

PHONOBLOCKS

-a phono preamplification
instrument

by Sutherland Engineering



OWNER'S MANUAL

A note from designer RON SUTHERLAND:

The PhonoBlock story

INTRODUCTION:

The PhonoBlock is the phono preamp I designed for my home system. Its design was a self indulgence. I built it to please me. There was no consideration to accommodate any market influences. That mind-set gave me the absolute freedom to build an uncompromised and, in my opinion, the best phono preamp.

- Ron



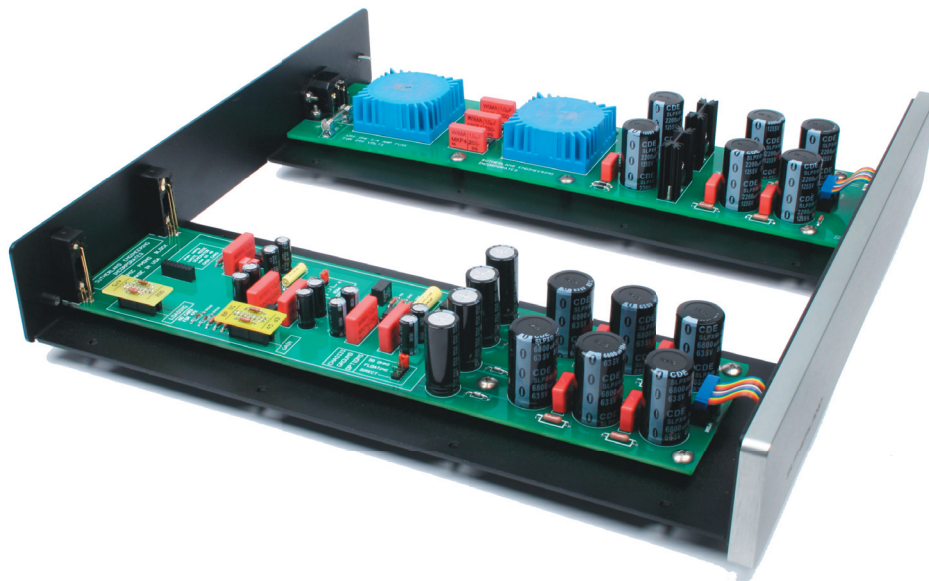
DESIGN PHILOSOPHY

Another path to the same destination.

Almost always, upscale designs are laden with features. More features are touted to represent advancement, product differentiation AND a rationale for the upscale price. The PhonoBlocks don't play that game. Their elevated performance is achieved by NOT cluttering the signal path with deleterious features. Complexity is not the path to purity. Elegant refinement is.

PHONOBLOCKS

SEPARATION...complete



DESIGN PHILOSOPHY

POWER SUPPLIES

POWER SUPPLY:

Much of the PhonoBlock's effortless musicality can be attributed to power supply capability. The power supply is not 'sized' for the gain stage's load. On the contrary, gain stage power requirements place an insignificant load on the power supply's capacity. The power available to the amplifier section is a bedrock solid foundation. Precisely defined by fixed current regulators, shunt voltage regulators right at the load and over 100,000 microfarads (per mono chassis) for energy storage. It takes nearly 20 seconds for this huge reservoir to fill up when AC power is applied.

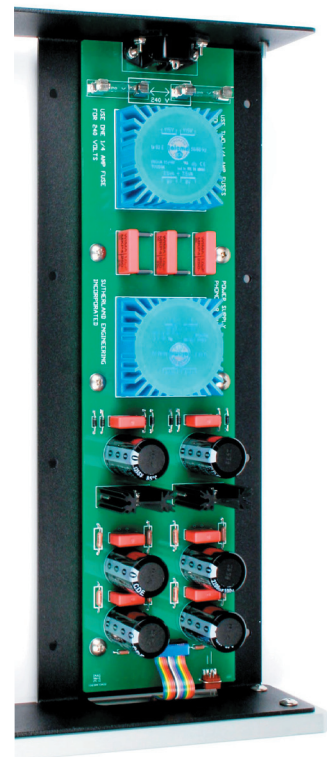
For a design guided by simplicity, the PhonoBlock's power supply may, at first, appear plenty complicated. Admittedly, it is both simple AND complex. It is a long chain of individually simple elements. Each element has a function of either filtering or regulation (also doing a filtering function). Each element inserts a level of isolation. The accumulated isolation is unprecedented.

The chain looks like this:

- AC power entry connector
- AC fuses
- First torroidal transformer
- Dual pi ferrite bead / film capacitor filter
- Second torroidal transformer

From here, there are two parallel power paths. One for the first gain stage and another one for the final gain stage. EACH of the two separate paths has these elements.

- Slow recovery, discrete diode, full-wave bridge rectifier
- Initial filter capacitors
- Constant current regulator
- First RC pi filter
- Second RC pi filter
- Shielded ribbon cable between shielded compartments
- Cross over from the right compartment to the left compartment



DESIGN PHILOSOPHY

- Third RC pi filter
- Forth RC pi filter
- Fifth RC pi filter
- Constant voltage shunt regulator
- Electrolytic and film capacitor bypass at the active devices

You can clearly see that each element adds 'distance' from the incoming AC power source. This is also apparent when you look at the physical layout of components. Each element adds a physical distance from the AC power connector. All listed items before the ribbon cable are in the right shielded enclosure. They are in linear order from back to front. The ribbon cable goes from right to left, taking power to the front of the audio board. Power filtering elements then go in linear order from front to back on the audio board. Finally, you will see the electrolytic and film capacitors very closely clustered right at the chips they are powering.

Simple, logical, straightforward, reliable AND effective.

CASE / CONSTRUCTION:

Once a circuit topology is optimized for sound quality, it is critical that the surrounding physical environment is supportive of that achievement.

Like so many other aspects of the PhonoBlock design, the case is unassuming, classic ----- but with a unique, purposeful twist. There are two shielded enclosures behind the machined front panel. The right side contains the AC power supply and left side contains the analog audio circuitry. We get the performance advantages of shielded isolation and the tidiness of unification.



And yet there is another concealed advantage. Usually the cable interconnecting audio and power supply sections is hanging out in space, exposed to radiated interference and other environmental uncertainties. The PhonoBlock interconnection is hidden away, protected and totally shielded. You don't even see that cable. It is securely tucked into a machined channel in the aluminum front panel.

There are other details making the PhonoBlocks special.

Some are small. For instance, if the front panel logo were simply silk-screened ink, sitting on the surface of the panel it would, over the years, rub off. It is actually a black dye anodized INTO the aluminum. You can see and even feel the difference.

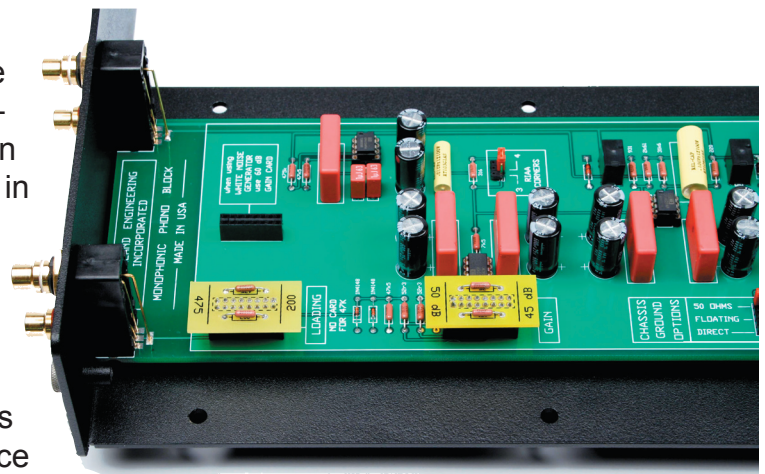
Some are big. The base of the PhonoBlock is laser machined 12 gage cold rolled steel. That's about 1/8" thick. That substantial platform is protected with baked on epoxy power coat.

Feet are custom machined from Delrin with rubberized cork inserts.

The theme of robust construction is also evident in the circuit boards. Fiberglass FR-4 is a well established, top quality choice for circuit board material. However, what you will see in the PhonoBlock is over the top. At 1/8" thickness, PhonoBlock circuit boards are twice as thick as normally seen. Individual parts are anchored from any mechanical movement.

PRINTED CIRCUIT DIELECTRIC:

Anytime two conductors are at a different voltage potential, there is an electric field generated between them. The dielectric (the insulation between conductors) within that field become involved in charge storage. If not carefully considered, that extra charge storage can time smear details of a musical signal. Circuit board material is a dielectric. With normal double-sided construction, there are copper conductors on each side of the board. Unintentionally, a new capacitor is introduced into the circuit, formed by top surface copper, bottom surface copper and the circuit board dielectric sandwiched between the two. It is NOT the



quality of capacitor we want to have in a high-end signal path. Some manufactures make the situation even worse by going to multi-layer boards in the analog audio sections. Instead of two layers of copper, there are four or more layers of copper. Even worse than that, the dielectric between layers is much thinner and the undesired capacitive effect is inversely proportional to thickness. At best, some manufactures make small, incremental improvements by using exotic board material.

The PhonoBlocks addresses the issue of circuit board dielectric in a novel – yet elegantly simple way. All signal carrying conductors are on the top plane of the circuit board. There are no copper conductors on the bottom plane, opposite signal carrying regions. Thus there are no electric fields generated between top and bottom layers. The circuit board dielectric is not exposed to electric fields and there is no undesired storage in circuit board material. The circuit board dielectric is not improved ----- it is removed. It is as if a window were behind you, instead of in front of you. It is still there, but not in the way of clarity.

WHITE NOISE GENERATOR:

It can take quite a long listening time before a high resolution component reaches its performance potential. The PhonoBlocks are no exception.

However, the PhonoBlocks distinguish themselves by including white noise generators --- one for each channel. White noise becomes the input signal and passes thru all stages of the PhonoBlock. You can even use the output of the PhonoBlock as a burn-in signal source for interconnect cables and the rest of your system.

The inclusion of such a feature into the signal path may seem to contradict the previously stated (emphatically stated) value of an uncluttered signal path.

The challenge is to add this useful feature without ANY compromise to the signal path. Remember, there are loading resistor circuit boards that plug into the PhonoBlock. The white noise generator circuit board plugs into exactly that same connector – instead of the loading resistor board. That same connector is used to either add resistive loading OR as a place to inject white noise. When you are finished with the White Noise Generator, just unplug it and replace it with your choice of resistive loading. There is no added complexity on the main PhonoBlock board.

GROUNDING OPTIONS:

Sometimes ground loops can cause hum in a phono system. Breaking ground loops can be easy or it can be a nightmarish frustration. In the difficult situations, grounding options can save the day.

For product safety and electrostatic shielding purposes, the metal casework of the PhonoBlock is electrically connected to the ground lead in the IEC power cord.

There are, however, options on the audio circuit's ground reference. Each mono chassis has three grounding options. They are selectable by moving a gold-plated shunt.

- Audio ground can float with respect to the chassis
- Audio ground can tie directly to the chassis
- Audio ground 'softly' connected to the chassis thru a 50 Ohm resistor

GAIN/LOADING OPTIONS:

One gain/load configuration will be optimum for a given system. There must be a mechanism for finding and installing that best choice.

The common way puts every conceivable option on the circuit board. Then only one of the available options is selected using some sort of switch. That approach is conventional, convenient and it works. Some products even have remote control to select configuration. On the down side, the circuit board

layout is compromised with the clutter of fitting in all option components. Signal path must wander thru the selector switch and the pile of unused option components. Sometimes the selector switch is of high quality. More often it is a cheap DIP rocker switch – the sort for setting digital signals. Not at all appropriate for passing the minute analog voltages from a phono cartridge.

To keep the signal path tight and uncluttered, the PhonoBlock uses plug in configuration boards. Gold plated sockets for the configuration boards are located on the main circuit board very close to the associated circuitry. Signal path length is kept short and direct. Only the one, optimum value component is applied to the signal path. The PhonoBlock comes with 4 gain options and 7 cartridge loading values. In addition, blank plug-in boards are included for fine tuning with custom values. You are not limited to standard values. Options are unlimited – but only one is in the circuit.

PHONOBLOCK specifications

Cartridge Loading

50 Ohms

100 Ohms

200 Ohms

475 Ohms

1k Ohms

10k Ohms

47k Ohms

blank card, can be configured for 1 to 47k Ohms plus capacitance

Gain settings

45 dB

50 dB

55 dB

60 dB

blank card, can be configured for 40 to 70 dB

SIZE:

17" wide

17" deep

3.25" high

SHIPPING BOX:

24" wide

24" deep

11" high

WEIGHT:

Net 21 lbs each

Shipping 26 lbs each

POWER REQUIREMENTS:

110 – 120 VAC, 10 watts, each

or

220 – 240 VAC, 10 watts, each

PHONOBLOCKS

www.sutherlandengineering.com