

OPERATING MANUAL



MC-8 + MC-8.1

AES3-AES3id Digital Multichannel Audio Format
and 8-channel Sampling Rate Converter



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 MUTECH 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 MUTECH 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!



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

MUTECH 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, MUTECH 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 MUTECH 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 MUTECH 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 MUTECH GmbH.

§3 Warranty 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 MUTECH 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 MUTECH 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 MUTECH 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 MUTECH GmbH in advance.

§5 Repairs

To obtain warranty service, the buyer must call or write to MUTECH 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 MUTECH 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:

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

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Peripheral MUTECH 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 distributes and converts between the mentioned AES signals and standards.

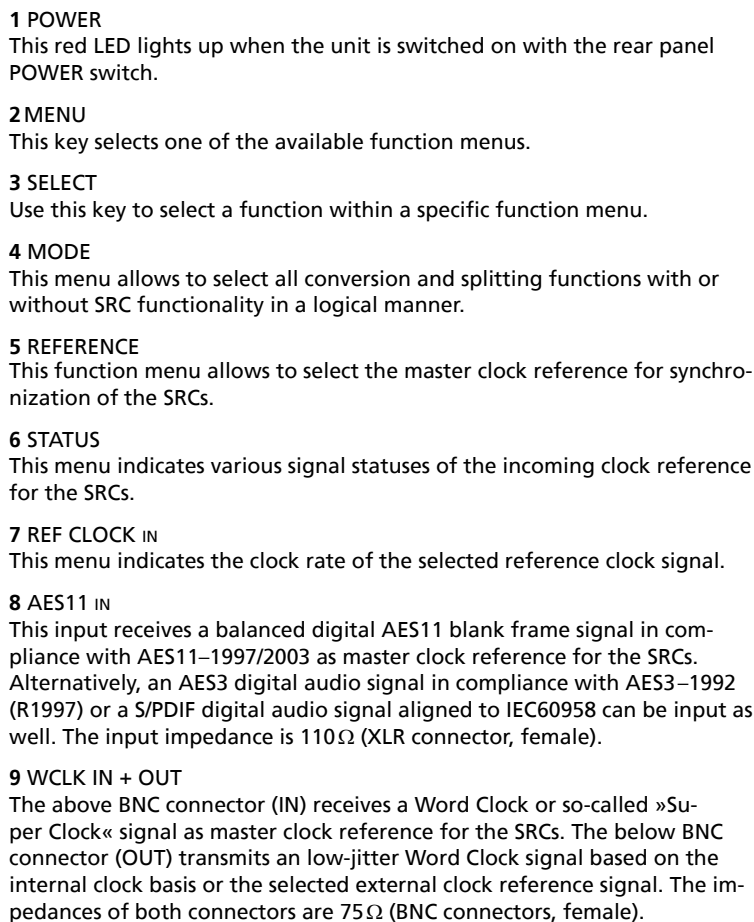
Format and Sampling Rate Converters with internal Master Clock:

- 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.MUTECH-NET.com !



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

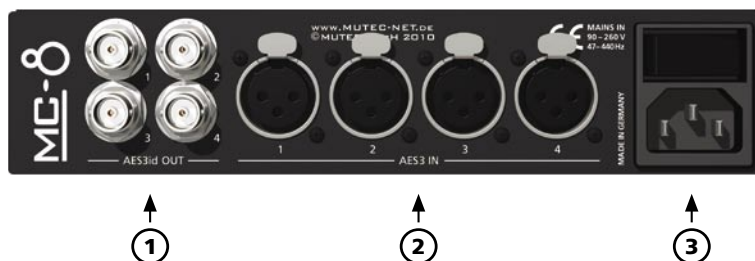


Differences between AES3 and AES11

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 $75\,\Omega$ (BNC connectors, female).

2 AFS3 IN

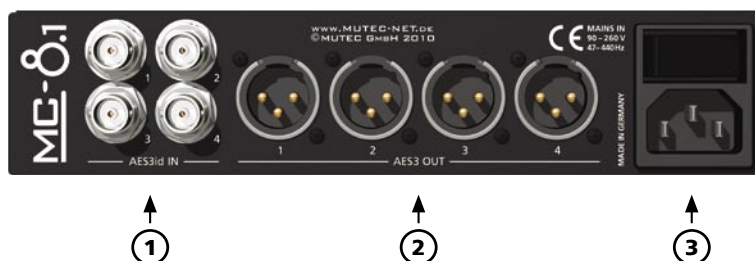
These four AES/EBU input interfaces can receive a balanced digital AES3 or AES11 signal in compliance with AES3–1992 (R1997) or AES11–1997/2003. Their numbering is aligned to this one of the four AES/EBU outputs. The input impedance is 110Ω (XLR connector, female).

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 frequency 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 frequency 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

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 feet 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.

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!

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.



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!



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. 30feet) 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«.

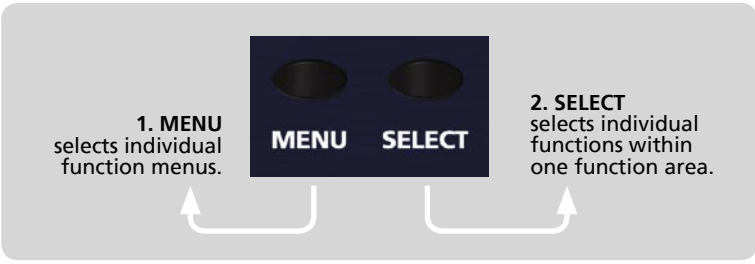


GENERAL OPERATION

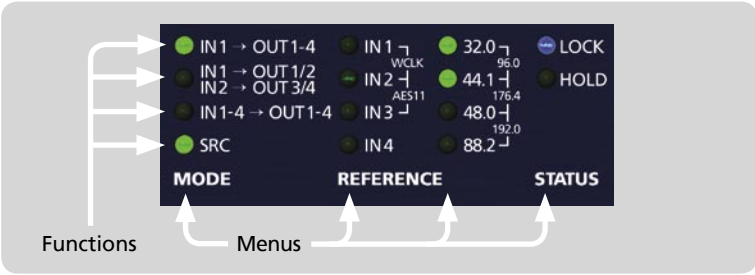
Selecting Function Menus and setting Functions

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 activates individual functions within one function menu.



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 available 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.

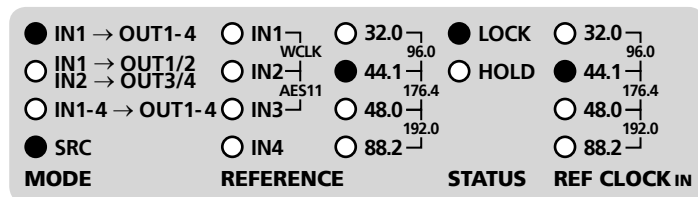
The »STATUS« area is not accessible by using the »MENU« and »SELECT« switches, because it only informs about different conditions of incoming signals.

! 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!

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



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



External Clock References | Internal Clock References

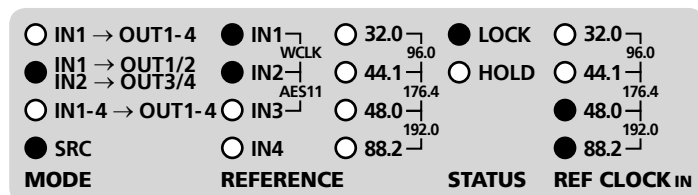
This setting enables to convert one input signal only (at input 1) to all four outputs simultaneously, as described on page 16.

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.

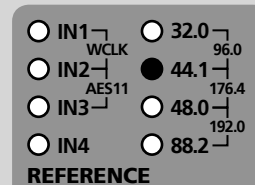
In the »STATUS« menu the blue LED »LOCK« is lighting and shows that the SRCs are locked to the externally supplied Word Clock signal.

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:



External Clock References | Internal Clock References

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.

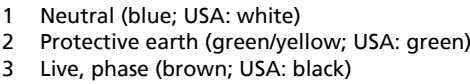
Function of Word Clock output when activating the SRCs

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.

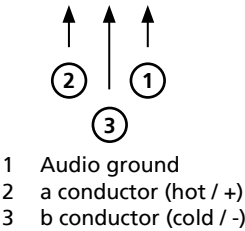


Mains

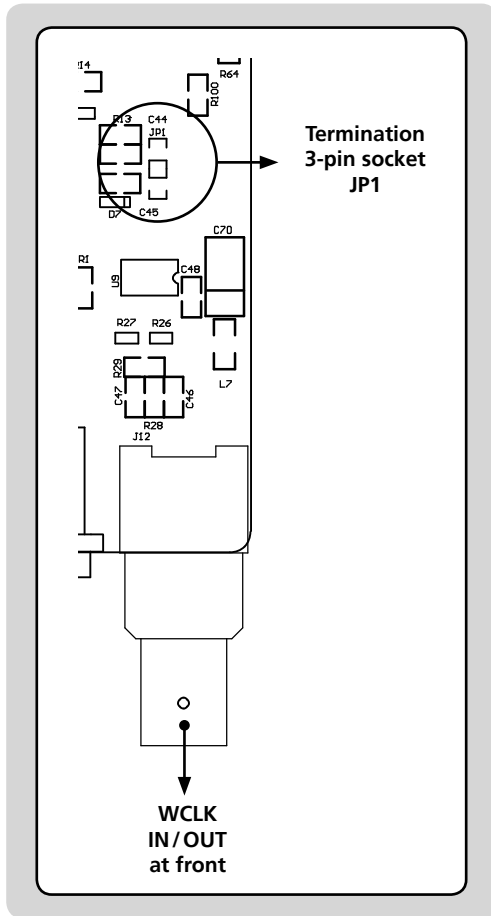


1 Signal
2 Ground

AES/EBU XLR Output



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

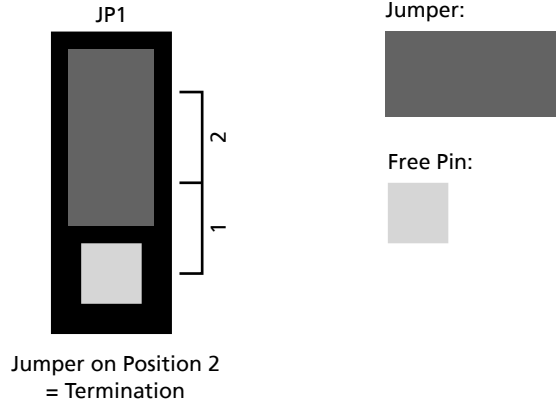


Word Clock Termination

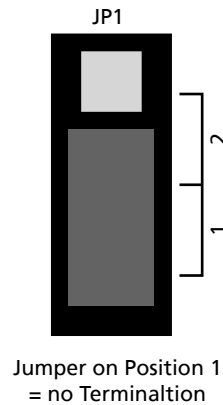
Switching-off the Termination of the Word Clock Input

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.



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.



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

APPENDIX

Technical Data

WORD CLOCK INPUT (WCLK)	
Interface	1 x BNC, 200 mV-7 V, unbalanced, input impedance 75 Ω
Lock Range	25.0 kHz to 200.0 kHz, 11.2896 MHz + 12.288 MHz (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	25.0 kHz to 200.0 kHz
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	25.0 kHz to 200.0 kHz
WORD CLOCK OUTPUT (WCLK)	
Interface	8 x BNC, 3.5 V @ 22 Ω, unbalanced, buffered
Transmitted Clock Rates	25.0 kHz to 200.0 kHz
AES/EBU3/11 OUTPUT	
Interface	1 x XLR male, transformer balanced, 3.5 Vpp @ 110 Ω, output impedance 110 Ω, buffered
Format, Resolution	AES3-1992/2003, AES11-1997/2003, 24 bits
Transmitted Sampling Rates	25.0 kHz to 200.0 kHz
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	25.0 kHz to 200.0 kHz
INTERNAL REFERENCE CLOCK SPECIFICATIONS	
Oscillator type	TCXO, temperature compensated crystal oscillator
Clock accuracy (shipped)	< ± 1.0 ppm
Clock stability vs. temperature	< ± 1.0 ppm within -10°C to +60°C
Operating temperature	-10°C to +60°C
Clock jitter	< 10 ps (RMS)
POWER SUPPLY	
Type	Internal, switching power supply
Input voltage	85 V-264 V (automatic adjustment), 47 Hz-440 Hz
Power consumption	max. 10 W
SYSTEM UNIT COVER	
Cover size/material/color	196 x 42 x 156 mm without connectors (W x H x D), aluminium sheet 1 mm, black
Front panel size/material	198 x 44 x 2 mm (W x H x D), aluminium
Weight	MC-8: ~ 751 g, MC-8.1: ~ 748 g



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FAX 0049-(0)30-74 68 80-99