADAT™/SMUX4, S/PDIF and AES3 simultaneously, whereas the ADAT™ output format depends on the clock rate of the incoming AES3 source signal (see grey box on the right hand side). It is not necessary that all four stereo input channels are carrying a valid AES3 signal. Also a single stereo signal can be converted. It will be transfered to the outputs of the other audio formats correspondingly to its input channel number (1–4).

Under »REFERENCE« the »AES3 + IN1« option is selected initially. By inputing an 8-channel AES3 signal, there is no need to select a different reference option (IN2–IN4). When your input signal contains valid AES3 streams only on e.g. channels 5/6 and 7/8, you need to select either »IN3« for input channels 5/6, or »IN4« for input channels 7/8 as reference signal source. The MC-4 needs to derive a valid clock signal from one of the incoming AES3 channel pairs. So, it is imperative to select one of the reference options »IN1–IN4« as converting reference correspondingly to the input channel pair which carries a valid AES3 digital audio signal.

Unidirectional Format Conversion from: S/PDIF to ADAT™ or ADAT™ / SMUX2 + 4, AES3



This setting allows to receive an 8-channel (as maximum) S/PDIF source signal with sampling rates between 25.0kHz and 200.0kHz. The signal's audio format will be converted into ADAT™, ADAT™/SMUX2, ADAT™/SMUX4 and AES3 simultaneously, whereas the ADAT™ output format depends on the clock rate of the incoming S/PDIF source signal (see grey box on the right hand side above). It is not necessary that all four stereo input channels are carrying a valid S/PDIF signal. Also a single stereo signal can be converted. It will be transfered to the outputs of the other audio formats correspondingly to its input channel number (1–4).

Under »REFERENCE« the »S/PDIF + IN1« option is selected initially. By inputing an 8-channel S/PDIF signal, there is no need to select a different reference option (»IN2–IN4«). When your input signal contains valid S/PDIF streams only on e.g. channels 5/6 and 7/8, you need to select either »IN3« for input channels 5/6, or »IN4« for input channels 7/8 as reference signal source. The MC-4 needs to derive a valid clock signal from one of the incoming S/PDIF channel pairs. So, it is imperative to select one of the reference options »IN1–IN4« as converting reference correspondingly to the input channel pair which carries a valid S/PDIF digital audio signal.

The MC-4's AES/EBU inputs generally accept AES3, AES11 and S/PDIF signal formats for conversion to the available output signal formats.

Due to the fact, that the function modes described on this page are format conversion modes only, it is imperative that the AES3 or S/PDIF input channels are of same sampling rates!

When the sampling rate of the incoming AES3 or S/PDIF signal is lower as 50.0kHz, both ADAT™ outputs transmit the same signal and function as ADAT™ signal splitter.

Is the sampling rate of the incoming AES3 or S/PDIF signal between 50.0kHz to 100.0kHz, the ADAT™ output format will be automatically switched over to ADAT™/SMUX2.

When the sampling rate of the incoming AES3 or S/PDIF signal is between 100.0kHz to 200.0kHz, the ADAT™ output format will be automatically switched over to ADAT™/SMUX4.

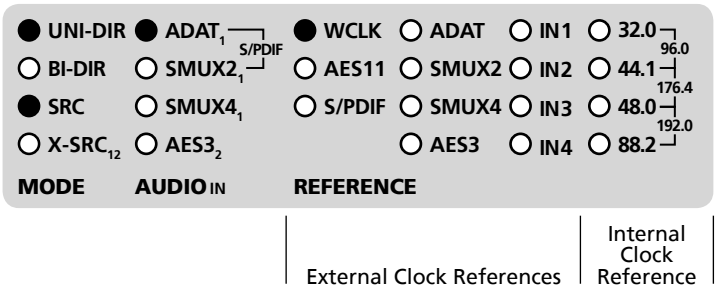
The corresponding SMUX format of the ADAT™ outputs will be displayed in the »STATUS« menu.

If a 2-channel stereo AES3 or S/PDIF signal is input for format conversion only, without SRC, it is imperative to select under »REFERENCE« the corresponding input number »IN1–IN4« as converting reference!

The sampling rate of the incoming AES3 or S/PDIF signal will be displayed in the »REF CLOCK IN« menu.

This is the only mode, in which the S/PDIF interfaces function as inputs, due to the limited number of four interfaces available at the rear for S/PDIF transfers!

Unidirectional Format with Sampling Rate Conversion from: ADAT™ to AES3, S/PDIF, ADAT™ or ADAT™ / SMUX2 + 4



This setting generally allows to receive an ADAT™ signal with up to 50.0kHz sampling rate. The signal's audio format will be converted into AES3, S/PDIF and ADAT™/SMUX2/4 simultaneously, as in the previous section described. Additionally to the format conversion a SRC process is added.

The sampling rate of all outputs now depends on the clock rate of the reference clock signal, which is selected in the »REFERENCE« menu. The above example shows Word Clock (»WCLK«) selected as clock reference, which is the default setting.

In this mode, the following clock references are available for synchronization of the internal SRCs:

- WCLK, 25.0kHz – 200.0kHz, SCLK 11.2896MHz + 12.288MHz
- AES11, 25.0kHz – 200.0kHz (through separate input at the rear)
- AES3 IN1–4, every of the AES3 stereo inputs, 25.0kHz – 200.0kHz
- 32.0kHz–192.0kHz, internal clock oscillator

To activate a clock source enter the »REFERENCE« menu and press the »SELECT« button repeatedly. When the external clock reference signal can be locked by the internal PLL circuit, the blue LED »$LOCK_1$« in the »STATUS« menu will light constantly. The clock rate of the selected clock source is then displayed in the »REF CLOCK IN« menu under »1« accordingly.

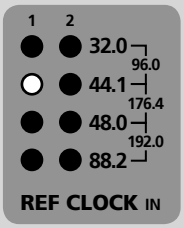
Does the reference clock signal not exceed 50.0kHz, both ADAT™ outputs transmit the same signal and the MC-4 functions as ADAT™ signal splitter.

If the reference clock signal exceeds 50.0kHz, the ADAT™ output format will be automatically changed to »SMUX2« or »SMUX4«, depending on the reference signal's clock rate. The corresponding SMUX format of the ADAT™ outputs will be displayed in the »STATUS« menu.

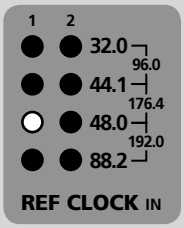
Locking so-called »Super Clocks«

Your MC-4 is able to lock to so-called »Super Clock« (SCLK) reference signals. These clock signals are used preferably for older digidesign ProTools™ MX systems. Specified are only two clock rates, 11.2896MHz + 12.288MHz which are the x256 multiple of the Word Clock rates 44.1kHz and 48.0kHz.

When locking to one of these Super Clocks, the rate will be inverted displayed in the »REF CLOCK IN« menu. Due to this, the LED in front of the corresponding base clock rate, that means Word Clock rate, does not light while all other LEDs light (see examples below).

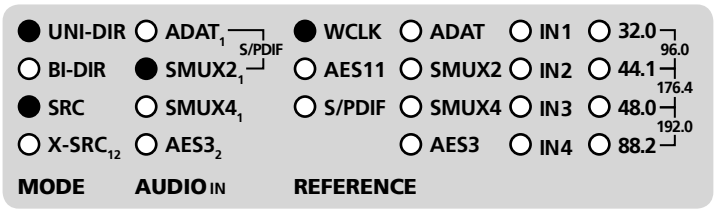


Super Clock of 44.1kHz Word Clock



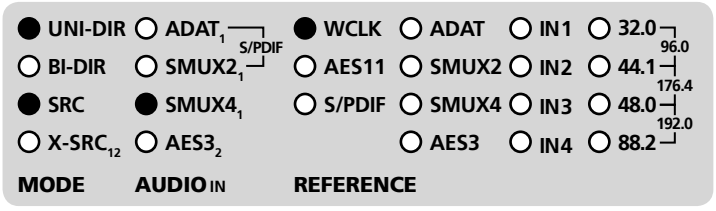
Super Clock of 48.0kHz Word Clock

Unidirectional Format with Sampling Rate Conversion from: ADAT™ / SMUX2 to AES3, S/PDIF, ADAT™ or ADAT™ / SMUX2 + 4



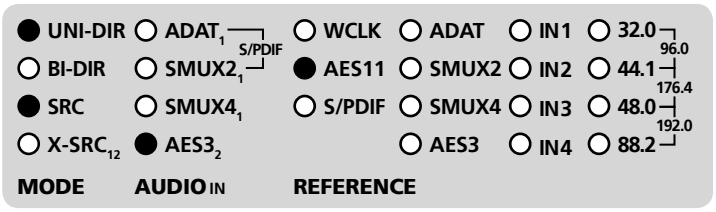
This setting allows to receive an ADAT™/SMUX2 signal with clock rates between 50.0kHz and 100.0kHz. The input signal's audio format will be converted into AES3, S/PDIF and ADAT™ or ADAT™/SMUX2/4 and its clock rate is changed simultaneously to this one of the reference signal's clock rate. The selection of the reference clock signal is the same as described above.

Unidirectional Format with Sampling Rate Conversion from: ADAT™ / SMUX4 to AES3, S/PDIF, ADAT™ or ADAT™ / SMUX2 + 4



This setting allows to receive an ADAT™/SMUX4 signal with clock rates between 100.0kHz and 200.0kHz. The input signal's audio format will be converted into AES3, S/PDIF and ADAT™ or ADAT™/SMUX2/4 and its clock rate will be changed simultaneously to this one of the reference signal's clock rate. The selection of the reference clock signal is the same as described above.

Unidirectional Format with Sampling Rate Conversion from: AES3 to ADAT™ or ADAT™ / SMUX2+4, S/PDIF, AES3



This setting generally allows to receive an 8-channel AES3 or AES11 signal with clock rates between 25.0kHz and 200.0kHz. The signal's audio format will be converted into ADAT™ or ADAT™/SMUX2/4, S/PDIF and AES3 simultaneously, as in the previous section described. Additionally to the format conversion a SRC process is added.

The sampling rate of all outputs now depends on the clock rate of the reference clock signal, which is selected in the »REFERENCE« menu. The above example shows »AES11« selected as clock reference.

In this mode, the following clock references are available for synchronization of the internal SRCs:

- WCLK, 25.0kHz – 200.0kHz, SCLK 11.2896MHz + 12.288MHz
- AES11, 25.0kHz – 200.0kHz (through separate input at the rear)
- ADAT™ or ADAT™/SMUX2/4, 25.0kHz – 200.0kHz
- AES3 IN1–4, every of the AES3 stereo inputs, 25.0kHz – 200.0kHz
- 32.0kHz–192.0kHz, internal clock oscillator

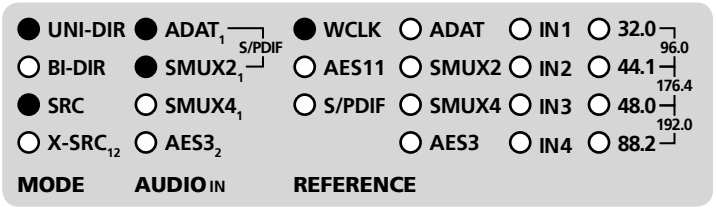
To activate a clock source enter the »REFERENCE« menu and press the »SELECT« button repeatedly. When the external clock reference signal can be locked by the internal PLL circuit, the blue LED »LOCK$_1$« in the »STATUS« menu will light constantly. The clock rate of the selected clock source is then displayed in the »REF CLOCK IN« menu under »1« accordingly.

In this conversion mode, the MC-4 accepts the incoming AES3 or AES11 signals with different sampling rates per stereo input. Due to this, it is maybe useful also to be able to select one of the stereo inputs as reference clock for the internal SRCs!

Does the reference clock signal not exceed 50.0kHz, both ADAT™ outputs transmit the same signal and the MC-4 functions as ADAT™ signal splitter.

If the reference clock signal exceeds 50.0kHz, the ADAT™ output format will be automatically changed to »SMUX2« or »SMUX4«, depending on the reference signal's clock rate. The corresponding SMUX format of the ADAT™ outputs will be displayed in the »STATUS« menu.

Unidirectional Format with Sampling Rate Conversion from: S/PDIF to ADAT™ or ADAT™ / SMUX2+4, AES3

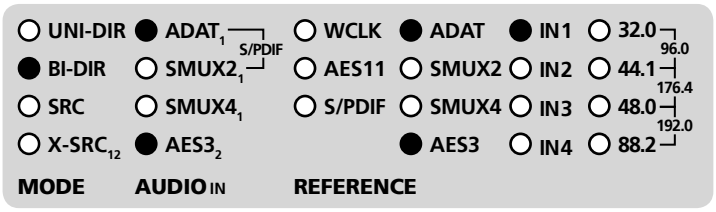


This setting generally allows to receive an 8-channel S/PDIF signal with clock rates between 25.0kHz and 200.0kHz. The signal's audio format will be converted into ADAT™ or ADAT™/SMUX2/4 and AES3 simultaneously, as in the previous section described. Additionally to the format conversion a SRC process is added.

The sampling rate of all outputs now depends on the clock rate of the reference clock signal, which is selected in the »REFERENCE« menu. The above example shows Word Clock (»WCLK«) selected as clock reference, which is the default setting.

In this mode are the same clock references available for synchronization of the internal SRCs as previously described.

Bi-directional Format Conversion between ADAT™ and AES3



This setting is a special function of your MC-4! It allows to receive an ADAT™ signal with up to 50.0kHz sampling rate and an 8-channel AES3 signal between 25.0kHz and 200.0kHz simultaneously. The ADAT™ input signal is converted to AES3 and the AES3 input signals are converted to ADAT™ or ADAT™/SMUX2/4, depending on the clock rate of the incoming AES3 signal. The format of the optical outputs is displayed in the »STATUS« menu.

In this mode, the MC-4 is able to work simultaneously with two different sampling rates, each within the above mentioned frequency ranges. Therefore, the system uses two PLL synthesizers to lock the incoming ADAT™ and AES3 signals with their individual clock rates. The status of the PLLs is displayed in the »STATUS« and »REF CLOCK IN« menus. To distinguish between the two PLL states, the two blue »LOCK« LEDs and the two raws of red »REF CLOCK IN« LEDs are marked with small numbers »1« and »2«. The number »1« indicates the state of the first PLL synthesizer which is standardly connected to the incoming ADAT™ audio signal. Number »2« indicates the state of the second PLL synthesizer which is standardly connected to the incoming AES3 audio signal. To make this more clear, we have also marked the two involved audio formats with small numbers: »$ADAT_1$« and »$AES3_2$«.

Due to the fact, that this is a format conversion mode only, it is imperative that <u>all AES3 signals are of same sampling rates</u>!

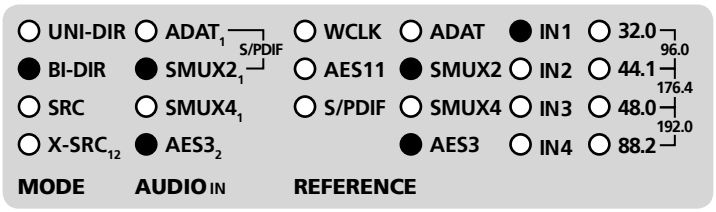
When the sampling rate of the incoming AES3 signal is lower as 50.0kHz, both ADAT™ outputs transmit the same signal and function as ADAT™ signal splitter.

Is the sampling rate of the incoming AES3 or S/PDIF signal between 50.0kHz to 100.0kHz, the ADAT™ output format will be automatically switched over to ADAT™/SMUX2.

When the sampling rate of the incoming AES3 or S/PDIF signal is between 100.0kHz to 200.0kHz, the ADAT™ output format will be automatically switched over to ADAT™/SMUX4.

The corresponding SMUX format of the ADAT™ outputs will be displayed in the »STATUS« menu.

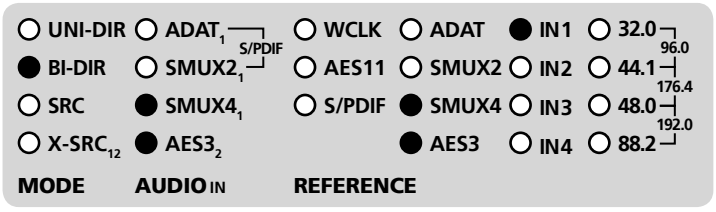
Bi-directional Format Conversion between ADAT™/SMUX2 and AES3



This setting allows to receive an ADAT™/SMUX2 signal with clock rates between 50.0kHz and 100.0kHz and an 8-channel AES3 signal simultaneously. The format conversion procedure is the same as described above. The sampling rates of the incoming audio signals and the format of the optical outputs are displayed in the »STATUS« and »REF CLOCK IN« menus.

To allow for the ADAT™ or ADAT™/SMUX2 format conversion without SRC into AES3 and vice versa, the MC-4 needs to derive valid clock signals from the incoming audio sources. Therefore, it is a must to activate one of the AES3 inputs »IN1–4«, the default setting is »IN1«. The reference »ADAT« or »ADAT™/SMUX2/4« is standardly activated due to the selected conversion mode and can not be changed in this mode.

Bi-directional Format Conversion between ADAT™/SMUX4 and AES3

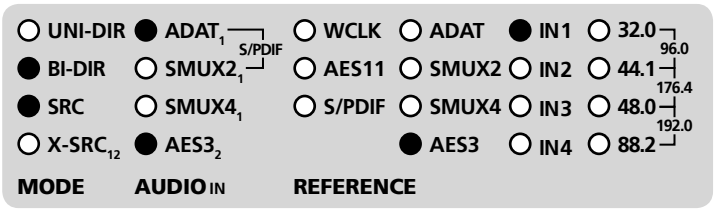


This setting allows to receive an ADAT™/SMUX2 signal with clock rates between 100.0kHz and 200.0kHz and an 8-channel AES3 signal simultaneously. The format conversion procedure is the same as described above. The sampling rates of the incoming audio signals and the format of the optical outputs are displayed in the »STATUS« and »REF CLOCK IN« menus.

The S/PDIF interfaces do not have any function in these bidirectional conversion modes, due to the lack of simultaneous useable inputs and outputs!

Please refer to the grey box »SMUX2 + SMUX4« on page 16 for details about SMUX2, SMUX4 and the ADAT™–AES3 channel splittings.

Bi-directional Format with Sampling Rate Conversion between ADAT™ and AES3



This function allows to receive an ADAT™ signal with up to 50.0kHz sampling rate and an 8-channel AES3 signal between 25.0kHz and 200.0kHz simultaneously. The ADAT™ input signal is converted to AES3 and the AES3 signals are converted to ADAT™ or ADAT™/SMUX2/4. The four AES3 stereo inputs and the ADAT™ signal can consist of complete different sampling rates!

This is possible by adding a SRC process on all input channels to the standard format conversion. The sampling rate of all outputs now depends on the clock rate of the reference clock signal, which is selected in the »REFERENCE« menu. The above example shows the first AES3 stereo channel pair »IN1« selected as clock reference.

In this mode, the following clock references are available for synchronization of the internal SRCs:

- WCLK, 25.0kHz – 200.0kHz, SCLK 11.2896MHz + 12.288MHz
- AES11, 25.0kHz – 200.0kHz (through separate input at the rear)
- ADAT™, 25.0kHz – 50.0kHz
- AES3 IN1 – 4, every of the AES3 stereo inputs, 25.0kHz – 200.0kHz
- 32.0kHz – 192.0kHz, internal clock oscillator

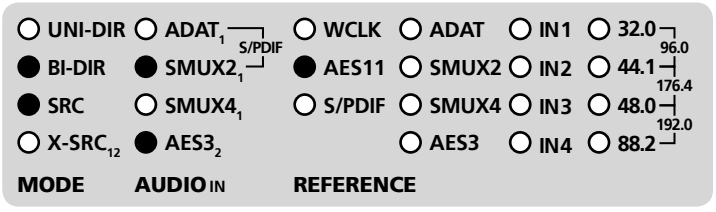
To activate a clock source enter the »REFERENCE« menu and press the »SELECT« button repeatedly. When the external clock reference signal can be locked by the internal PLL circuit, the blue LED »LOCK1« in the STATUS menu will light constantly. The clock rate of the selected clock source is displayed in the »REF CLOCK IN« menu under »1«.

Does the reference clock signal not exceed 50.0kHz, both ADAT™ outputs transmit the same signal and the MC-4 functions as ADAT™ signal splitter.

If the reference clock signal exceeds 50.0kHz, the ADAT™ output format will be automatically changed to »SMUX2« or »SMUX4«, depending on the reference signal's clock rate. The corresponding SMUX format of the ADAT™ outputs will be displayed in the STATUS menu.

In this conversion mode, the MC-4 accepts the incoming AES3 signals with different sampling rates per stereo input. Due to this, it may be also useful to select one of the stereo inputs as reference clock for the internal SRCs!

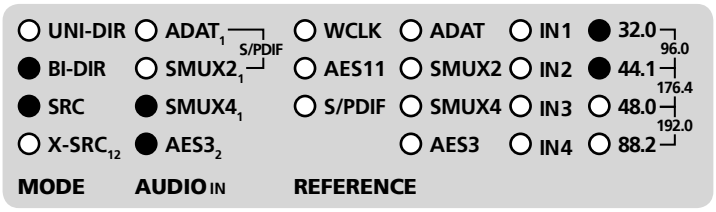
Bi-directional Format with Sampling Rate Conversion between ADAT™ / SMUX2 and AES3



This setting allows to receive an ADAT™/SMUX2 signal with clock rates between 50.0kHz and 100.0kHz and an 8-channel AES3 signal between 25.0kHz and 200.0kHz simultaneously. The format and sampling rate conversion procedure is the same as described above. The format of the optical outputs is displayed in the »STATUS« menu, the sampling rate of the incoming clock reference signal is displayed in the »REF CLOCK IN« menu under »1«. The above example shows »AES11« selected as clock reference.

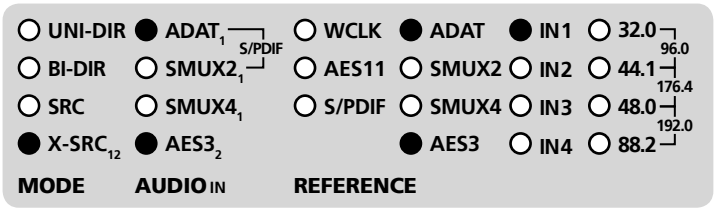
The S/PDIF interfaces do not have any function in these conversion modes, due to the lack of simultaneous useable inputs and outputs!

Bi-directional Format with Sampling Rate Conversion between ADAT™ / SMUX4 and AES3



This setting allows to receive an ADAT™/SMUX4 signal with clock rates between 100.0kHz and 200.0kHz and an 8-channel AES3 signal between 25.0kHz and 200.0kHz simultaneously. The format and sampling rate conversion procedure is the same as described on page 21. The format of the optical outputs is displayed in the »STATUS« menu, the sampling rate of the incoming clock reference signal is displayed in the »REF CLOCK IN« menu under »1«. The above example shows the internal clock generator running at »96.0k« selected as clock reference.

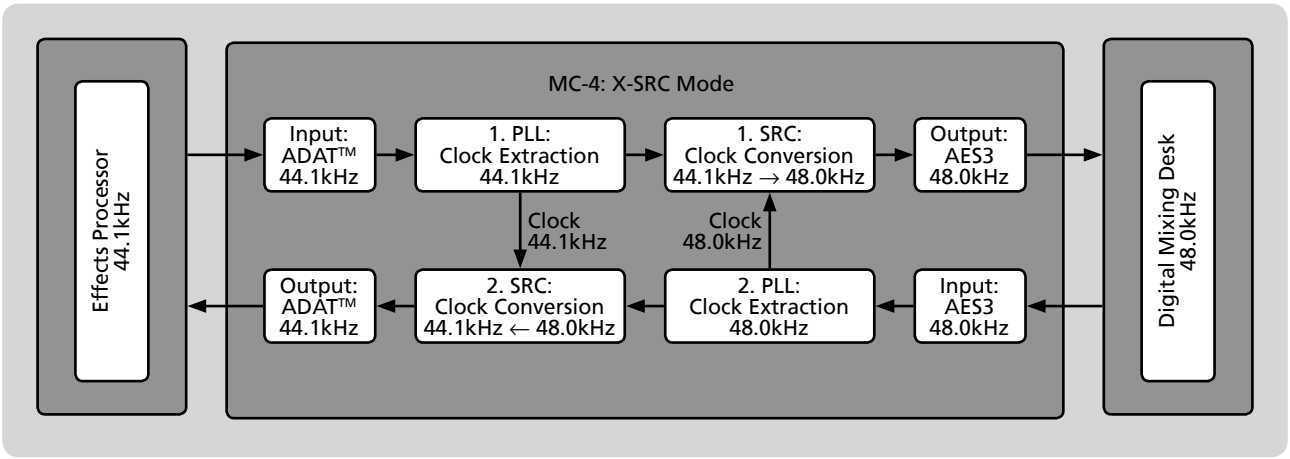
X-SRC Mode between ADAT™ and AES3



This setting is a very special and of course unique function of your MC-4!

The function allows to convert an ADAT™ signal into an AES3 signal and an AES3 signal into an ADAT™ signal at the same time, whereas both conversion streams may consist of different sampling rates. On this occasion, the MC-4 extracts the clock out of the two incoming digital audio signals and uses these clock references to synchronize the SRCs in front of each of the format-same outputs. This is especially useful when interconnecting two unsynchronized digital audio devices, each running on its own internal clock base.

A standard application is the interconnection of a digital mixing desk and a digital multichannel effects processor. Please see the following sketch to get an overview:



Format of Optical Outputs

The ADAT™ optical outputs follow the clock rate of the ADAT™ optical input signal. So both, the ADAT™ input and output are of same format at any time. A conversion from e.g. ADAT™ to ADAT™ / SMUX2 is not possible in the X-SRC mode!

This setting allows to receive an ADAT™ signal with up to 50.0kHz sampling rate and an 8-channel AES3 signal between 32.0kHz and 192.0kHz simultaneously. The ADAT™ input signal is converted to AES3 and the AES3 signals are converted to the ADAT™. The clock rate of the incoming ADAT™ signal is extracted by the first PLL synthesizer and supplied as clock reference to the second SRC, which feeds the ADAT™ output. The clock rate of the incoming AES3 signal is extracted by the second PLL synthesizer and supplied as clock reference to the first SRC, which feeds the AES3 output.

In this mode, the following clock references are available for synchronization of the internal SRCs:

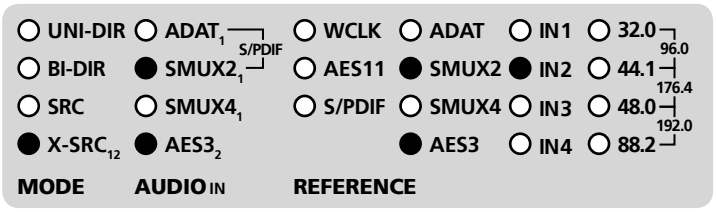
- ADAT™, 32.0kHz–50.0kHz (predefined)
- AES3 IN1–4, every of the AES3 stereo inputs, 32.0kHz–192.0kHz

The ADAT™ input is predefined as clock source for the second SRC, that means the ADAT™ output. As for the AES3 outputs, one of the four AES3 stereo inputs needs to be defined as clock source for the first SRC. Therefore enter the »REFERENCE« menu and press the »SELECT« button repeatedly to select one of the AES3 inputs »IN1–4«.
The example on page 22 shows the AES3 input »IN1« selected as clock reference for the first SRC, that means the AES3 signal path.

When the external clock reference signals can be locked by the PLLs, the blue LEDs »LOCK$_1$« and »LOCK$_2$« in the STATUS menu will light constantly. The clock rate of the clock sources are displayed in the »REF CLOCK IN« menu under »1« and »2«. The identifier »1« generally indicates the lock status and clock rate of the ADAT™ clock reference. The identifier »2« indicates the lock status and clock rate of the selected AES3 clock reference.

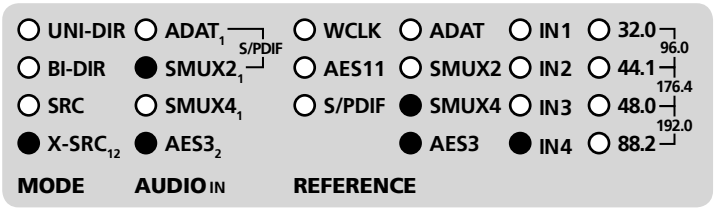
Using the X-SRC mode, the MC-4 extracts the needed clock rates out of the incoming digital audio signals. Thereby, the system does not need and does not accept any additional external applied clock reference signals.

X-SRC Mode between ADAT™ / SMUX2 and AES3



This setting allows to receive an ADAT™/SMUX2 signal with clock rates between 50.0kHz and 100.0kHz and an 8-channel AES3 signal between 32.0kHz and 192.0kHz simultaneously. The format and sampling rate conversion procedure is the same as described above. The clock reference for the ADAT section is predefined with »SMUX2«. The above example shows the AES3 input »IN2« selected as clock reference for the first SRC, that means the AES3 signal path.

X-SRC Mode between ADAT™ / SMUX4 and AES3



This setting allows to receive an ADAT™/SMUX2 signal with clock rates between 100.0kHz and 200.0kHz and an 8-channel AES3 signal between 32.0kHz and 192.0kHz simultaneously. The format and sampling rate conversion procedure is the same as described above. The clock reference for the ADAT section is predefined with »SMUX4«. The above example shows the AES3 input »IN4« selected as clock reference for the first SRC, that means the AES3 signal path.

STATUS

STATUS

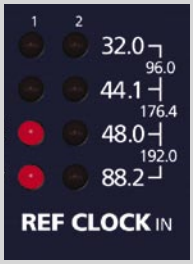
This area displays different system conditions of your MC-4. There is no access for changing settings.

»$LOCK_1$« and »$LOCK_2$«
Doing unidirectional format conversions or bidirectional format conversions with SRC, the »$LOCK_1$« LED lights when the internal PLL circuit has detected the incoming digital audio signal or clock reference signal as valid. During bidirectional format conversions or the different X-SRC modes, the »$LOCK_1$« and »$LOCK_2$« LEDs light both, when the incoming digital audio signals are valid. As it is only possible to do bidirectional conversions between ADAT™ and AES3, the first LED »$LOCK_1$« is assigned to the ADAT™ input and the second LED »$LOCK_2$« is assigned to the AES3 inputs.

If the digital audio signal or reference clock signal is unstable, the »$LOCK_1$« and »$LOCK_2$« LEDs do not light, the whole audio conversion process will be stopped and the digital audio outputs do not transmit any signals.

If the internal oscillator is selected as reference clock for the SRCs, the »$LOCK_1$« LED will light correspondingly.

»SMUX2 + SMUX4 ADAT OUT«
These two LEDs light correspondingly, if an ADAT™/SMUX2/4 signal with a sampling rate between 50.0kHz and 100.0kHz (SMUX2), or with a sampling rate between 100.0kHz and 200.0kHz (SMUX4) is output. These LEDs are not reporting any state of the ADAT™ optical inputs!



REF CLOCK IN

REF CLOCK IN

»1« + »2«

This area displays the incoming reference clock rates for the different states of operation of the MC-4.

When working with unidirectional format conversion only, the sampling rate of the digital audio signal, which is selected as reference, will be displayed under »1«. Doing unidirectional format and sampling rate conversion, the clock rate of the selected reference clock signal will be displayed »1« as well.

When working with bidirectional conversion modes, the two LED lines are pre-assigned, for the ADAT™ signal line »1« and for the AES3 signals line »2«.

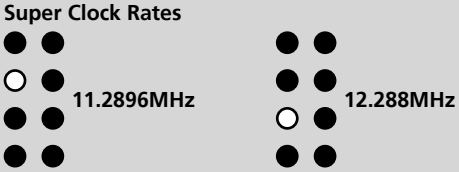
If the internal oscillator supplies the reference clock for the SRCs, the clock rate which is selected in the »REFERENCE« menu will be displayed under »1«.

The following basis reference clock rates are supported and will be analyzed:

These indications are only available if the internal PLL circuit is locked stably to the external reference signal and the corresponding blue LOCK LED lights permanently.

Word Clock Rates

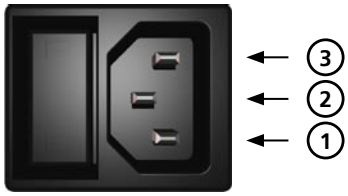
Super Clock Rates



APPENDIX

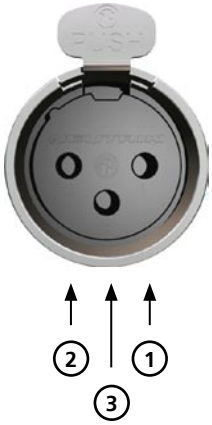
Pin Assignment of the Connectors

Mains



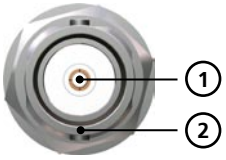
1 Neutral (blue; USA: white)
2 Protective earth (green/yellow; USA: green)
3 Live, phase (brown; USA: black)

AES/EBU, XLR, Input



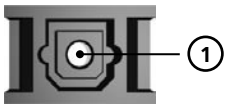
1 Audio ground
2 a conductor (hot / +)
3 b conductor (cold / -)

Word Clock + Super Clock
BNC In-/Output



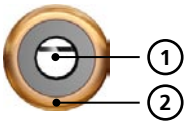
1 Signal
2 Ground

S/PDIF, Optical, Input/Output
TOSLINK Standard



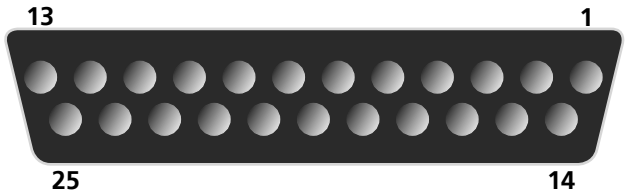
1 Optical signal

S/PDIF, Cinch, Input/Output



1 Audio signal
2 Audio ground

AES/EBU 25pin D-Sub, 8-channel Input and Output



PIN	SIGNAL	PIN	SIGNAL
1	IN 1/2 (hot)	14	IN 1/2 (cold)
2	IN 3/4 (hot)	15	IN 3/4 (cold)
3	IN 5/6 (hot)	16	IN 5/6 (cold)
4	IN 7/8 (hot)	17	IN 7/8 (cold)
5	OUT 1/2 (hot)	18	OUT 1/2 (cold)
6	OUT 3/4 (hot)	19	OUT 3/4 (cold)
7	OUT 5/6 (hot)	20	OUT 5/6 (cold)
8	OUT 7/8 (hot)	21	OUT 7/8 (cold)
9	NC	22	Frame GND
10	Frame GND	23	Frame GND
11	NC	24	Frame GND
12	Frame GND	25	Frame GND
13	Frame GND		

Technical Data

ADAT™ OPTICAL INPUT (8 CHANNELS)	
Interface	2 x Toslink™, EIAJ RC-5720
Format, Resolution	Alesis ADAT™, SMUX2, SMUX4, 16–24 bits
Lock range	25.0kHz to 200.0kHz
AES/EBU AUDIO INPUT (8 CHANNELS)	
Interface	1 x Sub-D 25 connector, transformer balanced, input impedance 110Ω, 200mV–7V
Format, Resolution	AES3–1992/2003, AES11–1997/2003, IEC60958, 16–24 bits
Lock range	25.0kHz to 200.0kHz
AES/EBU REFERENCE INPUT	
Interface	1 x XLR female, transformer balanced, input impedance 110Ω, 200mV–7.0V
Format, Resolution	AES11–1997/2003, AES3–1992/2003, 16–24 bits
Lock range	25.0kHz to 200.0kHz
ADAT™ OPTICAL OUTPUT (8 CHANNELS)	
Interface	2 x Toslink™, EIAJ RC-5720
Format, Resolution	Alesis ADAT™, SMUX2, SMUX4 (4 channels only!), 16–24 bits
Transmitted sampling rates	25.0kHz to 200.0kHz
AES/EBU AUDIO OUTPUT (8 CHANNELS)	
Interface	1 x Sub-D 25 connector, transformer balanced, input impedance 110Ω, 200mV–7V
Format, Resolution	AES3–1992/2003, AES11–1997/2003, 16–24 bits
Transmitted sampling rates	25.0kHz to 200.0kHz
S/PDIF COAXIAL INPUT OR OUTPUT (8 CHANNELS)	
Interface	4 x Coaxial (Cinch/RCA female), unbalanced, 0.5Vpp @ 75Ω, output impedance 75Ω, buffered, switched as inputs or outputs depending on the operation mode
Format, Resolution	IEC60958, 16–24 bits
Supported sampling rates	25.0kHz to 200.0kHz
WORD CLOCK INPUT	
Interface	1 x BNC, 200mV-7V, unbalanced, input impedance 75Ω
Lock range	25.0kHz to 200.0kHz, 11.2896MHz + 12.288MHz (so-called Super Clocks)
WORD CLOCK OUTPUT	
Interface	1 x BNC, 3,5V@22Ω, unbalanced, buffered
Transmitted clock rates	25.0kHz to 200.0kHz
SIGNAL PROCESSING	
Digital audio format conversion	ADAT™ + SMUX2/4 → AES3, S/PDIF, ADAT™ + SMUX2/4 AES3 → ADAT™ + SMUX2/4, S/PDIF, AES3 S/PDIF → ADAT™ + SMUX2/4, AES3 ADAT™ + SMUX2/4 ↔ AES3
Sampling rate conversion	Lock range: 4.0kHz to 212.0kHz Dynamic range: 144dB (A-weighted) Resolution: 24Bits THD+N: -140dB Input/Output sampling ratio: 1:16 (upsampling), 16:1 (downsampling)
INTERNAL REFERENCE CLOCK SPECIFICATIONS	
Oscillator type	TCXO, temperature compensated crystal oscillator
Clock accuracy (shipped)	<±0.5ppm
Clock stability vs. temperature	<±0.5ppm within -10°C to +60°C
Operating temperature	-10°C to +60°C
Clock jitter	<10ps (RMS)
POWER SUPPLY	
Type	Internal, switching power supply
Input voltage	85V–264V (automatic adjustment), 47Hz–440Hz
Power consumption	max. 10W
SYSTEM UNIT COVER	
Cover size/material/color	196 x 42 x 156mm without connectors (W x H x D), aluminium sheet 1mm, black
Front panel size/material	198 x 44 x 2mm (W x H x D), aluminium
Weight	~615g

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