MC-4

ADAT™–AES3–S/P-DIF DIGITAL AUDIO FORMAT AND SAMPLING RATE CONVERTER

V2

MUTEC·

Professional A/V Technology
Germany

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.

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!

CAUTION
RISK OF ELECTRICAL SHOCK!

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.

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.com • www.MUTEC-net.com

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▦ CONTROL ELEMENTS AND TERMINALS

▦ INSTALLATION

▦ GENERAL OPERATION

▦ OPERATING THE MC-4

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INTRODUCTION

Thank you very much for purchasing the 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/P-DIF. All digital audio signals can be processed with 8 channels and sampling rates up to 192.0 kHz, 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.

Furthermore, the MC-4 offers an internal, low-jitter clock base with high 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 is available. Furthermore, in this operation mode the MC-4's Word Clock output supplies a low-jitter reference clock signal which is of same high accuracy as the internal clock base. 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 ½ 19" case currently available in the market!

MC-4 Features

- ADAT™, AES/EBU and S/P-DIF interfaces in one box.
- **Bidirectional format and sampling rate conversions from 32.0 kHz to 192.0 kHz.**
- **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.**
- **Low-jitter 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 ½ 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/P-DIF 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.

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.**

⚠ **Register your MUTEC Product for Warranty and Support!**

We ask you to be so kind to register your MUTEC product through our website immediately after purchasing. This ensures full warranty services over a period of two years after purchasing the product. Moreover, for all registered products we offer to our customers technical support. We also will inform you about product updates and new products which may of interest for you (on voluntary base, of course).

Please regsiter your product at:

www.MUTEC-net.com

> SERVICES, > MUTEC Product Registration
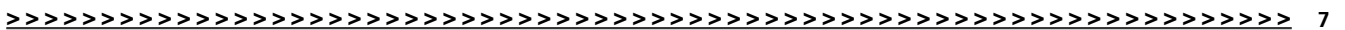
Peripheral MUTEC Products

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.com

- 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.

Signal Distributors

- 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 110 Ω 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.com !

CONTROL ELEMENTS AND TERMINALS

MC-4 Front Panel
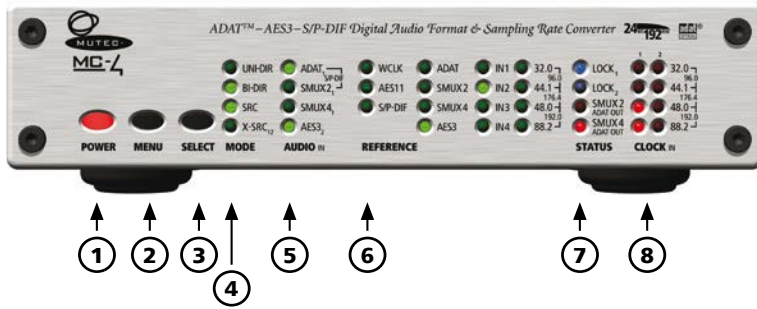
1 POWER
This red LED lights up when the unit is switched on with the rear panel POWER switch.

2 MENU
This key selects one of the available function menus.

3 SELECT
Use this key to select a function within a specific function menu.

4 MODE
This function menu allows to select all available conversion modes.

5 AUDIO IN
This function menu allows to select the digital audio formats which should be converted with the previously selected conversion mode.

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

7 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.

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

Refer to the chapter »OPERATIONS« 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/P-DIF digital audio signal aligned to IEC60958 can be input. The input impedance is 110 Ω (XLR connector, female).

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

2 WCLK IN + OUT

The above BNC connector (IN) receives a Word Clock or so-called »Super Clock« signal as master clock reference for the SRCs. The below BNC connector (OUT) transmits a low-jitter Word Clock signal based on the internal clock base or the selected external clock reference signal. If format conversions only are carried out, the WCLK output sends a Word Clock signal extracted from the selected digital audio reference signal.

The impedances of both connectors are 75 Ω (BNC connectors, female).

3 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).

4 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 fed with S/P-DIF digital audio signals aligned to IEC60958. The input and output impedances are 110 Ω. The pin assignment of the 25pin D-Sub connector complies with Yamaha, AKAI, Mackie and others, too.

5 ADAT™ OUT

These two optical outputs transmit digital audio multichannel signals in compliance with the Alesis ADAT™ format. Eight channel ADAT™ with up to 50.0kHz clock rate are sent to both optical outputs, enabling a signal doubling. For transfering ADAT™ signals with higher clock rates up to 192.0kHz, both outputs »A« and »B« are used to split the ADAT™ signal, as described on page 16, under »SMUX2 + SMUX4« (Toslink™ connector, EIAJ standard).

6 S/P-DIF IN/OUT

These interfaces function as receiver and transmitter for S/P-DIF 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 impedances of all connectors are 75 Ω (Cinch connectors, female).

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
1 x Manual

> 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 optical ADAT™, AES/EBU and S/P-DIF 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.

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 110 Ω. When purchasing the cable ask your retailer for a confirmation that the cable will perform flawlessly in your specific application.

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

> 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!

> **⚠ 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 75 Ω 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 75 Ω 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.

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 Light-

> **⚠ Please make sure that the cable used has a resistance of 75 Ω! 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!**

bridge, 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 75 Ω 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« button toggles between different basic function menus.
2 Switching the »SELECT« button activtes individual functions within one function menu.
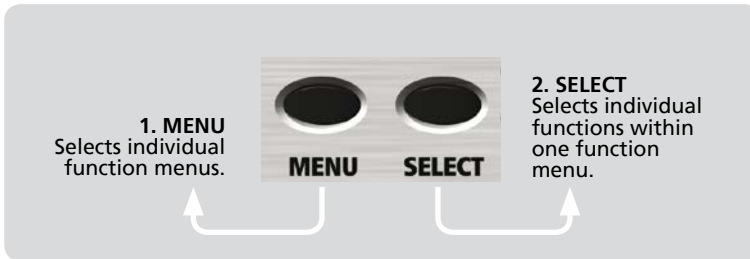
MENU + SELECT operation
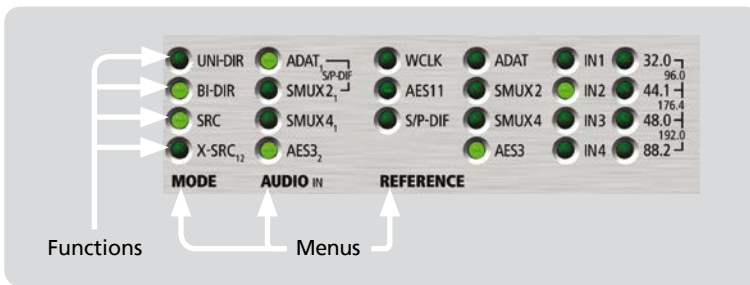
Function Menus + Functions

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« button selects a new function within a menu. The LED of the selected function flashs accordingly. After the LED stops flashing, the function is activated.
3 When the needed function is selected, do not press the switches again! After a period of approximately 4 seconds the LED of the selected function stops flashing.

The »STATUS« and »CLOCK IN« areas are not accessible by using the »MENU« and »SELECT« keys, because they only inform about different conditions of incoming signals.

> **⚠ Safety Instructions**
>
> **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 the device!**

> **⚠ Shut-Down of Outputs**
>
> **All digital audio outputs are shut-down during function selection!**
> **After a function is finally selected and the corresponding LED lights constantly again, the digital audio outputs are activated for signal transfer.**

> **⚠ User Settings Remain**
>
> **All user-specific function settings are available furthermore when power is restored.**

OPERATING THE MC-4

MODE + AUDIO IN + REFERENCE Menus

These three function menus are offering access to the whole functionality of your MC-4.

The »MODE« menu allows to select the general conversion option as uni- or bidirectional conversion, with or without sampling rate conversion or the X-SRC mode.

Within the »AUDIO IN« menu you select the digital audio formats for conversion. This menu acts in dependency of the »MODE« menu. The operating 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 provides all necessary synchronization options for the corresponding conversions modes and the use of the internal sampling rate converters (SRC). This menu also acts in dependency of the »MODE« menu. It is only directly accessable when a SRC mode is selected under »MODE«.

The menus »STATUS« and 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$_1$** ⌐ = 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/P-DIF 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/P-DIF ○ 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.

1   2
○ ○ 32.0 ⌐
    $_{96.0}$
● ○ 44.1 ⌐
    $_{176.4}$
○ ○ 48.0 ⌐
    $_{192.0}$
○ ○ 88.2 ⌐
REF CLOCK IN
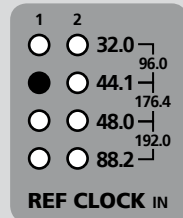
When no input signal is available, the MC-4 supplies at all digital audio outputs blank frame signals, the Word Clock output carries a corresponding Word Clock reference signal. Thus, connected devices receive immediately valid clock signals at their appropriate inputs after starting up the whole studio 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 synthesizer locks 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.

Channel Assignment

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

SMUX2 + SMUX4

The 8 channel ADAT™ format uses standardly one optical connector and is limited to sampling rates up to 50.0kHz. To enable the use of higher sampling rates up to 192.0kHz, SMUX2 or SMUX4 processing must be activated separately because these formats are not decoded 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 a full 8-channel ADAT™ stream, whereas input »A« receives channel 1−4 and input »B« receives channel 5−8. SMUX2 transmits ADAT streams with clock rates between 50.0kHz and 100.0kHz.

SMUX4 works equally to SMUX2. Due to the higher sampling rates, only 4 channels of an 8-channel ADAT™ stream can be processed. Thus, the optical input »A« receives channel 1+2 and input »B« receives channel 3+4. Channels 5−8 can no more processed with SMUX4, which transmits ADAT™ streams with sampling rates from 100.0kHz to 200.0kHz.

ADAT™ / SMUX Adaption

⚠ **When AES3 or S/P-DIF signals with sampling rates up to 50.0kHz coming in, both optical outputs transmit the same ADAT™ signal and function as signal splitter.**

Incoming AES3 or S/P-DIF signals with 50.0kHz to 100.0kHz sampling rates let the optical output format switch to SMUX2.

Sampling rates of 100.0kHz to 200.0kHz of incoming AES3 or S/P-DIF signals let the optical output format switch to SMUX4.

The corresponding SMUX format of the optical outputs is displayed under »STATUS«.

Unidirectional Format Conversions

MODE	AUDIO IN	REFERENCE		IN	
● UNI-DIR	● ADAT₁ ⌐ S/P-DIF	○ WCLK	● ADAT	○ IN1	○ 32.0 ⌐ 96.0
○ BI-DIR	○ SMUX2₁	○ AES11	○ SMUX2	○ IN2	○ 44.1 ⌐ 176.4
○ SRC	○ SMUX4₁	○ S/P-DIF	○ SMUX4	○ IN3	○ 48.0 ⌐ 192.0
○ X-SRC₁₂	○ AES3₂		○ AES3	○ IN4	○ 88.2 ⌐

This setting e.g. allows for unidirectional format conversion (see »MODE«, »UNI-DIR«) of an ADAT™ source signal with up to 50.0kHz sampling rate (see »AUDIO IN«, »ADAT«) simultaneously to all available output formats. The sampling rate of the source signal will be displayed in the first LED row, marked with »1«, of the »CLOCK IN« menu. The ADAT™ signal will be re-clocked and transfered to both optical ADAT™ outputs. Thus, the original input signal is not lost and available for two times for further use!

Under »REFERENCE« the »ADAT« option is selected automatically. Please see the passage below »Why a Clock Reference for unidirectional ADAT™ Conversion without SRC?« for more information on that.

Within the »AUDIO IN« menu, you can select with the »SELECT« button the other available digital audio inputs. The reference for the selected audio format will be activated accordingly.

Why a Clock Reference for unidirectional ADAT™ Conversion without SRC?

To allow for ADAT™ format conversion without SRC into AES3 and S/P-DIF, the MC-4 needs to derive a valid clock signal from the incoming ADAT™ audio source. Therefore, the corresponding reference option is activated in the »REFERENCE« menu automatically. This selection can not be changed.

Converting 2-Channel Signals only

If an AES3 or S/P-DIF 2-channel stereo signal is input for format conversion only (without SRC option), 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/P-DIF signal will be displayed in the »CLOCK IN« menu.

Converting multichannel AES3 or S/P-DIF Signals

When format converting multiple AES3 or S/P-DIF stereo signals to ADAT™ without using the SRC option, you must ensure that the individual stereo input signals are all of equal and sychnronized sampling rates!

Further Setting Examples

MODE	AUDIO IN	REFERENCE		IN	
● UNI-DIR	○ ADAT₁ ⌐ S/P-DIF	○ WCLK	○ ADAT	○ IN1	○ 32.0 ⌐ 96.0
○ BI-DIR	○ SMUX2₁	○ AES11	○ SMUX2	○ IN2	○ 44.1 ⌐ 176.4
○ SRC	● SMUX4₁	○ S/P-DIF	● SMUX4	○ IN3	○ 48.0 ⌐ 192.0
○ X-SRC₁₂	○ AES3₂		○ AES3	○ IN4	○ 88.2 ⌐

Unidirectional format conversion from ADAT™ SMUX4 to AES3, S/P-DIF coaxial, ADAT™ SMUX4.

MODE	AUDIO IN	REFERENCE		IN	
● UNI-DIR	● ADAT₁ ⌐ S/P-DIF	○ WCLK	○ ADAT	● IN1	○ 32.0 ⌐ 96.0
○ BI-DIR	● SMUX2₁	○ AES11	○ SMUX2	○ IN2	○ 44.1 ⌐ 176.4
○ SRC	○ SMUX4₁	● S/P-DIF	○ SMUX4	○ IN3	○ 48.0 ⌐ 192.0
○ X-SRC₁₂	○ AES3₂		○ AES3	○ IN4	○ 88.2 ⌐

Unidirectional format conversion from S/P-DIF coaxial to AES3, ADAT™. Here, a two channel S/P-DIF signal only is applied at S/P-DIF input »1«, thus under »REFERENCE« the corresponding clock reference »IN1« is selected.
This is the only mode, in which the S/P-DIF interfaces work as inputs!

Unidirectional Format and Sampling Rate Conversions

MODE: ● UNI-DIR ○ BI-DIR ● SRC ○ X-SRC$_{12}$
AUDIO IN: ● ADAT$_1$ (S/P-DIF) ○ SMUX2$_1$ ○ SMUX4$_1$ ○ AES3$_2$
REFERENCE: ● WCLK ○ AES11 ○ S/P-DIF | ○ ADAT ○ SMUX2 ○ SMUX4 ○ AES3 | ○ IN1 ○ IN2 ○ IN3 ○ IN4 | ○ 32.0 (96.0) ○ 44.1 (176.4) ○ 48.0 (192.0) ○ 88.2

External Clock References | Internal Clock Reference

This setting e.g. allows to receive an ADAT™ signal with up to 50.0kHz sampling rate. The signal's audio format will be converted into AES3, S/P-DIF and ADAT™ or 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, SCLK
- AES11 (through separate input at the rear)
- AES3 IN1–4, every of the AES3 stereo inputs
- Internal clock oscillator

To activate a clock source enter the »REFERENCE« menu by pressing the MENU key and press the »SELECT« key repeatedly. When the external clock reference signal can be successfully locked, the blue LED »LOCK$_1$« in the »STATUS« menu lights constantly and the clock rate of the clock source is displayed in the »CLOCK IN« menu under »1«.

Individual AES3 Input Signals

Running the MC-4 in the SRC mode, the clock rates of indivudual AES3 input signals can be totally different within a range of 25.0kHz to 200.0kHz. It is also not necessary to feed in signals at all four AES3 inputs. The input assignment is passed to the outputs.

Further Setting Examples

MODE: ● UNI-DIR ○ BI-DIR ● SRC ○ X-SRC$_{12}$
AUDIO IN: ○ ADAT$_1$ (S/P-DIF) ○ SMUX2$_1$ ○ SMUX4$_1$ ● AES3$_2$
REFERENCE: ○ WCLK ● AES11 ○ S/P-DIF | ○ ADAT ○ SMUX2 ○ SMUX4 ○ AES3 | ○ IN1 ○ IN2 ○ IN3 ○ IN4 | ○ 32.0 (96.0) ○ 44.1 (176.4) ○ 48.0 (192.0) ○ 88.2

Unidirectional format with sampling rate conversion from AES3 to ADAT™ or SMUX2/4, S/P-DIF coaxial, AES3. AES11 is selected as clock reference for the internal SRCs.

MODE: ● UNI-DIR ○ BI-DIR ● SRC ○ X-SRC$_{12}$
AUDIO IN: ● ADAT$_1$ (S/P-DIF) ● SMUX2$_1$ ○ SMUX4$_1$ ○ AES3$_2$
REFERENCE: ○ WCLK ○ AES11 ○ S/P-DIF | ○ ADAT ○ SMUX2 ○ SMUX4 ○ AES3 | ○ IN1 ○ IN2 ○ IN3 ○ IN4 | ● 32.0 (96.0) ● 44.1 (176.4) ○ 48.0 (192.0) ○ 88.2

Unidirectional format with sampling rate conversion from S/P-DIF coaxial to AES3, SMUX2. When the internal clock basis is selected as clock reference with 96.0kHz, the ADAT™ output signal is automatically converted into SMUX2 at the optical outputs. When sampling rates less than 88.2kHz are selected, unidirectional conversion to an 8 channel ADAT™ signal is possible from the 4 S/P-DIF inputs.

Formats accepted via AES/EBU inputs

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

⚠ **ADAT™/SMUX Adaption with SRC Option**

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

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

⚠ **Locking so-called »Super Clocks«**

Your MC-4 is able to lock 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 multiples of the Word Clock rates 44.1kHz and 48.0kHz.

When locking one of these Super Clocks, the rate will be inverted displayed in the »CLOCK IN« menu. Thus, 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).

1	2	
●	●	32.0 (96.0)
○	●	44.1 (176.4)
●	●	48.0 (192.0)
●	●	88.2

REF CLOCK IN

Super Clock of 44.1kHz Word Clock

1	2	
●	●	32.0 (96.0)
●	●	44.1 (176.4)
○	●	48.0 (192.0)
●	●	88.2

REF CLOCK IN

Super Clock of 48.0kHz Word Clock

Bidirectional Format Conversions

MODE	AUDIO IN	REFERENCE		
○ UNI-DIR	● ADAT$_1$ ⌐ S/P-DIF	○ WCLK	● ADAT	● IN1 ○ 32.0 ⌐ 96.0
● BI-DIR	○ SMUX2$_1$ ⌐	○ AES11	● SMUX2	○ IN2 ○ 44.1 ⌐ 176.4
○ SRC	○ SMUX4$_1$	○ S/P-DIF	○ SMUX4	○ IN3 ○ 48.0 ⌐ 192.0
○ X-SRC$_{12}$	● AES3$_2$		● AES3	○ IN4 ○ 88.2 ⌐

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 SMUX2/4, depending on the common clock rate of the incoming AES3 signals. The format of the optical outputs is changed automatically and 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 »CLOCK IN« menus. To distinguish between the two PLL states, the two blue »LOCK« LEDs and the two raws of red »CLOCK IN« LEDs are marked with small numbers »1« and »2«. The number »1« indicates the state of the first PLL, which is standardly connected to the incoming ADAT™ audio signal. Number »2« indicates the state of the second PLL connected to the incoming AES3 signals. To make this more clear, we have also marked the two involved audio formats with small numbers: »ADAT$_1$« and »AES3$_2$«.

Necessary Reference Assignment

To allow for bidirectional conversions between ADAT™ or SMUX2/4 and AES3, the MC-4 needs to derive valid clock signals from the incoming audio sources. Therefore, it is a <u>must</u> to activate one of the AES3 inputs »IN1–4« in the »REFERENCE« menu, the default setting is »IN1«. The reference »ADAT« or »SMUX2/4« is standardly activated due to the clock rate of the incoming ADAT™ or SMUX signal and can not be changed in this mode.

Further Setting Examples

| MODE	AUDIO IN	REFERENCE		
○ UNI-DIR	○ ADAT$_1$ ⌐ S/P-DIF	○ WCLK	○ ADAT	● IN1 ○ 32.0 ⌐ 96.0
● BI-DIR	● SMUX2$_1$ ⌐	○ AES11	● SMUX2	○ IN2 ○ 44.1 ⌐ 176.4
○ SRC	○ SMUX4$_1$	○ S/P-DIF	○ SMUX4	○ IN3 ○ 48.0 ⌐ 192.0
○ X-SRC$_{12}$	● AES3$_2$		● AES3	○ IN4 ○ 88.2 ⌐

Bidirectional format conversion between SMUX2 with clock rates from 50.0kHz to 100.0kHz and an 8-channel AES3 signal. The sampling rates of the incoming audio signals and the format of the optical SMUX2 outputs are displayed in the »STATUS« and »CLOCK IN« menus.

MODE	AUDIO IN	REFERENCE		
○ UNI-DIR	○ ADAT$_1$ ⌐ S/P-DIF	○ WCLK	○ ADAT	● IN1 ○ 32.0 ⌐ 96.0
● BI-DIR	○ SMUX2$_1$ ⌐	○ AES11	○ SMUX2	○ IN2 ○ 44.1 ⌐ 176.4
○ SRC	● SMUX4$_1$	○ S/P-DIF	● SMUX4	○ IN3 ○ 48.0 ⌐ 192.0
○ X-SRC$_{12}$	● AES3$_2$		● AES3	○ IN4 ○ 88.2 ⌐

Bidirectional format conversion between SMUX4 with clock rates from 100.0kHz to 200.0kHz and an 8-channel AES3 signal. The sampling rates of the incoming audio signals and the format of the optical SMUX4 outputs are displayed in the »STATUS« and »CLOCK IN« menus.

⚠ Equal Clock Rates for AES3!

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

⚠ ADAT™ / SMUX Adaption

When AES3 signals with sampling rates up to 50.0kHz coming in, both optical outputs transmit the same ADAT™ signal and function as signal splitter.

Incoming AES3 signals with 50.0kHz to 100.0kHz sampling rates let the optical output format switch to SMUX2.

Sampling rates of 100.0kHz to 200.0kHz of incoming AES3 signals let the optical output format change to SMUX4.

The corresponding SMUX format of the optical outputs is displayed under »STATUS«.

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

Bidirectional Format and Sampling Rate Conversions

MODE	AUDIO IN	REFERENCE				
○ UNI-DIR	● ADAT₁ ⌐S/P-DIF	● WCLK	○ ADAT	○ IN1	○ 32.0 ⌐96.0	
● BI-DIR	○ SMUX2₁	○ AES11	○ SMUX2	○ IN2	○ 44.1 ⌐176.4	
● SRC	○ SMUX4₁	○ S/P-DIF	○ SMUX4	○ IN3	○ 48.0 ⌐192.0	
○ X-SRC₁₂	● AES3₂		○ AES3	○ IN4	○ 88.2 ⌐	

This setting allows e.g. 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 optical ADAT™ input signal is converted to AES3 and the AES3 signals are converted to ADAT™ or SMUX2/4, depending on the clock rate of the reference clock signal. The four AES3 stereo input and the ADAT™ signals can consist of different sampling rates!

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

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

- ☞ WCLK, SCLK
- ☞ AES11 (through separate input at the rear)
- ☞ ADAT™, SMUX2, SMUX4
- ☞ AES3 IN1–4, every of the AES3 stereo inputs
- ☞ 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«.

Individual AES3 Input Signals

Running the MC-4 in the SRC mode, the clock rates of indivudual AES3 input signals can be totally different within a range of 25.0kHz to 200.0kHz. It is also not necessary to feed in signals at all four AES3 inputs. The input assignment is passed to the outputs.

Further Setting Examples

MODE	AUDIO IN	REFERENCE				
○ UNI-DIR	○ ADAT₁ ⌐S/P-DIF	● WCLK	○ ADAT	○ IN1	○ 32.0 ⌐96.0	
● BI-DIR	● SMUX2₁	○ AES11	○ SMUX2	○ IN2	○ 44.1 ⌐176.4	
● SRC	○ SMUX4₁	○ S/P-DIF	○ SMUX4	○ IN3	○ 48.0 ⌐192.0	
○ X-SRC₁₂	● AES3₂		○ AES3	○ IN4	○ 88.2 ⌐	

Bidirectional format and sampling rate conversion between SMUX2 and an 8-channel AES3 signal referenced to a Word Clock signal. The sampling rate of the reference clock signal and the format of the optical SMUX2 outputs are displayed in the »CLOCK IN« and »STATUS« menus.

MODE	AUDIO IN	REFERENCE				
○ UNI-DIR	○ ADAT₁ ⌐S/P-DIF	○ WCLK	○ ADAT	○ IN1	○ 32.0 ⌐96.0	
● BI-DIR	○ SMUX2₁	○ AES11	○ SMUX2	○ IN2	○ 44.1 ⌐176.4	
● SRC	● SMUX4₁	○ S/P-DIF	○ SMUX4	● IN3	○ 48.0 ⌐192.0	
○ X-SRC₁₂	● AES3₂		● AES3	○ IN4	○ 88.2 ⌐	

Bidirectional format and sampling rate conversion between SMUX4 and an 8-channel AES3 signal referenced to the third AES3 input signal. The sampling rate of the reference clock signal and the format of the optical SMUX4 outputs are displayed in the »CLOCK IN« and »STATUS« menus.

⚠ **ADAT™ / SMUX Adaption with SRC Option**

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

If the reference clock exceeds 50.0kHz, the optical output format will automatically change to »SMUX2« or »SMUX4«, depending on the reference signal's clock rate. The corresponding SMUX format of the optical outputs is 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!

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

X-SRC Mode

MODE	AUDIO IN	REFERENCE		
○ UNI-DIR	● ADAT$_1$ ⎤ S/P-DIF	○ WCLK	● ADAT ● IN1	○ 32.0 ⎤ 96.0
○ BI-DIR	○ SMUX2$_1$ ⎦	○ AES11	● SMUX2 ○ IN2	○ 44.1 ⎤ 176.4
○ SRC	○ SMUX4$_1$	○ S/P-DIF	○ SMUX4 ○ IN3	○ 48.0 ⎤ 192.0
● X-SRC$_{12}$	● AES3$_2$		● AES3 ○ IN4	○ 88.2 ⎦

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

The X-SRC mode allows to convert an ADAT™ signal into an 8-channel AES3 signal and an 8-channel AES3 signal into an ADAT™ or SMUX2/4 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 or unsynchronizable 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:

MC-4: X-SRC Mode

| Effects Processor 44.1kHz | → | Input: ADAT™ 44.1kHz | → | 1. PLL: Clock Extraction 44.1kHz | → | 1. SRC: Clock Conversion 44.1kHz → 48.0kHz | → | Output: AES3 48.0kHz | → | Digital Mixing Desk 48.0kHz |

Clock 44.1kHz ↓ — Clock 48.0kHz ↑

| Effects Processor | ← | Output: ADAT™ 44.1kHz | ← | 2. SRC: Clock Conversion 44.1kHz ← 48.0kHz | ← | 2. PLL: Clock Extraction 48.0kHz | ← | Input: AES3 48.0kHz | ← | Digital Mixing Desk |

⚠ Format of Optical Outputs

The optical outputs follow the clock rate of the ADAT™ or SMUX input signal. Thus, both the optical input and output are of equal format at any time!

⚠ No External Clock Needed

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.

In this example, an ADAT™ signal with 44.1kHz sampling rate and an 8-channel AES3 signal with 48.0kHz sampling rate are feed in simultaneously. The ADAT™ input signal is converted to AES3 and the AES3 signals are converted to 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 optical 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™ (predefined with input selection)
- ☛ SMUX2 (predefined with input selection)
- ☛ SMUX4 (predefined with input selection)
- ☛ AES3 IN1–4, every of the AES3 stereo inputs

The optical ADAT™ input is predefined as clock source for the second SRC, the optical ADAT™ output. As for the AES3 outputs, one of the four AES3 stereo inputs must be defined as clock source for the first SRC. Therefore enter the »REFERENCE« menu and press the »SELECT« key repeatedly to select one of the AES3 inputs »IN1–4«. The example above shows the first AES3 input »IN1« selected as clock reference for 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 light constantly. The clock rate of the clock sources are displayed in the »CLOCK IN« menu under »1« and »2«. The identifier »1« generally indicates the lock status and clock rate of the ADAT™ or SMUX clock references. The identifier »2« indicates the lock status and clock rate of the selected AES3 clock reference.

Further Setting Examples

MODE: ○ UNI-DIR ○ BI-DIR ○ SRC ● X-SRC$_{12}$
AUDIO IN: ○ ADAT$_1$ (S/P-DIF) ● SMUX2$_1$ ○ SMUX4$_1$ ● AES3$_2$
REFERENCE: ○ WCLK ○ AES11 ○ S/P-DIF | ○ ADAT ● SMUX2 ○ SMUX4 ● AES3 | ○ IN1 ● IN2 ○ IN3 ○ IN4 | ○ 32.0 (96.0) ○ 44.1 (176.4) ○ 48.0 (192.0) ○ 88.2

Bidirectional format and sampling rate conversion between SMUX2 and an 8-channel AES3 signal. The AES3 signals are all referenced to the second AES3 input signal.

MODE: ○ UNI-DIR ○ BI-DIR ○ SRC ● X-SRC$_{12}$
AUDIO IN: ○ ADAT$_1$ (S/P-DIF) ○ SMUX2$_1$ ● SMUX4$_1$ ● AES3$_2$
REFERENCE: ○ WCLK ○ AES11 ○ S/P-DIF | ○ ADAT ○ SMUX2 ● SMUX4 ● AES3 | ○ IN1 ○ IN2 ○ IN3 ● IN4 | ○ 32.0 (96.0) ○ 44.1 (176.4) ○ 48.0 (192.0) ○ 88.2

Bidirectional format and sampling rate conversion between SMUX4 and an 8-channel AES3 signal. The AES3 signals are all referenced to the fourth AES3 input signal.

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™ or SMUX2/4 and AES3, the first LED »LOCK$_1$« is assigned to the optical input and the second LED »LOCK$_2$« is assigned to the AES3 inputs.

If the digital audio or reference clock signal is unstable, the »LOCK$_1$« and/ or »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, the »LOCK$_1$« LED will light correspondingly.

»SMUX2 + SMUX4 ADAT OUT«
These two LEDs light correspondingly, if an 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 optical inputs!

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 ADAT™ or SMUX2/4 with »1« and for AES3 signals with »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 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

32.0kHz   44.1kHz   48.0kHz   88.2kHz   96.0kHz

176.4kHz   192.0kHz

Super Clock Rates

11.2896MHz   12.288MHz

APPENDIX

Pin Assignment of the Connectors

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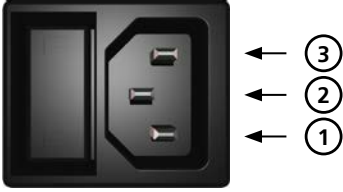
1 Neutral (blue; USA: white)
2 Protective earth (green/yellow; USA: green)
3 Live, phase (brown; USA: black)

AES/EBU, XLR, Input
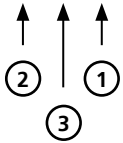
1 Audio ground
2 a conductor (hot / +)
3 b conductor (cold / -)

Word Clock + Super Clock
BNC In-/Output

1 Signal
2 Ground

S/P-DIF, Cinch, Input/Output
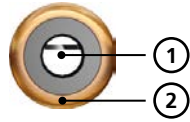
1 Audio signal
2 Audio ground

S/PDIF, Optical, Input/Output
TOSLINK Standard

1 Optical signal

AES/EBU 25pin D-Sub, 8-channel Input and Output
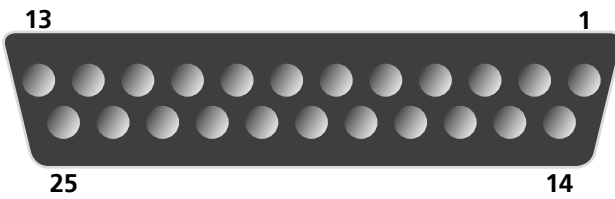
PIN	SIGNAL	PIN	SIGNAL
1	IN 1/2 (hot)	14	IN 1/2 (cold)
2	IN 3/4 (hot)	15	IN 3/4 (cold)
3	IN 5/6 (hot)	16	IN 5/6 (cold)
4	IN 7/8 (hot)	17	IN 7/8 (cold)
5	OUT 1/2 (hot)	18	OUT 1/2 (cold)
6	OUT 3/4 (hot)	19	OUT 3/4 (cold)
7	OUT 5/6 (hot)	20	OUT 5/6 (cold)
8	OUT 7/8 (hot)	21	OUT 7/8 (cold)
9	NC	22	Frame GND
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, IEC 60958, 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/P-DIF 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	IEC 60958, 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 200.0 kHz, 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/P-DIF, ADAT™ + SMUX2/4 AES3 → ADAT™ + SMUX2/4, S/P-DIF, AES3 S/P-DIF → 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)	<±1.0ppm
Clock stability vs. temperature	<±1.0ppm 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	~850g