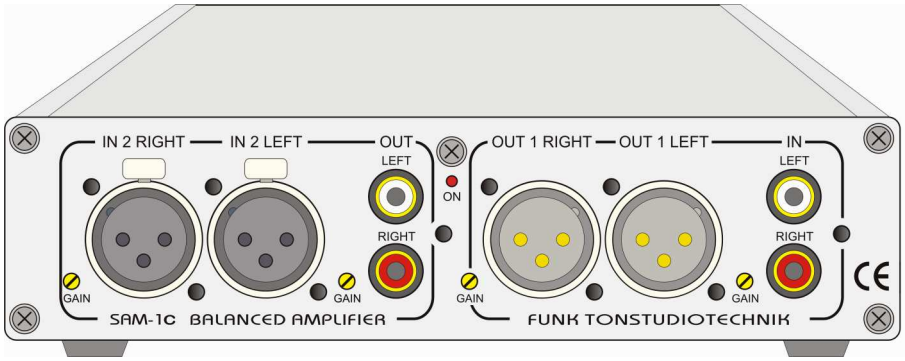
# SAM-1C

## BALANCING and ADJUSTMENT AMPLIFIER




The SAM-1C is the parallel model to the SAM-1Bs but with further improved audio data. This versatile, professional 4-channel matching and balancing/differential amplifier (instrumentation amplifier) in ironless circuit technology has been developed for use with the highest demands on sound quality. Asymmetrical "home recording" and PC inputs and outputs and hi-fi equipment can be optimally matched to professional balanced or unbalanced studio equipment inputs/outputs. Level adjustment from -10 dBv to +6 dBu and vice versa as well as signal distribution and fully balanced level adjustment (SAM-1C/2SvS2) are also possible, depending on the configuration. Common unbalanced outputs of hi-fi equipment can be optimally matched to balanced power amplifier inputs or balanced active loudspeakers, for example, with the SAM-1C/2-0.

High-level balanced studio equipment XLR outputs are converted asymmetrically to RCA sockets with the SAM-1C/0-2, with simultaneous level reduction to the hi-fi equipment level.

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The **SAM-1C** can enable the following functions simultaneously :

1. a high-impedance signal becomes low-impedance (impedance conversion)
2. an input signal can be amplified/attenuated
3. a symmetrical signal becomes asymmetrical
4. an asymmetrical signal becomes symmetrical
5. 2 balanced signals can be summed (mixed) (stereo > mono)
6. "Hum loops" between asymmetrical units can be eliminated
7. eliminate on or off clicks of a sound system ("power-down" mute).
8. configurations as balancing and distribution amplifier internally possible

**Mode of operation:** in order for the interference voltages induced or influenced on a line to cause as little interference as possible in an input of an audio control system connected to this line, this input must be "symmetrical to earth", i.e. the two resistances measured between each of the input terminals and earth must be equal in magnitude and phase. The induced interference voltages, which are equal in magnitude and phase on both conductors, then cancel each other out in their effect with a symmetrical input and are without influence.

**Common-mode rejection:** The balanced input stages SSIM-04Mc of the SAM-1C achieve a typical suppression of symmetrical interference at 1 kHz with a ratio of > 500000/1 (-115 dB) ! This extremely high symmetry allows almost complete cancellation of interference induced in the line. Interference due to different ground potentials is also optimally suppressed. This also applies to applications with otherwise asymmetrical cabling.

The SAM-1C has a precision switching power supply for operation on all power supplies worldwide with operating voltages of 80..260 V at 45..440 Hz.

**Auto-Mute:** The amplifiers in the SAM-1C have a time-controlled muting relay in the output. This ensures a largely click-free switching on and off of the unit even after a sudden drop or failure of the supply voltage, thus protecting connected loudspeakers.

A great advantage of the SAM-1C is its modular design, which makes different variants possible. Due to the service-friendly design, the amplifier modules including all sockets can be exchanged or extended in a few minutes without soldering. All inputs/outputs have spindle trimmers on the rear of the unit, with which the gain or level reduction can be adjusted very precisely for each channel separately from the outside.

During the development of the unit, special emphasis was placed on lowest noise (dynamic range at amplification 1: typically 136 dB !) and minimum distortion with simultaneous very broadband design of all amplifier stages. The THD distortion at 1 kHz, +6 dBu line level and 0 dB gain is typically < 0.00005%. This could only be achieved by using several operational amplifiers per balanced input and "instrumentation amplifier technology".

**Bandwidth:** An excellent phase response of less than 1° in the range of 10 Hz...20 kHz and a large signal bandwidth of over 100 kHz guarantee excellent impulse processing. Due to its exceptional bandwidth of over 500 kHz, the SAM-1C can also be used for the matching of time code signals.

The excellent crosstalk attenuation of more than 125 dB at 1 kHz and 120 dB at 10 kHz between the two channels also allows the use of both signal paths for different mono signal sources simultaneously.

Due to the high common-mode rejection of the balanced input amplifiers of typ. >115 dB at 1 kHz, interferences that interfere with the balanced line are almost completely eliminated.

The balanced inputs and outputs of the SAM-1C can also be operated asymmetrically, e.g. for use as an asymmetrical catch-up amplifier, impedance converter, as a phase inverter stage or for "hum loop elimination".

Once the output level has been set, it remains constant through servo balancing with balanced and asymmetrical wiring of the XLR outputs. In contrast to many other balanced amplifier circuits, the maximum achievable output voltage (headroom) does not decrease with asymmetrical wiring of the balanced output! This results in a further improvement of the dynamic range of 4..6 dB compared to comparable balancing amplifiers when the outputs are operated in unbalanced mode.

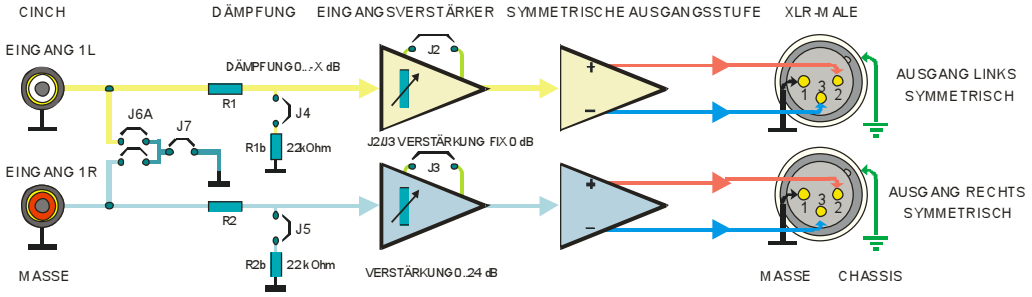
Operation up to 300 Ω output load is guaranteed.

The unbalanced inputs/outputs are connected via gold-plated RCA sockets. The balanced inputs/outputs are connected to neutral XLR sockets with gold-plated contacts.

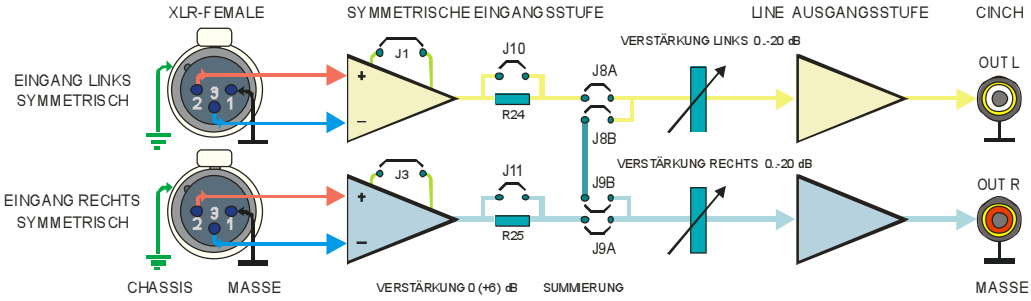
The Unit is equipped with a standard mains socket for IEC mains cables. The power switch is also located on the rear of the unit. Circuit zero (ground) and earth (chassis) are separated from each other for greater freedom when installing in different systems. The new switching power supply also ensures the complete absence of mains interference components in the signal.

The SAM-1 series is used in many German public radio and television stations.


SYMMETRIER AMPLIFIER IN THE SAM1-C BLOCK DIAGRAM




DIFFERENTIAL AMPLIFIER IN THE SAM-1C BLOCK DIAGRAM




Available versions :

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|---|---|---|
| **SAM-1Bs/2-0** | 2x Cinch in | > 2x XLR sym. out |
| **SAM-1Bs/0-2** | 2x XLR sym. in | > 2x Cinch out |
| **SAM-1Bs/0M2** | 2x XLR sym. in | > 2x Cinch mono out (Summing amplifier) |
| **SAM-1Bs/2M2** | 2x XLR sym. in | > 2x Cinch mono out + 2x sym mono out (Summing amplifier) |
| **SAM-1Bs/2MV0** | 1x Cinch in | > 1x Cinch direkt out + 2x sym. out XLR (Distribution amplifier) |
| **SAM-1Bs/2SMVS1** | 1x XLR in | > 4x Cinch direkt out + 2x sym. out XLR (Distribution amplifier) |
| **SAM-1Bs/2SVS2** | 2x XLR sym. in | > 2x XLR sym. out (fully balanced matching amplifier) |
| **SAM-1Bs/2-2** | 2x Cinch in | > 2x sym. out XLR + 2x XLR sym. in ⇒ Cinch out. |
| **SAM-1Bs/4-0** | 4x Cinch in | > 4x sym. out XLR |
| **SAM-1Bs/0-4** | 4x XLR sym. in | > 4x Cinch out |
| **SAM-1Bs/0M4** | 2x XLR sym. stereo in | > 2x [2x Cinch mono out] (Summing amplifier double/stereo) |
| **SAM-1Bs/4V0** | 2x Cinch in | > 2x Cinch direct out + 2x 2 sym. out XLR (Distribution amplifier) |
| **SAM-1Bs/4MV0** | 1x Cinch in | > 3x Cinch direct out + 4x sym. out XLR (Distribution amplifier) |

FUNK TONSTUDIOTECHNIK GERMANY 103187 BERLIN Blockdammweg 39-59 ☎ 0049 (0)30 6115123 FAX: (0)30 6123449
Infos: www.funk-tonstudiotechnik.de