



**Model M•AD-824  
Analog-to-Digital Converter  
and M•SYNC**

**Quick-Start Guide**  
Version 2.0

**OVERVIEW-**

The M•AD-824 is a two-channel module that converts analog audio to digital audio with wordlengths of 16, 20 or 24 bits at sample rates of 44.1, 48, 88.2 or 96kHz.

The M•SYNC module provides either internal or external clock operation for the M•AD-824, and can generate internal clock or lock to an external source at standard sample frequencies (44.1, 48, 88.2 or 96kHz). When locked to an external source in “Wide” mode, the module can accommodate vari-speed frequencies in the ranges of 42-54kHz and 84-100kHz. On the back panel, there are BNC connectors for “SYNC IN” (Word Clock or AES) and “SYNC OUT” (Word Clock only).

The construction of the LavryBlue 4496 system is a modular design. Each module has a front panel and a rear panel that are directly in-line with each other from front-to-back in the 4496 chassis.

**GETTING STARTED-**

The power supply in the 4496 operates on an input voltage between 90-264 VAC at 47-63 Hz. The power supply automatically adjusts to an AC input in this range- there are no settings to change.

We recommend that you take the unit out of its box and plug in the power cable. It’s easier to use these instructions while working with the unit in front of you.

**1.) Connect the ANALOG INPUT CABLES to the M•AD-824.**

Looking at the back of the 4496, each M•AD-824 module has a group of three XLR connectors. In each group, the LEFT INPUT is the **right** female XLR and the RIGHT INPUT is the **left** female XLR connector. The male XLR is the AES digital output.

This “mirror image” position of the analog inputs is due to the straight-through construction of the modules. Facing the front of the 4496, the Left channel is on the LEFT and the Right channel is on the RIGHT side of each module’s PC board.

The audio XLR inputs of the M•AD-824 are electronically balanced line level (nominal +4dBm). In order to maintain good noise rejection qualities, Lavry Engineering recommends that you use balanced inputs for unbalanced sources as well.

The polarity of the XLR inputs on the M•AD-824 is configured at the factory for: **Pin 2 “+” (non-inverting) & Pin 3 “-” (inverting)**. It is possible to switch to Pin 2 “-” (inverting) & Pin 3 “+” (non-inverting) by changing the setting of the DIP switch Position 2 from OFF to ON. Please see the Operations Manual for the LavryBlue System for details.

**2.) Connect the DIGITAL OUTPUT CABLE to the M•AD-824.**

The output of the M•AD-824 is AES digital format, which is a 110 ohm “balanced” 5V standard. The output is compatible with SPDIF format (75 ohm unbalanced), and can be adapted by using a simple adapter cable or “barrel” adapter from RCA to XLR. Please see the M•AD-824 OPERATION section of the LavryBlue Operations manual for more details.

### 3.) Select the Desired Sample/Clock Rate on the M•SYNC.

The **M•SYNC** is controlled by the left-most panel on the front of the 4496.

The 2 left switches set the sample frequency for Internal Clock and External Clock- Narrow Mode. The **HIGH/LOW** switch is set to **High** for 88.2 and 96 kHz, and to **Low** for 44.1 and 48 kHz.

#### SAMPLE RATE SWITCH POSITIONS:

Sample Rate-indicated by LED	48/96 - 44/88 Switch	High – Low Switch
44.1 kHz	Down	Down
48 kHz	Up	Down
88.2 kHz	Down	Up
96 kHz	Up	Up

- The **Narrow/Wide** switch has no effect when the **M•SYNC** is set to “Internal” operation.
- The “Lock” lamp does not illuminate during Internal Clock operation.

### 4.) Set the CLOCK SOURCE on the M•SYNC.

-For **Internal Clock** operation, set the far right switch on the **M•SYNC** to **INT**.

-For **External Clock** operation, set the far right switch on the **M•SYNC** to:

**WRD CLK** to lock the **M•SYNC** to an incoming **external word clock** signal.

- The lock condition is indicated when the lock lamp is illuminated.

**AES** to lock the **M•SYNC** to an incoming **external AES** signal.

- The lock condition is indicated when the lock lamp is illuminated.

PLEASE NOTE: The **M•SYNC**'s BNC Sync input is NOT internally terminated. For a simple two device system connected with a short BNC cable, termination is probably not necessary. For example: connecting two 4496 units together- Sync Out to Sync In. When connecting to other equipment or chaining the Word Clock signal to more than one receiving device, some form of termination should be used on the last device in the chain. Please see “Regarding Termination” in the **M•SYNC SPECIFICATIONS** section of the LavryBlue Operations manual for details.

-There is a **2X SWITCH** on the rear panel near the BNC connectors. Select “ON” to enable the unit to receive **standard** sync rates (38-52 kHz) while facilitating **conversion at double speed** (76-102 kHz).

FOR EXAMPLE: if you have 48kHz external word clock source, the **M•SYNC** module can generate a signal at 96kHz to clock the A-to-D converter(s) when the **2X** Switch is “ON,” and the **M•SYNC**'s switches are set to “48/96,” “High,” “Narrow,” and “Wrd Clk.”

- For External Lock, use the **NARROW/WIDE** switch to choose which type of lock mode is best suited to accommodate the clock source:

Choose **NARROW** to reduce the sampling frequency input range to lock to signals within +/-150ppm (parts per million) around a fixed rate (44.1, 48, 88 or 96kHz). Narrow lock operation provides improved jitter rejection when operating with a known fixed frequency. *This can sound better than using Wide mode for these four sample frequencies.*

- When in **NARROW** lock, the appropriate frequency indicator lamp shows the selected output rate. The sample frequency switch settings and 2X switch settings must match the external clock frequency.
- The “Lock” lamp illuminates when lock is achieved.

Choose **WIDE** for applications including most normal vari-speed operations. It allows the sample rate to run automatically between 38-51 kHz, or for double speed operation between 76-102 kHz.

Select **WIDE** and **LOW** to accommodate a clock range of 42-54 kHz.

- The top two frequency lamps will light.

Select **WIDE** and **HIGH** to accommodate a clock range of 84-100 kHz.

- The bottom two frequency lamps will light.

### 5.) Using the “SET/SELECT” Switch on the M•AD-824

The SET/SELECT switch is intuitive and actually far easier to use than to describe! **Use it to enter (or exit) the Program Mode** by holding the switch either up or down for 3 seconds.

There are individual functions (Saturation Modes, Reference, & Peak Hold) and multiple parameter functions (Wordlength, & Dither/ABC).

**SELECT- click switch “Down”** to moves the indicator from one function to the next. In all cases except REFERENCE mode, toggling the switch “Down” *both enables* the indicated parameter *and* selects the next function.

**SET-click switch “Up”** to toggle individual functions “On” and “Off”. For individual functions, a constantly illuminated lamp means “On” and blinking lamp means “Off.” For multiple parameters, **SET** moves the indicator sequentially through each parameter. In multiple parameters, possible choices are indicated by a blinking lamp, and the current selection is indicated by a constantly illuminated lamp.

To move through all functions, continue toggling **SELECT**. The lamps for the parameters or function will illuminate to indicate their status as you toggle through each function, then move on to the next function.

To **exit the program mode at any time**, hold the switch either UP or DOWN for 3 seconds. If you don’t use the switch for 10 seconds, the unit will automatically exit the program mode; except in Reference Mode, which will remain active until you hold the switch down (Select).

**6.) Select the Desired WORD LENGTH (16, 20, 24 bit).**

Enter program mode and the Word Length lamps illuminate (the first function in the list). To set the Word Length, toggle “Up” (SET) until the lamp next to the desired word length stops blinking (16, 20, or 24 bits). The Word Length you just set can now be **selected** by clicking DOWN.

**Selecting** by clicking the switch “Down” *both enables* the Wordlength you just set *and changes* the display to indicate the status of the next function-

**7.) Optional SOFT SATURATION.**

**Again- while in Programming Mode if the lamp is blinking, the function is not selected or is “OFF.” If it stays lit, it is selected or “ON.”**

**Analog Soft Saturation**

This is an analog peak limiter to help protect against overloads. The MAX lights still indicate when the maximum input level of the converter is exceeded and the resulting digital waveform will be “clipped.” An internal 3-position jumper, J6, enables the threshold to be lowered or raised for the analog soft saturation feature. Please refer to the LavryBlue Operations Manual for details.

**Digital Soft Saturation**

Select this option to emulate an overdrive condition of magnetic tape. Signal levels below -12 dBFS digital are raised 6dB’s. Above this level, a transfer function that emulates analog tape saturation is applied to the waveform. As a result signal peaks that would have reached “0dBFS” are reduced by 6dB’s. Please keep in mind that enabling this mode automatically adds 6dB more level as seen on the meters of the M•AD-824 (for signals below the -12dBFS “threshold”), so the point at which the “saturation” starts is “-6dB” on the meters. The MAX lights still indicate when the maximum input level of the converter is exceeded and the resulting digital waveform will be “clipped.”

Please Note- If your music source has a fairly high average level, and the input is already high enough that the signal peaks are near “0dB” on the meters, you may find that you want to lower your input level when you switch this function “ON.” This may mean that the increase in level is less than the maximum 6dB’s possible, but at that point (with that much “saturation”) it will probably sound noticeably distorted. This function is not supposed to replace a limiter, if that is what is called for. The design is optimized to prevent an occasional loud peak from causing clipping if the level was raised in a program source that has a relatively low average level with occasional peaks that are much louder- a “wide dynamic range.”

The next two settings on the MAD front panel are METER functions, so they will be addressed after the Dither and Noise Shaping functions. Click the switch down (Select) until the Dither, ABC-1, and/or ABC-2 lamps start blinking.

## 8.) Select DITHER & Optional NOISE SHAPING for 16 bit or 20 bit modes.

Dither, ABC-1 and ABC-2 are grouped together (similar to word length).

**αβC** αcoustic βit Correction® is dither plus psycho-acoustic enhancement of the converter's dynamic range for word length reduction to 20 or 16 bits. Some describe this as getting more than 16 bits performance with a 16 bit word length.

**ABC-1** provides a gentler enhancement curve.

**ABC-2** provides a more aggressive enhancement curve.

- It is possible to set this function to *none* of the three choices for “no dither or αβC.” In this case, all three lamps will be blinking.
- Setting the position of the internal DIP switch position to “ON” changes ABC-1 and ABC-2 to less aggressive curves. Please refer to the LavryBlue Operations Manual.

## 9.) METER FUNCTIONS

### To Use The Reference Meter Bridge:

Please Note: To use this mode, you need a reference tone source (for example 1kHz) at “0dB” on your VU meters or at a level that represents the AVERAGE level of the music source. This level will typically be in the range of 10 to 20dB's below analog PEAK level. The range of the meter is “expanded” around the reference level so that each lamp above or below the reference level indicates approximately 0.2dB of level change.

Select “Reference.” A pair of solidly lit lamps (L and R) indicates the reference level between -10 and -20dB on the Meters. Click up (Set) to step to the desired REFERENCE LEVEL (-10, -12, -14, -16, -18 or -20dBFS). Apply the tone to the analog inputs of the M•AD-824. If the top lamps of the meter are blinking, it means that the analog input level is ABOVE the meter range, and if the bottom lamps are blinking the tone is BELOW the range. Use a small screwdriver to adjust the front panel 20-turn pots until the second pair of lamps stops blinking, and move up or down the scale to coincide with the selected reference level.

Determining the optimum level setting for the trimmers of the MAD module will take some experimentation. The most important consideration is that the typical peak level of the audio program you want to record comes very close to, but does not exceed “0dBFS” which is represented by the “MAX” lamps on the MAD meters. The following procedure uses music program to roughly determine the optimum level; then allows you to “fine tune” it using the REFERENCE function.

Once you have established the output gain of the device feeding the MAD module, DO NOT change it during this calibration procedure.

- 1.) Feed music program to the analog inputs which is typical of the type of material you want to record with the MAD-824. Adjust the trimmers on the front of the MAD module so that the peak level is close to “0” on the MAD meters, but does not cause the MAX lamps to illuminate.

- 2.) It is easiest to feed the reference tone to the MAD module before switching to REFERENCE mode to establish what level it will appear on the MAD meters. For example- Use a tone at “0 dBVU” from an analog source or “-12 dBFS” from a digital source feeding a DA converter. Without changing the output level of the device feeding the MAD analog inputs or the trimmers on the MAD, make a note of the level of the tone as displayed on the MAD meters. For this example, we will use “-12 dB.”
- 3.) The indicated level of the tone has to be in the range of “-20” to “-10” to use the REFERENCE mode. If it is not, you may need to use another analog level as your reference level (+3 dBVU analog , or -8dBFS digital for example). Choose a level that you can accurately meter or duplicate at a later time.
- 4.) Select the REFERENCE mode, and set the reference level to the dB level established in (2) above. Our example is “-12 dB,” so you would click the toggle switch in the SET direction until the reference marker lamps are next to the -12 label on the MAD meters. When the setting reaches “-20,” it starts over again at “-10,” so it may be necessary to click the switch in the set direction repeatedly to get it back to “-12.”
- 5.) There should also be two other lamps illuminated on the MAD meters which represent the input signal level. Please note that you do not have to use the reference marker’s level as your reference level. Each lamp above or below the reference mark represents 0.2 dB’s of change, so by counting the number of lamps above or below the reference marker, you can establish the reference level for an “in-between” level such as “-13 dB.” Using our example where the reference mark is at “-12,” this level would be indicated by the lamps that are between the “-30” and “-20” label on the MAD meters, which is five lamps below the “-12” lamp.
- 6.) Because the level established using music program in step 1 (above) represent the loudest level without “clipping,” it would be advisable to use the lower of the two channels as the reference level. For example, before further adjustment, the meters on the MAD module show the reference tone at one lamp above -12 on the left channel, and one lamp below -12 on the right channel. If you lower the left channel to one lamp below -12 (or -12.2 dB), the channels will be balanced and at a level that did not cause clipping.
- 7.) Some further experimentation may be necessary to “fine-tune” the setting. By using the REFERENCE mode to make the adjustment, it is both easy to change in a calibrated manner and easy to reset to a known level.
- 8.) One last note- it is possible to turn the trimmers down on the MAD module and create a situation where the analog outputs of the device feeding it “clip” or distort before the signal reaches “0dBFS.” With the trimmers turned all the way “down” (counterclockwise) the maximum input level of the MAD module is very close to +24dBu, which may be up to 6 dB’s hotter than some analog outputs are capable of outputting. For example- if the maximum output level of your analog device is +18dBu, then “0 dBVU” or “-14dBFS” would correspond to “-14” on the MAD meters to match the maximum analog level to digital clipping level. In this case, the trimmers would be closer to the middle of their adjustment range.

### **PEAK HOLD FUNCTION-**

Enabling this function will indicate and “hold” the highest peak level on the meter. The peak indication that is held can be reset by quickly activating the front panel switch when the MAD is normal mode (after exiting the programming mode).

## YOU NEED TO KNOW . . .

### ABOUT MASTER-SLAVE MODES –

A module may operate in either master or slave mode. All the slaves copy parameters set on the master.

**A master module is usually located in the leftmost chassis position and set to “master”** via the on-board DIP switch (position 1 set to ON). All the other modules can be set to slave (DIP switch position 1 set to OFF). If another module is set to “master,” the module(s) to the right of it will “listen” to that master. **See page 13 of the manual for DIP switch location.**

- When the power is turned on, the -9dB lamps will flash for a few seconds on any master modules. The -9dB lamps will remain steady on slave modules.

**Slave module parameters may be programmed independently** via the slave module’s own front panel switch. However, the master-slave relationship will override such settings; the next time the master module parameters are programmed, the settings will change immediately on all the slaves as well. So if you want to program the Slave modules differently than the Master, be sure to program the Master module *first*.

- When the frame is powered, the slaves will always emulate the nearest master module.

### INSTALLATION OF THE M•DA-824:

The flexibility of the LavryBlue 4496 chassis allows up to 4 single width modules to be in different slots within the frame with some restrictions:

If the unit has an M•AD-824 A-to-D module, it must be in the leftmost slot, and an M•SYNC module is required. The M•SYNC panel replaces the logo panel in the leftmost position on the front of the 4496. Additional M•AD-824’s must be in the adjacent slot(s) to the immediate right of the first M•AD-824 module. Other converter modules can then be added to the right of the last M•AD-824, including one or more M•DA-824’s. In systems with one or two converter modules, a MicPre can be added to the right of the converter modules.

**MicPre’s are doublewide modules, and take up two “slots.”**

Lavry Engineering is required to install the first M•AD-824 module and MSYNC in the 4496 chassis. There are a number of critical calibrations that are part of this procedure. Your dealer can provide assistance or contact Lavry Tech Support:

[techsupport@lavryengineering.com](mailto:techsupport@lavryengineering.com)