

# LAVRY

## AD-24-200



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## CAUTION

The front panel of the Lavry Savitr is plated with 24 karat gold, which is vulnerable to abrasion. When shipping this unit, protect the front panel with a non-abrasive cloth.

For safety, users should not attempt to service or repair the unit unless given specific instructions to do so by Lavry Support staff-members.

Do not let the unit suffer sudden impact. The structure of the unit is enforced with machined steel parts, but with a sudden impact it is possible to damage electronic connections on the circuit boards. Secure the unit firmly into place in your 19 inch rack, or place the unit on a level surface.

To secure the unit into a 19 inch rack, it may be necessary to remove the 4 rubber feet adhered to the bottom surface. They can be removed without the use of any tools which could leave scratches on the metal surface. If the feet have been removed, and the unit is moved to a level surface, first replace the rubber feet on the bottom surface of the unit.

## INTRODUCTION

Congratulations on your purchase of the Lavry Savitr AD-24-200 ultra-precision analog to digital converter. Savitr features include adjustable input GAIN, External Clock Search & Lock, LOW-LATENCY mode, MX mode, output format selection (AES/SPDIF), and Lavry's exclusive SOFT SATURATION.

The steel enclosure is a standard 1U high 19 inch rack-mount chassis. All electrical communication and connection is made via the rear panel. The power switch and 4 other switches are located on the rear panel; all of these switches would typically not be used during standard operation. Regular user control is done via the front panel's pushbutton switches and indicators.

## MODEL OPTIONS

There are currently two options for the Savitr; Savitr (AUX) with the AUXILIARY Digital Audio output module and Savitr (MWC) with the Multiple Word Clock output module. Only one output module can be installed at any time, and retrofit is possible.

### 1. SAVITR (AUX) - Auxiliary Digital Audio Output

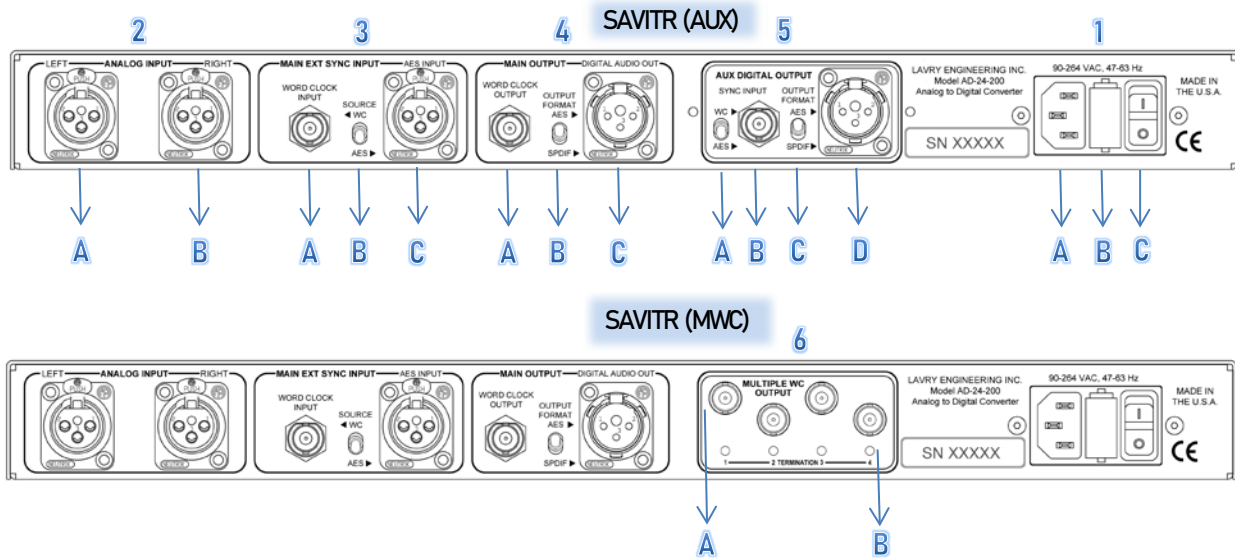
The AUXILIARY module offers an additional digital audio output with independent settings for clock mode, output format, and external clock format (Word Clock/AES). Whether you choose to use the optional high quality Sample Rate Conversion (SRC) or not, the integrity of the digital audio from the Auxiliary output maintains the sonic characteristics of the Main output. SRC allows real-time output of the encoded audio at two different sample frequencies (Main & Aux).

### 2. SAVITR (MWC) - Multiple Word Clock Output

The Multiple Word Clock output module allows the user to operate the Savitr with an internal clock for optimal conversion performance, while also serving as the Master Clock in systems requiring more than one WC source (up to 5 in total).

The MWC adds 4 BNC Word Clock outputs, and also features Termination sensing for each output. Proper termination is essential in order to minimize jitter within the cable.

## REAR PANEL



### 1. AC POWER section

#### A. AC Power Inlet

The Savitr power supply accepts AC power in the range of 90–264 Volts at 47–63 Hertz. The power supply adjusts automatically for proper operation within this voltage & frequency range.

The included power cord has a push-button locking feature. Once inserted, you must press the yellow button to remove the power cable!

This unit can also be powered via a standard IEC C13 power cord rated for the supplied AC voltage.

#### B. Fuse Tray

This fuse tray contains 2 fuses.

Be certain to unplug the IEC power cord before attempting to remove the Fuse Tray.

If the unit will not power on, please first check the AC power source. If the AC power source is OK, one or both of the fuses might have blown. (Please refer to Appendix A – Fuse Access)

#### C. Power Switch

This switch controls the unit's AC power. The symbols on the switch are standard "line and circle" power symbols.

- UP position depressed : ON
- DOWN position depressed: OFF

## 2. ANALOG INPUT section

- A. LEFT Input connector
- B. RIGHT Input connector

These 2 locking female XLRs accept Balanced or Unbalanced analog audio signals.

The internal GAIN range: 0 dB to 7 dB

- To achieve Full-scale; balanced input range: 17-24 dBu
- To achieve Full-scale; unbalanced input range: 17-20 dBu

## 3. MAIN EXT SYNC INPUT section

This section allows the user the option to synchronize the digital audio of the unit to an external clock source with a sample frequency in the range of 32-200 kHz.

- A. WORD CLOCK INPUT connector

This BNC input is internally terminated by 75Ω.

- B. SOURCE toggle switch

- UP position: The unit can sync to the WORD CLOCK signal on the BNC.
- DOWN position: The unit can sync to the AES signal on the XLR.

- C. AES INPUT connector

This locking female XLR enables sync to an AES digital audio signal.

## 4. MAIN OUTPUT section

- A. WORD CLOCK OUTPUT connector

This BNC outputs a clock source signal.

- B. OUTPUT FORMAT switch

Use this switch to set the digital audio OUTPUT FORMAT

- UP position : OUTPUT FORMAT = AES
- DOWN position : OUTPUT FORMAT = SPIDF

- C. Digital Audio Output connector

This locking male XLR is the main digital audio output.

## 5. SAVITR (AUX) - AUX DIGITAL OUTPUT SECTION

### A. SYNC INPUT switch

- UP position: SYNC INPUT is set to receive WORD CLOCK.
- DOWN position: SYNC INPUT is set to receive AES.

### B. SYNC INPUT connector

This BNC input is used to lock the AUX output to an external clock source (Word Clock or AES). The input is internally terminated by 75Ω.

If you are clocking the Main output from an External clock source and want the AUX output to sync to the same source; connect a short BNC cable from the MAIN Word Clock output to the AUX Sync Input. Set the AUX Sync Input format to WC, and use the front panel controls to set AUX to External.

### C. OUTPUT FORMAT switch

- UP position: the AUX digital audio output signal is AES formatted.
- DOWN position: the AUX digital audio output signal is SPDIF formatted.

### D. Digital Audio Output connector

This locking male XLR outputs the AUX digital audio signal.

## 6. SAVITR (MWC) - MULTIPLE WORD CLOCK OUTPUT SECTION

### A. BNC WORD CLOCK OUTPUTS 1-4

These four BNC output connectors each output a fully buffered Main Word Clock signal. Like the Word Clock in the MAIN Output section, they are short circuit protected so a problem on any single connection will not affect the operation of the other outputs. All offer the same extremely low-jitter performance as the WC output in the MAIN OUTPUT section. For optimal performance, operate the Savitr on Internal Clock.

### B. Termination Sensing Indication

Each of the four BNC outputs has individual Termination sensing with multi-colored LED indication. Proper 75 Ω termination is essential to minimizing jitter effects caused by transmission of a Word Clock signal between devices via the required 75 Ω coaxial cable.

- Dark LED = High impedance (or no termination)
- Green LED = Proper 75 Ω termination
- Red LED = Low impedance improper termination (50 Ω or less, Double termination is ~ 37.5 Ω)

## FRONT PANEL (START-UP SEQUENCE)



The front panel layout consists of the METER, and USER CONTROL SETTINGS.

### 1. METER

The meter displays digital audio output peak levels.

### 2. USER SETTINGS groups

User control settings consist of switches, LED indicators (lamps) and trim pots.

### STARTUP sequence

During calibration, the METER runs a visual sweep from left to right, illuminating one pair of lamps at a time. The unit loads all settings saved before the previous shutdown.

When the STARTUP sequence has completed, the unit enters OPERATION mode.

## FRONT PANEL OPERATING MODES

The front panel has two modes: OPERATION and EDIT.

The front panel changes appearance and functions differently, depending on the mode.

In EDIT mode, no change in audio function occurs until the SET button is pressed.

Upon exiting EDIT mode the unit returns to OPERATION mode, all front panel settings are stored and will automatically be recalled on power-up.

In OPERATION mode, audio user controls are disabled to prevent unintentional changes during normal use. Display functions and EDIT Enable remain active in OPERATION mode.

Some pushbuttons have two labels on the front panel, one applies in OPERATION mode and the other applies in EDIT mode. The following descriptions refer to the label that applies in each specific mode.



## FRONT PANEL (OPERATION MODE)



### 1. Enable lamp

EDIT mode: ON  
OPERATION mode: OFF

### 2. Enable switch

A sustained press of this switch enables EDIT mode. The ENABLE lamp will turn ON when this change occurs.

### 3. M switch

This switch cycles through the illumination levels of the METER lamps.

### 4. S switch

This switch cycles through the illumination levels of the USER CONTROL SETTINGS groups.

### 5. Peak Refresh switch

The peak-hold function for the meter can be enabled or disabled by a sustained press of this switch until the ENABLE lamp flashes once. When enabled; the peak-hold can be reset with a momentary press of this switch.

## FRONT PANEL (EDIT MODE)



In EDIT mode, the user-controls are divided into 6 distinct sections, labeled MAIN, AUX, SOFT SAT, SPECIAL, GAIN, and EDIT.

All User-Control lamps will display one of 4 states:

- OFF
- ON
- Long flash- Pressing Set will turn function On
- Short flash- Pressing Set will turn function Off

Conversion continues uninterrupted in EDIT mode. Operation will only change to new settings after the SET switch is pressed. This will be followed by a brief mute of the output.

## 1. EDIT control section

### Enable switch

To switch between OPERATION and EDIT mode, press and hold this switch until the ENABLE lamp changes. In EDIT mode the unit will automatically exit to OPERATION mode after a short idle time.

### Enable lamp

- EDIT mode: ON
- OPERATION mode: OFF

### Set switch

This switch executes all changes to audio settings. If SET is not pressed before exiting EDIT mode, all changes will not be executed and the display will revert to the previously stored settings.

## 2. MAIN and

## 3. AUX control sections

These two sections control clock sources for conversion and WC output.

- Savitr (AUX): the control method of each section is identical when the AUX module is installed.
- Savitr (MWC): when the MWC is installed, the AUX section controls are disabled. The front panel LED indicators remain dark as a result. MWC outputs follow Main output SF settings.

### MAIN or AUX switch

Each momentary press selects the next available Sample Frequency option of INTERNAL clock mode.

Each sustained press selects the next available clock mode (INTERNAL, NARROW, WIDE LOCK).

Sample Frequency is automatically detected and selected in EXTERNAL clock modes.

Savitr (AUX) only: When both MAIN and AUX are set to Internal and to the same Sample Frequency, SRC processing is bypassed for the AUX output.

### EXT lamp

- OFF: INTERNAL clock mode.
- ON: EXTERNAL clock mode (NARROW or WIDE LOCK).
- Long flash- Pressing Set will select EXTERNAL clock mode (NARROW or WIDE LOCK).
- Short flash- Pressing Set will select INTERNAL clock mode.

## SAMPLE RATE lamps

There are 6 lamps labeled with numbers 44.1, 88.2, 96, 176.4, and 192. These refer to sample rates in kHz. Depending on clock mode, these lamps function differently.

### INTERNAL clocking mode

- ON: displays the active clock rate.
- Long flash- Pressing Set will select this clock rate.

### NARROW clocking mode

Narrow Lock Mode offers highest jitter rejection with External Sync.

#### SEARCHING function (Narrow)

Displays a repeating pattern of single flashing lamps, until a clock signal among the 6 rates is found.

#### LOCKED (Narrow)

A single Sample Rate Lamp (ON): displays the locked rate.

### WIDE LOCK clocking mode

Wide Lock Mode allows lock to non-standard Sample Rates.

#### SEARCHING function (WIDE)

Displays a repeating pattern of **paired** flashing lamps, until a clock signal between 32 and 200 kHz is found.

#### LOCKED (WIDE)

Paired lamps (ON) indicates the range of the locked frequency:

- 44.1 and 48 (ON) : 32-68kHz
- 88.2 and 96 (ON): 68-136kHz
- 176.4 and 192 (ON): 136-200kHz

## 4. SOFT SAT control section

### SOFT SAT switch

This switch will SELECT a SOFT SATURATION level.

The numbers 2, 4, & 6 correspond to the dB level\* of gain applied to the signal below the saturation threshold.

The result is an apparent increase in average loudness level. \*Gain applied is +/- 0.2dB of nominal.

### 3 lamps

These lamps indicate and control application of 4 levels of SOFT SATURATION to the audio signal:

- OFF: No Saturation.
- ON: Displays level of SOFT SATURATION.
- Short flash all three lamps- Pressing Set will select NO SOFT SATURATION.
- Long flash- Pressing Set will select this setting for SOFT SATURATION.

## 5. SPECIAL control section

### Low Latency control

#### Switch

This switch SELECTS between BEST-QUALITY and LOW LATENCY modes.

#### Lamp

- OFF: BEST-QUALITY mode.
- Long flash- Pressing Set will select LOW LATENCY mode.
- ON: LOW LATENCY mode.
- Short flash- Pressing Set will select BEST-QUALITY mode.

### MX control

The MX transformation is a proprietary technology, reducing the perceived harsh distortions due to signal clipping (exceeding the allowed signal level range).

#### Switch

This switch SELECTS between NEUTRAL and MX modes.

#### Lamp

- OFF: NEUTRAL mode.
- Long flash- Pressing Set will select MX mode.
- ON: MX mode.
- Short flash- Pressing Set will select NEUTRAL mode.

## 6. GAIN control section

### INPUT TRIM potentiometers

The L and R potentiometers control INPUT GAIN for the LEFT and RIGHT analog channels.

Using a small, flat-head screwdriver: ↻CLOCKWISE rotation INCREASES GAIN. These trim pots provide 0-7dB of GAIN for Balanced inputs. Adjustment may require many rotations.

**CAUTION:** Over-rotation of the GAIN trimmer beyond the adjustment range may result in damage to the gain trimmer.

While adjusting the GAIN, always meter the output level of the Savitr, and stop turning the trimmer if the level stops changing. Digital meters with a numeric readout of peak level and with a minimum resolution of 0.1dB are required. This type of metering is commonly available in high quality audio recording software.

It is also recommended that all processing (SOFT SAT and MX) be disabled when adjusting the front panel GAIN of the Savitr.

FULL-SCALE signal for BALANCED inputs is 24dBu. The trim potentiometers provide up to 7dB of internal GAIN to accommodate lower level input signals.

FULL-SCALE signal for UNBALANCED inputs is 20dBu. The trim potentiometers provide up to 3dB of internal GAIN to accommodate lower level input signals.

It is recommended that some front panel GAIN be applied if MX processing is employed to achieve hotter levels by “clipping” the audio. There is a small amount of “headroom” if the input level exceeds +24dBu, but levels exceeding +24dBu by more than 1dB may result in clipping before the signal reaches the MX processing. For best results, use front panel GAIN to ensure the input of the SAVITR does not overload and that the analog source feeding the SAVITR does not distort by being driven into output clipping.

## TECHNICAL SPECIFICATIONS

### THD+N (0 dB Internal Gain)

Analog Input Level	Source Frequency	Gain	20 kHz Bandwidth		40 kHz Bandwidth	
-1 dBFS	1 kHz	0 dB	-110 dBFS	0.00032 %FS	-107 dBFS	0.00045 %FS
-0.1 dBFS	20 Hz to 20 kHz	0 dB	-109 dBFS	0.00035 %FS	-103 dBFS	0.00071 %FS
-1 dBFS	20 Hz to 20 kHz	0 dB	-109 dBFS	0.00035 %FS	-106 dBFS	0.00050 %FS
-3 dBFS	20 Hz to 20 kHz	0 dB	-113 dBFS	0.00022 %FS	-110 dBFS	0.00032 %FS

### THD+N (with Internal Gain)

6 dB of Internal Gain: Increases THD+N by less than 2dB of the values above.

### Dynamic Range

Sample Rate	Bandwidth	Unweighted	A-Weighted
44.1 kHz	20 kHz	126 dBFS	128 dBFS
96 kHz	40 kHz	122 dBFS	128 dBFS
192 kHz	80 kHz	104 dBFS	128 dBFS

### Channel Separation

- 1 kHz: 123dBFS
- 20-20 kHz: 108dBFS

### Latency

Conversion Rate	Main Output		Auxiliary Rate	AUX Output	
	Best Quality	Low Latency		Best Quality	Low Latency
44.1 kHz	471 $\mu$ s	153 $\mu$ s	44.1 kHz	3.7 ms	3.5 ms
48 kHz	440 $\mu$ s	150 $\mu$ s	48 kHz	3.4 ms	3.4 ms
88.2 kHz	267 $\mu$ s	109 $\mu$ s	88.2 kHz	1.9 ms	1.7 ms
96 kHz	249 $\mu$ s	103 $\mu$ s	96 kHz	1.7 ms	1.6 ms
176.4 kHz	137 $\mu$ s	89 $\mu$ s	176.4 kHz	940 $\mu$ s	890 $\mu$ s
192 kHz	130 $\mu$ s	86 $\mu$ s	192 kHz	865 $\mu$ s	820 $\mu$ s

## APPENDIX A- AC POWER, POWER CORD, AND FUSE ACCESS

### 1. AC Power and Power Cord

The Lavry Savitr AD-24-200 power supply accepts AC power in the range of 90-264 Volts at 47-63 Hertz. The power supply adjusts automatically for proper operation with AC power within this voltage & frequency range.

The power for the Savitr is controlled by the rear panel power switch.

The included power cord has a push-button locking feature. Once inserted, you must press the yellow button to remove the power cord!

### 2. Accessing the Fuses

The Savitr has two fuses located in the Power Entry Module (PEM).

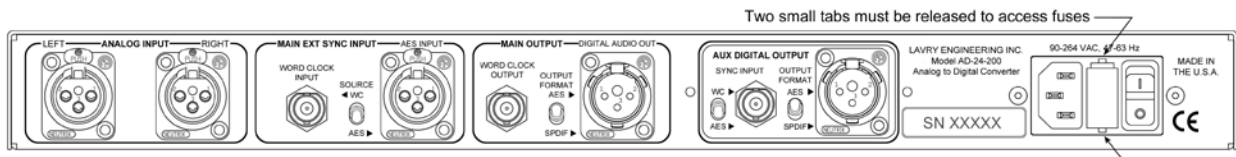
The following procedure will provide the information needed to access the fuses in your Savitr.

The AC power cord must be removed before attempting to access the fuses!

The Savitr requires two 1.25A Time Delay (Slow Blow) 250V 5mm x 20mm fuses. They are located in the *fuse tray* of the PEM.

The fuse tray is held in the PEM by two small spring-loaded plastic tabs, which must be pressed with a small screwdriver to release. The top tab must be pressed downward and the bottom tab must be pressed upward. If possible, use two small screwdrivers to press both tabs at the same time.

Here is an illustration of the rear panel:



Always replace the fuses with the recommended type and use the same value for both fuses!

If you have any questions, please contact us at: [techsupport@lavryengineering.com](mailto:techsupport@lavryengineering.com)

## WARRANTY

Subject to the conditions set forth below, for one year after the original purchase date of the product, Lavry Engineering will repair the product free of charge in the United States in the event of a defect in materials or workmanship.

Lavry Engineering may exchange new or rebuilt parts for defective parts. Please call the factory for an RMA number prior to shipment. No product will be accepted for warranty service without a pre-issued RMA number.

This warranty is extended only to an original purchaser of the product from Lavry Engineering, or an authorized reseller of Lavry Engineering. Products that are purchased from unauthorized resellers do not have any warranty coverage. A valid purchase receipt or other valid proof of purchase will be required before warranty service is provided. This warranty only covers failures due to defects in materials or workmanship and does not cover damages which occur in shipment or failures resulting from accident, misuse, line power surges, mishandling, maintenance, alterations and modifications of the product, or service by an unauthorized service center or personnel. Lavry Engineering reserves the right to deny warranty service to products that have been used in rental, service bureau, or similar businesses.

This limited warranty gives you specific legal rights. You may have others which vary from state/jurisdiction to state/jurisdiction.

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