PHÆDRUS PHABRICS

TYPE: **PHABRICS**
B9A AUDIO BUILDING BLOCKS
PHABRIC-2 HEADPHONE STAGE
(**including Blumlein Σ stereo shuffler**)

The Phædrus Audio PHABRICS are premium-quality audio building blocks. Housed in a B9A (Noval) tube format, the minimal external circuitry may be wired onto the valve base, thereby eliminating the need for a PCB.


Incorporating a headphone amplifier of unique design, the PHABRIC-2 may be optimised to operate with a very wide range of headphones with impedances from 16Ω to 600Ω.

The PHABRIC-2 incorporates a binaural shuffler.

The inverse of Blumlein's **δ** shuffler which matrixed spaced omnidirectional microphone signals to signals suitable for loudspeaker stereo[1], the PHABRIC-2 reverses the process resulting in fatigue-free headphone-listening of exceptional realism.

The PHABRIC-2 incorporates 20dB (× 10) of gain, so that a complete, psychoacoustically-optimised, stereo headphone stage may be realised using the minimum of external components.

For more information contact: sales@phaedrus-audio.com
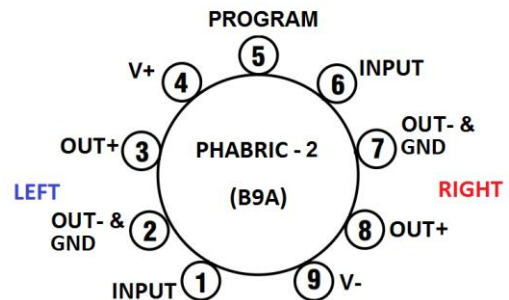
PHABRIC-2 (PHONES) Technical Specifications

Base type: B9A *Noval*
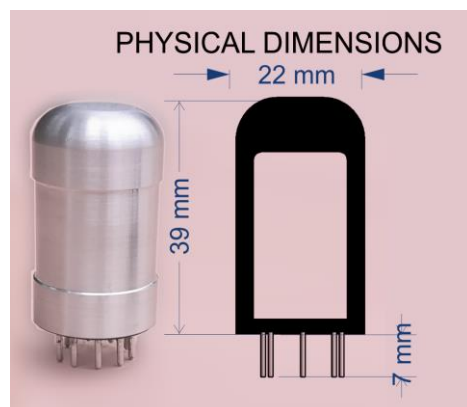**Input signal level (min)**: +0dBu into 10kΩ (0.775V RMS or 2.2V pk-pk)
Gain: +20dB
Power output: 65mW into 32Ω, 70mW into 300Ω[2]
Distortion: 0.004% (65mW into 32Ω)
Power Supply: ±12V. Do not exceed ±15V

PHYSICAL DIMENSIONS

Notes:
1. http://pspatialaudio.com/blumlein_delta.htm
2. Exposure to high sound levels can cause hearing damage. Be careful to control headphone levels always.

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TYPE: **PHABRICS**
B9A AUDIO BUILDING BLOCK
PHABRIC-2 HEADPHONE DRIVER
(including Blumlein Σ stereo shuffler)

APPLICATION INFORMATION

The DC conditions of the PHABRIC-2 are tightly controlled, so bulky, high value, output coupling capacitors of dubious audio quality are not required. However, AC input coupling is necessary and should be achieved using high-quality 100nF (0.1uF) capacitors. The small value reveals the very high impedance of the PHABRIC-2's FET input stage. Do not be temped to use capacitors of a higher value because these capacitors form part of the input filter.

The PHABRIC-2 must be fed from an impedance no greater than 3kΩ. The worst-case output impedance of a 10kΩ potentiometer is 2.5kΩ, so this is the highest permissible value of upstream volume control.

The PROGRAM pin controls the binaural shuffler circuit. If this is left floating, the shuffler is inoperative. If pin 5 is connected to the adjacent pin 6, the shuffling is invoked. A toggle switch connected between these two pins offers a convenient way to control the shuffling circuit. The shuffler circuit is an equal energy design (see diagram below), so that the frequency response of the headphones does not change when shuffling is invoked.
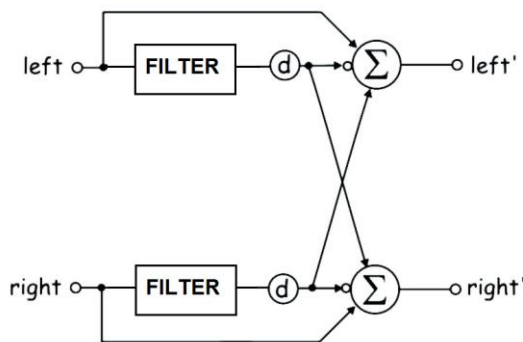
When the PHABRIC-2 is intended to drive low-impedance headphones *only*, the output may be forced in a low impedance state by wiring a **33Ω resistor between OUT+ and OUT-** on each channel.

Forcing the output into a low-Z mode is worthwhile when driving some models of low-impedance, open-back headphone. It is better not force low-impedance mode when driving low-Z, In Ear Monitors (IEMs).

The PHABRIC-2 component incorporates internal decoupling, but external 10µF – 100µF decoupling capacitors are recommended when the power is supplied over long wires. These may be soldered directly to the base to avoid the need for a PCB.
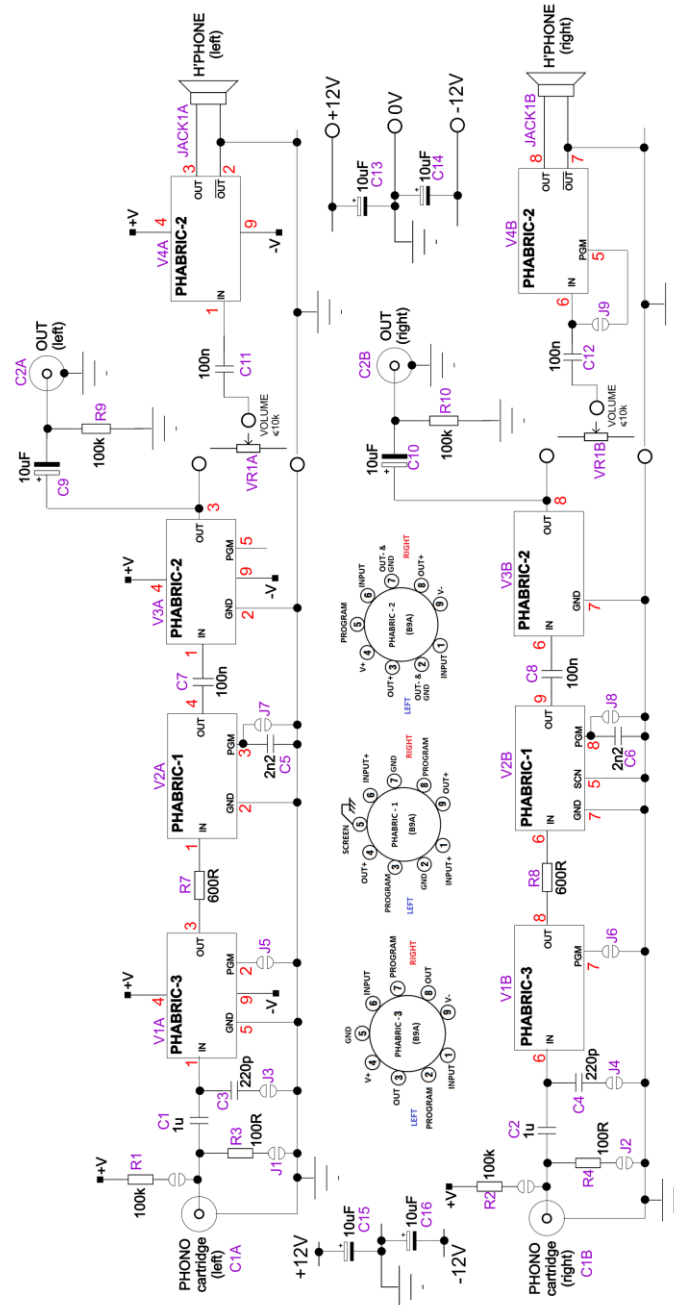
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EVALUATION BOARD (PHABRIC-1-EVAL)

An evaluation board is available for the PHABRIC-2 HEADPHONE DRIVER AND STEREO SHUFFLER audio building block so that the binaural (Blumlein Σ) shuffling and dual power amplifier may be thoroughly tested and evaluated. The board may be externally powered by a bench power-supply or with batteries. A full schematic is given below.

Blumlein Σ Shuffler

Because the shuffler in the PHABRIC-2 has transfer functions which are the conjugate of the Blumlein Delta (δ) shuffler, we term this shuffler a Blumlein Σ type. For more information about the Blumlein Delta (or TIHM) microphone technique go to: http://pspatialaudio.com/blumlein_delta.htm And, for audio demonstrations of the Blumlein Σ Shuffler go to: http://www.phaedrus-audio.com/PHABRIX.htm

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