

iota-audio-design

"small things that matter"

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The iota
Signature Reference
&
Power supply
Balanced Phono Stage
Owners Manual

Designed and Manufactured in the UK.

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The Phono Stage Family Tree

- **iota Median Phono Stage X-1** (*with plug top supply*).
- **iota Median Phono Stage XL-2** (*with twin outlet version of the above, therefore able to supply power for two products from the iota range at the same time*).
- **iota Signature Reference Phono Stage** - *A two box phono stage, with dedicated high current, fully regulated "Signature Twin", dual mono power supply, with selected high quality components throughout the signal and power supply stage.*

Product History:

The products listed above are the result of many years work from a dedicated team of designers and music enthusiasts with a love of Vinyl records. The development that was undertaken at the beginning of 1991 was to produce a phono stage that could extract the highest quality of sound reproduction from vinyl records, with the minimum of noise and interference, whilst still being compatible with the widest range of equipment. The very first units were sold as single box items, with a balanced input and single ended output, & internal power supply. Bespoke cartridge loading facility was provided for the customer's chosen cartridge, on individual removable headers.

Following this initial product a revised fully balanced version followed some two years later, this was in larger casework & offered the present day arrangement of "dial in" loading and gain switches that could be customer set to accommodate any cartridge, as well as the amended casework and signal circuitry, it also incorporated an external power supply to further enhance the noise performance of this product. Over the first few months of production of this new product some owners so

delighted by the jump in performance offered by our products over their original equipment, asked if it would be possible to take the concept any further? The result was the first of our "Signature" products developed following these requests.

The procedure adopted was to optimise the original circuit and power supply, and then hand select all the components in the signal path. Unfortunately due to the increased complexity and the laborious and time-consuming nature of the selection work the cost also increased. As a result it was expected that only a very limited number of signature products would be ordered, however the original production batch, expected to sell over the next year was sold out in less than a few weeks! All ordered by existing happy owners after hearing the improved signature product.

With the revised **Iota Signature Reference** despite being a development of the original design concept & using similar techniques. The products differ in many key areas, e.g. different signal circuits, and larger power supplies, with higher current delivery and extra stages of regulation, plus selected higher-grade, close tolerance components used throughout the dual mono design. Unfortunately as a result it was impossible to provide an upgrade path from the **Median phono stage** to the **Signature Reference** due to the added complexity.

Other than cosmetic changes in external case work this range of Iota phono stages continued in production otherwise essentially unchanged in both the **Median & Signature** versions until 2016. Then we significantly revised and upgraded the components used in both of the designs, but not only did we offer this improved 2016-Rev II version for new owners, but we also offered to service and upgrade existing phono stages, and following the upgrade we also provided a new guarantee for all upgraded items irrespective of whether the item was owned by the original customer or purchased on the second-hand market. Because many original owners have continued to use our products for many years we have had a very good take up in this upgrade service, and the feedback has been universal in its acknowledgement of the performance upgrade with all our existing owners.

The present 2016-Rev II versions of the **iota** range still allows customers to purchase the **Median X-1** phono stage with its basic supply, and then at a later stage upgrade both the performance and flexibility by replacing it with the **XL2 power supply** then also allowing further **Iota** products to be added & supported.

Why a Balanced Phono Stage?

The phono cartridge, either moving coil (MC), or moving magnet (MM) is a device to "read" the groove of a vinyl record by responding to the modulations within the groove, and as a result of these vibrations, there by generate electrical energy in the form of fractional voltage signals.

When these output signals are presented to the phono stage these are "decoded" or more accurately equalised to produce the sound we hear through the speakers.

As such all standard phono cartridges are in fact fundamentally balanced devices, despite this with most conventional phono stage applications, turntables are used as a single ended source and terminated in RCA phono plugs. Why ..? We believe largely because of convenience as most other sources in a domestic hi-fi system were traditionally also terminated by phono plugs, and so it was considered the easy option, it certainly has nothing to do with extracting the best performance and lowest noise or immunity from interference!

As unfortunately the cartridge is also subject to a great many other outside forces acting upon it; not least of which are magnetic radiated fields produced by power supplies, and transformers and other equipment. This is evident by a fixed level of noise at either 50 or 60 Hz dependant upon your countries mains supply. Radio frequency interference in the form of "Ham radio" or "CB radio", or even local taxi's may also be heard to break through, as well as the signal we want to hear, this situation is exacerbated by ignoring the advantages of balanced operation, and instead using the cartridge into single ended equipment.

Design principals.

Our phono stage was developed to offer the best performance from the vinyl records without the usual problems of hum, noise, and radio frequency interference. Whilst still offering total flexibility in the choice of cartridge. As there is no such thing as a "*standard*" cartridge, in respect of either the recommended load or output, it is essential for a phono stage to be adaptable to allow the use of any cartridge currently available, as well as to ensure maximum performance.

The very wide variations in load and output voltage which can be accommodated with this phono stage allows the user to fine tune precisely a specific cartridge and arm cable combination to a particular system. In fact it is even possible to allow for even minor deviations in specification, sometimes due to manufacturing tolerances, which can be displayed by an individual cartridge. This is not always possible with other phono stages.

The importance of providing the correct load or cartridge termination to ensure maximum performance can not be underestimated. It is essential for both the best performance and to avoid the obvious changes in tonal balance, which will be evident with incorrect loading. With incorrect loading applied to a cartridge it is also possible to induce miss tracking that will produce both a distorted sound, as well as permanent damage to precious vinyl!

Once again with most phono stages these effects are unavoidable, or at best only a compromise position will be offered, which by its very nature compromises the performance of the system, and may not extract all the

information available from your vinyl collection. This is why our phono stages are in regular use in professional recording studio applications, where the transfer of rare or unique vinyl takes place directly to new digital master tapes. They are expressly chosen for this application as a result of the exceptional noise performance, tonal accuracy, and fidelity.

Balanced operation for both the input and output ensures the ideal means of handling the very vulnerable signal that vinyl reproduction represents. With our phono stage it is possible to use any practical length of suitable arm cable without experiencing interference problems. The same is also true of the output from the phono stage; true differential balanced operation allows even extreme lengths of cable to be run, once again without "pick up" or interference affecting the signal. This is possible due to "common mode rejection" which is a feature of true differential balanced operation. True balanced operation is only possible by providing not only the equalisation of the original signal but also generating the 180-degree opposite signal as well. Both of these signals must also be protected at all times by a very effective screen to further protect the signal. When the signal is fed into a suitable amplifier the two opposite signals are compared and any additional features (i.e. interference picked up by the cable) is rejected by the action of common mode rejection.

This is not possible with conventional single ended operation, as any interference will simply be added to the original signal and be amplified by your equipment, and you will then hear this in the form of hum or other unwanted noise, or by masking or simply failing to resolve information.

Unpacking & connecting the unit:

The equipment is supplied in two separate boxes; one will contain the phono stage and the other the power supply. The Iota nameplate may still have the protective film in place, unless your retailer has removed this, simply peel this film off to reveal the high gloss finish under the film.

With the exception of the **X1** power supply for the **Median** that is fitted with a captive cable, all other power supplies are supplied with a standard three pin IEC mains sockets. We also include a suitable mains supply cable with moulded plug. Please confirm the plug as supplied is suitable for your country and its mains voltage.

Please also note this product must have the mains earth connected, & in the event of a fuse failure only replace fuses with the correct type, and value. See rear panel for description.

Because of the design and construction of our phono stage, the power supply will not produce interference with our equipment; therefore you may position the units either side by side or with the phono stage on top of the power supply whichever is most convenient.

First connect the dedicated **Iota** power supply cable between the units, this cable is fitted with a specific connector and rotary-locking ring. Insert the multi pin plug, five pin for **Median**, and eight pin for **Signature Reference**, please observe the correct position of the key slot on one side of the plug, and insert the plug correctly. With the plug fully inserted tighten the rotary locking ring, (***finger tight ONLY***) this will avoid accidental disconnection.

Now connect your tone arm cable to the phono stage. Usually the red plug or cable is the right hand channel. If your arm cable is fitted with an earth tag connect this to the grounding post on the rear of the phono stage. It is not normally necessary to further connect any ground wire to your pre / integrated amp from this post. Now connect the output cables from the phono stage to your pre /integrated amp.

Please ensure any connection to your existing equipment is made to a spare **LINE level only connection, and NOT** to any input that already has a phono stage on board, Potential damage to your equipment could result if mis-connected. Once all connections have been made switch on your new phono stage and confirm the LED's show power is available. The Iota equipment will benefit from an extended warm up, and can be left on permanently, unless you do not expect to use the equipment for an extended period, when it is best to switch off the unit and remove the mains cable.

F.A.Q.

Can I only use the Phono stage with balanced equipment?

No is the simple answer to this question, although originally designed as a true differential balanced unit, and in order to give its best results, the phono stage should be used in total balanced mode. However as a true differential balanced device our phono stage used with either an unbalanced source or amplifier, excellent performance is possible with only simple adapters being required. Either fitted to the back panel of the equipment, or more simply by providing the appropriate balanced to single ended interconnecting cables. ***Please enquire with your retailer as to whether or not your existing equipment could be modified to take full advantage of balanced operation.***

What "Bespoke" options are available?

For customers with special requirements our phono stage can be altered to meet your specific requirements. For example our phono stages in the standard configuration are able to support most cartridges available on the market, however if you would like a different range of cartridge loading or gain options we are able to offer alternative values specifically for your preferred cartridge.

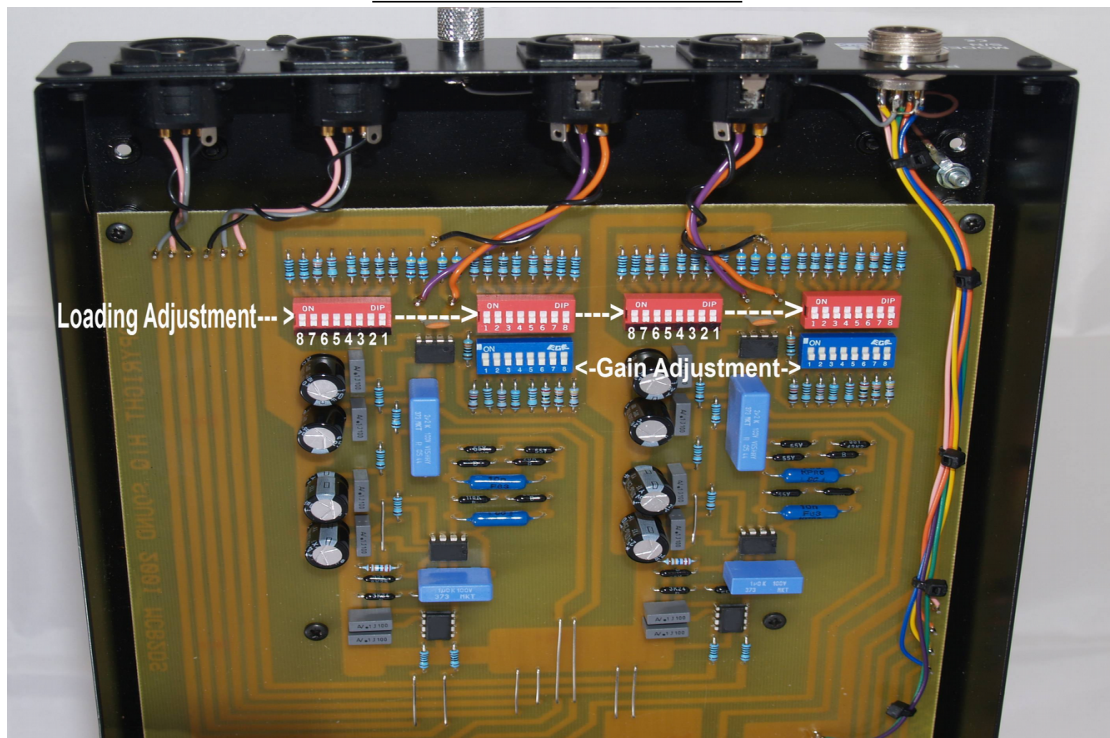
For Moving Magnet (MM) cartridges the standard single loading option may be ideal, however we can amend the phono stages so that the wide range of Moving Coil (MC) options are replaced with values that specifically support experimentation with MM loading and outputs. As such we are also able to provide specific values to suit a very wide range of MM cartridges.

What cable should connect the Balanced Phono Stage to the turntable?

The original cable fitted to your arm may be constructed in a manor that would support re-termination in true balanced mode. Alternatively if the tone-arm on your turntable is fitted with the standard type SME/Jelco pattern five pin plug, the original cable can be replaced with our dedicated true balanced cable, terminated with a right angled or straight SME/Jelco plug at one end, and Neutrik XLR plugs at the other.

Due to the extra protection offered by true differential balanced operation, there is essentially no real practical limit to the maximum length of tone arm to phono stage cable. As a result some of our customers site the phono stage remotely from their turntable, or in some cases even in another room. For example during development and testing we have used arm cables in excess of 25 meters without signal degradation!

DIP Switch locations



Setting the phono stage for cartridge load and output:

In order to maintain signal integrity & maximum protection from interference the adjustable DIL switches are located inside the metal casework of the unit.

When the unit is new the wrap around lid, which is designed to be an exact fit, can be slightly stiff to slide off, until the lid has been slid on and off a few times.

- 1) Remove the mains power supply plug from the back panel of the phono stage.
- 2) Place the unit on a smooth protective surface, & remove the screws that secure the units lid, these screws are accessible from the underside of the enclosure. Then put the unit on its side with the feet facing you, & with the front name plate to your left. Place your left hand on the top edge of the unit & while holding this top edge, push the phono stage out of the lid, towards the name plate, with your other hand, by pushing against the back panel. The lid will then easily slide off from the rear of the unit.
- 3) To establish the correct Loading & Gain that is recommended for your cartridge please consult the manufacturers information/specification sheet, this is usually provided in the box with the cartridge. If this is not available there are numerous on line data bases that offer this information. All cartridge manufacturers define the output voltage that a cartridge will generate, and this will be expressed in either microvolts with the symbol **uV**, or as millivolts **mV** or as a fractional value.

E.g. *Recommended load and output may be expressed as follows :*

MM = 47K (**load**) 4mV (**Gain**) at 1kHz, 5cm/sec

or

MC > 20Ω (**load**) 0.3mV or 300 uV (**Gain**) at 1 kHz, 5cm/sec

If the exact value is not shown, please set to the closest available option. Some experimentation with different values may prove beneficial in some systems.

- 4) Locate the DIL switches The four switches for adjusting the **load** are coloured **red**, and the two **gain** switches are **blue**.
- 5) *****Please note ***** In order to maintain circuit symmetry for the **Load** switches, the numbers are reversed on the two switches highlighted. Consequently these two red **Load** DIL switches have the numbers blanked out. Therefore to set the correct values, please observe the numbering on the following table, and set accordingly, on four switches.
- 6) Put the switches into the ON position for the value required.

Switch layout:

***** * LOAD * *****	***** * LOAD * *****	***** * LOAD * *****	***** * LOAD * *****
8 1	1 8	8 1	1 8
***** * GAIN * *****		***** * GAIN * *****	
1 8		1 8	

Selecting the correct cartridge gain:-

Cartridge Output Gain switch setting = db

4mV	None (MM)	40 db
0.100 mV	1	58 db
0.125 mV	2	60 db
0.150 mV	3	62 db
0.200 mV	4	64 db
0.250 mV	5	66 db
0.300 mV	6	68 db
0.400 mV	7	70 db
0.500 mV	8	72 db

When setting the load DIL switches please observe the column in the table below that is correct for your turntable, which column to use will depend upon how your tonearm cable is terminated.

Select the correct load for balanced (XLR) Turntable sources see column **A**

For unbalanced (single ended RCA phono) Turntable sources see column **B**

Cartridge load.....Set Load switches :

<u>Turntable A (balanced)...</u>		<u>or.....B (single ended).....</u>		<u>switch no's</u>
5 ohm	/	2.5 ohm	=	1 2 3 4 5
10 ohm	/	5 ohm	=	1 2
15 ohm	/	7.5 ohm	=	4 5 7 8
20 ohm	/	10 ohm	=	1
30 ohm	/	15 ohm	=	4
40 ohm	/	20 ohm	=	5
50 ohm	/	25 ohm	=	6 7
66 ohm	/	33 ohm	=	6
100 ohm	/	50 ohm	=	7 8
200 ohm	/	100 ohm	=	7
47 K	/	---	=	None

Please contact iota-audio-design or your retailer for any further information, or additional options & special requirements.

Guarantee: This equipment is covered by a full three-year parts and labour warranty, against fault workmanship or materials. This guarantee is offered on a return to manufacturer basis, and does not affect your statutory rights, within the terms of the sale of goods act.

The invoice, or some form of proof of purchase that will be provided by your retailer is your guarantee certificate for the equipment. Please keep a record of the equipment's serial number, and the date of purchase in the space below.

1) Equipment purchased.....

2) Name and address of retailer.....

.....

3) Date of purchase.....

N.B. Additional notes on balanced cables and connections.

Our equipment is designed to be universally applicable with all other manufactures equipment, however we have no control over how other equipment is grounded; to ensure hum free operation please adhere to the following notes.

The tonearm input cable only require the screen of that cable to be connected at one end. Therefore connect the screen to PIN 1 of the XLR of each channel, but ONLY at the phono stage end.

Any tonearm earth cable should be kept separate from both the screen and signal cables, and this separate earth cable does not require a connection to or from the outer screen of these cables. This separate tonearm earth cable should be connected to the 5th pin of an SME/Jelco plug at the tonearm, and should then ONLY be connected at the other end to the external grounding post of the phono stage.

Any balanced interconnect cables used with our equipment should have the screen of the cable connected ONLY to Pin 1 of the XLR plugs, and should NOT have a connection between the screen of the cable and the optional connector tag to the outer metal shell of the XLR.

iota-audio-design Balanced phono stage Specification & measured performance:

Noise:

All measurements made linear, 22.4-22.4KHz measurement bandwidth, Rg=10 Ohms

Output Noise Floor:

MM: < -85dBV

MC: (switch position 4, gain=64dB): < -72dBV

Equivalent input noise:

MM: <125dBV (560nV)

MC: (switch position 4, gain=64dB): <-136dBV (160nV)

THD: <0.01%

RIAA Accuracy: <+/- 0.15dB (30-20KHz, all settings)

Channel balance: <+/- 0.15dB (1KHz, all settings)

Overload margin: >20dB (all settings, 20-20KHz)

Crosstalk: <-80dB (all settings, 20-20KHz)(Dual Mono Construction)

CMMR (Common Mode Rejection Ratio) 1KHz: >>50dB
Typically >80dB (all settings)

Input capacitance: 150pF

Input Impedance: See user manual for individual switch values.

Gain:

Switch Position	Spec dB
0	40
1	58
2	60
3	62
4	64
5	66
6	68
7	70
8	72
