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High-end balancer/debalancer with transformer properties

Can also be used as:

high-performance MC transmitter,
 fully-fledged preamp with sym/asym input/output.



Sym-Controller SYM-C

This precision module works electrically like a real transformer with different transmission ratios, but without galvanic isolation.

Inputs and outputs can be operated without reference to ground. Can also be used as a low-noise MC amplifier or high-end preamp.

The transmission ratio (\bar{U}) can be set in 5 steps from 1:1 to 1:16 (photo: previous version)

With the audiophile high-end op amp LME49720

Unfortunately, this finished module is no longer available

Still available as a kit from [phelektronik](#)

Main application: converting an unbalanced signal (Cinch) to a balanced (XLR).

Apart from the lack of galvanic isolation, the module works electrically like a real transformer.

Operation without ground reference is possible if a transmitter without ground reference is already used in an application.

The perfected audiophile circuit design enables a very precise conversion of the signal.

The negative properties of a transformer do not exist here, such as low-frequency distortions, limited frequency range, overshoots, optimal function only with power adjustment, magnetically influenced, etc.

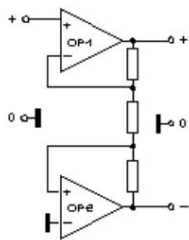
Advantages over a transformer: Very low output resistance at all frequencies, load-independent, definable input resistance by soldering a resistor. All data almost independent of the gain, significantly lower distortion factor.

High-quality components enable very low noise and very low distortion. If the output - or the input - is operated asymmetrically, one pin **must be grounded**, as with a real transformer, because there is no ground reference. This is made possible by a circuit design in which one output stage corresponds to the negative feedback of the other stage. As a result, one channel always refers to the other channel and not to ground. The result is a load-independent perfect symmetry - just like a real transformer.

Transmission ratio adjustable.

To ensure that the throughput gain is not limited to 1, the gain can be set in 5 stages with plug pins. 1:1 to 1:16. Therefore, this module is also ideal as a symmetrical preamp, or to replace an MC transformer. The optimum input resistance of the MC system can be soldered onto the input pins as a component.

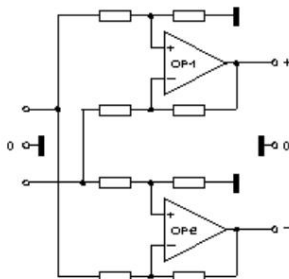
Conventional balancing circuits



1. This circuit shows the simplest structure, which is quickly soldered onto a breadboard.

Advantage: Very few components, fulfills its purpose in simple applications. Higher amplification possible with appropriate wiring of OP-1. High impedance input.

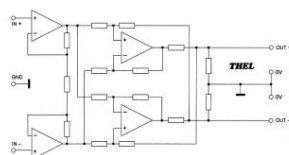
Disadvantage: No symmetrical input. The output signal has a ground reference and must not be short-circuited.



2. This circuit shows a slightly higher quality but still simple structure.

Advantage: Exact symmetry even with an asymmetrical input signal. Better performance than the above circuit.

Disadvantage: The input resistances cannot be increased at will, otherwise there would be a strong increase in noise. The input resistances cannot be reduced arbitrarily, otherwise the signal source will be heavily loaded. Therefore not suitable for high amplification and very small signals (strong increase in noise). The output signal has a ground reference and must not be short-circuited.



Our high-end SYM-C balancer does not have any of the disadvantages mentioned above. However, the circuit design is significantly more complex due to the **floating ground principle**, but it is justified by the high audiophile performance. The audiophile type LME49720 is used as the OP amp. The output signal that is not used (unbalanced output) **must be connected** to ground.

Voltage conditioning "on board" with highly effective smoothing and stabilization. Above $\pm 18V$ the voltage on the module is limited. This makes it possible to apply a not so clean operating voltage of up to $\pm 35V$. It can thus be supplied from an existing device. If the module z. B. be switched before a bridge output stage, then no additional power supply unit is required if this voltage can be taken from the output stage (max $\pm 35V$). This is of great advantage if there is hardly any space available for an additional power supply unit.

The **max signal output voltage** is $\pm 15V$, but max 3V below the operating voltage.

operating voltage symmetrical	+/- 5V to +/-35V
optimal	+/- 18V
power consumption	+/- 20-30mA
Reinforcement (A)	1-2-4-8-16
Gain (dB)	0-6-12-18-24
max input voltage	+/-15V (with ampl. 1)
max output voltage	+/-15V (or Ub -3V)
Input res. (+/- each to ground)	47k ohms
Output resistance min	25 ohms
load resistance	600 ohms
distortion factor	approx. 0.00008%
frequency range \ddot{U} =1:1	1MHz (-3dB 1.5MHz)
Frequ. range \ddot{U} =1:20 Rise	500kHz (-3dB 800kHz)
time Dimensions LxWxH	0.4µs
	80x47x15mm

Price (incl. VAT)

66.00-euros-

PSU recommendation

for high-end applications, each module should have its own power supply, or according to the existing power pack in the device to be installed

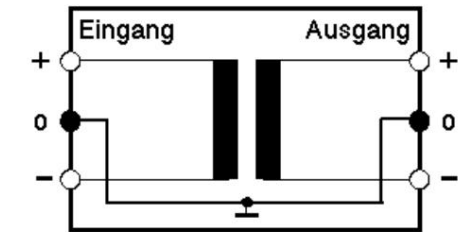
mono module

For the stereo operation become 2 pieces needed

Unfortunately, this finished module is no longer available

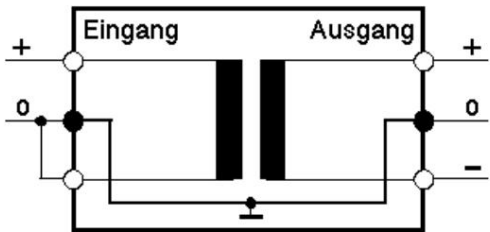
Still available as a kit from phelektronik

The main applications of the sym controller



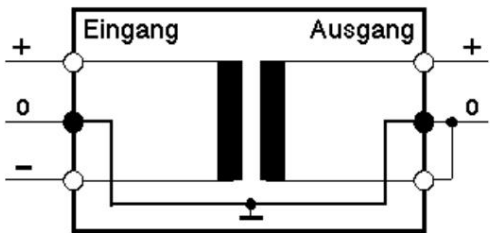
1. Basic circuit

Electrically, the module behaves like a real transformer in all disciplines, except for potential isolation, ie unused signal pins **must be** connected to ground, including that of the output (floating ground principle).



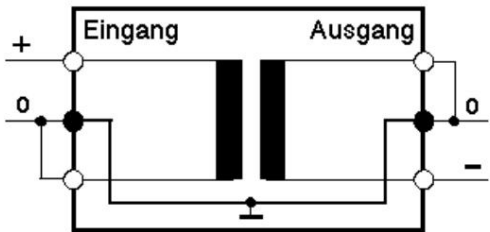
2. Symmetrizer

The classic application. The output has no direct reference to ground, this is provided by the next module (receiver). The ground connection can therefore either be on the next module or only on one side connected to the cable shield.



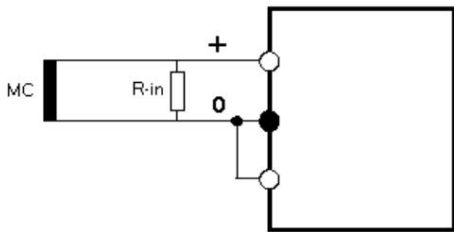
3. De-balancer

Rarely needed, for example as an additional balanced input of an unbalanced preamp, etc. Nevertheless also here the highest performance of the output signal from both polarities of the input signal. Of the unused output **must be** connected to ground.



4. Signal Inverter

This variant is used when the polarity of an asymmetrical signal is to be inverted. Of the unused output **must be** connected to ground.

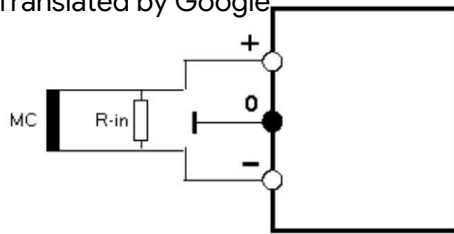


5. MC pickup

asymmetrical

MC pickups usually deliver a much lower voltage than MM systems. Should be Amplifiers only have one MM input, this variant can be used instead of a transformer will. In this case, the Sym controller can only be connected to the MM input of an existing RIAA equalizer be used.

When using an MC pickup, a load resistance is usually added according to the information in the manufacturer required. This resistance (e.g. <100 to >1kOhm) is parallel to the two tonearm leads soldered to the input pins.



A factor of 10 (20dB) is often selected as the amplification factor, but can be individually adapted to the requirements. On the output side, all variants of the conversion (eg No. 2 + 3) are possible.

symmetrical

Further applications

All inputs and outputs can be configured independently of one another for further applications.

A purely **symmetrical high-end preamp**, with or without amplification, is also possible.

Also a **balanced microphone preamp**. To do this, a resistor in the circuit would have to be changed, since the amplification of max. 20dB is usually not sufficient. The recommended input resistance of approx. 2k ohms for microphones would have to be soldered on as shown with MC.

Important As the "SYM-C" module does not have any independent function, it is necessary to connect additional modules and components, such as transformers, rectifiers, filters, sockets for inputs and outputs, mains switches, etc. in order to have a functional device receive.