

LAVRY

AD11



LavryBlack Series
Model AD11 Stereo
Analog to Digital Converter
With
Microphone Preamplifier

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Quickstart Guide- Introduction

Please Note: Because the AD11 uses the same XLR inputs for Line and Microphone level, it is possible that Phantom power could be present on the input(s) if the user does not exercise care in checking the phantom power settings *and* gain settings. In the vast majority of cases, damage is very unlikely. Furthermore, because there are extensive safety features to prevent this, it is unlikely to occur in normal usage; however:

- *It is advisable to have phantom power enabled on the AD11 only when using condenser microphones.*

To familiarize yourself with the operation of the front panel controls of the AD11, it is advisable to perform the **Setting example** procedure on page 2 before changing settings or making any connections other than AC power. But first, here are some basics:

-When AC power is applied to the AD11, the unit initializes itself. First, a single LED “scans” each row of the front panel meters, then both rows. The unit then enters a special version of Setting Mode to display the settings and allow changes to the **phantom** settings for the left and right channel’s +48V Phantom power.

-The unit then returns to Operating Mode.

For more details, please see the section titled “phantom (+48V Phantom Power for Condenser Microphones)” in the Operation section of the manual on page 12.

All switches on the AD11 are spring-loaded three position toggles that automatically return to the center (no function) position. They are: \leftrightarrow (forward-back), Exit-Set, and Up-Down.

The front panel LEVEL meters change modes; in Operating mode they serve as output level meters and the numbers *above the display* indicate the peak level in dB’s below “0dB full scale digital” (0dBFS). In Setting mode the legend *below the display* applies, and the bottom row of LED’s (labeled “right”) indicate the status of *most* settings. However, for individual channel settings the top row indicates the left channel setting, or for external clock operation; “lock” to an external sync source. This also means that the cursor may move *vertically* between the top and bottom row of LED’s to access the left and right channel settings, in addition to moving left or right. For this reason, the direction of the cursor’s movement will be referred to as “forward and back.” Please see Diagram 2 on page 10 for more detailed information.

The two switches under the SELECT legend are used to change basic settings.

- In Operating mode, click the \leftrightarrow (forward-back) switch down to enter *Setting mode*. A flashing LED appears as a cursor in the “LEVEL” display to indicate which setting can be changed.

-The AD11 is now in Setting mode and the display under the LEVEL legend has changed modes from level meter to a setting status display.

- The \leftrightarrow switch now moves the cursor forward or back as indicated by the arrows. Clicking the switch down is “forward” and up is “back.”

- The right switch toggles the setting at the cursor position “On” or “Off” when the switch is clicked down in the “**set**” direction. For single selections, repeated clicks in the **set** direction will toggle the function “On” or “Off” with each click.

- Some settings require at least one selection to be “On” at all times (Sample Frequency & Output Format). Once any of these settings is “On,” clicking **set** repeatedly has no effect.


- Click the right switch up towards “**exit**” to exit the Setting mode.




Please see the Setting Example (next page).





Quickstart Guide- Setting Example

This procedure assumes settings have not been changed from the factory defaults, which are: **44.1** kHz Sample Frequency (SF), **spdif** output format “on,” meter peak **hold** “on.”

- 1) Turn the AD11 power “on” and wait for the initialization to complete (meters stop moving sequentially, setting status finishes being displayed, and display reverts to Meter mode).
- 2) Enter Setting mode by clicking the  switch in the down direction.

The *default* Setting mode display looks like this (where  symbolizes a rapidly flashing cursor):




- 3) A *rapidly* flashing cursor appears at the first position on the left (**44.1**) indicating it is “On.”
- 4) Click the  switch down three times and a *slowly* flashing cursor appears at “**96**” (slow = Off). The LED above **44.1** will illuminate constantly to indicate it is “On.”
- 5) Click the right (“exit-set”) switch down towards “**set**” and the cursor will begin flashing *rapidly* to indicate that **96** (kHz) is “On.” The LED above “**44.1**” will go dark (44.1 is now “Off”).
- 6) Click the  switch down three times to position the flashing cursor above the **aes** legend. The LED above **96** will stop flashing and stay illuminated.
- 7) Click the right switch down towards “set” and the cursor will change from flashing slowly to flashing rapidly to indicate that **aes** (digital output format) is now selected. Because the **aes** and **spdif** settings are also interlocked, the **spdif** LED will also go dark.
- 8) Click the  switch down three times until the cursor appears in the **left** (upper) row of LED’s above the **phantom** legend. Please note how the cursor goes to the **right** (lower) row of LED’s before moving to the **left** row. This is because there are individual settings for left and right channel.
- 9) Click the right switch down towards **set**; the cursor will change from flashing slowly to flashing rapidly to indicate the **phantom** (+48V power) is now “enabled” for the left channel *only*.
- 10) Click the  switch down three times until the cursor appears above the **hold** legend. Click the right switch towards **set** and the cursor will change from flashing rapidly to flashing slowly to indicate that the peak hold function has been turned “off.”

The display should look like this (where  symbolizes a slowly flashing cursor):



96kHz SF, AES output format, phantom power enabled left channel, meter peak hold “off”

Hint: To double-check if a setting is correct, use the  switch to move the cursor away from the setting you just changed to see if its LED indicator is “On” or “Off” (instead of flashing).

- 11.) Click the right switch up towards “**exit**” to exit the Setting mode. The settings have been stored in memory and the AD11 is now in Operating mode.
- 12.) Now that you are familiar with the Setting mode, you can re-enter setting mode and configure the AD11 for the settings you normally use. It is advisable to disable phantom power unless you plan to use a condenser microphone with the AD11 the next time power is applied. The default settings can be used safely for initial operation.
- 13.) **Please see the CONNECTIONS section of the manual before using the AD11.**

Quickstart Guide- Settings and Operation

The AD11 front panel has three sections:

(Diagram 1)



When AC power is applied to the AD11, the unit initializes itself. First, a single LED “scans” each row of the front panel meters, then both rows. The unit then enters a special version of Setting Mode to display the settings and allow changes to the **phantom** settings for the left and right channel’s +48V Phantom power. The unit then returns to Operating Mode. For more details, please see the section titled “phantom (+48V Phantom Power for Condenser Microphones)” in the Operation section of the manual on page 12.

- Please use caution when changing settings. Although the AD11 changes its digital outputs “gracefully;” it is not possible to predict how a device the AD11 is feeding will react. For this reason; it is advisable to lower your monitor speaker volume to avoid possible speaker damage prior to changing any settings.

AD11 MODES

The AD11 has two modes- the Operating Mode and the Setting Mode.

- In Operating mode, the front panel displays the level of the digital output signal in the meters below the LEVEL legend (as shown on Page 7). The legend *above* the window applies in this mode (-42 through 0) to indicate dB level below 0dB full scale digital level (0dBFS). The GAIN display indicates the setting of the left *or* right channel when the **up/down** switch *for that channel* is actuated, and for approximately 10 seconds afterwards. The GAIN display then reverts to displaying “LE.” A quick “click” of either channel’s **up/down** switch will display the stored setting for that channel without changing it. Please see “Diagram 1, Section 3 Gain Controls” (page 6) for details on the behavior of the GAIN control; including when switching between Line and Mic range. The GAIN control is always active in both Operating and Setting modes; but is most likely to be used in Operating mode.
- In Setting mode (as illustrated above in Diagram 1), status of the settings is displayed as well as the position of the cursor in the LEVEL display section. The legend *below* the window applies in this mode (**44.1**, **48**, **wc**, **sat**, etc). The position of the cursor is denoted by the flashing LED. For settings at the cursor position, a rapidly flashing cursor means the setting is “On” and a slowly flashing cursor means the setting is “Off.” At all other positions, if the LED is illuminated the setting is “On,” and if the LED is dark the setting is “Off.”
- If the function has a left and right setting, the left setting is on the upper row (“left channel meter” in Operating mode) and the right channel setting is on the lower row (“right channel meter” in Operating mode).
- When an external clock setting is selected, the LED in the upper row directly above the type of sync will indicate “lock” to the external signal. The two types of sync are “**wc**” for Word Clock or “**dig-a**” for AES or SPDIF sync. If the AD11 is not “locked,” or there is no signal present on the sync input, the LED in the upper row above **wc** or **dig-a** remains dark.

- Exiting Setting Mode causes the settings to be stored in non-volatile memory. This means the AD11 will retain the settings even if the AC power is turned “off.” Any time the GAIN display reverts to the “LE” symbol, the Gain settings are also stored.

Diagram 1, Section 1- Setting Controls

The two switches under the SELECT legend on the left side of panel control the Setting mode of the AD11. The first switch labeled with the \leftrightarrow symbols has two functions:

- Clicking the switch down in the Operating mode causes the AD11 to enter Setting mode. A flashing cursor and indicators for settings that are “on” will appear in the LEVEL display window. The legend *under* the window apply in this mode (**44.1, 48, wc**, etc.).
- While in Setting mode, clicking the switch down moves the cursor *forward* to the next position and clicking the switch up moves the cursor one step *back* to the previous position.
- For convenience, the position of the cursor is retained when exiting Setting mode. The cursor will appear at the same position when Setting mode is re-entered to allow easy access to the same setting. The exception is when the unit is first powered; in this case the cursor always appears at **44.1** (the first position).

The second switch is labeled “**exit**” and “**set**” and when in Setting mode:

- Clicking the switch down (**set**) toggles the function On or Off. For single selections, the function is toggled On or Off every time the switch is “clicked” in the **set** direction.
- In the case of selecting a sample frequency (SF); the SF at the cursor position is enabled and all other SF’s are disabled the first time the switch is clicked in the **set** direction. Subsequent **set** “clicks” have no further effect.
- In the case of selecting digital output format (**aes** or **spdif**), the setting at the cursor position is enabled and the other one is disabled the first time the switch is clicked in the **set** direction. Subsequent **set** “clicks” have no further effect.
- Clicking the switch up (**exit**) immediately exits the Setting mode.

After exiting the Setting mode, clicking the switch in either direction has no effect on settings. If the meter Peak Hold function is enabled, a **set** click clears the held value.

Diagram 1, Section 2- Settings Status Display (only in Setting mode)

In Setting mode, the LED’s above each label indicate the status of each setting. The cursor position affects the way an LED indicates the status.

- At the cursor position, a rapidly flashing LED indicates “on” and a slowly flashing cursor indicates “off.”
- At all other positions, a steadily illuminated LED indicates “on,” and an LED that is not illuminated indicates “off.”
- Please note that in the following Setting mode function descriptions, the distinction between whether or not the LED is at the cursor position may be omitted for clarity.

- **Sample Frequency selection.** This consists of the **44.1, 48, 88.2**, and **96** labels and the LED’s above them. Only one sample frequency (SF) can be selected at any time.

- If the cursor is positioned at the selected SF, the LED flashes rapidly.
- If the cursor is positioned at an SF that is not selected, the LED flashes slowly.
- When the cursor is at a different position than the selected SF, the LED for the selected SF is constantly illuminated while the LED for the cursor flashes slowly. Clicking the **set** switch will enable the SF at the cursor position and disable the previously selected SF (the constantly illuminated LED will go dark and the cursor will flash rapidly).
- Once an SF is selected and the cursor is still at that position, subsequent **set** clicks have no effect (one SF setting will always be selected).

- **External Word Clock.** This setting enables synchronization to an external Word Clock signal at the Sample Frequency set in the SF section (above). The LED in the “left channel” row” above **wc** indicates “Lock” to an external Word Clock signal. Please see Diagram 2 on page 10 for more details- the **wc** Lock indicator is labeled “a” in Diagram 2.

- If the external **wc** function is “On” as indicated by the LED, the AD11 will lock to TTL level sample-period Word Clock signals applied to the “**clock in**” BNC connector on the rear panel. The Sample Frequency (SF) of the Word Clock signal *must match the AD11’s SF*.

- If the **wc** setting is “off,” the AD11 will not lock to external Word Clock inputs.

Like other functions in the Setting mode, if the cursor is positioned at the **wc** LED, it will flash rapidly to indicate that the function is “on.” Clicking the set switch once will disable external WC functions and this will be indicated by a slowly flashing LED. When the cursor is at another position, the LED is “off” (not illuminated) when the WC function is “off,” and the LED is “on” when the function is “on.”

- The **wc** and **dig-a** functions are interlocked so that only one can be enabled at any time. However; they both can be “Off.”

- **External AES/SPDIF Sync-** The setting designated “**dig-a**” (digital audio) enables synchronization to an external AES or SPDIF signal at the Sample Frequency set in the AD11’s SF section (above). The LED in the **left** row above **dig-a** indicates “Lock” to the external AES or SPDIF signal. This LED is labeled “b” in Diagram 2.

- If the external **dig-a** function is “On” as indicated by the LED, the AD11 will lock to either an AES or SPDIF digital audio signal applied to the “**clock in**” BNC connector on the rear panel.

- If the **dig-a** setting is “off,” the AD11 will not lock to external AES or SPDIF sync inputs.

- Use of a digital audio signal that contains “muted audio” (“digital black”) is recommended as an external sync signal to minimize jitter effects. AES sync is preferable to SPDIF sync.

- **aes** and **spdif**. These settings determine the configuration of the digital output format. The digital audio signal from *both* the XLR and RCA digital outputs will contain the same digital code format, as determined by these settings. The output format *must be* either AES or “SPDIF” (IEC 60958 type II), and the setting function is interlocked so that one of the two settings is always active.

- **phantom**. This function is controlled separately for each channel, and *automatically becomes inactive for gain settings of 12dB or less*. The +48V phantom power function is enabled on the left channel input when the **left** channel LED is on, and is enabled for the right channel input when the **right** channel LED is on (for gain settings from 20 to 65dB).

Please Note: Phantom power turn “on” is ramped to minimize the possibility of damage to ribbon microphones. However, caution is still advised when using ribbon microphones with the AD11, especially vintage ribbon microphones.

- **sat**. The AD11 features Lavry’s exclusive digital tape saturation emulation (“Soft Saturation”) which can be enabled and disable separately for each channel. This function provides peak level control without attack and release times, and automatically adds 3 dB’s of gain to the digital output for signals below “-3dBFS.”

- When this function is enabled, signals below “-3” on the AD11’s meters are completely unaltered (linear), and signal peaks above this level are progressively “rounded-off” in a manner similar to analog tape saturation.

- Internally, signals that would normally reach “0dBFS” are reduced to -3dBFS, thus allowing the **sat** function to raise the *average* signal level by 3 dB’s (for signals below the “saturation threshold”). This also causes the *peak* digital output level to be restored to “0dBFS.” As a result, it is still possible to “clip” the output signal if this input signal level is exceeded.

In other words, the same analog input level will result in digital “clipping;” but the average output level of typical music program will be 3dB’s *louder*.

- The **left** row LED indicates the status of the left channel **sat** setting, and the **right** row LED indicates the status of the right channel **sat** setting.

- **hold**. This setting enables and disables the LEVEL meters’ peak hold function. In Operating mode when **hold** is enabled, a single LED representing the highest peak level stays illuminated on each channel until the **exit/set** switch is clicked in the **set** direction.

Diagram 1, Section 2- LEVEL DISPLAY METERS (Operating mode)

This section displays the digital level of the output signal of the AD11 in decibels referenced to “Zero dB Full Scale” digital level (all bits “On”) which will be referred to as “0dBFS.” The numbers above the display apply in Operating mode (**-42, -36, ..., 0**) and represent the peak signal level in dB’s below 0dBFS. Just to the left of the display, the legends **left** and **right** indicate which input channel the meters display.

Diagram 1, Section 3- GAIN CONTROLS (Setting *and* Operating Mode)

This section contains the GAIN display and separate “**up/down**” switches for the **left** and **right** channels.

- The **up/down** switches always control the gain in both Operating and Setting modes.

- The display can show the gain setting for either channel. The gain for each channel is displayed when the **up/down** switch *for that channel* is activated, and for approximately ten seconds afterwards. The GAIN display then reverts to “LE” to indicate that the GAIN settings have been stored in non-volatile memory.

- Because the same GAIN controls are used for both Line level and Microphone inputs, there are two different GAIN ranges. The range from 0 to 12dB of gain is for line level inputs, and the range from 20 to 65dB is for microphones or other balanced low-level, low impedance sources. The GAIN display *will STOP changing and flash* before the GAIN is changed from 12db to 20dB, or from 20dB to 12dB to indicate the change in operating modes. It is necessary to release the GAIN toggle switch, wait for the display to stop flashing, and then press it again to transition from one range to the other. Please see the Operating section of the manual for more details. For clarity, the condition “within the Line or Mic range” may be omitted (below).

- If “LE” appears in the GAIN display and the **up/down** switch is “clicked” once, the GAIN setting for that channel is displayed *without change to the setting*. If the display has not reverted to “LE” and the same switch is clicked again, or held (either up or down), the gain setting will change.

- If the numerical GAIN setting is displayed and the switch for the *other* channel is clicked once, the setting for the other channel is displayed without change.

- If the numerical Gain setting is displayed, and the switch for that channel is clicked once, the gain changes by one dB. There is an “acceleration” function, so when the switch is held, the gain setting changes slowly at first, and then more rapidly the longer the switch is held.

- The GAIN display shows “LE” at other times to indicate that the settings have been stored in memory. Again, to simply check the Gain setting for each channel, click that channel’s **up/down** switch once. The setting will be displayed without change from the stored value if “LE” is displayed, or the other channel’s numerical gain setting was being displayed.

USB Connection- Please see “USB Operation” in the Operation section of the manual (on page 8) for more details on computer audio settings. The AD11 appears as a Core Audio input device in Apple OSX and a WDM input device in Windows OS. ASIO4ALL can be used with PC’s with ASIO compliant recording software.



MODEL AD11

The LavryBlack AD11 features:

- Built in Microphone preamps with phantom power
- Accepts +4 or -10 line level inputs balanced or unbalanced (MicPre's are relay bypassed)
- Front panel adjustable gain for each channel
- 0 to 12 dB of gain for line level inputs in precise 1 dB steps
- 20 to 65 dB of gain for low impedance balanced microphone inputs in 1 dB steps
- Recording at 44.1, 48, 88.2 or 96 kHz with 24 bit word length
- Super-stable internal clock
- External clocking via Word Clock or AES/SPDIF sync
- BNC Word Clock output for synchronizing other gear to the AD11
- Digital output format selectable between AES/EBU and SPDIF (IEC 60958 type II)
- Peak hold selectable on large wide range LED meters
- Soft Saturation for "hotter" level and peak level control without time constants
- Optional Rack Mount Kit (can be used to mount any combination of two LavryBlack units)



CONNECTIONS

Connect analog audio INPUTS from your source using any of the following:

- Professional line level "+4dBu" balanced or unbalanced sources to the XLR inputs
 - Consumer line level "-10dBV" balanced (TRS) or unbalanced (TS) to 1/4" inputs
 - Low impedance balanced sources (typically microphones) to the XLR inputs for gains >12dBs.
- Phantom power is selectable individually for each channel via the front panel.

Stereo digital audio outputs are in the form of XLR, RCA, and USB:

- The XLR and RCA digital audio output connectors can transmit either AES/EBU professional format or IEC 60958 type II consumer format ("SPDIF").
- If more than one digital audio output is needed, a simple XLR to RCA adapter can be used to feed most coaxial SPDIF inputs from the XLR output, and similarly, a simple RCA to XLR adapter or adapter cable can be used to feed most AES inputs from the RCA output.
- Connect an external TTL level Word Clock, AES sync, or SPDIF sync to the **clock in** BNC connector for external clock operation. The input has 75 Ohm termination.
- Connect the BNC **clock out** to another device's Word Clock input to synchronize it to the AD11 operating on Internal Clock. The receiving device must have 75 Ohm termination.

- The USB output can be used to connect to a Windows® PC or Apple® computer that supports USB 2.0. There are no drivers to install; but ASIO4ALL can be installed on Windows PC's for use with ASIO compliant software. Please see the next section for details on USB operation.

Once the inputs and outputs have been connected:

- Connect the AC power cord to the AD11's back panel power entry receptacle.
- Connect the AD11 and other devices to an AC power source. The AD11 will automatically adjust to AC power inputs in the range of 90-264 VAC- no need to change settings!

USB Operation

The AD11 has a USB output compatible with the USB 2.0 standard. It is not necessary to install any drivers with Windows® OS or Apple® OS for basic operation.

With the OS started normally and the AD11 power "On," connect the USB cable from the AD11 to a USB port on the computer. Although the AD11 should now be capable of inputting digital audio to an application, it is a good idea to change a few settings for "bit-accurate" operation.

For more information, please refer to the following resources available on our website:

- The USB Setup page of the Lavry WIKI has information useful in preventing and troubleshooting USB audio problems: http://www.lavryengineering.com/wiki/index.php/USB_setup
- Documents under the Manuals and Other Downloads link of the Lavry website SUPPORT tab:

ASIO4ALL Setup: <http://www.lavryengineering.com/pdfs/lavry-asio4all-setup-english.pdf>

Connecting to Protocols and Mac: <http://www.lavryengineering.com/pdfs/lavry-ad11-da11-protocols.pdf>

Windows® OS

Due to the nature of the USB interface, for highest quality it is advised that you set the AD11 and the setting in the Windows SOUND control panel to the same sample frequency as the recording software. The setting is found under the Recording Device/Microphone Properties/Advanced tab.

Windows® Vista/Seven-

In the SOUND control panel Recording tab, the AD11 will appear as a "Microphone." Either click on the "Lavry ADC microphone" and then on the Properties button in the lower right, or just double-click on the "Lavry ADC microphone" to open the Microphone Properties dialog. Under the Microphone Properties Advanced tab, choose the desired sample frequency for the "Default Format." Under the Levels tab, the level control will need to be set to "3" (percent) or -0.4dB to avoid clipping. For best results we recommend using ASIO4ALL with recording programs that support ASIO. Some program use advanced WDM drivers which effectively bypass the SOUND control SF and level settings. In this case, WDM is recommended over ASIO for lowest latency. The settings for Exclusive Mode may also affect operation with audio software- check them if you have problems.

For ASIO operation, ASIO4ALL is available as a free download and can be used to make the AD11 operate as an ASIO input device. Please note that the operation varies when using ASIO4ALL and some of the Windows settings may be bypassed. For example: the recording software's sample rate settings over-ride the SOUND control panel settings, the level control does not function, and there is no level indicated on the "meter" next to the "Microphone 2-Lavry ADC" in the Recording tab when the ASIO application (recording software) is opened. Also, if the SOUND control panel is open at the same time as the recording application, the input signal may be unavailable to the recording software.

Windows® 10-

In the SOUND control panel Recording tab, the AD11 will appear as a "Microphone." Either click on the "Lavry ADC microphone" and then on the Properties button in the lower right, or just double-click on the "Lavry ADC microphone" to open the Microphone Properties dialog. Under the Microphone Properties Advanced tab, choose the desired sample frequency for the "Default Format." Under the Levels tab, the level control will need to be set to "53" (percent) for ~0.2dB loss or "54" for ~0.1dB of gain. In the recording program select WDM "Microphone Lavry ADC" (not Microsoft Sound Mapper).

Some program use advanced WDM drivers which effectively bypass the SOUND control SF and level settings. The settings for Exclusive Mode may also affect operation with audio software- check them if you have problems.

Apple® OSX-

Due to the nature of the USB interface, for highest quality it is advised that you set the AD11 and the setting in the Audio MIDI Setup/Audio Devices/Lavry ADC- Input Settings to the same sample frequency as the recording software. Please be certain that your audio software is open first, as this can affect whether or not the setting dialog appears in the right pane of the Audio Devices dialog.

- Select "Utilities" from the Finder "GO" menu. For easier access in the future, you may want to drag the "Audio MIDI Setup" to the Dock. Open the "Audio MIDI Setup" dialog. Choose AUDIO DEVICES. If the Lavry AD11 is connected, it should appear in the left pane of the Audio Devices dialog as "Lavry ADC, 2 In/0 Out." Click on it to select it. If a small black microphone symbol is not preset on the right side of the Lavry ADC section, at the bottom of the left pane, click on the down arrow next to the gear symbol, and select "Use this device for sound input." In the right pane, under "Input," select the desired sample frequency from the dropdown list under FORMAT.

- The Lavry ADC is now available for use in an "Aggregate device." Click on the Aggregate device if it already exists, and in the right pane confirm that the current "Lavry ADC" has a check-box next to it. If the AD11 was unplugged, or the AC power was turned "off," the USB connection will be re-set. This can result in two "Lavry ADC's" appearing in the list in the right pane- the original one (grey- now disabled) and the "new" one. You must un-check the old one and check the box next to the new one for the AD11 to function as the input in the aggregate device! The "old" Lavry ADC will disappear when the box is un-checked.

- You can add the Built-In Output to the aggregate device for playback. If you are using an external DA converter such as the LavryBlack DA11, be certain to set the Output settings of the Built-In (digital) Output to the proper sample frequency and "24 bit" for highest quality.

OPERATION:

When AC power is applied, the AD11 initializes itself. First, a single LED "scans" each row of the front panel meters, then both rows. The unit then enters a special version of Setting Mode to display the settings and allow changes to the **phantom** settings for the left and right channel's +48V Phantom power. The unit then returns to Operating Mode. For more details, please see "phantom (+48V Phantom Power for Condenser Microphones)" in the Operation section of the manual on page 12.

A. FRONT PANEL DISPLAYS

The AD11 has two modes- Operating Mode and Setting Mode.

In the center of the front panel, the LEVEL display has two modes:

1.) In OPERATING mode, two rows of LED's serve as peak digital level meters for the left and right channels. The legend *above* the display (-42, -36, -30, ..., 0) indicate the level in decibels relative to full scale digital or "0dBFS;" which corresponds to "digital clipping" level or "all bits = 1." The top LED "0" thus acts as a "clipping" indicator. The meters also have a Peak Hold function, which can be reset and enabled or disabled via the front panel SELECT switches.

2.) In SETTING mode the status of all of the programmable settings are displayed. The legend for the indicators in Setting mode is *below* the display (44.1, 48, ..., sat, hold).

- Most of the settings use only the lower row of LED's (the meter "right" channel); but some also use the upper row of LED's (meter "left" channel). These are: **wc**, **dig-a**, **phantom**, & **sat**.

- **wc** and **dig-a** are external clock modes. The LED immediately above each of these labels (in the lower "**right**" row) is the setting status display. The LED's in the top row ("**left**") are the LOCK indicators for each type of sync (**wc** or **dig-a**). Only one LOCK indicator can be illuminated at any time, and will only illuminate when the AD11 is successfully locked to the external sync. Please see Section B "**wc & dig-a**" on page 11 for more details.
- **phantom** and **sat** functions are selectable on each channels; for these settings the upper LED ("**left**") indicates the status of the left channel setting and the lower LED ("**right**") indicates the right channel setting.

On the right side of the front panel, the GAIN display has two modes: left channel and right channel. - This display *does not* change between Setting and Operating mode.

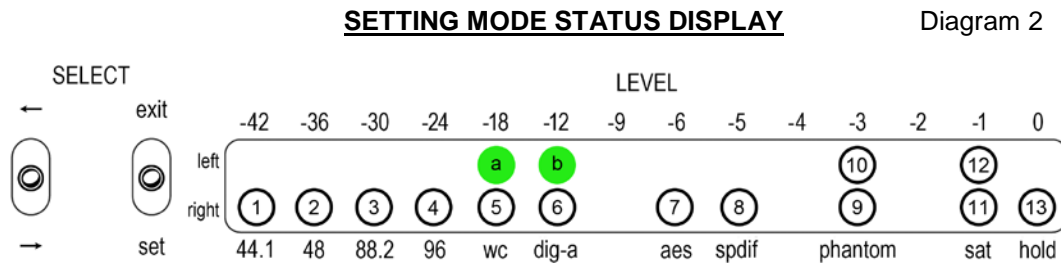
- The display always shows the Gain setting of the channel that was last adjusted.
- The display shows the setting for approximately ten seconds after the adjustment, and then reverts to "LE" to indicate the gain setting has been stored in non-volatile memory.
- If the display shows "LE" and either channel's **up/down** switch is clicked once, the gain setting for that channel is displayed without change from the stored value.
- If the GAIN display shows one channel's numerical Gain setting and the other channel's **up/down** switch is clicked once, the gain setting for the new channel is displayed without change from the stored value.

For more details on the GAIN controls, see Operation manual section "C. GAIN SETTING."

B. SETTING MODE

- Please use caution when changing settings- phantom power settings as well as "digital" settings. This applies to changes between Line and MicPre range; but not to changes of Gain within Line or Mic range. Gain changes *within* a range can be made at any time. Although the AD11 changes its digital outputs "gracefully," it is not possible to predict how a device the AD11 is feeding will react. For these reasons; it is advisable to lower your monitor speaker volume to avoid possible speaker damage prior to changing the relevant settings.

Diagram 2 illustrates the AD11 front panel display in SETTING mode. The numbers indicate the sequence in which the cursor moves with each click in the downward direction of the \leftrightarrow switch. Please note that the **phantom** and **sat** functions have individual left and right channel settings.



To enter the Setting mode, click the \leftrightarrow switch under the SELECT legend once either up or down. The LEVEL display will change from meter mode to indicate the status of the programmable settings.

To exit the Setting mode, click the right SELECT switch up towards "exit." The LEVEL display will revert to the Operating mode; indicating the peak digital output level and that the programmable settings are stored in non-volatile memory. This means the settings will be retained if the power is turned "Off" and restored when the power is turned back "On."

- The first time Setting mode is entered after power is applied, the left-most LED (**44.1**) will begin flashing. If other functions are enabled, the LED's above their legend will be illuminated.
- At all other times, when Setting mode is exited the position of the cursor is retained; so upon re-entering Setting mode it will appear at the same position.

The LED at the cursor position indicates the status of the function differently than other positions-

- At positions other than the cursor position, if the LED is illuminated ("On"), the function is enabled ("On"). If the LED is "Off," the function is "Off."
- At the cursor position, if the LED is flashing at a fast rate, the function is "On." If the LED is flashing slowly, the function is "Off."

Please note that in the following function descriptions, the distinction between whether or not the status LED corresponds to the cursor position is omitted for clarity.


- For "single" functions such as **wc**, **dig-a**, **phantom**, **sat**, or **hold**; each time the right SELECT switch is clicked in the **set** direction, the function at the cursor toggles between On and Off.
- The **wc** and **dig-a** settings are interlocked; if one is enabled, selecting the other disables the first.

- The sample frequency (SF) selection and output format are interlocked electronically, so selecting a new setting de-selects the previous one. For example, if **44.1** is selected, and you position the cursor above the **96** legend and click **set**; the 96 kHz SF will be selected and the 44.1 SF will be deselected. Similarly, selecting the **spdif** output format will de-select the **aes** format. - At least one SF and one output format setting will be selected at all times.

44.1, 48, 88.2, 96 (kHz)

These indicate the four possible sample frequencies at which the AD11 can operate, on internal or external clock. The indicators are numbered 1, 2, 3, & 4 in Diagram 2.

The Sample Frequencies (SF) setting controls the digital audio and Word Clock outputs of the AD11. When operating on external clock, it is also necessary to set the SF of the AD11 to match the SF of the external clock source.

- To change the desired SF, enter the Setting mode by clicking the  switch once, and then click it either up or down to move the cursor to the position above the legend for the desired SF.

- With the cursor above the desired SF legend, click the right SELECT switch down in the **set** direction once to change the output SF. Without moving the cursor, clicking the **set** switch again *will have no effect* because one SF must be selected at all times

- wc & dig-a (for External Clock Operation)

These two settings are used to synchronize the AD11 to an external Word Clock (**wc**) or AES/SPDIF clock source (**dig-a** for “digital audio signal”). The status indicators are numbered 5 & 6 in Diagram 2.

The external clock signal (Word Clock or AES/SPDIF clock) must be connected to the “**clock in**” BNC connector on the rear panel of the AD11 and the SF of the external clock must match the SF setting of the AD11 for the proper operation. As a safety precaution, in External Clock operation a mismatch in SF will cause the AD11 digital output to “mute” and the front panel meters to indicate “no output signal” in Operating mode.

- In addition to the status indicators that show whether an external clock function is enabled, there are “LOCK” indicators for each format of external clock. They are located in the “**left**” (upper) row, immediately above each status indicator:

- Word Clock “LOCK” is labeled “a” in Diagram 2

- AES/SPDIF “LOCK” is labeled “b” in Diagram 2


When the AD11 is set to the Sample Frequency of the incoming external clock signal and it can successfully lock to the external clock signal, the LOCK indicator illuminates. If the LOCK indicator does not illuminate, check the SF settings of the AD11 and external clock source, the external clock settings (either the **wc** or **dig-a** LED *must also be illuminated*), and cabling for possible problems.

- If the AD11 is not “locked” to the incoming external clock, it does not operate properly; even when one of the external clock settings is selected (**wc** or **dig-a** is “On” with no “Lock” indication). Operating the AD11 in this manner can result in recordings with “clicks,” “pops” or “drop-outs” recorded along with the music program, or at the incorrect sample rate.

- Although the AD11 will “lock” to an SPDIF sync source, it is recommended that AES sync is used if possible because the low voltage of the SPDIF signal makes it less reliable for synchronization.

- aes & spdif (Output Format)

The “SPDIF” digital audio format is now the IEC 60958 type II Consumer format. For simplicity, the “SPDIF” designation will be used both in this manual and on the front and rear panels of the AD11.

- To change the Output Format, enter Setting mode by clicking the  switch once, and then click it either up or down to move the cursor to the position above the legend for the desired Output Format.

- With the cursor above the desired Output Format legend, click the right SELECT switch down once in the **set** direction to change the Output Format. Clicking the **set** switch again will have *no effect* because one Output Format must be selected at all times.

In addition to the digital audio and “embedded clock,” the digital code contained in the AES and SPDIF data streams contain other “informational bits” or “flags.” The digital audio code and clock signal are the same in both formats; but the informational bits are quite different.

As a result of these similarities and differences, most digital audio equipment can accept either input format using simple adapters or adapter cables. The informational bits are either ignored, generate only status warnings if a miss-match occurs, or in some cases require a manual setting change to allow “normal” operation when a miss-match occurs.

However, some equipment will only operate properly if the correct format is presented to the inputs (typically consumer oriented equipment due to copyright concerns). For this reason, the AD11 has settings for the output format.

These settings are numbered 7 & 8 in Diagram 2, and like the SF settings, one must be “On” (selected) at all times.

Please Note: These settings affect BOTH the XLR and RCA outputs in the same manner! This means that the same format will be output from both the XLR and RCA outputs.

In most cases, a simple adapter or adapter cable can be used to convert the outputs to the other type of connection. For example, an adapter can be used to convert the RCA output to an XLR to feed a second AES input. In this case the output format would typically be set to “**aes**.”

In the other case, a simple adapter can be used to convert the XLR output to RCA to feed two SPDIF inputs. In this case, the output format would typically be set to “**spdif**” because the consumer format is more likely to be required by the equipment receiving the AD11’s output.

If you are feeding both an AES and SPDIF input, the **spdif** setting will allow the RCA input device to operate “normally.” The AES input device is likely to accept the signal. In some cases, a change to the AES input device’s settings may be required to allow the audio to pass through normally.

phantom (+48V Phantom Power for Condenser Microphones)-

There is a Phantom Power setting for each channel. The left channel phantom power status indicator is number 10, and the right channel indicator is number 9 in Diagram 2.

- Immediately after AC power is applied to the AD11, the unit goes through an initialization sequence. First a single LED “scans” each channel of the meter, then both channels. Next, the AD11 enters a special version of the Setting mode to allow the user to check and change the settings of the Phantom Power, if desired. The cursor moves automatically through each setting until it reaches the **phantom** setting for the right channel, where it pauses for ~8 seconds to allow changes to the right channel’s setting. It then moves to the left channel and pauses for ~8 seconds to allow changes to the left channel setting. Regardless of whether the settings are changed or not, the sequence then completes itself and the AD11 reverts to Operating mode. This insures that the user always has an opportunity to be certain the phantom power is set properly before the AD11 can be used.

- It is advisable to not enable the phantom power setting until after a condenser microphone is plugged into a channel of the AD11, and to disable the phantom power before un-plugging the mic to minimize the possibility that +48V will be present on the input when a line level source is connected.

- This function is controlled separately for each channel, and *automatically becomes inactive for gain settings of 12dB or less*; even when the **phantom** setting is enabled for that channel and the LED is illuminated.

- The +48V phantom power function is enabled on the left channel input when the **left** channel LED is on, and is enabled for the right channel input when the **right** channel LED is on.

Please Note: Phantom power turn “on” is ramped to minimize the possibility of damage to ribbon microphones. However, caution is still advised when using ribbon microphones with the AD11; especially with vintage ribbon microphones.

Sat (Soft Saturation Mode)-

- The **sat** function can be enabled individually for the left and right channels.
- The left channel setting is number 12, and the right channel setting is number 11 in Diagram 2.

The AD11 features the Lavry exclusive Soft Saturation mode- a digital emulation of analog tape saturation. The advantage of this mode is that it allows dynamic range control (increased average level) with no degradation due to attack and release times employed in compression and limiting. This means that the Soft Saturation can be used either before or after compression or limiting without undesirable side effects due to differences in time constants between the two processes.

- When this function is enabled, signals below “-3” on the AD11’s meter are completely un-altered (linear), and signal peaks above this level are progressively “rounded-off” in a manner similar to analog tape saturation.
- Internally, signals that would normally reach “0dBFS” are reduced to -3dBFS, thus allowing the AD11 to raise the *average* signal level by 3 dB’s (for signals below the “saturation threshold”). This also results in the *peak* digital output level being restored to “0dBFS.” As a result, it is still possible to “clip” the output signal if this input signal level is exceeded. In other words, the same analog input level will result in digital “clipping;” but the average level is 3dB’s *louder* for typical audio program.

hold (Meter Peak Hold Function)-

When enabled, the highest input signal level as displayed on the AD11’s front panel meters is “held” until it is manually reset by clicking the right SELECT switch in the **set** direction. The indication is a single LED in the meter staying illuminated while the signal level varies below it. Enabling or disabling as well as resetting this function is common to both channels.

C. GAIN SETTING

This section consists of the **left** and **right** “**up/down**” toggle switches and the GAIN display located between them on the right side of the AD11 front panel. GAIN setting is always active in both Setting and Operating modes, and changes can be made at any time within Line or Microphone range. It is recommended that the monitor volume be lowered when changing between Line and MicPre range to avoid possible speaker damage.

There are separate Microphone Preamplifier and Line level input circuits, and the AD11 employs relays to switch between these input circuits. There is no compromise to the performance of the AD11 in either mode as a result. The same can be said of the “+4 /-10” level switching of the line level inputs- employing fixed gain to raise the level of the “-10” ¼” inputs before the adjustable gain results in excellent signal to noise performance at all line input Gain settings.

- The adjustable Gain range for Line level inputs is: 0 to 12 dB in one dB steps.
- The adjustable Gain range for Microphone inputs is: 20 to 65 dB in one dB steps.

Both GAIN **up/down** switches function in a similar way:

- Because the same GAIN controls are used for both Line level and Microphone inputs, there are two different GAIN ranges. The range from 0 to 12dB is for line level inputs, and the range from 20 to 65dB is for microphones or other balanced low-level, low impedance sources.
- When the **up/down** switch is held in either position or “clicked” in single steps, the GAIN display will *stop changing before* the GAIN is changed from 12db to 20dB, or from 20dB to 12dB. The display flashes for ~5 seconds to indicate that the operating mode will change if the gain continues to change in the same direction. To change ranges, it is necessary to release the GAIN toggle switch, wait for the display to stop flashing, and then press it again within ~3 seconds to transition from one range to the other. To change the gain within the same range, press the **up/down** switch in the opposite direction at any time.

- If the GAIN display is “LE” and either switch is “clicked” once, the gain setting for that channel is displayed without change from the last (stored) setting. Similarly, if one channel’s Gain setting is

displayed and the other channel's **up/down** switch is clicked once, the new channel's Gain setting is displayed without change.

- Once the numerical gain setting is displayed, if the switch is clicked again, the gain will increase or decrease by one dB. Holding the switch will result in the gain changing continuously within the Line or Microphone range. There is an "acceleration" function so the change in gain increases in speed the longer the switch is held.

D. OPERATING MODE- General Information

The LEVEL meters will display the peak digital level of the output of the AD11. Any changes to the level of the analog input source or the gain of the AD11 will be reflected in the AD11's digital output level, and thus the AD11's LEVEL meters. The meters are very accurate, and take into account every output sample. There is no "attack time;" so the peak level displayed will always accurately indicate the maximum peak level for signals as short as one sample period.

The "0" LED is "digital clipping level" or "0dBFS" (zero dB full-scale digital level). This would correspond to "Over" or "Clipping" indication on other types of digital meters. It is recommended that you set the input level so that the peak level occasionally reaches a level between "-3" and "-1;" but does not reach "0." If the analog input does exceed the level which corresponds to "0dBFS," it will be "clipped" in a clean manner with minimal overshoot or distortion. In theory, a signal could just reach "0" and not be clipped; but in practice this is very unlikely. Like every other segment on the AD11's meters, the "0" segment will display the correct level for signals as short as a single sample.

If you wish to employ clipping as part of your recording process, please be certain that the analog input signal does not exceed +24dBu for balanced XLR inputs, +18dBu for unbalanced XLR inputs, or +12dBu for balanced or unbalanced 1/4" inputs. One simple way to help ensure this is to set the AD11's Gain setting to a value higher than "0." The additional internal gain will insure that the clipping does not occur at the analog input stage of the AD11.

For 1/4" inputs- TRS (tip-ring-sleeve for balanced signals) or TS (tip-sleeve for unbalanced signals), 12 dB of additional fixed gain is automatically added to the adjustable gain. This allows a total of 24 dB of adjustable gain for line level inputs (taking into account a change of input connection from XLR to 1/4" plug). The 1/4" inputs are not recommended for microphone connections.

The phantom power is automatically disabled individually on each channel for gain settings lower than 20dB. Because the phantom power is selectable on each channel, it is possible to use one channel of the AD11 for line level inputs and the other channel for a condenser microphone input at the same time.

As long as the AD11 is operated in the Line level range, there is no possibility of the phantom power being applied to a Line output feeding the AD11. The Microphone preamplifier is optimized for balance signals, so connection of the AD11 input to a source other than a balanced low-impedance source while operating the Gain in the Microphone range will result in degraded performance, and is therefore not recommended. For example: do not use unbalanced high impedance microphones.

As part of operation of the "safety interlocks" in the phantom power system; it is possible that the phantom power could be disabled for a short time under a very specific set of circumstances. This would be:

- 1.) Phantom power is enabled on one channel and disabled on the other channel.
- 2.) Phantom power is enabled for the channel on which it was previously disabled.
- 3.) Phantom power will turn Off on the first channel, and BOTH channels will "ramp-on."

This is normally only likely to occur during the set-up phase of operation; so as long as the user exercises caution and follows the recommended practical of reducing the monitor volume when changing settings, there should be no operational problems as a result.

When operating the AD11 on "external clock;" please be certain that the "Lock" lamp is illuminated before exiting Setting mode, or if there appears to be an issue with synchronization. Because the AD11 defaults to internal clock when external clock is not present; it is possible that the receiving

device may still accept the incoming digital audio signal. In some cases, a lack of synchronization can result in subtle “clicks” being mixed with the music signal which can be difficult to hear (compared to more obvious drop-outs or loud “pops” that can also occur with no “sync”).

When using the AD11 as the Clock Master (AD11 operating on Internal Clock), the Word Clock Out connection MUST have one 75 Ohm termination. Most Word Clock inputs are either terminated, have a termination switch, or have an internal jumper setting for this function. For simple systems with only one receiving device, this means that the input must either be terminated internally, or a 75 Ohm BNC terminator must be placed on a BNC “T” that is plugged into the receiving device’s Word Clock input. If the Word Clock output of the AD11 is “chained” using BNC “T” connectors on the clock inputs of multiple slave devices, the termination must be “Off” on all devices except the last device in the chain. There should be only one 75 Ohm termination located at the end of the chain opposite the AD11. All three digital outputs are available at all times, so multiple recording or monitoring devices can be connected to the AD11. Please note: there will be a difference in the (short) “delay” between when computer software receives the USB input signal and when a non-computer device receives an AES or SPDIF signal. In most cases, a non-computer device that accepts an AES or SPDIF signal will appear to receive it almost instantaneously; while a computer will have a more significant delay because of the buffering needed for the USB interface and RAM buffering required to stream the digital audio into and out of the computer/software, as well as RAM buffering needed for any processing by plug-ins. This is also true of computers receiving the digital audio signal via an AES or SPDIF digital audio interface (PCI soundcard, FireWire, or USB).

This is due to the nature of computer audio, and is not unique to the AD11, which has a conversion delay similar to most other contemporary AD converters. The AD11’s conversion delay is related to the Sample Frequency (SF), and is shorter for higher SF’s. The total delay will vary with buffer settings and the type of interface used (USB, or for AES/SPDIF inputs; a soundcard or USB/Firewire). It is strongly recommended that the user tests the delay when using multiple types of converters in multi-channel systems by recording some form of transient signal and measuring the difference in relative position in the recording software. If some form of “delay compensation” is not available in the recording software *and* the difference is musically significant, the user can manually offset the position of the recorded track. “Musically significant” can be a matter of opinion; but generally speaking a difference of 1-2 milliseconds between different instruments or vocals is not significant because this is equal to an “acoustic delay” caused by a difference in the distance between the mic and source of 1-2 feet. Short delays are much more critical for “correlated” sounds such as a stereo recording of one instrument with two microphones. For this reason, it is recommended that the same converter unit be used to record both channels of a stereo source.

The AD11 should be placed or mounted in a manner that allows airflow around the sides and top of the unit. Although the AD11 does not generate a large amount of heat, operating it with insufficient ventilation or in a high ambient temperature condition could cause the heat to build up internally, which could lead to premature failure of the electronic components.

SPECIFICATIONS:

GAIN Control Precision- Gain 0-12dB:

Integral linearity (deviation from straight line) – better than 0.1dB

Differential linearity (step size) – better than 0.08dB

AD dynamic range > 110dB A-weighted 0-12dB gain

AD distortion THD+N Better than .001% input: 1kHz, -3dBFS 0dB gain

Microphone Gain range: 20-65 dB 1dB steps

MicPre+AD: Dynamic range referenced to: 0dBFS digital level un-weighted 20-20k

20dB >108dB

40dB >106dB

60dB >90dB

MicPre Distortion: THD+N >.001% Input +4dBu 20dB gain = 0dBFS

Maximum Input level to achieve “0dB Full Scale” digital level (Analog levels \pm 0.25 dB):

XLR Balanced input:

With gain set to 0 dB +24dBu

With gain set to 12 dB +12dBu

With Gain set to 20 dB +4dBu (Only for low impedance balanced sources- typically microphones)

XLR Unbalanced input:

With gain set to 6 dB +18dBu

With gain set to 12 dB +12dBu

¼” input Balanced or Unbalanced:

With gain set to 0 dB +11dBu (+8.8dBV)

With gain set to 12 dB - 1dBu (-3.2dBV)

Input connections Line Level:

XLR - Balanced analog: Pin 2 non-inverting, Pin 3 Inverting. Pin 1 shield

- Unbalanced analog: Pin 2 non-inverting, Pin 3 signal return, Pin 1 shield

¼” - Balanced analog TRS: Tip non-inverting, Ring inverting, Sleeve shield

- Unbalanced analog TS: Tip non-inverting, Sleeve signal return and shield

Input connections for Low Impedance Balanced Microphone (uses same XLR inputs as Line Level):

Transformer-free electronically balanced Pin 2 “+” XLR inputs.

Phantom Power- +48 volts Phantom power for condenser microphones, can be enabled or disabled for each input channel individually using front panel setting. Automatically disabled for Gain settings less than 20dB.

External Clock Input: BNC- Accepts either Word Clock or AES/SPDIF sync. Fixed internal 75 Ohm termination.

External Clock Output: BNC- Sample period “TTL” level Word Clock signal at the output SF. The connection must have one 75 Ohm termination at the receiver.

Digital Output Connections:

XLR- Connect to AES inputs using standard 110 ohm XLR to XLR cables. Connect to coaxial SPDIF inputs using XLR to RCA adapter or adapter cable. Output format set by front panel setting to either AES or "SPDIF" (IEC 60958 type II Consumer format). Output is always 24 bit Wordlength.

RCA- Connect to SPDIF/RCA inputs using standard 75 ohm RCA to RCA cables. Connect to XLR inputs using RCA to XLR adapter or adapter cable. Output format set by front panel setting to either AES or "SPDIF" (IEC 60958 type II Consumer format). Output is always 24 bit Wordlength.

USB- Connects to computer using standard USB cable. Requires USB 2.0 or above.

AC Power:

Voltage 90-264 VAC, Frequency 40-63Hz,
Typical Current usage: 0.1A

Fuse Rating 2.5A "Time Delay" *

*Subject to change! Please always check the rating on the fuse and the one printed next to the fuse holder on the power supply PC board before replacement. Replace the fuse ONLY with a fuse of the same rating. If you have any questions, contact: techsupport@lavryengineering.com

Please Note: The AD11 automatically adjusts to AC power inputs in the range of 90 to 264 Volts AC and line frequencies between 47 and 63 Hertz. There are no settings to change.

Dimensions and Weight:

8"w x 1.75"h x 10.75" d (including front panel switches and rear panel connectors) < 5lbs, 6lbs in box

Optional Rack Mount Kit: An optional Rack Mount Kit is available which can be used to mount any combination of two LavryBlack units in a 1U 19" rack space. Please note that this kit cannot be used to rack mount a *single* LavryBlack unit.

LIMITED WARRANTY – LAVRYBLACK SERIES MODEL AD11

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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