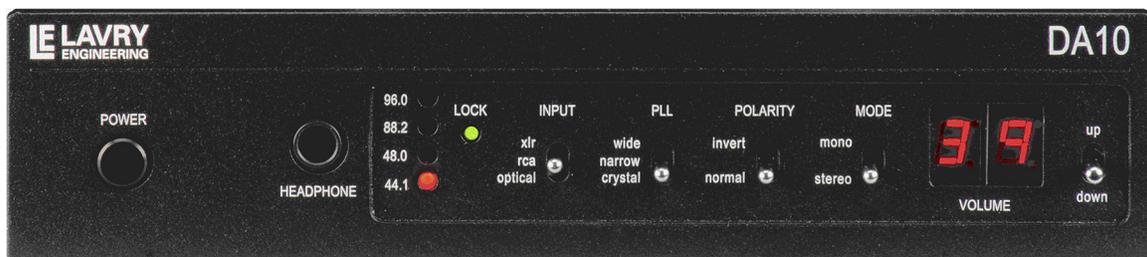


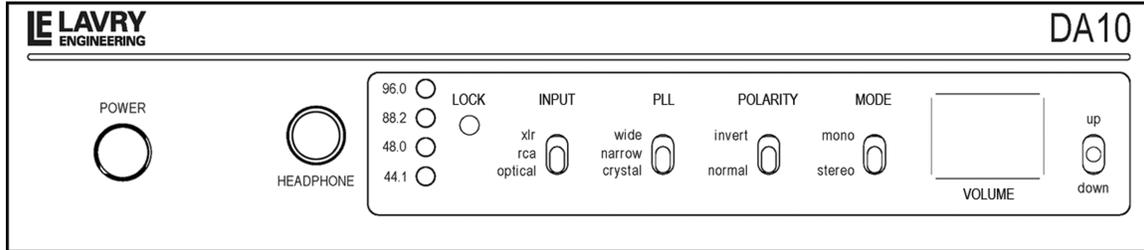
LavryBlack Series Model DA10 Digital to Analog Converter



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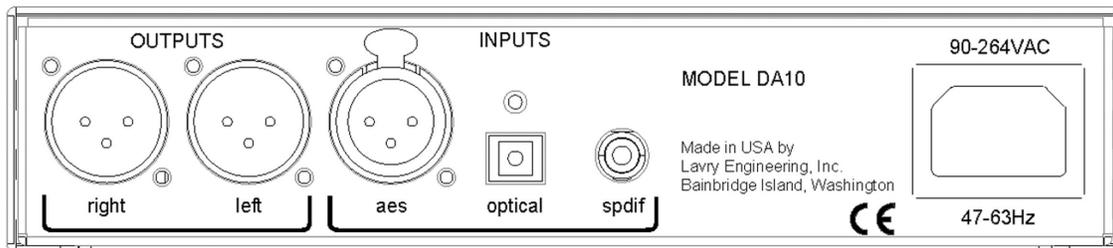
Rev 3.7
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MODEL DA10

The LavryBlack DA10 features:

- Ultra low jitter modes.
- Included sample rate conversion for non-standard rates.
- Potentiometer-free digitally controlled analog volume circuitry.
- High power discrete headphone output.
- XLR, Coaxial (RCA) and Optical (Toslink) digital inputs.
- Stereo/Mono switch.
- Audio Output Signal Polarity Inversion.
- Optional 19 inch rack mount kit for two LavryBlack units side-by-side in 1U space.



Rear Panel

CONNECTIONS:

CAUTION: Care must be taken when connecting the DA10 directly to the input of a power amplifier or powered monitors to avoid speaker damage. It is suggest that *before making any connections*, the DA10's Volume setting be reduced to a low value ("00" to "05"). Please switch OFF or disconnect power to all devices in your system before making input and output connections to the DA10.

Connect a stereo digital audio INPUT from your source using any or all of the following:

- AES source using an XLR cable to the XLR connector labeled "**aes**."
- Stereo optical source using a Toslink fiber to the **optical** connector.
- SPDIF source using a coaxial 75 Ohm RCA cable to the RCA connector labeled "**spdif**".

Note:

- All the connectors can receive either AES/EBU (professional format) or "SPDIF" (consumer format). For example, an XLR to RCA adapter can be used to feed a coaxial SPDIF signal to the XLR input. "SPDIF" is the original name for stereo digital audio signals that are now known as the AES3 or IEC 60958 type II "Consumer" format.

- In some cases, the format of the signal on an RCA output or an optical output can be set to formats other than "Stereo" or "SPDIF." For example, multi-disc DVD players that can play audio CD's may need to have the output format changed to "Stereo" before the DA10 can reproduce the audio on a CD. Some computer interfaces have optical outputs that can be set to "ADAT" which is multi channel, and is not compatible with the stereo digital input of the DA10.

Connect the XLR OUTPUTS to your destination device (recording studio equipment, receiver, power amplifier, or powered speakers).

- Use XLR to RCA adapters or adapter cables to connect the XLR outputs of the DA10 to equipment with RCA inputs.
- If connections are made to equipment with unbalanced inputs, please be sure to set the internal jumpers for the proper unbalanced mode (typically "Pin 2 Hot"). Please see the section titled CONFIGURING THE XLR OUTPUTS.
- The XLR marked **left** to the LEFT Channel of the destination.
- The XLR marked **right** to the RIGHT Channel of the destination.
- Please see the section titled "Determining the Correct DA10 Volume Setting for Your System" for details on the correct Volume settings.
- Connect headphones to the HEADPHONE jack. The headphones can be plugged or unplugged at any time. It is recommended that you unplug headphones when not in use.
- DO NOT use "earbuds" or any other headphones designed for use with portable battery-powered devices such as MP3 players. Damage to the headphones may result.

CONFIGURING THE XLR OUTPUTS:

The unit is factory configured to operate in Balanced output mode. The balanced signal appears on both PIN 2 and PIN 3 of the XLR outputs. PIN 1 is a ground connection for the cable shield. The unit may be configured (via internal jumpers) to drive Unbalanced inputs.

Most XLR to RCA adaptors or adapter cables (such as a cable with XLR Female on one end and an RCA plug or ¼ inch MONO plug on the other) work correctly as Balanced to Unbalanced converters. However, you **MUST set the internal jumpers for the proper unbalanced configuration** when using adapters to avoid distortion of the audio output.

Here is an example of an XLR to RCA adapter (Female XLR to RCA socket):



The XLR pin of the adapter that connects to the center pin of the RCA plug is the "HOT" pin for unbalanced operation. In most cases, this is Pin 2 of the XLR connector. Pin 1 and Pin 3 are typically connected together and to the outer contact of the RCA connector.

Please see section G: "SETTING THE DA10'S INTERNAL JUMPERS" for additional information.

OPERATION:

A. INPUT SELECTOR, SAMPLE FREQUENCY INDICATORS, & LOCK LAMP

The switch labeled INPUT selects which digital audio input acts as the source for the audio output. The three positions **xlr**, **rca**, and **optical** correspond to the input connectors on the back panel.

- When the PLL mode is set to **narrow** or **crystal** and the DA10 receives a valid input signal, both the “lock” lamp and the sample rate indicator that corresponds to the input’s sample frequency illuminate. The input must have a sample frequency of 44.1, 48, 88.2, or 96 kHz.
- In **wide** PLL mode, all four sample frequency indicators illuminate to indicate the DA10 will accept inputs with a sample frequency between 32 and 200 kHz. The “lock” lamp illuminates when the DA10 is locked to a valid signal.

B. PLL SETTINGS:

- Use **crystal** or **narrow** settings for 44.1, 48, 88.2 and 96 kHz rates for optimum jitter rejection. **Crystal** mode offers the highest level of jitter rejection, but **narrow** mode offers excellent jitter rejection as well.
- Use **wide** for all other sample frequencies between 30kHz and 200kHz.

It is advisable to select the PLL mode (**crystal**, **narrow**, or **wide**) before turning the DA10 “ON.” Changing between **crystal**, **narrow** and **wide** while the power is ON may cause the DA10 to take up to 50 seconds to reach optimal performance. Although audio is being reproduced after the setting has been changed, the quality of the audio may improve over this period.

C. AVOIDING CLICKS:

The DA10 provides protection against its own “AC power ON clicks”.

The DA10 CANNOT protect against “power ON clicks or pops” from digital sources feeding the DA10. ALWAYS apply AC power to digital sources connected to the DA10 before applying AC power to the DA10, or reduce the volume to “00” before applying power to, or changing operating modes of the digital source.

- The volume setting is “non-volatile” and is stored when you turn the AC power “OFF.” For this reason, it is advisable to reduce the volume to a low setting or “mute” (00) before turning the AC power “OFF” in systems where the DA10 is connected directly to power amps or powered speakers.

- It is also advisable to apply AC power to the power amp or power monitors *after* the DA10 is turned “on” when feeding them directly from the XLR outputs of the DA10 (no preamp or volume control between the DA10 and power amps). Conversely, it is advisable to remove AC power from the power amp or powered monitors *prior* to turning the DA10 “Off.”

Although care has been taken to minimize the possibility, switching between input sources (**xlr**, **rca**, or **optical**) and PLL modes (**wide**, **narrow** or **crystal**) during operation may cause unwanted clicks, especially when the signal is loud.

D. MODE and POLARITY SETTINGS:

Either **stereo** or **mono**, and **normal** or **invert** can be selected at any time during operation.

-MONO mode is provided for monitoring the “mono compatibility” of a mix, and is most often used in professional recording applications. The MONO signal is the AVERAGE (sum divided by 2) of the Left and Right signals. This approach helps to preserve the perceived volume level when switching between **stereo** and **mono** while listening to typical stereo music program.

- The POLARITY switch affects the Polarity of both the main XLR outputs and the headphone output and is labeled “**normal**” and “**invert**.”

The POLARITY setting is provided for two reasons:

1. To provide flexibility with output connection wiring.
2. To allow the signal polarity to be corrected when it is inverted due to polarity inversion in the recorded music or other equipment/wiring in your system.

- Please note that this function operates in all configurations of the XLR outputs- balanced, unbalanced Pin 2 Hot, and unbalanced Pin 3 Hot. The “sense” of the function is reverse for unbalanced Pin 2 Hot operation and balanced “Pin 2 +” wiring (please see the chart below).

Settings for most XLR to RCA adapters.

Polarity Switch Setting	Balanced output	Unbalanced Pin 2 Hot	Unbalanced Pin 3 Hot
Normal	Pin 2 -, Pin 3 +	Inverted (-)	Non-Inverted (+)
Invert	Pin 2 +, Pin 3 -	Non-Inverted (+)	Inverted (-)

The Polarity of the signal affects the motion of the speaker reproducing the audio, and if incorrect can affect the fidelity of the audio in a way that will vary with program material. If correct throughout the recording and reproduction process, a positive air pressure at the microphone will result in a positive pressure created by the speaker. If it is “inverted,” the speaker will move in the opposite direction and the resulting acoustic signal will be less accurate. This means that if you “invert” an inverted signal, it will have the correct Polarity! Because there is no way to detect if the signal polarity is inverted before it reaches the DA10, there is no direct correspondence between setting the switch to the “invert” position and whether or not the reproduced signal is actually inverted. A surprising number of recordings have been made with the polarity inverted.

- Please Note: The audibility of incorrect signal polarity varies widely with music program material, the audio system, and listening environment. It can range from very subtle to quite apparent.

E. VOLUME CONTROL:

The DA10 features a digitally controlled *analog* Volume circuit to control the volume of the XLR and Headphone outputs. Even though the control is in discrete 1 dB steps, the change is accomplished after the DA conversion in the analog domain. This means that the audio is always converted at FULL RESOLUTION, regardless of the Volume output level.

This approach offers a number of advantages:

- Extremely consistent sound quality regardless of volume; much better than a traditional potentiometer “knob” type of control.
- Excellent matching between channels at every volume setting for consistent stereo balance.
- Ease of reset-ability for listening or critical monitoring at a consistent level
- The volume setting is non volatile – the unit recalls the last setting when powered ON.

The volume control consists of the numerical display under the VOLUME legend, and the **up/down** switch just to the right of the display. The volume can be controlled in 1 dB steps from full volume (56) to the lowest volume (01). When the display indicates “00,” the signal is muted. Holding the **up/down** switch in either position will cause the Volume setting to change continuously until the switch is released or the setting reaches the end of the range.

Please be certain to configure the outputs of the DA10 for the proper balanced or unbalanced setting to match the wiring and inputs of your system. See the section titled CONFIGURING THE XLR OUTPUTS for details.

F. DETERMINING THE CORRECT VOLUME SETTING FOR YOUR SYSTEM

There are two ways the DA10 can be used to listen to digital audio sources through speakers:

- 1.) Connect the main output of the DA10 to the input of a receiver or preamp, set the DA10 to a “fixed” level, and adjust the speaker volume using the volume control of the receiver or preamp.

2.) Connect the main output of the DA10 directly to the input of a power amp or powered monitors and use the Volume control of the DA10 to adjust the speaker volume.

PLEASE NOTE: When operating the DA10 connected directly to a power amp or powered monitors, it is important to reduce the VOLUME of the DA10 to a very low setting BEFORE turning the AC power of the power amp or monitors “ON!”

Because the DA10 is capable of driving professional level balanced inputs as well as consumer level unbalanced (RCA) inputs, some care is needed when using the DA10 with unbalanced consumer HiFi equipment. Although exceeding the absolute maximum input level of the HiFi equipment is not likely to cause damage, it will reduce the quality of the listening experience.

- The first time you use the DA10 feeding equipment with a volume control, it is recommended that you start with the DA10 at a very low VOLUME setting, and raise the volume on the preamp or receiver to a level you would use to listen to other inputs (Phono or FM radio, for example). Switch to the input that the DA10 is feeding, and raise the VOLUME setting of the DA10 until the acoustic volume is the same as other sources. Matching the acoustic level between sources will almost certainly mean you are not exceeding the input rating of your equipment!

There is wide variation in the absolute maximum input level that HiFi equipment is capable of accepting without distortion. When this level is exceeded, the music program can be distorted regardless of the volume setting of the HiFi equipment because the distortion may be caused *before* the volume control. This could also occur when feeding a power amp or powered monitors directly, especially if the input level control of the power amp/monitors is turned “down” very low. It could be harder to detect in this situation, because the corresponding acoustic volume would typically be very loud when this distortion occurs.

- Most consumer equipment with RCA inputs are designed to operate with an absolute maximum input level of 2V rms (which is 5.6 V peak-to-peak). When operating in unbalanced configuration, the VOLUME setting on the DA10 that corresponds to this level is “46.” *It is recommended to check the specifications and confirm this corresponds to the absolute maximum input rating of your equipment according to the manufacturer! If it does not, you should determine the correct setting of the DA10 that is the absolute maximum setting for your system.* Please see the section titled “Determining the Correct DA10 Volume Setting for other input ratings” (below).

- For professional equipment with balanced inputs, a VOLUME setting of 56 corresponds to +24dBu. Some professional equipment has a maximum input rating of +18 dBu, which corresponds to the VOLUME setting of “50” on the DA10 for balanced operation and “56” for unbalanced operation.

In cases where the DA10 is feeding a consumer receiver or preamp, once the absolute maximum level has been established, the actual level used for typical listening may be lower than this value. As a rule, if you switch between analog sources on the receiver or preamp and there is a large difference in volume between other sources and the DA10, it is probably better to lower the VOLUME setting of the DA10 below the absolute maximum level if it is much louder than other sources. It will probably take some experimenting with different music program to establish a good “working volume” with your system. There is a possibility that the optimum DA10 level setting will still result in the DA10 being slightly louder than other sources. It is also recommended that you not exceed the absolute maximum level, even with music program that has large variations in level, because a loud peak could occur that would cause distortion.

In most cases, lowering the volume setting on the DA10 will degrade the signal quality less than lowering the volume control on the receiver or preamp below a setting which is “normal” for other analog sources (Phono, FM broadcast, etc.). The digitally controlled analog level circuitry of the DA10 degrades the signal less than typical “knob” potentiometer volume controls on consumer equipment, particularly at lower level settings.

Volume Setting	XLR Balanced Operation	XLR Unbalanced Operation	Headphone Level
56	24dBu	18dBu	18dBu
50	18dBu	12dBu	12dBu
---	---	---	---
46	14dBu	8dBu	8dBu
---	---	---	---
01	-31dBu	-37dBu	-37dBu
00	OFF	OFF	OFF

AES/EBU professional analog line levels:

Set to 56 for 24dBu balanced = 34.72V peak to peak = 12.28V rms

Set to 56 for 18dBu un-balanced = 17.36V peak to peak = 6.14V rms

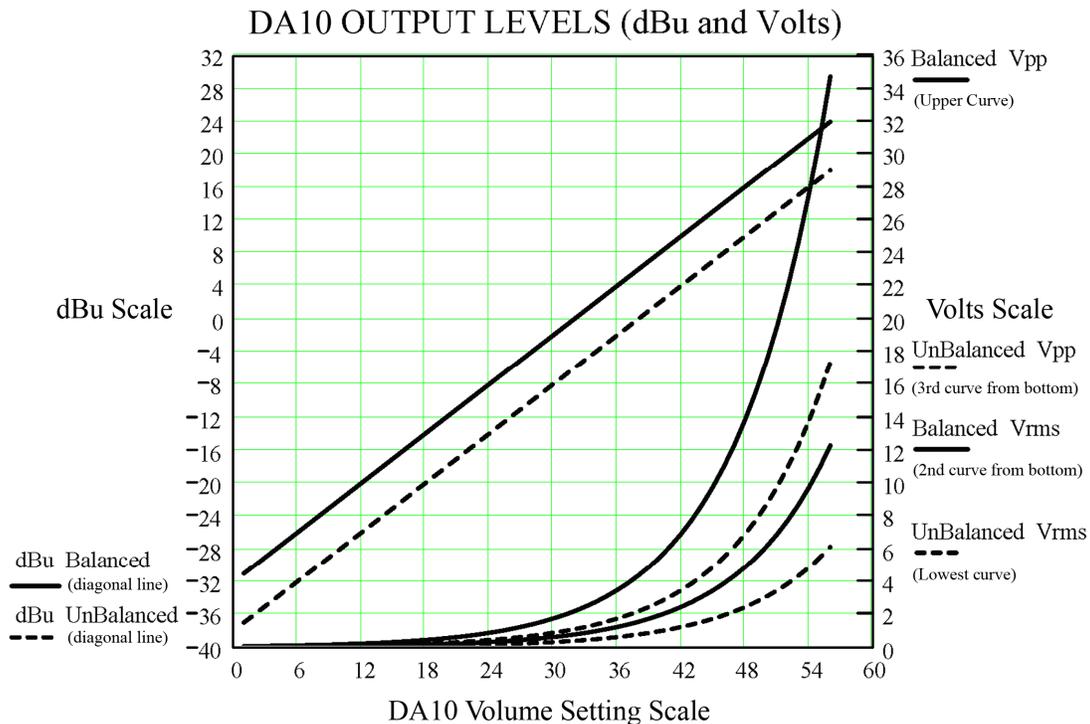
A typical home power amp or powered speaker:

Set to 40 for 8dBu balanced = 5.6V peak to peak = 2V rms

Set to 46 for 8dBu unbalanced = 5.6V peak to peak = 2V rms

Determining the Correct DA10 Volume Setting for other input ratings-

Use the graph (below) to determine the proper maximum Volume control setting of the DA10 for other voltage values. For Volts rms or Volts p-p, find the voltage on the vertical scale on the right side of the graph and trace horizontally until it intersects the relevant curve (solid for rms, dotted for V peak to peak, balanced or unbalanced). At the point where the horizontal line intersects the curve, trace straight down to the scale on the bottom of the graph to find the closest DA10 Volume control setting that will be the maximum volume for your equipment's inputs. Pro users can use the vertical scale on the left edge of the graph for the same purpose using dBu units. For example: if you find 2 volts on the right scale, and trace horizontally until it intersects the dotted "Unbalanced Vrms" curve, then trace down to the bottom scale, it intersects at "46."



If you have difficulty determining the correct setting, please contact techsupport@lavryengineering.com once you have the manufacturer's ratings for your equipment.

G. SETTING THE DA10'S INTERNAL JUMPERS

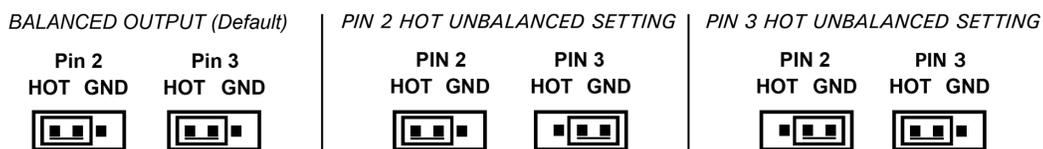
The internal jumpers must be configured to match the wiring of the cables or adapters which will be plugged into the DA10's XLR outputs. If they are not set properly before the XLR outputs are connected to unbalanced wiring or inputs, no damage will result because the outputs are protected against "short circuits," *but the output signal will be significantly distorted at higher volume levels*. It is therefore recommended that you open the DA10 and set the internal jumpers to the correct setting before using the DA10 with unbalanced output connections.

If custom cables are an option, please also see section H- ALTERNATIVE WIRING FOR UNBALANCED CONNECTIONS

Opening the DA10 to Set the Internal Jumpers-

- 1.) If you have not plugged the DA10 in yet, it is a good idea to do so first. Plug in the only the AC power cord, and turn the DA10 "ON." Start by reducing the volume setting to "00" and turn "OFF" the AC power to the DA10.
- 2.) Disconnect all cable connected to the DA 10, including the AC power cord.
NEVER OPEN THE DA10 CASE WITHOUT FIRST DISCONNECTING THE AC POWER CORD!
- 3.) Next, place the DA10 bottom-side-up on a table and remove the five recessed Phillips head screws located around the outer edge of the top cover with a #2 Phillips screwdriver.
- 4.) Carefully turn the DA10 over, and position it with the back panel near the edge of the table. The back panel is the one with the input and output connectors.
- 5.) You may need to pick the DA10 up a bit to start sliding the bottom chassis out of the top cover. Once it starts to come out, we would recommend grasping the chassis by placing your thumb on the top edge of the rear panel with your four fingers under the bottom of the unit. Slide the bottom chassis completely out of the top cover.
- 6.) Place the DA10 chassis so the front edge (with the switches and digital Volume display) is closest to you, and you are looking towards the inside of the back panel.
- 7.) Looking down from above, the jumpers are located just in front of the XLR connectors mounted in the back panel. Each "jumper" consists of a row of three small square gold pins set in a black plastic base. The jumpers are actually the small rectangular black plastic blocks that are placed across two of the three pins in each set.
- 8.) Look for the designation printed on the circuit board next to each set of pins. It will say either "Hot, Pin 2, & Ground" or "Hot, Pin 3, & Ground" next to each set of pins. (see example below)
- 9.) Most standard adapters are wired for "Pin 2 Hot Unbalanced." This means Pin 3 is connected to Pin 1 (which is "ground"); setting the jumpers for "Pin 2 Hot Unbalanced" operation will be used for the first example. Skip to step (11) for "Pin 3 Hot Unbalanced" settings.

DA10 INTERNAL JUMPERS SETTING EXAMPLES (as seen from above)



To set the jumpers for "Pin 2 Hot Unbalanced" operation:

- 10.) The jumpers that need to move are the ones labeled: "Hot, Pin 3, & Ground." Pull the small rectangular black plastic jumper straight "up" and off of the two pins it is on and re-position it to slide back down on the two pins labeled "Pin 3" and "Ground." Once you have done this for both left and right XLR connector, you are done with this part. Please go to step (12).

To set the jumpers for “Pin 3 Hot Unbalanced” operation:

11.) The jumpers that need to move are the ones labeled: “Hot, Pin 2, & Ground.” Pull the small rectangular black plastic jumper straight “up” and off of the two pins it is on and re-position it to slide back down on the two pins labeled “Pin 2” and “Ground.” Once you have done this for both left and right XLR connector, you are done with this part.

12.) You are now ready to put the top cover back on the chassis. Pick up the chassis with your thumb on the top edge of the rear panel, and your four fingers on the bottom of the chassis. Carefully slide the chassis into the top cover and be sure the black and white power wires do not get caught between them. As you slide the cover on, just as the top edge of the rear panel starts to go inside the top cover, the switches and headphone jack start to come through the openings in the front cover. Be gentle, and look to see that the switches are lining-up with their openings before you slide the top cover all the way “on.”

13.) Place the DA10 bottom-side-up on the table, and replace the five Phillips head screws. They don’t need to be very tight- just make sure they are “hand-tight.” In other words- don’t turn the screw driver with too much more force than you would use to turn a door knob!

You are finished setting the jumpers.

Testing the DA10 for Unbalanced Operation-

Connect the appropriate cables, with the volume turned “down” on your preamp, or the AC power turned “OFF” on your power amp or powered monitors. Turn the DA10’s power “ON” and set the input and PLL settings, if you have not already done so. Turn “ON” the power amp or raise the volume of the preamp to a normal level. Start playback of your source, and using the DA10’s level control, raise the volume until you hear sound from your speakers. If you have turned the volume setting up to at least “20,” and you still don’t hear any sound at all, try plugging headphones into the DA10. If you hear sound in the headphones and not from the XLR output, reduce the volume and check all the other switch settings and connections in your system. If everything seems to be in order, and you hear sound in the headphones, but not from the XLR output, there is a possibility that your adapters are wired for the opposite “Pin Hot” configuration from the way you set the jumpers. This would ground the signal, resulting in “no sound.” The outputs are protected, so operating the DA10 this way for a short time will not damage anything. Double check the wiring of your adapters, and if you need to, open the DA10 and reset the jumpers correctly.

H. ALTERNATIVE WIRING FOR UNBALANCED CONNECTIONS

If custom cables are an option, properly wired custom cables can be used in a manner that allows the internal jumpers to remain in the Balanced configuration when feeding unbalanced inputs. This makes it possible to switch between feeding balanced inputs and unbalanced inputs without having to open the DA10 and change the jumper settings.

Please note: Using this approach, it is very important that you use ONLY these special cables when connecting the DA10 to unbalanced inputs!

- Alternative 1: Use PIN 3 for the “Hot” signal conductor, connect PIN 2 to *nothing*, and connect Pin 1 as the signal’s “low” conductor. For example, with coaxial cable Pin 3 would connect to the center conductor and Pin 1 would connect to the “shield.”

- Alternative 2: Use PIN 2 for the “Hot” signal conductor, connect PIN 3 to *nothing*, and connect Pin 1 as the signal’s “low” conductor. For example, with coaxial cable Pin 2 would connect to the center conductor and Pin 1 would connect to the “shield.”

In either case, when shielded twisted pair cable is used, the shield can be connected together with the “low” signal conductor of the pair to Pin 1.

SPECIFICATIONS:

THD+N at max volume (volume = 56) – typical, 0.0008% FS, maximum 0.0013% FS

Test conditions: 20Hz – 20KHz, -3dBFS sine wave, 22-22KHz BW

At all possible settings and switch combinations.

Dynamic Range: -110dB typical, -109 dB minimum

Test conditions: Non weighted

At all possible settings and switch combinations.

Drive Capability:

24dBu Balanced XLR output into 1K ohms at Volume = 56 or lower

21dBu Balanced XLR output into 600 ohms at Volume = 53 or lower

18dBu Unbalanced XLR output into 600 ohms at Volume = 56 or lower

18dBu Headphone into 100 ohms at Volume = 56 or lower *

18dBu Headphone into 50 ohms at Volume = 50 or lower *

* PLEASE NOTE: Do not use “earbuds” or any other type of headphones designed for use with portable battery-powered devices such as an MP3 player. The DA10 is not designed to work with this type of headphone. The headphone output is capable of much higher levels than a battery-powered device in order to properly drive typical HiFi headphones. Damage may occur to the portable device headphones if they are connected with the DA10 Volume control set to a higher setting.

Volume Control Precision:

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

Differential linearity (step size) – better than 0.08dB

AC Power:

Voltage 90-264 VAC, Frequency 40-63Hz, Current 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 DA10 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.

Weight and Dimensions:

8” wide x 1.75” high x 10.75” deep (with space for front panel switches and rear panel connectors), < 5lbs. (shipping weight 6 lbs)

LIMITED WARRANTY - LAVRYBLACK SERIES MODEL DA10

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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