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Version 1.1 – 7/2012

This manual contains a description of the product SPL Madison, Model 1260. In no way it represents a guarantee of particular characteristics or results of use. The information in this document has been carefully compiled and verified and, unless otherwise stated or agreed upon, correctly describes the product at the time of packaging with this document.

Sound Performance Lab (SPL) continuously strives to improve its products and reserves the right to modify the product described in this manual at any time without prior notice. This document is the property of SPL and may not be copied or reproduced in any manner, in part or fully, without prior authorization by SPL.

## Declaration of CE Conformity

The construction of this unit is in compliance with the standards and regulations of the European Community.



## Notes on Environmental Protection

At the end of its operating life, this product must not be disposed of with regular household waste but must be returned to a collection point for the recycling of electrical and electronic equipment. The wheellie bin symbol on the product, user's manual and packaging indicates that. The materials can be reused in accordance with their markings. Through reuse, recycling of raw materials, or other forms of recycling of old products, you are making an important contribution to the protection of our environment. Your local administrative office can advise you of the responsible waste disposal point.



WEEE Registration: 973 349 88

## Contact

### SPL electronics GmbH

Sohlweg 80, 41372 Niederkruechten, Germany

Phone +49 (0)2163 983 40

Fax +49 (0)2163 983 420

E-Mail: [info@spl.info](mailto:info@spl.info)

Internet: [spl.info](http://spl.info)

## Symbols and Notes

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IN THIS MANUAL A LIGHTNING SYMBOL WITHIN A TRIANGLE WARNS YOU ABOUT THE POTENTIAL FOR DANGEROUS ELECTRICAL SHOCKS – WHICH CAN ALSO OCCUR EVEN AFTER THE DEVICE HAS BEEN DISCONNECTED FROM A POWER SOURCE.



AN EXCLAMATION MARK (!) WITHIN A TRIANGLE IS INTENDED TO MAKE YOU AWARE OF IMPORTANT OPERATIONAL ADVICE AND/OR WARNINGS THAT MUST BE FOLLOWED. BE ESPECIALLY ATTENTIVE TO THESE AND ALWAYS FOLLOW THE ADVICE THEY GIVE.



The symbol of a lamp directs your attention to explanations of important functions or applications.



**Attention:** Do not attempt any alterations to this device without the approval or supervision of SPL electronics GmbH. Doing so could void completely any and all of your warranty rights and claims to user support.

## Scope Of Delivery

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The scope of delivery comprises the Madison, the power cord, the guarantee card and this manual.

Please keep the original packaging. In case of a service procedure the original packaging ensures a safe transport. It also serves as a safe packaging for your own transports if you do not use special transportation cases.

## Welcome

and thank you for purchasing the SPL Madison, the 16 channel MADi interface solution from SPL.

From now on you will be able to connect to more professional consoles, audio cards and routing equipment and sound way better than ever before.

## Made in Germany. With Passion.

The SPL team surely hopes you like this unit as much as we like you for buying it. There is a lot of passion, brains and time put into this unique analog and digital device and we really can't wait to hear back from you and get all the details on how you use the Madison and how satisfied you are with it.

So please get in touch and become friends with SPL as we are eager to know where our creations live and surely want to be able to offer benefits to our loyal clients.

So why not register your Madison unit on our website?

This will ensure that your warranty is registered, that you'll receive notifications of future firmware updates and other important, useful and interesting information.

After registration our technical support team will be by your side whenever you need it.

## Support

Visit us at [spl.info](http://spl.info) to access our Support page, where you can find links to the Product Registration and Download pages. Our Frequently Asked Questions (FAQ) area is open for questions 24/7/365 under all weather conditions.

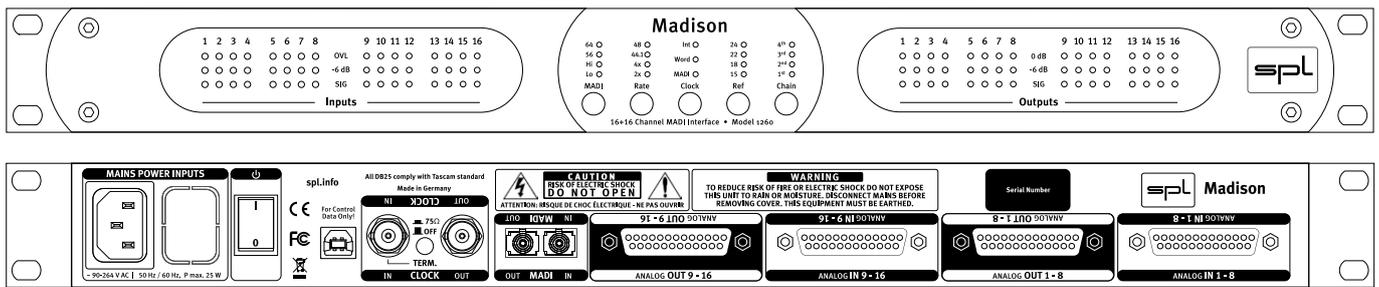
Or follow us on Facebook, Twitter, YouTube, etc...

Website/Blog: [spl.info](http://spl.info)

Videos: [youtube.spl.info](http://youtube.spl.info)

Twitter: [twitter.spl.info](http://twitter.spl.info)

Facebook: [facebook.spl.info](http://facebook.spl.info)



## The Madison in six seconds

- 16 Channel bi-directional digital/analog converter with SPL sound
- Digital MADI IO (max. 64 Ins and 64 Outs)
- Analog IO: Mastering-grade, fully balanced SPL AD/DA converters, 16 Ins and 16 Outs, unique SPL 36V Rail analog technology
- Reference/Studio Level: full 24dBu, or +22dBu, +18dBu and +15dBu
- Expand later: Daisy-chain up to four Madison units for up to 64 analogue ins and outs
- Why Madison: To make your world a better sounding place

# Important Security Advices

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Please read and keep this manual. You should carefully follow all of the safety and operating instructions before you use the device. Please also note all warnings and special safety instructions noted in this manual and on the unit.

**Connections:** Only use the connections as described. Other connections can lead to health risks and damage the equipment.

**Water and humidity:** Do not use this device anywhere near water (for example in a bath room, a damp cellar, near swimming pools, or similar environments). Otherwise you are dealing with an extremely high risk of fatal electrical shocks!

**Insertion of objects or fluids:** Be careful to not insert any object into any of the chassis openings. You can otherwise easily come into contact with dangerous voltage or cause a damaging short circuit. Never allow any fluids to be spilled or sprayed on the device. Such actions can lead to dangerous electrical shocks or fire!

**Opening the unit:** Simply put: DON'T, if you are not a certified SPL technician or engineer. Really: Do not open the device housing, as there is great risk you will damage the device, or – even after being disconnected – you may receive a dangerous electrical shock!



**Electrical power:** Operate the device only from power sources that can provide proper power in the range from 90 to 264 volts. When in doubt about a source, contact your dealer or a professional electrician. To be certain you have isolated the device, disconnect all power and signal connections. Make sure that the power supply plug is always accessible. When not using the device for a longer period, make sure to unplug it from your wall power socket.

**Cord protection:** Make sure that your power and audio signal cords are arranged to avoid being stepped on or any kind of crimping and damage related to such event. Do not allow any equipment or furniture to crimp the cords. Extra caution is required for the MADI optical fibre cables, the glass fibre inside the cords can be easily broken by bending or kinking.

**Power connection overloads:** Avoid any kind of overload in connections to wall sockets, extension or splitter power cords, or signal inputs. Always keep manufacturer warnings and instructions in mind. Overloads create fire hazards and risk of dangerous shocks!

**Lightning:** Before thunderstorms or other severe weather, disconnect the device from wall power; do not do this during a storm in order to avoid life threatening lightning strikes. Similarly, before any severe weather, disconnect all the power connections of other devices and antenna and phone/network cables which may be interconnected so that no lightning damage or overload results from such secondary connections.

**Air ventilation:** Chassis openings offer ventilation and serve to protect the device from overheating. Never cover or otherwise close off these openings. Never place the device on a soft surface (carpet, sofa, etc.). Make sure to provide for a mounting space of 4-5 cm/2 inches to the sides and top of the unit when mounting the unit in racks or on cabinets.

**Controls and switches:** Operate the controls and switches only as described in the manual. Incorrect adjustments outside safe parameters can lead to damage and unnecessary repair costs. Never use the switches or level controls to effect excessive or extreme changes.

**Repairs:** Unplug the unit from all power and signal connections and immediately contact a qualified technician when you think repairs are needed – or when moisture or foreign objects may accidentally have reached inside the housing, or in cases when the device may have fallen and shows any sign of having been damaged. This also applies to any situation in which the unit has not been subjected to any of these unusual circumstances but still is not functioning normally or its performance is substantially altered. In cases of damage to the power supply and cord, first consider turning off the main circuit breaker before unplugging the power cord.

**Replacement/substitute parts:** Be sure that any service technician uses original replacement parts or those with identical specifications as the originals. Incorrectly substituted parts can lead to fire, electrical shock or other dangers, including further equipment damage.

**Safety inspection:** Be sure always to ask a service technician to conduct a thorough safety check and ensure that the state of the repaired device is in all respects up to factory standards.

**Cleaning:** Do not use any solvents, as these can damage the chassis finish. Use a clean, dry cloth (if necessary, with an acid-free cleaning oil). Disconnect the device from your power source before cleaning.

## Placement

Place the unit on a leveled and stable surface or mount it in a dedicated rack frame. The unit's enclosure is EMC-safe and effectively shielded against HF interference.

Nonetheless, you should carefully consider where you place the unit to avoid electrical disturbances. It should be positioned so that you can easily reach it, read the meters and status LED's well, but there are other considerations as well.

Try not to place it near heat sources or in direct sunlight, and avoid exposure to vibrations, dust, heat, cold or moisture. It should also be kept away from transformers, motors, power amplifiers and digital processors.

## Rack Mounting

Be sure that you keep, both above and below the device, a distance of 4-5 cm/2 inches in order to eliminate electromagnetic or high frequency interference from other equipment. Moreover, this will ensure adequate air circulation to prevent overheating. Do NOT locate other devices that produce excessive heat below the unit. The rear side of the unit should be properly supported – especially when transport is involved.

## Air Circulation

Always ensure sufficient air circulation by keeping a distance of 4-5 cm/2 inches to the sides and top of the unit, especially where the housing has air slots. Never place the unit on a soft surface (carpet, sofa etc.).

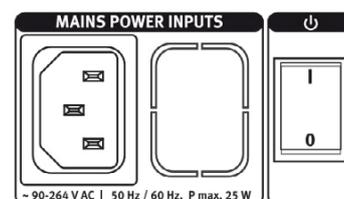
## Before Connecting to the Power Outlet

Be careful to check that the power outlet you are connecting to meets the following requirements: ~90-264VAC, 50 / 60 Hz.

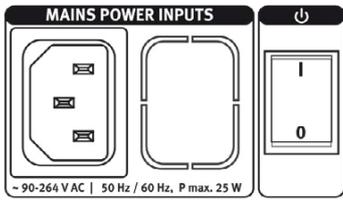
Connect the power cord to the rear MAINS POWER INPUT socket. The transformer, power cord and inlet of the appliance conform to VDE, UL and CSA requirements.

## Signal Connections

Before connecting any other equipment – and in all other cases where you are connecting cables with or from other sources – you should be sure to switch off the Madison and all other devices you want to connect it to. Otherwise you risk damaging the unit, other connected gear and/or your ears.



# Rear Panel: Switches



## On/Off Switch

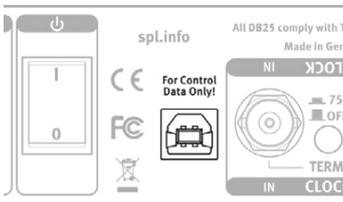
Use the rear POWER switch to activate and deactivate the unit. The operational status is indicated by the LED's on the center of the front panel.

We deliberately chose to place it on the rear panel in order to avoid interferences from power wiring through the unit to the front panel. When switching on and off, you do not need to follow any particular sequence with connected devices in the periphery of the unit. There is, however, a general rule for audio devices connected together: always turn on power amplifiers last and turn them off first. If sufficient power is provided, you can also switch the unit on and off through a multiway connector or other main switches.



**Caution:** Before connecting any other equipment – and in all other cases where you are connecting cables with or from other sources – you should be sure to switch off the Madison and all other devices you want to connect it to. Otherwise you risk damaging the unit, other connected gear and/or your ears.

# Rear Panel: Digital Connections



## USB Port

**NOTE:** The USB port is not an audio interface to a computer!

Use the USB port on the Madison to update the internal operating system/firmware of the Madison whenever such updates become available. Information on how to process such updates are given with the update files.

The USB port may also be utilized as a service port for SPL engineers.

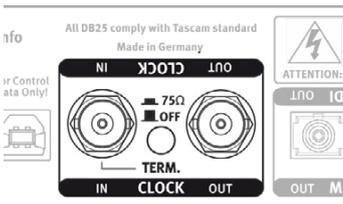
## Clock

Provides Wordclock I/O, including a termination switch for the Wordclock input. The termination switch should be engaged if there is no connection present on the Wordclock input and the Wordclock output is used to clock an external device.

The Madison can receive incoming and generate outgoing Wordclock.

At higher sample rates (88.2-192 kHz) the Madison can alternatively process and generate Frameclock, a Wordclock signal that always stays in the range between 44.1 and 48 kHz.

Frameclock is automatically used as soon as the MADI Low Speed mode is selected on the front panel MADI Settings (see „MADI Modes 56 CH and 64 CH“ on page 13).



## MADI Input and Output

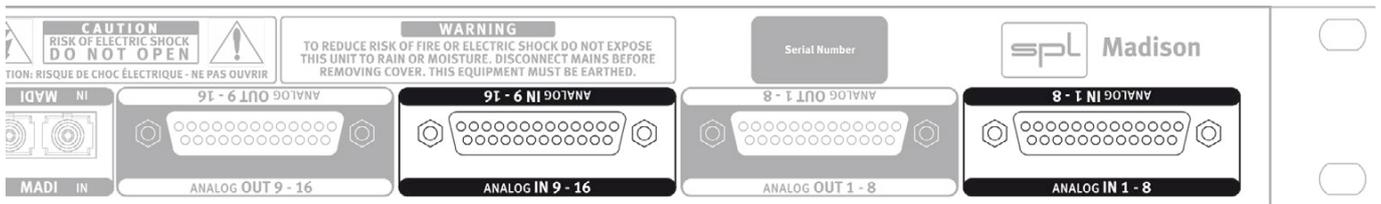
MADI is a widely used digital audio interface that can send 64 channels in two directions over two multimode fibre cables, one for inputs and one for outputs.

The specs for optical MADI cables are:

Dual SC type connector and cable, glass multimode fibre 50/125µ or 65/125µ.

One Madison unit converts 16 analogue input and 16 analogue output channels to/from MADI. Therefore, a chain of four Madison units can use the full capacity of MADI.

# Rear Panel: Analog Connections



## DB25 sockets: Inputs 1-8 and 9-16

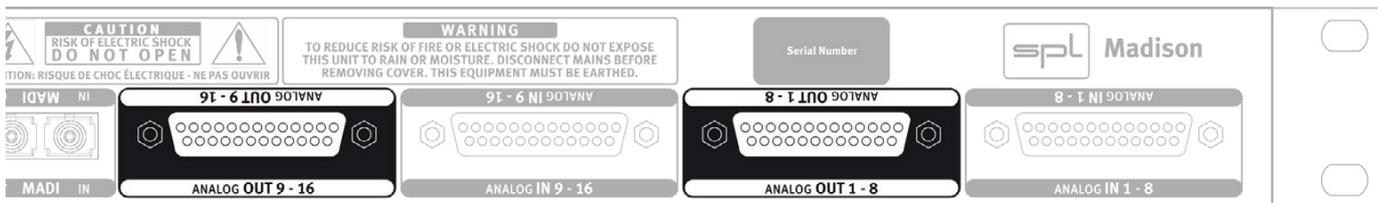
The 16 Analog Inputs are connected via two DSUB 25 eight-channel connectors, that comply to the TASCAM pinout (see below). This multichannel analog standard allows direct connection to many other devices (consoles, monitor controllers, patchbays etc.).

There are also many ready-made cable snakes available that connect DSUB 25 to XLR, T-phone or TRS.

**NOTE:** At sample rates of 176.4 and 192 kHz in 56 CH mode, only input and output channels 1-14 are processed, while CH 15 and 16 remain inactive (see „MADI Modes 56 CH and 64 CH“ on page 13).

*All individual analogue channels are fully balanced and powered by SPL's unique 36V rail technology.*

## DB25 sockets: Outputs 1-8 and 9-16



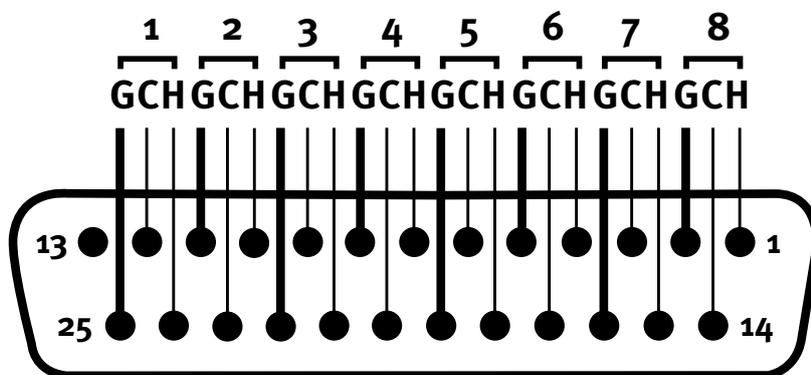
The 16 Analogue Outputs are connected via two DSUB 25 eight-channel connectors, that comply to the TASCAM (R) pinout (see below). This multichannel analogue standard allows direct connection to many other devices (consoles, monitor controllers, patchbays etc.).

There are also many ready-made cable snakes available that connect DSUB 25 to XLR, T-phone or TRS.

**NOTE:** At sample rates of 176.4 and 192 kHz in 56 CH mode, only input and output channels 1-14 are processed, while CH 15 and 16 remain inactive (see „MADI Modes 56 CH and 64 CH“ on page 13).

*All individual analogue channels are fully balanced and powered by SPL's unique 36V rail technology.*

## DB25 sockets: Pin Wiring (TASCAM-Standard)



**G=GROUND (GND), C=COLD (-), H=HOT (+)**



## MADI Modes 56 CH and 64 CH

Since MADI was invented in the early 1990's (AES10-1991), the industry forced a couple of evolutionary changes on the standard (AES 10-2003) to adapt to the broad digitalization of audio production in general.

Today, two general MADI modes are known: 56CH and 64CH; and two different ways to wrap up channels at higher sample rates: High Speed and Low Speed mode (also known as Legacy or SMUX mode).

**56CH mode:** At „normal“ sample rates (44.1-48kHz) the MADI stream contains 56 audio channels and allows to varispeed the signal +/- 12.5%.

**64Ch mode:** At „normal“ sample rates (44.1-48kHz) the MADI stream contains 64 audio channels and does not allow positive varispeed values.

## Hi Speed Mode

Only selectable at „double“ (88.2-96kHz) or „quad“ (176.4 or 192kHz) sample rates.

**Example at 96kHz in 64CH mode:** In order to carry twice the amount of information per channel, the MADI frame rate is transmitted at higher speeds at 96 kHz, but the frame size is reduced to 32 slots (one data slot per channel). Since the frame and the speed increase, MADI still consumes the same bandwidth.

In High Speed mode each channel is allocated one data slot. At 96kHz MADI can carry 32 channels of audio (16 at 192kHz).

## Lo Speed Mode

Only selectable at „double“ (88.2-96kHz) or „quad“ (176.4 or 192kHz) sample rates.

**Example at 96kHz in 64 CH mode:** In Low Speed mode the frame rate stays at 48kHz and the frame size is also kept at 64 slots, however each channel uses two consecutive data slots. Thus, the frame is larger but the speed is slower, so MADI still provides the same bandwidth.

Since each channel is allocated two consecutive data slots, MADI can still provide 32 channels of audio at 96 kHz (or 16 at 192kHz).

Legacy mode is not often required and High Speed mode is most common when you need to operate at double or quad sample rates.

However, in environments with MADI equipment from different generations, and also in mixed digital environments, Low Speed mode may prove necessary.

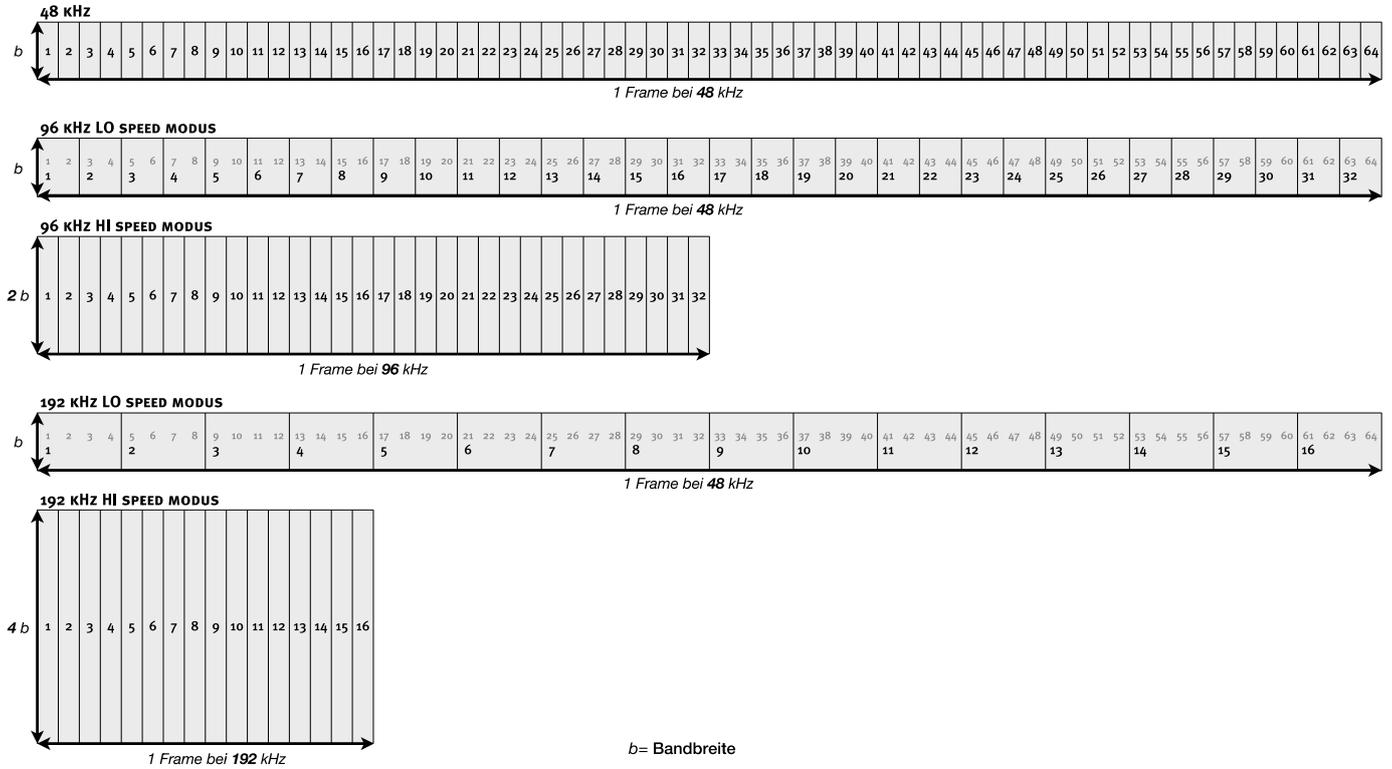
**NOTE:** High Speed and Low Speed modes are only selectable when 2x or 4x sample rates are selected (also refer to „RATE Button“ on page 15).



## MADI Modes and MADI Frame Sizes

The following diagram shows one audio frame at different sample rates and MADI modes. The numbers inside the cells represent the MADI channels.

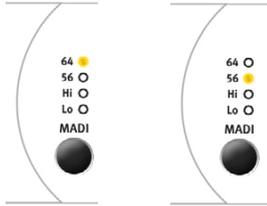
The area of the frame remains the same, regardless of whether several slots are used or the slot bandwidth “b” (indicated by the height in this diagram) is increased to accommodate one single audio channel at higher sample rates.



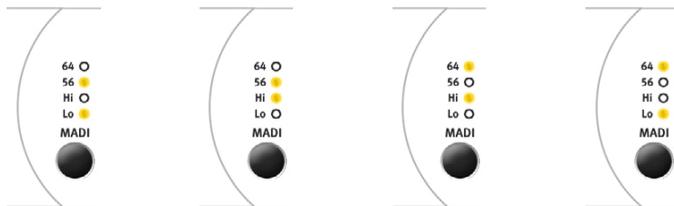
## MADI Button

Use the MADI Button in order to select one of the modes described in the previous chapter „Operation“. Press the button to toggle between modes, the above LEDs indicate which mode is selected.

**With sample rates of 44.1 to 48kHz** you can only toggle between 56Ch and 64Ch MADI mode (Hi and Lo Speed are only selcetable at double or quad sample rates).



**With sample rates of 88.2, 96, 176.4 and 192 kHz** you can select: 56Ch + Lo-Speed, 56Ch + Hi-Speed, 64Ch + Lo-Speed, 64Ch + Hi Speed



**NOTE: If the currently active MADI mode LED is flashing, the Madison has detected a MADI mode mismatch between the current setting and the connected device (monitored at the MADI input).**

Press the MADI button until the conflict has been resolved and the LED stops flashing, or change the external device’s MADI mode to match Madison’s settings.

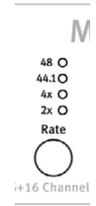
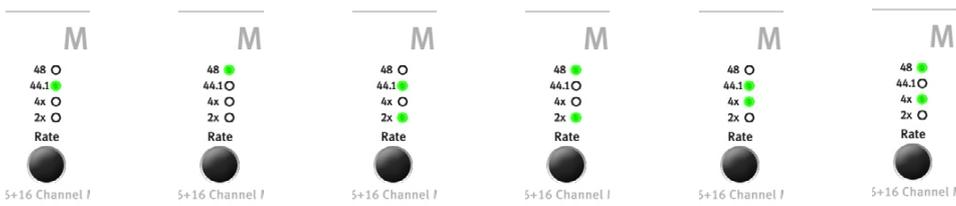


## RATE Button

The Rate button determines the sample rate or clock speed at which the unit is processing digital audio in samples per second.

The Rate button cycles through the available sample rates:

44.1kHz, 48kHz, 88.2kHz (44.1kHz x2), 96kHz (48kHz x2), 176.4kHz (44.1kHz x4) and 192 kHz (48kHz x4).



**With Clock set to INT** (“Master” Operation, the internal Clock Shop is used): the Rate setting determines the sample rate of the whole digital system, which revolves around the Madison’s clock. There can be no other device digitally connected to Madison that is set to use its own internal clock (except when sample rate converter devices are used).

**With Clock set to WC or MADI** (“Slave” Operation): The Rate button determines the sample rate that is expected from the master device. This may be necessary to precisely differentiate between varispeed and a different sample rate, and also for communication in MADI Low Speed (Legacy) mode.

**NOTE: If the currently active sample rate LED is flashing, it means that the Madison cannot lock to the selected sample rate.** When switched to INT clock, the sample rate that the Madison is measuring on the MADI input, does not match. If this happens and an external Clock (Word or MADI) is selected, the clock source is either not active or not connected at all, the external clock operates outside of the Madison’s standard sample rates, or it exceeds the maximum deviation of ±12.5% for varispeed.





## CLOCK Button

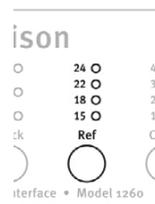
The clock of the Madison can be set to its own internal high-precision clock, generated by our ultra-low jitter SPL Clock Shop, which then becomes the clock Master of the complete digital system connected to it. All other digital devices connected to the Madison need to slave to this clock (by connecting to the Madison's Wordclock or MADI Out).

If INT is selected, you cannot connect another unit simultaneously which uses an internal clock, too (except for real-time sample rate converters).

When set to either WC (Wordclock) or MADI, the Madison will attempt to sync (or clock) to the respective input.



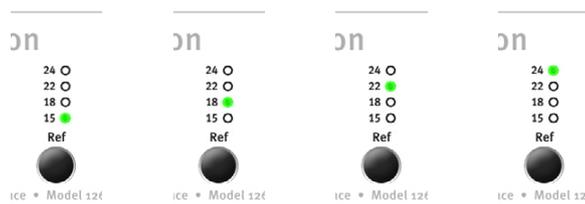
**NOTE:** If the currently selected clock LED is flashing, it means that the Madison is not receiving the clock, cannot lock to the selected clock, or the external clock operates outside of the Madison's standard sample rates or exceeds the maximum deviation of  $\pm 12.5\%$  for varispeed.



## REF Button

With the Ref Level Button, the Madison can cycle through four different analog levels to adapt to different environments (broadcast, vintage audio equipment, modern studio levels) easily:

- +15dBu at odB(FS=fullscale)
- +18dBu at odB(FS)
- +22dBu at odB(FS)
- +24dBu at odB(FS)



**NOTE:** Changing the reference level from the front panel will change all inputs and outputs immediately.

### Basic Analog Levels

Inside the Madison there are two discrete circuits to provide +24 dBu and +18 dBu levels.

The basic analog levels determine the Madison's full signal-to-noise ratio.

### Digitally Attenuated Levels

The reference level of +22 dBu is derived digitally from the +24 dBu circuit by digitally reducing the output levels by -2dB and increasing the input levels by +2dB.

The reference level of +15 dBu is derived digitally from the +18 dBu circuit by digitally reducing the output levels by -3dB and increasing the input levels by +3dB.



## CHAIN Button

With the Chain Button the user can determine the position of a unit within the chain. Up to four units can be daisy-chained over MADI in order to connect multiple Madisons to one MADI device.

MADI can transport:

- 64 input and 64 output channels at sample rates of 44.1 to 48kHz
- 32 input and 32 output channels at sample rates of 88.2 to 96kHz
- 16 input and 16 output channels at sample rates of 176.4 to 192kHz

When daisy-chaining multiple units, the amount of possible MADI channels inside the specified sample rates determines the maximum amount of Madisons that can be used simultaneously in a chain:

- 1 to 4 units @ 44.1 to 48kHz
- 1 or 2 units @ 88.2 to 96kHz
- only 1 single unit @ 176 to 192 kHz (no more chain operation possible)

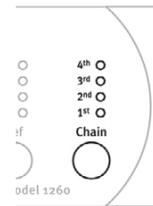
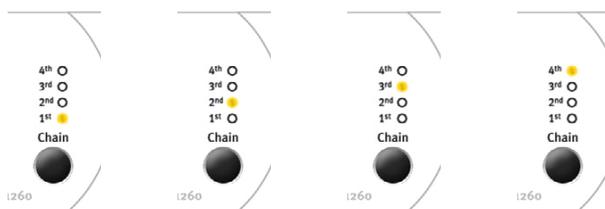
## Connecting and Setting up a Daisy-Chain of Multiple Units

Determination of a unit's position within a chain is achieved by selecting the block of 16 channels coming from the MADI input that should be taken and converted to its 16 analog outputs. At the same time, this same block of 16 channels will be used to route the 16 analog inputs on that Madison to the corresponding MADI outputs.

All other MADI channels will pass through the Madison completely unchanged, which is required in order to successfully pass on the content from previous devices and not collide with following devices inside the chain.

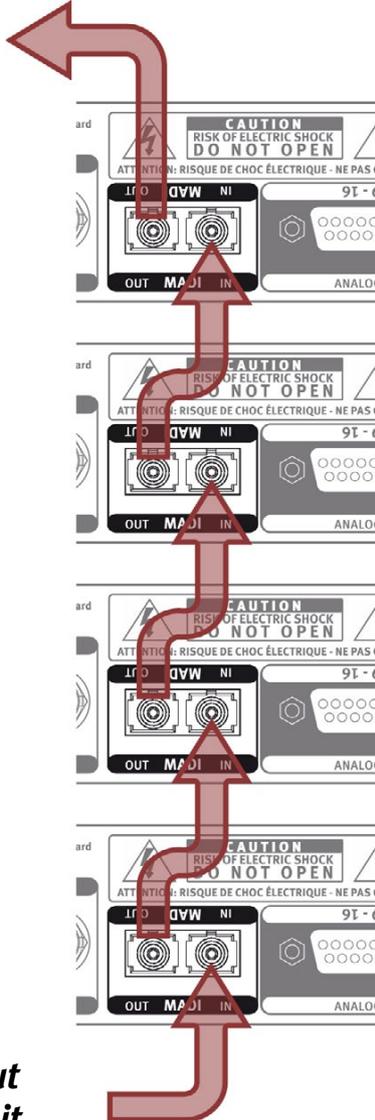
Since the Madison also needs a one sample buffer to pass the data from its MADI input to its MADI output, the chain position determines the right amount of latency compensation for each device inside the chain. This is done in order to preserve sample-accurate alignment of all analogue inputs or outputs of a multi Madison system.

- Chain 1st: MADI CH 1-16
- Chain 2nd: MADI CH 17-32
- Chain 3rd: MADI CH 33-48
- Chain 4th: MADI CH 49-64



## MADI Wiring in a Daisy-Chain

*To MADI input  
of an external  
unit*



### **Unit 4**

(Chain: 4th)  
MADI channels 49-64

### **Unit 3**

(Chain: 3rd)  
MADI channels 33-48

### **Unit 2**

(Chain: 2nd)  
MADI channels 17-32

### **Unit 1**

(Chain: 1st)  
MADI channels 1-16

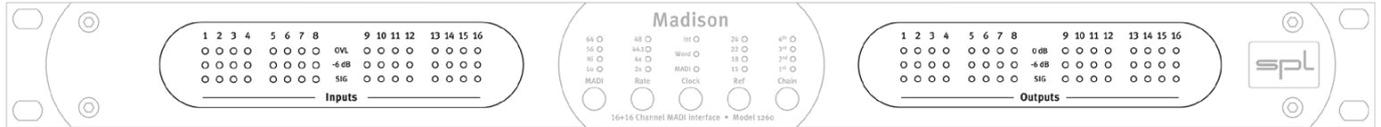
*From MADI output  
of an external  
unit*



### **Important Notes for a Madison Chain**

- To interconnect multiple Madison units you need additional optical fibre cable (not included) that should meet the following specs: Dual SC type connector and cable, glass multimode fibre 50/125µ or 65/125µ.
- The unit position you specify with the CHAIN button must match its real position in wiring.
- Clocking Inside the Chain: either a valid (master) clock needs to run through the chain or all units inside the chain need to be clocked to a common house-clock outlet via Wordclock.

## Input and Output Meters

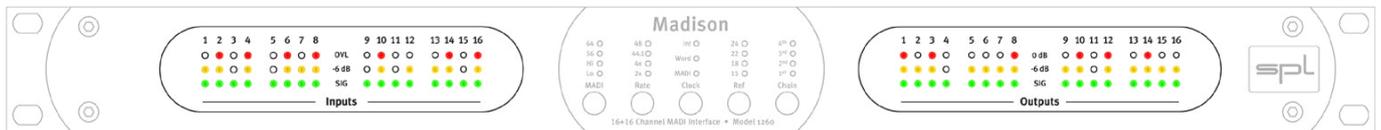


The metering system for the Madison inputs and outputs measures the peaks in the digital domain (Post AD and Pre DA).

The meters are organized in blocks of four by four channels. Since the human brain can differentiate an amount of four without using much brain power, it is easy — even from a distance — to know exactly which channel is clipping, isn't receiving a signal or has a low input level. Three LEDs per channel provide sufficient level info in traffic-light fashion:

- Green LEDs indicate a signal is present (level  $\geq -42\text{dB}$ )
- Yellow LEDs indicate the level is optimal (level  $\geq -6\text{dB}$ )
- Red LEDs indicate an overload at the input or that output levels are approaching  $0\text{dB}$  (level  $\geq -0.1\text{dB}$ ). Clips (red LEDs) are held for one second.

All levels are related to the set reference levels, see "REF Button" on page 17.



## Converter and Connections

Resolution	24 Bit
Sample Rates	44.1, 48, 88.2, 96, 176.4, 192 kHz
Varispeed	±12.5% in 56 CH mode, -12.5% in 64 CH mode
Reference Levels/Inputs	24dBu max, selectable 22dBu, 18dBu, 15dBu
Reference Levels/Outputs	24dBu max, selectable 22dBu, 18dBu, 15dBu
Clock	Internal clock circuitry from SPL, Wordclock or MAD1
Expandability	4 units via MAD1 chain for 64 channels
Wordclock Input	75 ohms, terminated impedance
Wordclock Level	Input: TTL/CMOS <sub>5</sub> /CMOS <sub>3</sub> ; Output: 3.3V <sub>tt</sub>
MAD1 channels	44,1 & 48kHz: 56/64ch
MAD1 channels	2x 44,1 & 48K: 28/32ch
MAD1 channels	4x 44,1 & 48K: 14/16ch
MAD1 formats	2x 44,1 & 48K, 4x 44,1 & 48kHz: SMUX/HighSpeed
Audio Inputs	16 analog, balanced inputs, DB25/Tascam MAD1 optical digital input (up to 64 channels)
Audio Outputs	16 analog, balanced outputs, DB25/Tascam MAD1 optical digital output (up to 64 channels)

## Analog Inputs/Measurements

S/N	115 dB (A-weighted, 48 kHz)
Dynamic Range	115 dB (-60 dBfs, A-weighted, 48 kHz)
S/(N+D)	102 dB (-1 dBfs, 48 kHz)
Interchannel Isolation	110 dB (48 kHz)
Passband Response	22 kHz (-0.02dB, 48kHz)
Passband Ripple	+/- 0.005 dB (Decimation-LPF, 48kHz)
Stopband Attenuation	100 dB (Decimation-LPF, 48kHz)

## Analog Outputs/Measurements

S/N	115 dB (A-weighted, 48kHz)
Dynamic Range	115 dB (-60dBfs, A-weighted, 48kHz)
S/(N+D)	100 dB (-1dBfs, 48kHz)
Interchannel Isolation	110 dB (48kHz)
Passband Response	21.8 kHz (-0.04dB, 48kHz)
Passband Ripple	+/- 0.06 dB (Digital Filter, 48kHz)
Stopband Attenuation	70 dB (Digital Filter, 48kHz)

## Rear Connections

1 IEC power connector	
USB Type A socket (no audio, firmware updates only)	
Wordclock input via BNC socket with Termination switch	
Wordclock output via BNC socket with Termination switch	
MAD1 optical input, Type SC	
MAD1 optical output, Type SC	
2 x DB25 8-channel analog inputs (Tascam)	
2 x DB25 8-channel analog outputs (Tascam)	
Power Supply	Switchmode, 90-264 V AC, 50/60 Hz, 35W max.
Thermal Units	65 BTU/h typ., 110 BTU/h max.
Dimensions (HxWxD, mm)	44 x 482 x 260 (without sockets D=240)
Dimensions (HxWxD, inch)	1,7 x 19 x 10,2 (without sockets D=9,4)
Weight kg	3,05 (3,17 with 2nd Power Supply)
Weight lbs	6,72 (6,99 with 2nd Power Supply)

Note: odBu = 0,775 V. Technical specifications subject to change without notice.







