

Lehmannaudio



Black Cube

Phono Stage

High Precision Passive RIAA-Network

Manual

NEW AND IMPROVED!

Valued customer,

Congratulations for buying the **Lehmannaudio** Black Cube phono RIAA preamplifier. The Black Cube is manufactured in Germany using very high quality components and carefully constructed to give you many years of musical pleasure.

This unit is made only for being inserted between a turntable's passive cartridge output and any audio amplifier's high level input. The Black Cube will handle nearly any system cartridge from high-level to low-level MM or MC and is made to fulfill the demands of audiophiles who enjoy analog music reproduction.

Please keep this manual nearby the Black Cube so that you can refer to it for further use.

Precautions

Please read the following before operating your Black Cube phono preamplifier. Whenever applicable below, Black Cube also includes the external power supply and its cable.

While Installing the Black Cube

- Be careful to use an appropriate cable for the connection between your power outlet and the Black Cube external power supply. Make sure that you have the appropriate version for your mains voltage.
- Be careful to prevent the Black Cube from getting wet; do not allow water to enter the Black Cube, especially when raining or snowing, or near a body of water. Otherwise fire or electrical shock may result.
- Do not place heavy objects on the power cord. If the cord is damaged, fire or electrical shock may result. In particular, it is possible that one might accidentally place a heavy object on a carpet that covers the cord; definitely avoid these situations!
- Do not install the Black Cube in a place where it might be exposed to oil, smoke or steam (for example, near a cooking table or humidifier). Otherwise, fire or electrical shock may result.
- Do not place the Black Cube on an unstable surface, such as an unstable bench or slanted surface. Otherwise, the device may fall or drop, resulting in an injury.
- Do not place the power cord near a heating device. Otherwise, the cord sheath may melt, resulting in fire or electrical shock.
- Do not locate the Black Cube in a place subject to excessive heat, such as inside a car with all the windows closed, or in direct sunlight. Otherwise, fire may result.
- Do not handle the power plug with wet hands. Otherwise you may receive an electrical shock.
- When you remove the power plug, be sure to hold the plug. Never pull on the cord. Otherwise, the power cord may become damaged, resulting in fire or electrical shock.
- The Black Cube offers superb sonic quality. To ensure best possible results, you should use the best quality connecting cables that you can afford. Regular maintenance involves keeping all connections clean using a quality contact cleaner.

Using the Black Cube

Do not touch the Black Cube under the following circumstances:

- If you hear thunder, remove the power plug from the AC outlet as soon as possible. If you

fear a lightning hit and the Black Cube has been connected to an AC outlet, do not touch the power plug. Otherwise you may receive an electrical shock.

- Do not attempt to modify this equipment. Otherwise, fire or electrical shock may result. Warranty is void on modified devices. Exceptions: dip switch settings, fitting of custom input load and upgrading with the PWX power supply when done carefully by a skilled person (trained technician). Normally this is your dealer.
- If you think the Black Cube needs to be checked for maintenance or repair, consult your dealer.
- Do not place a container of water or any small metal object on top of the Black Cube or the external power supply. If water is spilled or if the metal object gets inside, fire or electrical shock may result. This applies to vases, potted plants, glasses, cosmetic bottles, medicine, etc. Do not change the setting of the dipswitches with any tools that consist of metal.
- Do not damage, process, bend, twist, stretch or heat the power cord. If the cord is damaged, fire or electrical shock may result.
- When you are connecting other audio devices to the Black Cube make sure that you first turn off the power to all devices to be connected. Refer to the user's guide for each device and use the specific cable for connection.
- Set the volume levels of all devices to minimum before connecting the Black Cube to your actual setup and to the AC outlet. Otherwise, an extremely loud noise could damage your loudspeakers or even your hearing.
- If you plan not to use the Black Cube for a long period of time (such as when you are on vacation), remove the power plug from the AC outlet. Otherwise, a fire could possibly result.

If any abnormality occurs while using the Black Cube, remove the plug from the AC outlet. In this case first shut off the power amplifiers or turn down the volume controls and so on to avoid possibly damaging transients

- If you notice any abnormality - such as smoke, smell, noise, etc. - remove the plug from the AC outlet. Confirm that the abnormality is no longer present, then consult your dealer for repair. If you continue using the Black Cube under abnormal conditions, fire or electrical shock may result.
- If a foreign object or water enters inside the equipment, remove the Plug from the AC outlet and consult your dealer for repair. If you continue using the Black Cube under this condition, fire or electrical shock may result.
- If the power cord is damaged (for example if it is cut or if the core wire is exposed), ask your dealer for a replacement. If you continue using the Black Cube under this conditions, fire or electrical shock may result.
- If the Black Cube or the external power supply is dropped, or if the case is damaged, remove the plug from the AC outlet and consult your dealer. If you continue using the Black Cube under abnormal conditions, fire or electrical shock may result.

Maintenance

- Before cleaning the Black Cube, remove the power plug from the AC outlet for safety. Otherwise, an electrical shock may result.
- Do not open the external power supply of the Black Cube. There are hazardous voltages inside that might result in an injury or an electrical shock.

Description

The passive filter network of the Black Cube is located between two linear active amplifier stages. Phase errors that occur due to active filter designs are thereby eliminated. Low-loss, low-tolerance WIMA foil capacitors in the filter network are responsible for very good localization and soundstage reproduction.

Sensitivity for 775mV/eff. output voltage: 0,38mV/3,8mV switchable on board (MC/MM).

Input capacitance: 100pF default

Input impedances: 47 kOhms/ 1 kOhms/100 Ohms switchable on board (Dip-switches with gold plated contacts), one slot for solder free installation of custom impedance on the printed circuit board (PCB). Hard wire Slot for switch free addition of extra custom impedance. No need for expensive impedance plugs!

Output impedance: <100 Ohms

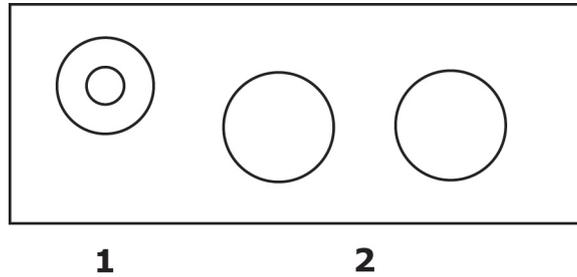
Gold plated RCA-connectors, massive ground connector

The external regulated power supply of the Black Cube can be placed up to two meters away from the audio section. The cable between power supply and audio section is shielded to keep Radio Frequency Interference (RFI) away from the nearly noiseless and highly stable supply voltages. This effect is even enhanced by additional supply voltage filtering on the double-sided audio pcb.

Case of 1,5mm aluminum protects the audio electronics.

Please read this manual first before connecting the Black Cube to mains voltage!

Input side (simplified)



1. *Ground connection (GND)*

If your turntable has a separate ground cable you should connect it here. You can connect any of

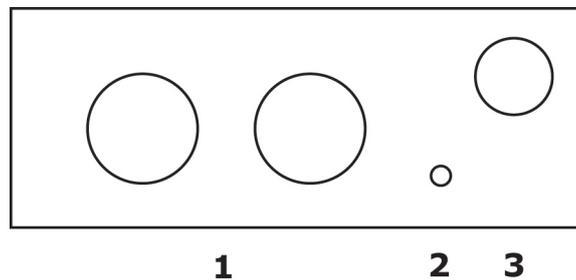
- 4mm plugs
- open ends
- cable shoes

2. *Signal input connectors (IN)*

Please connect your turntable's output here. To minimize loss in the interconnect use the shortest possible cable between tonearm and the Black Cube.

Be careful to preserve correct channel connections – left to left and right to right.

Output side (simplified)



1. Audio outputs (OUT)

RIAA-filtered high-level output. Please connect your output cables to the line input to be used. For example, to a line-level preamplifier, active loudspeakers with volume control or power amplifier input with volume control.

Be careful to preserve correct channel connections – left to left and right to right.

W A R N I N G: You must never connect the output cables to a following phono input because RIAA-filtering and amplification would be done twice! You could damage the following phono stage or your power amplifier and loudspeakers! The resulting noise could even damage your hearing!!!

2. Control (LED)

Lits when the Black Cube audio section is connected to the power supply

3. Input for the external power supply

The Black Cube Audio section features a 2m shielded cable and is connected to the external regulated power supply with a Neutrik XLR connector with gold plated contacts. Either the standard power supply or the PWX power supply (Black Cube SE and Black Cube Twin) with a considerably bigger and better transformer can be used. The use of the PWX power supply results in a plus of authenticity, bass reproduction, dynamics and natural flow. The PWX power supply can be upgraded easily to the Black Cube standard.

No matter which power supply you use please connect the power supply to the audio section first and then connect the complete unit to mains voltage! Do not unplug and replug the power supply while listening.

Matching of gain and input load

You can change input impedance (resistive loading) and gain by using the onboard DIP-switches for each channel separately. These switches are accessible from the bottom of the unit. Input capacitance is always 100pF. You may change the setting of the switches with the Black Cube connected to mains voltage and even to your stereo system however in that case please first turn your volume knob to the minimum position because loud pops could occur during switching.

DIP switch Table

	gain	/ input load		
Nr.	1	2	3	4
ON	(MC)380 μ V Gain = 66dB	1 kOhms	free (for custom load)	100R
OFF	(MM)3,8mV Gain = 46dB	/	/	/

The Black Cube is highly flexible and also offers an insert point (R103, R203) for inserting a resistor to accommodate cartridges which require special loading to be activated by the switch and one additional hardware slot for each channel for permanent installation (R100, R200) with direct effectivity.

The impedance switches connect the impedance resistors in parallel to the 47k resistor. By using the special impedance slots load options are unlimited. Soldering is not necessary

Before you insert a custom load please do the following:

- Disconnect the power from the Black Cube's power supply.
- Place the Black Cube on a clean smooth surface.
- Carefully unscrew the four screws of the audio board's case with the tool included with the Black Cube or any other 2mm hex screwdriver
- After removing the top you can now insert your custom input load for each channel. Do not use any tools that could damage the electronic circuit. Please use high quality metal film resistors.
- The DIP switches are now accessible from the outside at the bottom of the unit near the input RCA connectors. To activate your custom load you have to set the switches no. 3 to the "on" position.

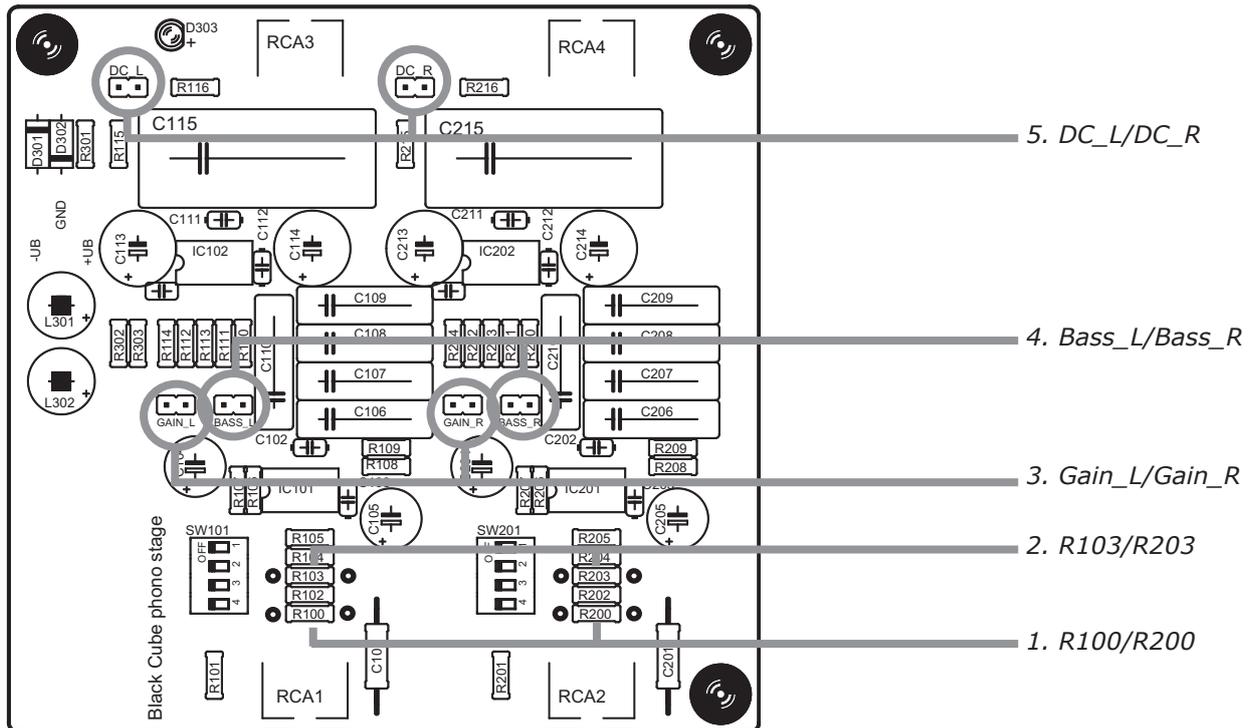
Use only high quality resistors for custom load impedances. Install these resistors only if you know what you are doing. Otherwise please consult your dealer.

If all switches are in the OFF-position the input impedance is 47kOhms which is suitable for most MM cartridges. The gain switch can be activated separately so that MC/47k becomes an option. This is recommended for some MC cartridges.

Please refer to your cartridge's information sheet for the recommended load. If you only know the internal impedance of your cartridge you can use the rule that the load impedance should not be less than 10x the internal impedance of the cartridge.

Both channel settings and impedances have to be identical!

Audio board view



1. R100/R200

Here are hard-wire slots for additional loads with immediate effect without having to activate an additional DIP-switch. Capacitive or resistive load placed here will be connected in parallel to all other activated loads, at least parallel to the default load 47k / 100pF.

2. R103/R203

Here are free slots for custom loads. To activate these loads switches nr. 3 (accessible from the bottom outside) have to be put into the „on“ position. Capacitive or resistive load placed here will be connected in parallel to all other activated loads at least parallel to the default load 47k / 100pF.

3. Gain_L/Gain_R

These jumpers change gain by +10dB. The jumpers are activated by default. Using DIP-switches Nr. 1 the gain is 46dB (off) and 66dB (on) respectively. If the selected gain is too high the jumpers can be put off.

4. Bass_L/Bass_R

These jumpers activate the Soft Bass Rolloff Filter to avoid high energy low frequency transmission that can damage loudspeaker chassis. Corner frequency of this filter is 60 Hz, attenuation is 6dB/Oct. The jumpers are not activated as default.

5. DC_L/DC_R

By activation of these jumpers the output capacitors are bridged. The DC jumpers are not activated as default.

WARNING: When the output capacitors are bridged there can be DC offset voltage present at the Black Cube's output connectors. Please make sure that the following input stage is AC-coupled before activating the DC jumpers. If you do not know the coupling status of the next following input stage have your setup checked by a dealer or avoid to use this jumper. DC at the output stage of a power amplifier can destroy loudspeaker chassis!

Common settings

switch Nr.	sensitivity / load			
	1	2	3	4
ON	(MC)250µV Gain = 66dB	1K	free (for custom load)	100R
OFF	(MM)2,5mV Gain = 46dB	/	/	/

The Black Cube supplies practically unlimited load adaption for practically every cartridge on the market. The high maximum gain of 66dB for MC cartridges makes sure that even very low output cartridges can be used with satisfactory results. Sensitivity quoted above is calculated for an output level of 500mV.

It is not possible to overload the Black Cube with any known phono cartridge if the unit is set up correctly.

Below some DIP-switch /gain jumper combinations for several kinds of cartridge are shown. Please note that both channel have to be configured identically to maintain correct stereo balance.

Cartridge	Switch	1	2	3	4	View Dip-switch	Gain Jumper
<i>MM</i>		off	off	off	off		X
<i>MM High Output</i>		off	off	off	off		-
<i>MC /47kOhm</i>		on	off	off	off		X
<i>MC /47kOhm high output</i>		on	off	off	off		-
<i>MC 1kOhm</i>		on	on	off	off		X
<i>MC 1kOhm high/mid output</i>		on	on	off	off		-
<i>MC 100 Ohm</i>		on	off	off	on		X
<i>MC 100 Ohm high/mid output</i>		on	off	off	on		-
<i>MC custom load</i>		on	off	on	off		X
<i>MC custom load high/mid output</i>		on	off	on	off		-

X = Jumper in place
(Default)

Technical Data

Input sensitivity: for output level of	MM	MC
755mV/ 0dB	3,8mV/1 kHz	380µV/1kHz
Gain 1kHz (incl. gain jumper)	46dB	66dB
Max. input level1kHz:	32mVmV	3mV
Channel deviation:	typ. max. 0,5dB	
Channel crosstalk:	fx = 1 kHz >	86dB
	fx = 10 kHz >	85dB
Input impedances:	47kOhms/1kOhms/100 Ohms switchable on board the audio PCB. One place for custom impedance on board the audio PCB. One additional hard wire slot for direct effectivity. No soldering required.	
Input capacitance:	100pF	
Output impedance:	< 100 Ohms	
Impedance following stage:	>10kOhm recommended	
Measures:	WxHxD (case only) 114mm x 44mm x 108mm	
Power consumption:	approximately. 3VA	
External power supply:	+/- 15VDC	

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