

Channel D Lino

**Balanced Direct-Coupled Wide Bandwidth Low Distortion
Low Noise Precision Phono Preamplifier**

Installation and Use Guide

For Low Output / Low Impedance Moving-Coil Phono Cartridges

Use Guide Revision 3b

Channel D Lino Installation and Use Guide

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Congratulations on your purchase of a Lino phono preamplifier! The Lino is a low noise, low distortion fully balanced preamplifier featuring a wide frequency bandwidth of 200 kHz. This provides you with the key to obtaining stunning, three-dimensional music reproduction from your LP records.

The Lino is specifically designed to deliver extremely high quality music reproduction from low output moving-coil cartridges.

The Lino incorporates newly available power supply components that enable circuit design strategies delivering power supply performance very closely approaching that of our flagship Seta rechargeable-battery phono preamplifiers. Like our flagship Seta models, modern manufacturing methods are used, including a low-noise, four-layer circuit board and precision, surface mount components. Surface mount components provide the shortest signal paths and highly optimized circuit layouts, with low stray inductance, capacitance, improved unit to unit consistency and performance all eclipsing old-fashioned through-hole designs. The result is a phono preamplifier with exquisite performance far exceeding expectations, especially considering its relatively modest price in the arena of most high end components.

The Lino is perfect as a preamplifier for connecting to high resolution (192 kHz / 24 bit), balanced-input analog to digital converters (ADCs). The Lino's Flat output used in conjunction with Channel D's *Pure Vinyl™* software providing RIAA EQ correction combines the strengths of the latest, 21st century cutting-edge analog and digital technologies, delivering superb, high definition, transparent vinyl playback.

For audiophiles requiring an all-analog signal path, the high precision (within ± 0.1 dB) RIAA EQ module provides standard RIAA-corrected phono preamplifier outputs, transforming the Lino into an extremely high performance balanced/XLR and unbalanced/RCA phono preamplifier. The benefit of also having the availability of selectable Flat outputs will facilitate linking analog LP playback with the performance and flexibility of high resolution digital audio, should you desire to do so later in the future.

Getting Started

Please take the time to read this Installation and Use Guide to familiarize yourself with the installation and operation of the Lino.

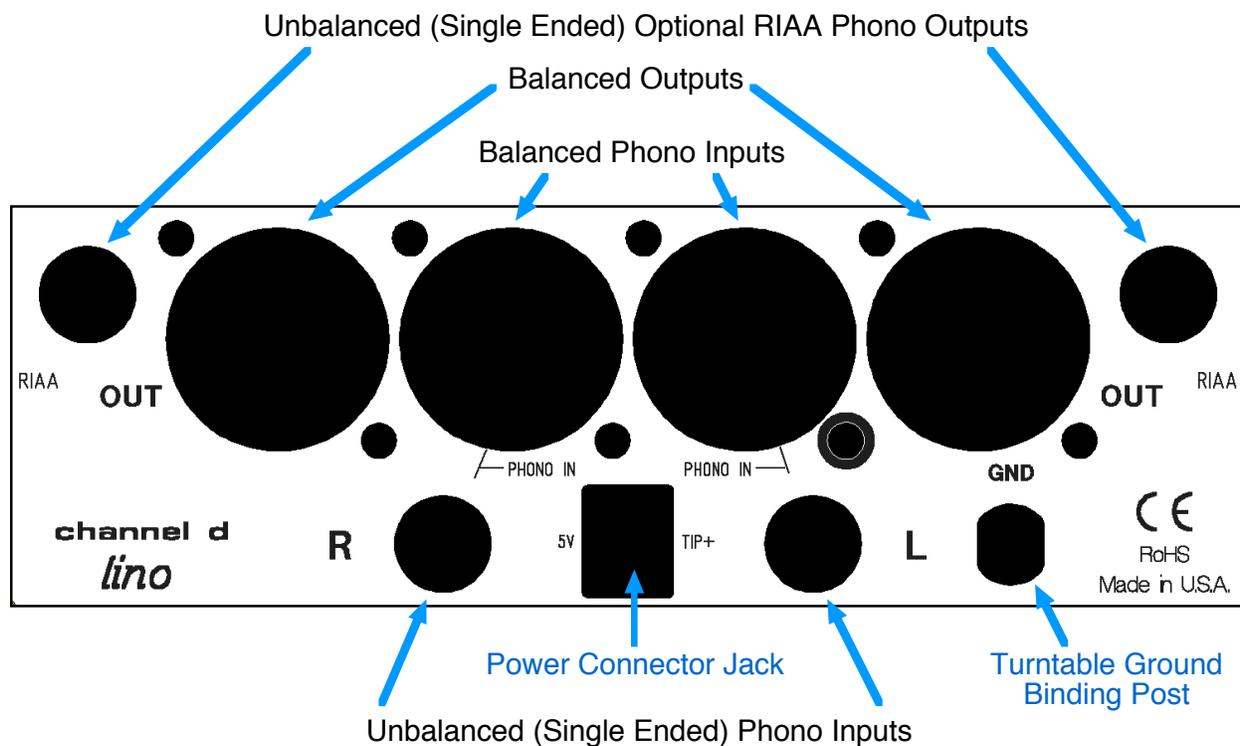
Important: If the package you received from your shipper is below room temperature, please allow the sealed inner carton containing the product to acclimate at room temperature for a few hours before opening it, to avoid causing condensation on cold internal surfaces.

After unpacking, connect the provided external power supply to an AC power source and plug the barrel connector into the power jack on the rear panel of the Lino. The following items are included. Please check the package and notify Channel D of any shortage:

- Lino Preamplifier
- External 5 volt power supply, 2.1 mm tip positive, 110 to 220 Volt 50 - 60 Hz Input, US domestic two conductor power cord (can be used with international adapters)
- Performance Measurement Graph showing your own Lino's RIAA EQ accuracy

All signal connections can safely be made to the Lino while the power supply is connected and powered. ***Be sure to mute the Pure Vinyl application software, if running on the computer, or otherwise mute or power down your power amplifier(s) while making signal connections, to avoid generating noises which could damage loudspeakers.***

The internal signal routing of the Lino is highly configurable. If the available choices seem overwhelming, rest assured that you can simply use the factory, "out of the box" settings, which are already preconfigured for the most common usage scenario based on the options included with your Lino.



Signal Inputs

- The RCA inputs may be used with conventional shielded cable (single-ended) phono connections. They also serve as single-ended to balanced adapters (provided that the turntable ground connection is isolated). *Consult the section of this Installation Guide concerning the proper configuration of the internal single ended / balanced jumpers. The factory setting is with the jumpers set for balanced, which usually would be the best configuration, even if used with RCA interconnects.*
- The XLR inputs are intended for use with balanced (shielded twisted pair or star quad) turntable connections. For optimum, low noise operation this is the preferred type of connection. Balanced wiring provides better noise immunity (because of common mode noise rejection) than conventional shielded (single conductor plus shield) cable.

Note: The RCA and XLR *inputs* are connected in parallel (barrel / shield = XLR pin 3; “hot” = XLR pin 2). The RCA barrel is electrically isolated from the chassis / circuit common.

Balanced Outputs

- The low impedance, balanced XLR outputs are normally intended for connection to the **balanced** inputs of a professional audio interface, for use with Channel D’s Pure Vinyl software (for Macintosh computers) for applying RIAA compensation (or other similar software on other computer platforms). (Consult the Pure Vinyl software User Guide for more information.)
- The Balanced outputs also can be configured as standard RIAA phono preamplifier outputs via an internal jumper setting.

If necessary, XLR pin 3 may safely be connected to circuit common / ground, as the Lino has servo balanced (ground sensing) outputs.

RCA Unbalanced (Single Ended) Outputs (RIAA EQ)

- This corresponds to a standard phono preamplifier (with RIAA EQ curve) output signal.

The RCA phono outputs are true, single ended (unbalanced) connections derived by differentially summing the balanced signal “legs,” rather than taking the unadvisable shortcut of only using the positive polarity signal leg of the balanced circuit, which would deliver poor performance.

Also, the standard RIAA EQ compensated signal appearing on the RCA output connectors is generated from a signal side chain independent of the XLR / balanced outputs, and may be used simultaneously with the XLR outputs without compromising the performance of the Lino.

The Lino is available in a lower price configuration omitting standard phono preamplifier RIAA outputs. This configuration must be used with external RIAA EQ, such as an analog to digital converter and Channel D Pure Vinyl software.

Power

- Connect the 5 volt power adaptor to the power input jack.

Important note: Do *not* replace the power supply with a different one. The two-wire power supply has been very carefully selected for galvanic isolation and low noise. If replaced with a linear supply or a three-wire supply even of exactly the same rating, the internal circuitry may be damaged. ***This will void the warranty.***

In answer to user inquiries, the performance of the Lino will *not* be improved by substituting a battery for the power supply. The Lino depends on having a relatively stable 5 volt (within ± 0.2 volt) DC input. This is not possible to achieve with any type of battery without also providing additional regulation. Input supply voltages above 5.2 volts will likely damage the Lino. Voltages below 4.8 volts will result in diminished performance or no output.

The external, brick style supply adapter provides a galvanically isolated (a key consideration) raw DC voltage. The output is not used "straight" from the adapter, but stepped up inside the preamplifier to split supplies and then very highly filtered in multiple stages.

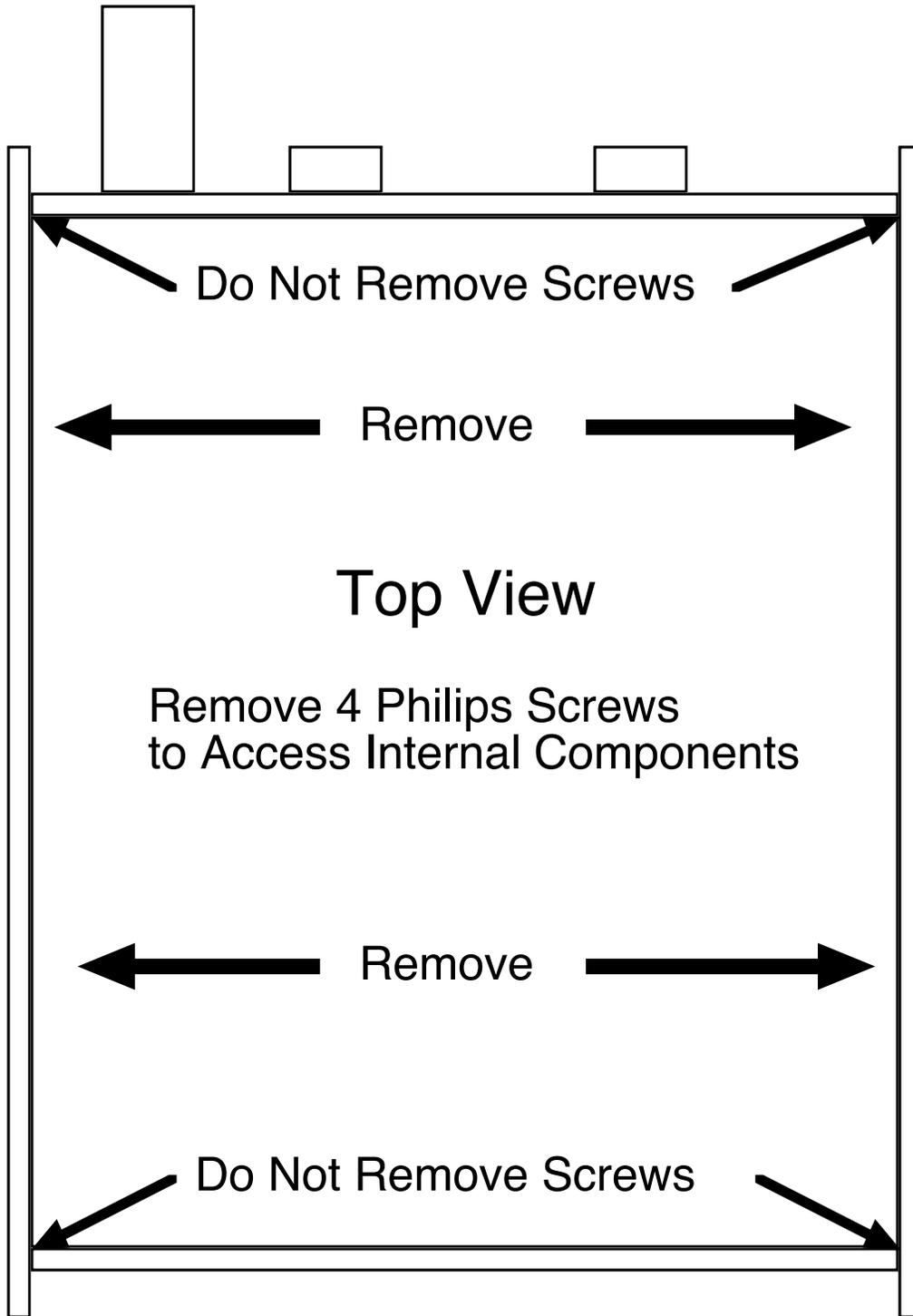
The circuitry employs a 4 layer circuit board with separate and continuous low inductance, low impedance internal ground and power planes congruent with the preamplifier circuitry. *The resulting power supply rails have much lower noise and ripple and tighter regulation than a linear DC supply can provide.* This is borne out in the signal to noise performance. A welcome additional benefit is very low idle power consumption and negligible heat production.

This kind of design wasn't even possible as recently as just 10 years ago. However, we now have a plentiful palette of new components to pick and choose from, thanks to the burgeoning consumer electronics industry's continuing quest for increasing miniaturization and reduced power consumption.

Chassis Ground

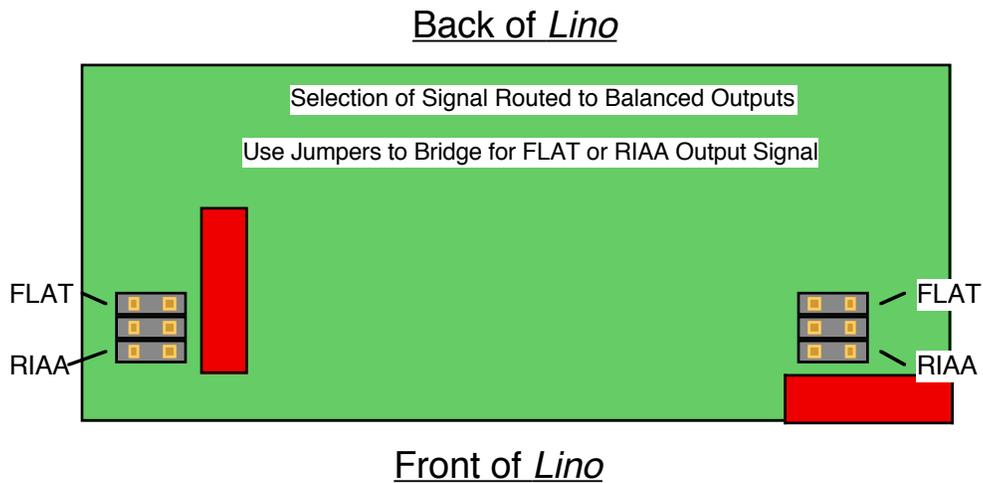
- Securely connect the chassis ground wire from your turntable / tonearm (if so equipped) to the grounding lug on the rear panel of the Lino. If your turntable doesn't have a grounding connection, leave this terminal disconnected. **Important:** *only* connect the ground to a turntable chassis or ground wire, not to a ground connection on any other equipment.

To access the internal components for cartridge loading, gain and configuration settings, remove four Philips - head screws attaching the lid. The screws closest to the front and back of the unit attaching the front and rear panels should not be removed.



FRONT OF LINO

Balanced Output Configurations - Flat or RIAA output



The locations of the Balanced signal output configuration jumpers on the circuit board are shown above. **Disconnect the Lino power supply before making these configuration settings.**

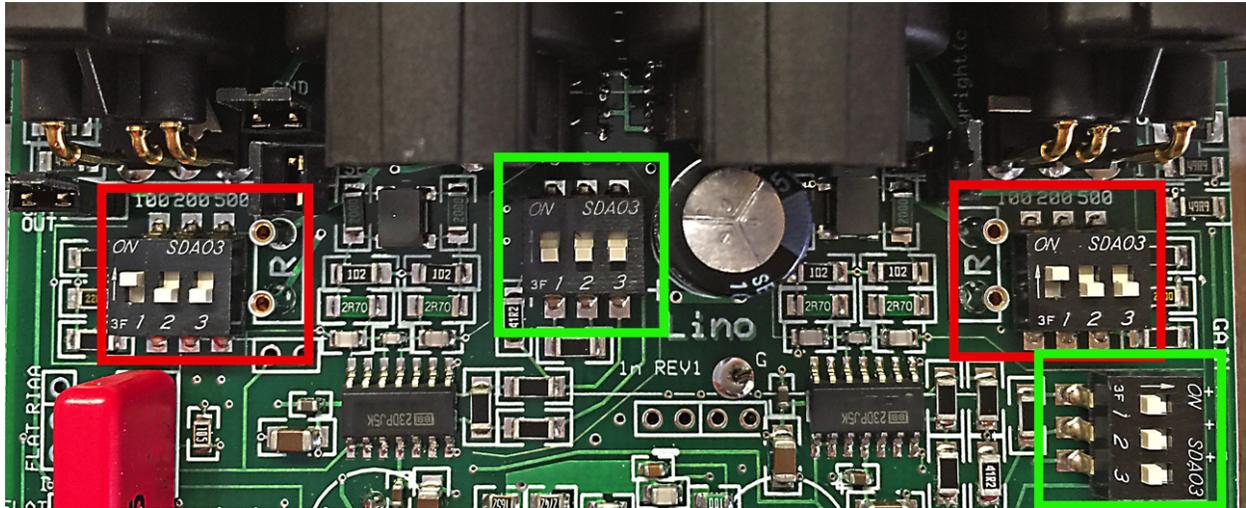
Lino preamplifiers ordered in a configuration omitting the RIAA EQ module will not include these jumper settings and will be connected for Flat balanced outputs. An external analog to digital converter (ADC) and Pure Vinyl would be required to provide the necessary RIAA EQ.

(1) Flat Phono Preamplifier for using with an external ADC and Pure Vinyl: Use sturdy tweezers or fine tipped pliers to grip and move the internal **BAL OUT** jumpers to direct the **FLAT** signals to the outputs. Connect the Balanced outputs to the Balanced inputs of your ADC.



(2) Stand Alone, Balanced Phono Stage: Move the internal **BAL OUT** jumpers to direct the **RIA A** signals to the Balanced outputs (two locations, as labelled on the circuit board). *This is the factory configuration, unless Channel D is advised in advance of shipment that you intend to use the Lino with an external ADC.*





Cartridge Loading: Internal DIP switches (red, above) are used to select the preinstalled cartridge load (consult the cartridge manufacturer’s specifications for proper load setting for your cartridge). Four standard load values are available (plus parallel combinations). *Other values can be obtained by inserting resistors (with 5 mm lead spacing) into the provided circuit board R sockets.*

Load (Balanced)	Left LOAD DIP switch	Right LOAD DIP switch
100 Ohms	1 On	1 On
200 Ohms	2 On	2 On
500 Ohms	3 On	3 On
2000 Ohms	All Off	All Off
140 Ohms	2, 3 On	2, 3 On
70 Ohms	1, 2 On	1, 2 On
60 Ohms	All On	All On

Preamplifier Gain: The gain is adjustable via DIP switches (green, above).

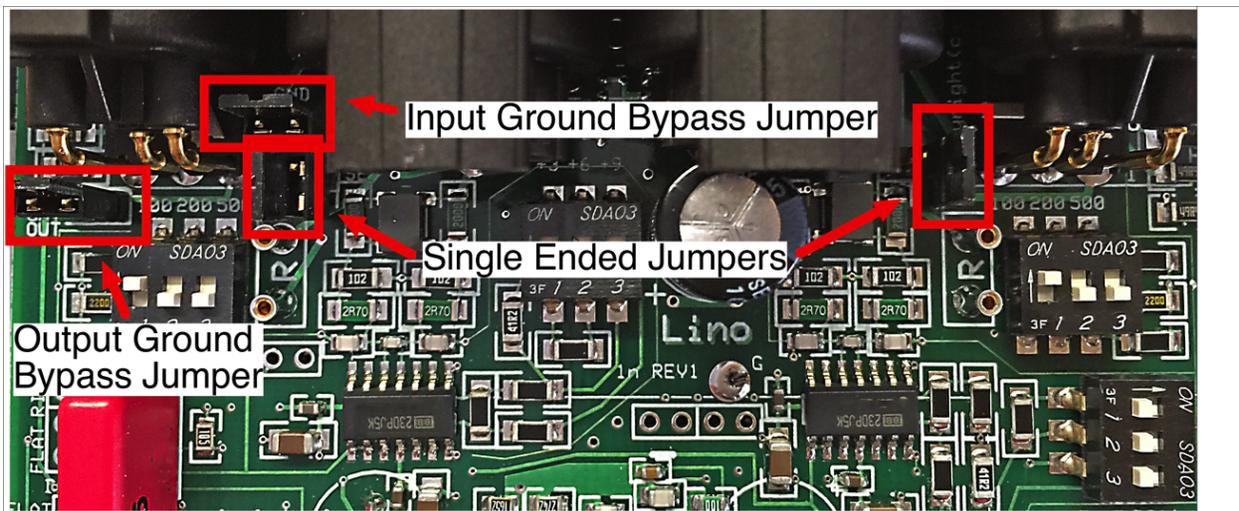
Gain (Flat / RIAA)	Left DIP switch	Right DIP switch
43 dB / 55 dB	All Off	All Off
46 dB / 58 dB	#1 (+3) On	#1 (+3) On
49 dB / 61 dB	#2 (+6) On	#2 (+6) On
52 dB / 64 dB	#3 (+9) On	#3 (+9) On

If you’re accustomed to using conventional phono preamplifiers, the Lino “Flat” gain settings may seem somewhat lower than usual. The gain settings are tailored to using the Lino with Channel D Pure Vinyl’s RIAA EQ compensation curve and an analog to digital converter. The required gain is about 10 to 12 dB less than needed in a conventional phono preamplifier, because the signal is provided to Pure Vinyl with treble emphasis (boost) intact. This is advantageous, reducing distortion and increasing the dynamic range of the conversion process. *Note for the technically knowledgeable: this gain turns out to be somewhat less than the maximum 20 dB boost of the RIAA compensation curve at 20 kHz, due to the frequency balance of most music.* If you would normally use a preamplifier gain of 64 dB for your moving-coil cartridge, the proper setting on the Lino would be 52 dB. The RIAA module and outputs incorporate an extra 12 dB of gain, as reflected in the table.

The *Pure Vinyl User Guide* includes complete information on setting the proper preamplifier gain for transferring LPs to digital files (with an external ADC - not included). Briefly, **you should aim for “Dry” signal level peaks in Pure Vinyl between -20 and -4 dBFS, for the music that you usually play.** Provided that peaks usually reach these levels, it’s not necessary to have to adjust the gain setting frequently, or at all. It’s prudent to allow at least 4 to 6 dB of headroom below full scale, to accommodate unexpectedly loud modulation levels. (At the low end of the suggested signal range above, be certain that a signal peak represents music and not “pops” or “clicks,” which also should remain below 0 dBFS at the high amplitude end of the signal range.)

If your audio interface permits setting nominal input signal levels to consumer or professional format (true of professional audio interfaces from Lynx, RME, etc.), first try the consumer (“-10 dBV”) setting, in conjunction with the minimum gain setting on the Lino.

- **If signal levels are too high**, set the **input** of the audio interface to professional (“+4 dBu”) format.
- **If the levels are too low**, increase the gain on the Lino. (For monitoring / playback, if the **output** levels of your interface can be adjusted independently of the input levels, use the +4 dBu setting for the **output**.)



Input Ground Bypass Jumper

The internal ground jumper bypasses (in the bridging position) the 100 ohm local ground isolation input resistor (connected between XLR Pin 1 and circuit common) directly to common. This may provide more, or less, “hum” immunity, depending on your other equipment. **Factory setting is with the jumper bridged.**

Output Ground (XLR Pin 1) Bypass Jumper

The output ground jumper bypasses (in the bridging position) the 100 ohm local ground isolation output resistor (connected between XLR Pin 1 and circuit common) directly to common. This may provide more, or less, “hum” immunity, depending on your other equipment. **Factory setting is with the jumper bridged.**

Single Ended / Balanced Input Jumpers

Two jumpers marked on the circuit board as S.E. are used to configure the Lino for single ended or balanced operation. In single ended operation, the negative cartridge terminals are connected to circuit

common. The single ended connection should be used **only** if noise (hum) is detected, and the connecting cable between the cartridge / turntable is the standard, consumer type shielded RCA cable (a single shielded conductor). *The Balanced configuration will provide the highest performance in most connection scenarios. Factory setting is with the jumpers open (balanced input).*

See the photo above illustrating the jumper setting for single ended operation. **The single ended setting is the jumper “bridging” position.** Both jumpers *must* be configured the same way for proper operation. For balanced operation, simply place the jumpers in the “Parking” position (with one jumper pin open).

The Lino will function noiselessly (no detectable hum) using the RCA input connectors even in single ended mode with most tonearm / turntable setups.

However, for optimum low-noise operation, it is strongly advised that balanced (shielded twisted pair) cable be used to connect the turntable to the Lino. This may entail rewiring the turntable. For low impedance (low output cartridges, such as moving coil, with an internal resistance of 100 ohms or less, and nominal output voltage around 0.6 mV or less) shielded twisted pair microphone / standard audio signal cable can be used. “Star quad” type shielded twisted quad audio cable will provide superior immunity to noise (hum) pickup. To use the star quad cable, the conductors of the same color should be connected together at each end of the cable. While extremely effective at rejecting electronic interference, the disadvantage of star quad is high capacitance, 40 pF per foot, or more (consult the manufacturer’s specifications), however, low output moving-coil cartridges are not affected by capacitive loads.

The shield (and only the shield) should be connected to the XLR connector pin 1; positive cartridge connection to pin 2, and negative to pin 3. For more information, see the *Pure Vinyl User Guide*.

If you hear any hum on the output, this indicates an input wiring issue. Take care to confirm that your turntable / tonearm / cartridge doesn’t connect the chassis ground or common to any of the cartridge signal leads:

The only case (in the world) we’re aware of (as of the time of this writing) pertains to tonearms and turntables manufactured by Rega. The internal connector is wired with the tonearm ground connected to the left channel negative signal lead. This will likely cause hum with the Lino (or any other balanced phono stage). This is not a fault of the Lino; it is a problem with the tonearm wiring, which is not configured properly for use with a balanced input. The tonearm output lead / strain relief at the base of the tonearm can be disassembled and the ground connection disconnected from the connector / cartridge signal wire. The tonearm ground connection then should be provided with a separate connection wire to attach to the Lino external grounding lug. This modification will improve the performance for balanced or unbalanced high quality preamplifiers. If you have a Rega turntable or tonearm, please contact Channel D for assistance.

Another example includes phono cartridges having a connection or bridging lug that connects the cartridge housing body to one of the signal leads (usually the left channel “negative” lead). This should be disconnected or removed by gently bending or tugging with fine tip pliers / tweezers or a similar tool.

Neumann RIAA Curve Modification (on RIAA module)

The Lino is configured from the factory for the standard RIAA phono correction curve. The so-called “Neumann” modification introduces an additional high frequency time constant to compensate for the putative roll-off of the mastering lathe cutting head. The Neumann setting can be enabled by removing the two jumpers on the RIAA module (or placing them in a “parking” position with one jumper socket open). *The factory setting is with the jumpers bridged (standard RIAA phono correction).*

Specifications - Lino Preamplifier for Low Output/Low Impedance (Moving Coil) Cartridges

- **Input Load Resistance:** maximum 2 k Ω ; user adjustable
- **Inputs:** Balanced, Neutrik, Premium Gold Pin XLR; RCA (single ended or balanced)
- **Outputs:** Balanced, Neutrik, Premium Gold Pin XLR
- **Output Impedance:** Less than 100 ohms
- **Power:** 5 volt external power adapter, 2.1 mm barrel, tip positive
- **Power Consumption:** less than 5 watts idle
- **Dimensions:** 5" x 1.75" x 5.5" (W x H x D)
- **Circuit Topology:** Fully balanced, direct-coupled from input to output (no capacitors in the signal path). Modern surface mount component technology.

RIAA Outputs

- **Gain:** 55, 58, 61, 64 dB
- **Deviation from RIAA Standard:** less than ± 0.1 dB, 20 Hz - 20 kHz
- **RIAA Channel Matching:** within ± 0.02 dB, 20 Hz - 20 kHz
- **Channel Separation:** ≥ 80 dB, 20 Hz - 20 kHz
- **Active Circuit Frequency Response (-3 dB):** DC to 1 MHz
- **Distortion:** less than 0.005%, 20 Hz to 20 kHz
- **Signal to Noise Ratio (at maximum gain):** 76 dB (referred to 0.5 mV input)
- **"Neumann" setting:** 50 kHz RIAA modification, can be enabled with internal jumpers
- **Outputs:** Balanced, Neutrik, Premium Gold Pin XLR (jumper selectable); RCA
- **Output Impedance:** less than 100 ohms
- **Circuit Topology:** Direct coupled from input to output; no DC blocking capacitors in signal path. Two stage correction circuit. (1) Completely passive high frequency correction. (2) Active low frequency correction using premium, low distortion wide bandwidth FET amplifier. Independent single ended / unbalanced (RCA) ground referenced outputs. Modern surface mount component technology.

Flat Outputs (for use with analog to digital converter and Pure Vinyl™)

- **Gain:** 43, 46, 49, 52 dB
- **Frequency Response (-3 dB):** greater than 200 kHz at any gain setting
- **Harmonic Distortion:** less than 0.0007%, 20 Hz to 20 kHz, at any gain setting
- **Channel Balance:** better than ± 0.025 dB
- **Intermodulation Distortion (19 kHz / 20 kHz 1:1):** less than 0.005% at any gain setting
- **Signal to Noise Ratio (at maximum gain):** 79 dB (referred to 0.5 mV input)

If you're accustomed to using conventional phono preamplifiers, the Lino "Flat" gain settings may seem somewhat lower than usual. The Flat gain settings are tailored for using the Lino with Channel D Pure Vinyl's RIAA EQ compensation curve and an analog to digital converter. The required gain is about 10 to 12 dB less than needed in a conventional phono preamplifier, because the signal is provided to Pure Vinyl with treble emphasis (boost) intact. *Note for the technically knowledgeable: this turns out to be somewhat less than the maximum 20 dB boost of the RIAA compensation curve at 20 kHz, due to the frequency balance of most music.* Accordingly, if you would normally use a preamplifier gain of 64 dB for your moving-coil cartridge, then the proper setting on the Lino flat output would be 12 dB less, or 52 dB. The RIAA hardware compensation module incorporates an additional 12 dB gain, resulting in 64 dB total gain with a 52 dB Flat gain setting.

Miscellaneous: Precision (0.1 percent) low temperature coefficient, low noise metal film resistors. Ultra low dissipation sputtered metal film polypropylene capacitors, selected by hand to match design within 0.1 percent tolerance (RIAA module). Ultra low ESR power supply decoupling capacitors. Low noise, four-layer circuit board with continuous internal ground and power planes. Carefully selected, low noise galvanically isolated brick power supply, stepped up to split supplies and filtered in multiple stages for extremely low noise.

Warranty

- One year parts and labor, limited warranty. In the unlikely event your Lino must be returned to Channel D for repair, contact Channel D in advance for a return material authorization number and shipping instructions.

In keeping with our continuing efforts to enhance and improve our products, we reserve the right to change specifications without notice.

APPENDIX

20 Hz to 20 kHz Sample RIAA Accuracy Graph

This is a sample. The graph for your own preamplifier unit is included separately from this Installation and Use Guide.

