OPERATING MANUAL

MC-8 + MC-8.1

AES3-AES3id Digital Multichannel Audio Format and 8-channel 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.com • www.MUTEC-net.com

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INTRODUCTION

Thank you very much for purchasing the MC-8 or MC-8.1, AES3-AES3id Digital Multichannel Audio + 8-channel Sampling Rate Converter, from MUTEC!

Main Differences between MC-8 and MC-8.1

This manual refers to both devices, the MC-8 and the MC-8.1, because of their nearly identical functionalities. Both are unidirectional converters. The main difference are their conversion directions:

- The MC-8 converts from AES3 to AES3id
- The MC-8.1 converts from AES3id to AES3

The whole remaining functionalities are totally identical!

General Function Description

The MUTEC MC-8 and MC-8.1 are extremely flexible, high-performance 8 channel AES3-AES3id digital audio and sampling rate converters.

The MC-8 converts and distributes unidirectionally AES3 to AES3id signals, whereas the MC-8.1 works in the opposite conversion direction. Both devices process digital audio signals up to 192.0kHz in all operation modes. Based on latest FPGA designs, the MC-8 and MC-8.1 achieve levels of performance regarding their signal qualities, unique flexibilities, clocking features and their 8 channel sampling rate conversion engines (SRC), which are outstanding in today's industry!

Various operation modes enable the use of the MC-8 and MC-8.1 in many applications. Apart from the standard function to convert four individual AES3 or AES3id stereo signals into the appropriate other format, the devices can also work as a signal splitters and distributors.

All conversions can be carried out with or without SRC functionality. The SRC engine is synchronizable to Word Clock, AES11, any digital audio input and the internal, ultra low-jitter clock base in every operation mode. When using the MC-8 or MC-8.1 with their SRCs locked to an external reference, the built-in HOLD function secures interruption-free audio conversion even in cases of an unstable or absent clock reference!

This all makes MC-8 and MC-8.1 for sure the most flexible and useful AES3 to AES3id digital audio converters allowing to handle any conversion application with ease.

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

MC-8 + MC-8.1 Features

- **Converts AES3 to AES3id (MC-8), or vice versa (MC-8.1), on 8 channels**
- **Works also as signal splitter or distributor**
- **Extracts and re-generates clock signals out of digital audio signals**
- **Improves audio quality of connected devices**
- **Accepts all Word Clock and AES11 clock references from 32.0kHz to 192.0kHz**
- **Protects from reference signal dropouts and losses**
- **Supplies interruption-free audio output signals in SRC mode**
- **AES11, Grade 1, internal reference clock (<1ppm)**
- **Easy to configure**
- **Compact case size fits in every studio set-up**
- **Built-in international power supply**

MC-8 + MC-8.1 Applications

- AES3 to AES3id, or vice versa, audio and sampling rate conversions
- Conversions and signal splittings simultaneously
- Audiophil clock recovery and signal regeneration
- Interconnection of symmetrically and unsymmetrically AES/EBU environments
- Line extension for e.g. theatre or broadcast installations
- 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.
- 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 Distribution Amplifier

- MC-2
  The MC-2 is a high-performance digital audio and reference sync signal distribution amplifier for AES3/11 and AES3/11id signals. The unit distribute s and converts between the mentioned AES signals and standards.

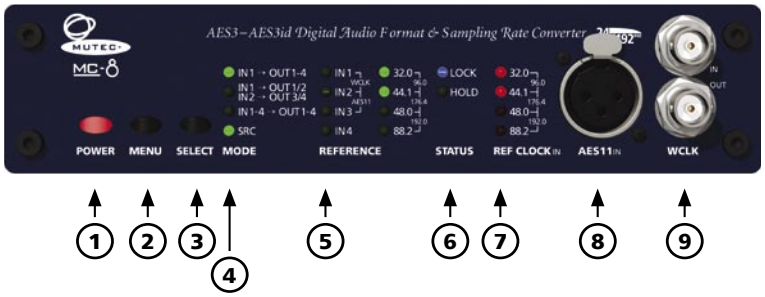
Format and Sampling Rate Converters with internal Master Clock:

- MC-4
  The MC-4 is a high-performance digital audio multichannel format and sampling rate converter for ADAT™, AES3 and S/P-DIF
- MC-6
  The MC-6 is a high-performance digital audio dual channel format converter for AES3, AES3id and S/P-DIF.

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

CONTROL ELEMENTS AND TERMINALS

MC-8 + MC-8.1 Front Panel (both panels are equal)



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 menu allows to select all conversion and splitting functions with or without SRC functionality in a logical manner.

5 REFERENCE
This function menu allows to select the master clock reference for synchronization of the SRCs.

6 STATUS
This menu indicates various signal statuses of the incoming clock reference for the SRCs.

7 REF CLOCK IN
This menu indicates the clock rate of the selected reference clock signal.

8 AES11 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).

9 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 an 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).

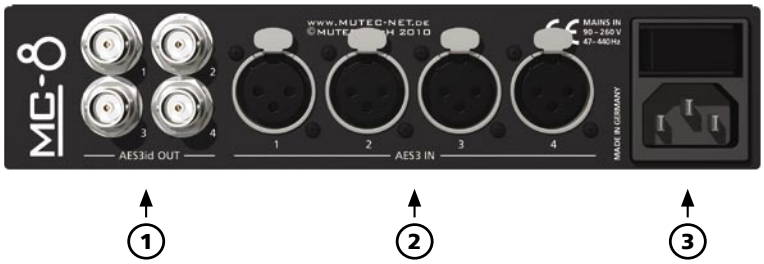
Refer to the OPERATIONS chapter for more information.

Differences between AES3 and AES11

Both standards, published by the Audio Engineering Society (AES), are based on the same interface, commonly called as AES/EBU interface which uses XLR connectors.

The AES3 standard carries both, the digital audio data and the reference clock information. The AES11, also known as ‚blank frame signal', does not carry any digital audio data, but only the reference clock information for synchronization.

MC-8 Rear Panel



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

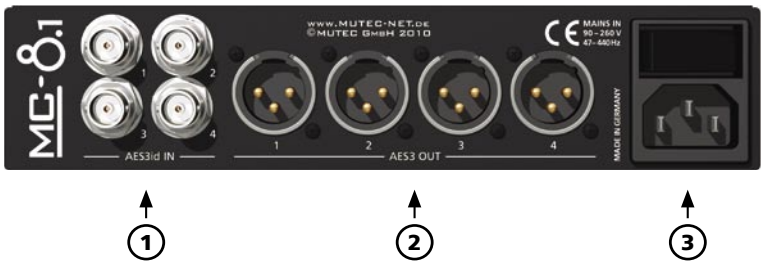
1 AES3id OUT 1–4
These four AES/EBUid output interfaces transfer AES3id digital audio stereo signals in compliance with the AES3id–2001 standard. Their numbering is aligned to this one of the four AES/EBU inputs. The output impedances of the connectors are 75Ω (BNC connectors, female).

2 AES3 IN
These four AES/EBU input interfaces can receive a balanced digital AES3 or AES11 signal in compliance with AES3–1992 (R1997) or AES11–1997/2003. Their numbering is aligned to this one of the four AES/EBUid outputs. The input impedance is 110Ω (XLR connector, female).

3 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.

MC-8.1 Rear Panel



1 AES3id IN 1–4
These four AES/EBUid input interfaces receive AES3id digital audio stereo signals in compliance with the AES3id–2001 standard. Their numbering is aligned to this one of the four AES/EBU outputs. The input impedances of the connectors are 75Ω (BNC connectors, female).

2 AES3 OUT
These four AES/EBU output interfaces transmit a balanced digital AES3 or AES11 signal in compliance with AES3–1992 (R1997) or AES11–1997/2003. Their numbering is aligned to this one of the four AES/EBUid inputs. The output impedance is 110Ω (XLR connector, female).

3 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-8 or MC-8.1
1 x Power cable
4 x Rubber feet
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, using the MW-05/19 rack mounting kit (MUTEC item no. 8020-035). In this case, the rubber feet cannot be attached. Please make sure that there is enough space on the right and left hand side of the device to enable sufficient air convection! The mounting depth including the terminals is 160 mm/6.7". Another 60 mm/2.4" should be added for the required cables.

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 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-8 or MC-8.1 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, R G59B/U«.

Additionally, you should make sure that the Word Clock input to be connected to the MC-8's or MC-8.1's output has 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.

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-8's or MC-8.1'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!

It is imperative that the lengths of all cables connected are largely the same, as this is the only way to ensure that all devices will be synchronized in phase (exception: cable tolerances).

Please make sure that the cable used has a resistance of 75Ω, in compliance with the specifications! 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 of all devices involved 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!

Since some manufacturers offer optimized cables for the transmission of digital AES/EBU and AES/EBUid audio signals, it will be a good idea to ask your retailer for specific cables.

Especially when working with high AES/EBU clock rates well shielded clock lines 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 AES/EBU and AES/EBUid Interfaces

AES/EBU
Connect the AES/EBU interfaces with the help of balanced electrical cables equipped with XLR connectors on both ends. The specifications stipulate a specific cable resistance of 110Ω (ask your retailer for a confirmation of this value when purchasing the cables).

AES/EBUid
Connect the AES/EBUid interfaces with the help of unbalanced electrical BNC cables equipped with BNC connectors on both ends (same as used for Word Clock). The specifications stipulate a specific cable resistance of 75Ω (ask your retailer for a confirmation of this value when purchasing the cables). Typically, such cables are marked »RG-59U, RG59B/U«.

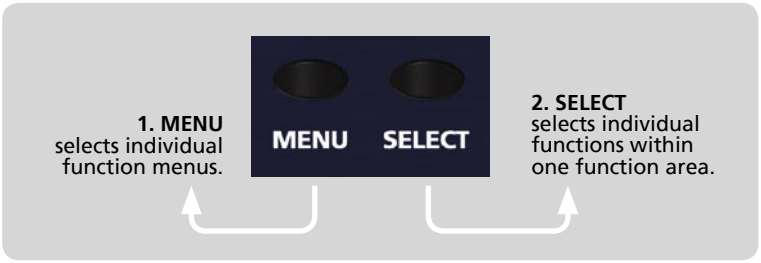
GENERAL OPERATION

Selecting Function Menus and setting Functions

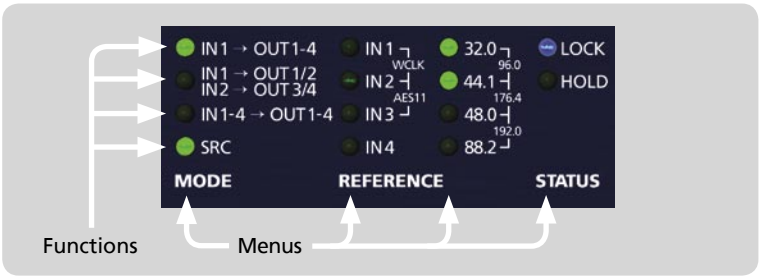
The device is fully operated using the two toggle switches at the front panel.

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 chapter CONTROL ELEMENTS AND TERMINALS for information on how to connect your MC-8 or MC-8.1!



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-8 or MC-8.1

MODE and REFERENCE Menus

These both menus are offering access to the whole functionality of your MC-8 or MC-8.1.

The »MODE« menu contains of one LED raw. With help of this menu you can select every conversion function, with or without SRC functionality.
If the LED »SRC« is selected, you have access to the second menu which is called »REFERENCE«. Otherwise, this second menu is not accessible.

The »REFERENCE« menu supplies all necessary synchronization options for the different conversions functions and the use of the internal sampling rate converters (SRC).

The menus »STATUS« and »REF CLOCK IN« are for control of the MC-8's or MC-8.1's operation status only. They are not accessable for adjustments.

General Operation Procedure

The MC- and MC-8.1 menus are strictly organized aligned to generally usual handling procedures when inserting such a box into your studio set-up. So, you can split up all of the necessary adjustments in two simple steps, which leads to the following two questions for the basic operation of your MC-8 or MC-8.1:

1) How I want to convert? With or without SRC function? → MODE

MODE		
○ **IN1 → OUT1-4**	=	Input 1 to all 4 outputs
○ **IN1 → OUT1/2** **IN2 → OUT3/4**	=	Input 1 to Outputs 1+2, Input 2 to outputs 3+4
○ **IN1-4 → OUT1-4**	=	Inputs 1 to 4 converted to output 1 to 4
○ **SRC**	=	Activates the sampling rate converters

2) Using the SRCs, which clock reference do I need for them? → REFERENCE?

REFERENCE	
○ **IN1**	○ **32.0**
WCLK	**96.0**
○ **IN2**	○ **44.1**
AES11	**176.4**
○ **IN3**	○ **48.0**
	192.0
○ **IN4**	○ **88.2**

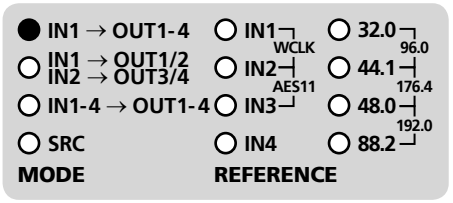
After these general decisions are made, your MC-8 or MC-8.1 is configured for optimal operation in your set-up. Due to the fact that the system monitors for useful function combinations, maloperation is not possible.

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

Function of Word Clock output when signal converting only

When you are using your MC-8 or MC-8.1 as electrical signal converter between AES/EBU and AES/EBUid only (as described on this page here), the Word Clock output on the rear will not carry a reference clock signal.

Conversion from one Input to all four Outputs

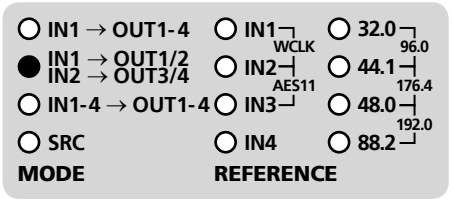


This setting enables to convert one input signal only (at input 1) to all four outputs simultaneously. That means:

- Input 1 → Outputs 1+2+3+4

Using this function, your MC-8 or MC-8.1 works as a typical 1→4 digital audio signal distribution amplifier. The input signal can be between 32.0kHz and 192.0kHz. Because the SRC function is not selected, your MC-8 or MC-8.1 is only electrically converting the signals and no adjustments in the »REFERENCE« menu can be carried out.

Conversion from two Inputs to two Output pairs

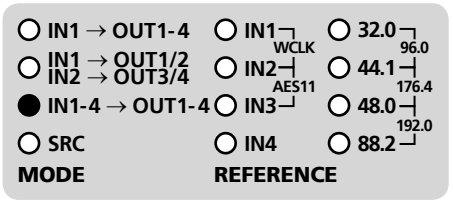


This setting enables to convert two individual input signals (at inputs 1+2) to two output pairs, one output pair for every input signal. That means:

- Input 1 → Outputs 1+2
- Input 2 → Outputs 3+4

Using this function, your MC-8 or MC-8.1 works as a typical digital audio signal splitter for two independent signals. The signals can be based on different sampling rates between 32.0kHz and 192.0kHz at the same time. Because the SRC function is not selected, your MC-8 or MC-8.1 is only electrically converting the signals and no adjustments in the »REFERENCE« menu can be carried out.

Conversion from four Inputs to four Outputs

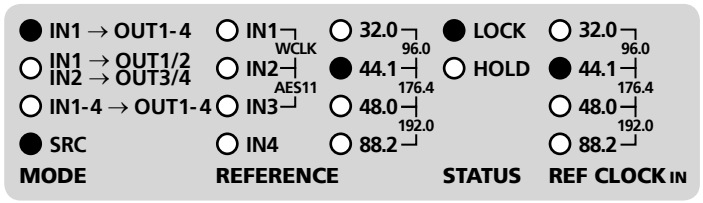


This setting enables to convert four individual input signals to the four outputs available. That means:

- Input 1 → Output 1
- Input 2 → Output 2
- Input 3 → Output 3
- Input 4 → Output 4

The signals can be based on different sampling rates between 32.0kHz and 192.0kHz at the same time. Because the SRC function is not selected, your MC-8 or MC-8.1 is only electrically converting the signals and no adjustments in the »REFERENCE« menu can be carried out.

Conversion from one Input to all four Outputs including the Sampling Rate Conversion Function



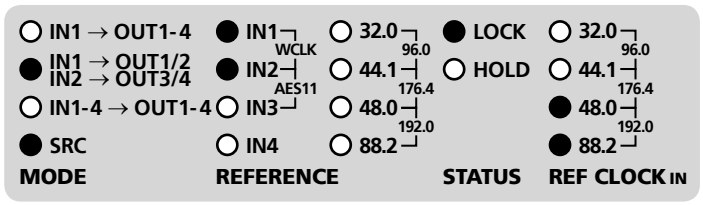
This setting enables to convert one input signal only (at input 1) to all four outputs simultaneously, as described on page 16.

Now, the internal sampling rate converters (SRC) are activated additionally and it is necessary to select a reference clock in the »REFERENCE« menu. In the above displayed example, the internal clock generator is selected with 44.1kHz clock rate. That means, not depending on the clock rate of the incoming signal, the outgoing signals will all carry the clock rate selected in the »REFERENCE« menu.

In the »STATUS« menu the blue LED »LOCK« is lighting and shows that the SRCs are locked to the internal clock generator.

In the »REF CLOCK IN« menu, the red LED »44.1« is lighting and thus shows the clock rate of the reference clock, that means the internal clock generator, which is here 44.1kHz.

Conversion from two Inputs to two Output pairs including the Sampling Rate Conversion Function



This setting enables to convert two individual input signals (at inputs 1+2) to two output pairs, one output pair for every input signal, as described on page 16.

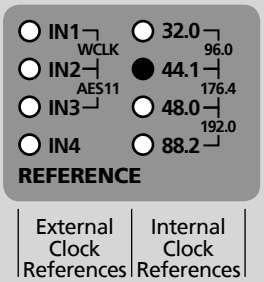
In the above displayed example, Word Clock (WCLK) is selected as clock reference for the internal SRCs.

In the »STATUS« menu the blue LED »LOCK« is lighting and shows that the SRCs are locked to the externally supplied Word Clock signal.

In the »REF CLOCK IN« menu, the last two red LEDs in the row light in front of »192.0« and thus show the clock rate of the externally supplied Word Clock signal, which is 192.0kHz.

References for Sampling Rate Conversion

Your MC-8 or MC-8.1 allows to synchronize the internal SRCs to various clock reference signals. These possible references can be selected in the »REFERENCE« menu:



Aligned to the clock reference type which you want to supply, you must select the corresponding clock reference within the »REFERENCE« menu. Enter the »REFERENCE« menu by pressing the »MENU« button and press then the »SELECT« button repeatedly to select the corresponding clock reference. Selectable clock references are:

- **IN1-4 = Digital audio input no. 1, 2, 3 or 4**
- **WCLK = Word Clock or Super Clock**
- **AES11 = AES11 blank frame signal**
- **32.0-192.0 = Internal clock generator**

When the external reference clock signal can be locked by the internal PLL circuit, the blue LED »LOCK« in the »STATUS« menu will light constantly. The clock rate of the selected clock source is then displayed in the »REF CLOCK IN« menu. External clock references can be supplied with all audio-related clock frequencies between 32.0kHz and 192.0kHz.

Function of Word Clock output when activating the SRCs

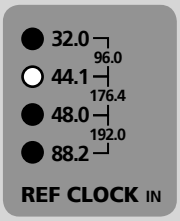
When you are using the sampling rate conversion function of your MC-8 or MC-8.1, the selected reference clock will be output through the Word Clock output at the rear for synchronization of other devices.

If you have selected the internal clock generator as reference for the SRCs, the adjusted clock rate will be output in phase with the digital audio signals. If e.g. an incoming digital audio or AES11 signal is selected as reference, the MC-8 or MC-8.1 will extract the clock out of this incoming reference signal and will output it as low-jitter reference clock at the Word Clock output. The same applies of course for an incoming Word Clock signal, selected as reference.

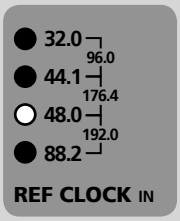
Locking so-called »Super Clocks«

Your MC-8 or MC-8.1 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 multiples 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).



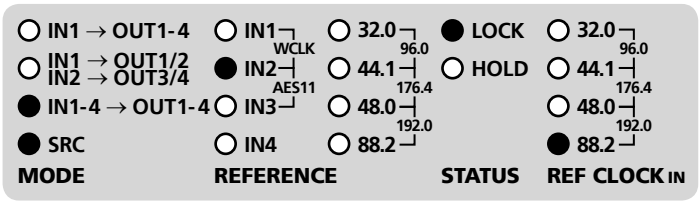
Super Clock of 44.1kHz Word Clock



Super Clock of 48.0kHz Word Clock

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.

Conversion from four Inputs to four Outputs including the Sampling Rate Conversion Function



This setting enables to convert four individual input signals to the four outputs available, as described on page 16.

In the above displayed example, the digital audio input no. 2 (»IN2«) is selected as clock reference for the internal SRCs.

In the »STATUS« menu the blue LED »LOCK« is lighting and shows that the SRCs are locked to the externally supplied digital audio signal.

In the »REF CLOCK IN« menu, the last red LED lights in front of »88.2« and thus shows the clock rate of the externally supplied digital audio signal, which is then 88.2kHz.

STATUS Menu

This area displays different clock-related conditions of your MC-8 or MC-8.1. There is no access for changing settings.

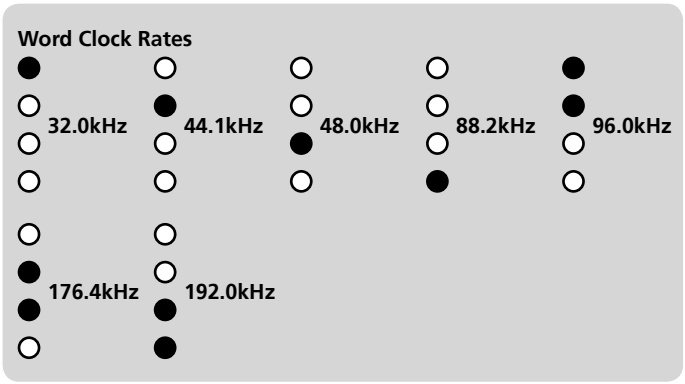
»LOCK«
This blue LED lights when the internal PLL circuit has detected the incoming clock reference signal as valid, or is locked to the internal clock generator. If the reference signal is unstable or lost, the »LOCK« LED does not light.

»HOLD«
This red LED lights when the external reference clock signal is interrupted or lost. During this, the Word Clock output signal is continuously available for stable and reliable synchronization of connected devices.

Furthermore, the HOLD function also enables to run the internal SRCs interruption-free for continuous signal conversion in cases when the externally supplied reference signal is interrupted or lost! Due to this, the conversion function of the whole system is reliably secured.

REF CLOCK IN Menu

This area displays the clock rate of the incoming reference clock signal. The following basis reference clock rates are supported and will be analyzed:

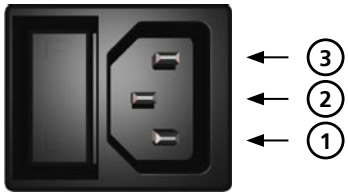


Regarding the display of incoming Super Clock rates, please see above on this page under „Locking so-called »Super Clocks«".

APPENDIX

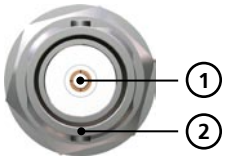
Pin Assignment of the Connectors

Mains



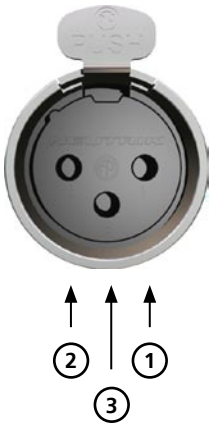
1 Neutral (blue; USA: white)
2 Protective earth (green/yellow; USA: green)
3 Live, phase (brown; USA: black)

BNC Input and Output for AES/EBUid,
Word Clock and Super Clock



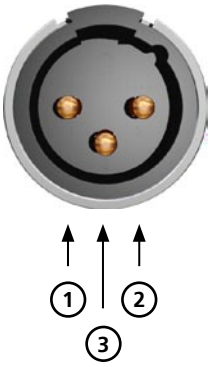
1 Signal
2 Ground

AES/EBU, XLR, Input

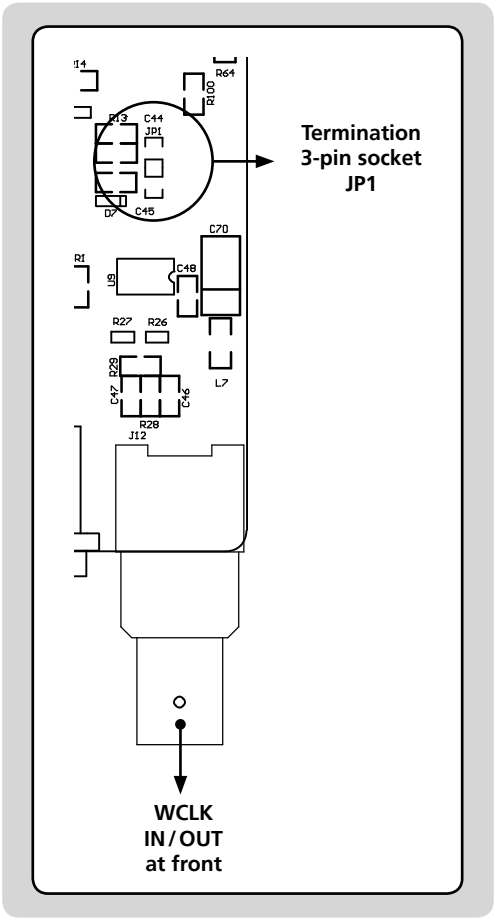


1 Audio ground
2 a conductor (hot / +)
3 b conductor (cold / -)

AES/EBU XLR Output



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

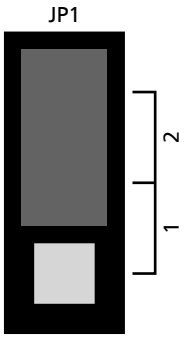


Word Clock Termination

Switching-off the Termination of the Word Clock Input

CAUTION! Disconnect the unit from the mains before opening! Remount the aluminium cover thoroughly before you attempt to operate the unit!

When MC-8 or MC-8.1 is shipped, the BNC-based Word Clock input connector is terminated internally with 75Ω. Therefore, one jumper is put on two pins - Position 2 - of the 3-pin socket JP1.

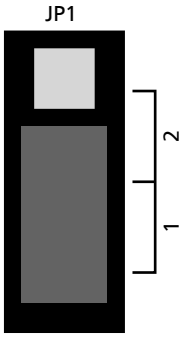


Jumper on Position 2
= Termination

Jumper:

Free Pin:

When moving the jumper from position 2 to position 1, the input termination will be switched-off. Therefore, the MC-8 or MC-8.1 must be connected in a chain, in which a device with terminated input follows. Otherwise you need to use a BNC-T piece in combination with a 75Ω BNC resistor for terminating the MC's input.



Jumper on Position 1
= no Terminaltion

For additional information regarding this issue, please refer to page 11.

Technical Data

WORD CLOCK INPUT (WCLK)	
Interface	1 x BNC, 200 mV-7 V, unbalanced, input impedance 75 Ω
Lock Range	25.0kHz to 200.0 kHz, 11.2896MHz + 12.288MHz (so-called Super Clocks)
AES/EBU3/11 INPUT	
Interface	1 x XLR female, transformer balanced, input impedance 110 Ω, 200 mV – 7.0 V
Format, Resolution	AES3 – 1992/2003, AES11 – 1997/2003, 16 – 24 bits
Lock Range	25.0kHz to 200.0kHz
AES/EBU3/11id INPUT (MC-8.1 only)	
Interface	1 x BNC, 200 mV-7 V, unbalanced, input impedance 75 Ω
Format, Resolution	AES3id – 1995/2001, 16 – 24 bits
Lock Range	25.0kHz to 200.0kHz
WORD CLOCK OUTPUT (WCLK)	
Interface	8 x BNC, 3,5 V @ 22 Ω, unbalanced, buffered
Transmitted Clock Rates	25.0kHz to 200.0kHz
AES/EBU3/11 OUTPUT	
Interface	1 x XLR male, transformer balanced, 3.5Vpp @ 110Ω, output impedance 110Ω, buffered
Format, Resolution	AES3 – 1992/2003, AES11 – 1997/2003, 24 bits
Transmitted Sampling Rates	25.0kHz to 200.0kHz
AES/EBU3/11id OUTPUT (MC-8 only)	
Interface	1 x BNC, 1.0 V, unbalanced, output impedance 75 Ω
Format, Resolution	AES3id – 1995/2001, 24 bits
Transmitted Clock Rates	25.0kHz to 200.0kHz
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	MC-8: ~ 751g, MC-8.1: ~ 748g

>>>