

pro
NIKE

**SERVO DRIVE
MIC PREAMP**

Professional
Dual Channel
High Definition
Microphone Preamplifier

Model 9524

SPL

Owner's Manual



SOUND PERFORMANCE LABORATORY

PROMIKE
Owner's Manual

by Hermann Gier

Manual version 1.1/95

The information in this document has been carefully checked and is assumed to be correct.

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Construction and circuit layout are subject to constant improvement and development.

Changes will be made without notice.

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Dear customer,

Thank you for the confidence you have shown towards SPL electronics GmbH by purchasing the SPL PROMIKE. The PROMIKE is a first-rate microphone preamplifier with exemplary specifications, excellent workmanship and unrivalled sound quality.

Please study this owner's manual carefully so that you can make the most of the PROMIKE and to ensure ease of operation.

We have tried to write this manual in such a way that it is easy to understand, with as clear a layout as the complexity of such a sophisticated product allows. The manual is divided into two columns throughout. The main column contains a detailed description whilst the margin contains headings and summarized information.

We wish you every success and unlimited enjoyment with your new PROMIKE.

SOUND PERFORMANCE LABORATORY
SPL electronics GmbH

FOREWORD

INTRODUCTION

The recording industry has gone through some dramatic changes in the past years. The home recording market produces professional results with modest investments. Mainly inexpensive mixing consoles with lots of channels and 8-bus-option are being used. High class filtering and microphone preamplification are not incorporated in these systems.

The »direct to DAT« recording philosophy has created another growing market. Sampling and direct cutting through quality mic preamps has become popular. The PROMIKE is the ideal choice for both recording situations. It is the cost-effective entry into high performance preamplification and ideally suited to partner your favorite mic in getting the best possible performance on tape. It improves the sonic quality of small mixing consoles with two channels of superior preamplification and it is the ideal tool for »direct to DAT« applications.

The PROMIKE is a dual channel microphone preamplifier with excellent noise and CCMR specs. It has a large input headroom (+25,72dB), which makes limiting a less important issue. Microphone and line level signals can be preamplified up to +72 dB. Variable high-pass and low-pass filters allow you to eliminate hum and rumble and other interfering frequencies. The superior phantom power supply for condenser microphones is also ideal for old tube microphones which need a very stable and clean +48V phantom powering. The PHASE REVERSE switch is used to change the polarity of the microphone. PPM-meters displaying output values between -48 dB and +9 dB are also incorporated. The input and output stages can optionally be equipped with beyerdynamic transformers.

OPERATING SAFETY

Important security advices



The housing of the PROMIKE has the standard 19" EIA format and occupies 1 unit (1 U = 44 mm) in your rack.

When installing the unit in a 19" rack, the rear side of the unit needs some support, especially in a Touring Case.

The PROMIKE should not be installed near units which produce strong magnetic fields or extreme heat. Do not install the PROMIKE directly above or below power amplifiers or digital processors. If possible, the PROMIKE should be placed in an »analog rack« where the majority of (or all) the equipment installed is analog. This eliminates problems which could result from interfering high-frequency signals such as clock frequencies, MIDI or SMPTE control signals.

Check that the voltage details quoted on the back panel are the same as your local mains electricity supply. Use a minus (-) screwdriver to set the voltage selector to the voltage for the area in which the unit will be used.

Never cover up the ventilation slots on the top of the unit.

If, during operation, the sound is interrupted or indicators no longer illuminate, or if abnormal odor or smoke is detected, or if water is spilled on the unit, immediately disconnect the power cord plug and contact your dealer or Authorized Service Center.

Only clean your PROMIKE with a soft, lint-free cloth. Use only standard cleaning agents. Never use alcohol or paint thinner, because they may damage the finish.

INPUTS & OUTPUTS

The PROMIKE is equipped with two electronically balanced, female 3-pole XLR sockets to connect two microphones or a line signals. For best connection of stereo microphones the PROMIKE is equipped with a 7-pin XLR connector.

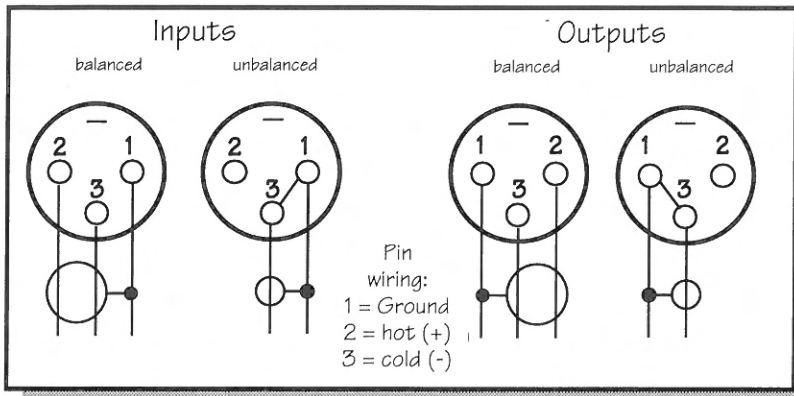
The outputs of the PROMIKE are designed balanced with male XLR sockets, unbalanced with 1/4" jacks and RCAs. The outputs can be used parallel to each other. This means that three output signals can be produced from one input signal (mic splitter function).

The Pin assignment of the XLR jacks is Pin 2 = hot (+).

The Pin assignment of the 7-pin XLR jacks is Pin 2/4 = hot (+).

(for more information on 7-pin XLR wiring refer to page 7)

The following diagram shows how to unbalance balanced wiring correctly:



Special attention has been paid to the power supply of the PROMIKE. The power pack is the heart of any unit, and the more accurately it works, the more this improves results.

The power supply is installed around a toroidal-core transformer which does not cause any electronic humming or mechanical sounds as a result of its minimum leakage field. The primary voltage can be switched between 230 V / 50 Hz and 115 V / 60 Hz.

A 3-pole standard IEC mains connection socket serves to connect a detachable 3-pole mains lead which is included in the scope of supply. Transformer, power cable and mains connector comply with the requirements of VDE, UL and CSA. The fuse rating is 200 mA.

The connection between ground and housing can be separated via the GND LIFT switching option. Hum loops can be remedied in this way.

On the secondary side of the power supply, an RC combination is used to filter out noise and hum voltages from the mains side. Both half-waves are smoothed with 2000 μ F capacitors in the positive and negative voltage path.

An independent, self-contained power pack is used for the phantom power supply. It obtains unregulated AC voltage from 2 x 25 V coils in the transformer. It is then smoothed again and stabilized. The power supply current flows to the intrusion point via the PCB. An RC combination stabilizes the power supply again at this point. Two medicinal 6.81 kW resistors with a tolerance of only 0.1% are used as bridging resistors.

POWER SUPPLY

A stable and well-filtered toroidal-core power supply provides the basis for good sound processing.

The GND Lift switching option helps remedy hum loops.

Ample filtering, smoothings and calibrations make for stable, constant service voltage.

The phantom supply voltage is from a separate power supply with sophisticated filtering and selected components.

The PROMIKE microphone preamplifier utilizes the instrumentation amplifier principle. This technology is also found in measuring equipment to amplify very low input signals, such as microphone signals, with minimum noise and distortion. The preamplifier is built around the highly acclaimed SSM 2017 semiconductor from Analog Devices. It offers common mode rejection better than 90 dB, delivers an uncoloured sound and is also resistant against hum and RF interferences.

THE **SERVO**DRIVE-TECHNOLOGY

The PROMIKE features **SERVO**DRIVE-technology for optimum amplification and to achieve natural sounding results.

SERVODRIVE monitors the amplifying stage regarding DC-offset of positive and negative voltages. DC-offset occurs when very low signal levels, such as microphone signals, are amplified by up to 2000 times to gain 0dB studio level. Any offset increases noise and distortion and therefore compromises the signal quality. **SERVO**DRIVE minimizes DC-offsets to values between 0mV and 2mV. The recorded signal contains less noise and distortion and improved tonal transparency.

The **SERVO**DRIVE stage consists of three op-amps. The first op-amp is the SSM 2017. The second op-amp operates as a sensor stage, which detects voltage differences between the positive and negative paths. The third op-amp is a summing stage which compensates the detected offset.

SERVODRIVE improves the audio quality significantly: Noise and distortion are reduced and all following units are operating with an offset-free signal.

DOUBLE GROUND SHIELDING

To protect the main preamplifier stage against RF, hum and other interfering frequencies the PROMIKE's printboard has a DOUBLE GROUND SHIELDING. The double sided printboard has ground layers on both sides of the printboard. All ground layers flow to a central ground where interfering signals are diverted to the mains ground before they fall into the preamplifier.

7-PIN XLR INPUT FOR STEREO MICROPHONES

PROMIKE offers the unique opportunity to connect a stereo microphone directly to the unit without using a 7-pin to 2x 3-pole adapter! The highly sensitive microphone signals (only a few piko-volts) are compromised by any adapter in the signal path. Especially THD (total harmonic distortion) raises when adapters are used.

The pin configuration is:

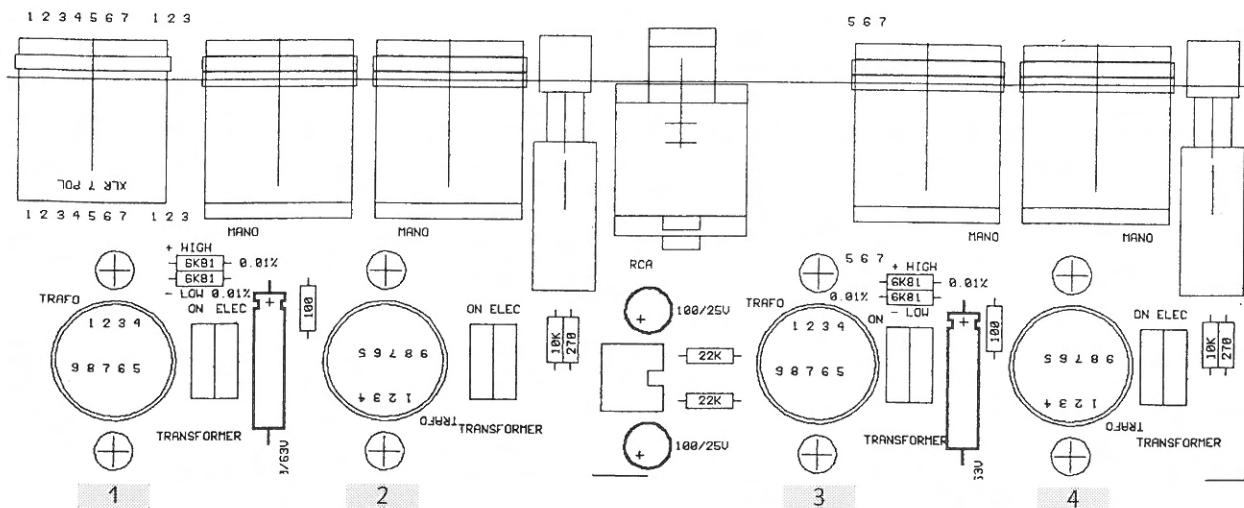
pin 1 =	GND	PCB tack 1
pin 2 =	hot (+)/channel 1 left	PCB tack 2
pin 3 =	cold (-)/channel 1 left	PCB tack 3
pin 4 =	hot (+)/channel 2 right	PCB tack 6
pin 5 =	cold (-)/channel 2 right	PCB tack 7
pin 6 =	NC	
pin 7 =	NC	

The PROMIKE can be modified for stereo microphones that use other connectors than 7-pin XLR.

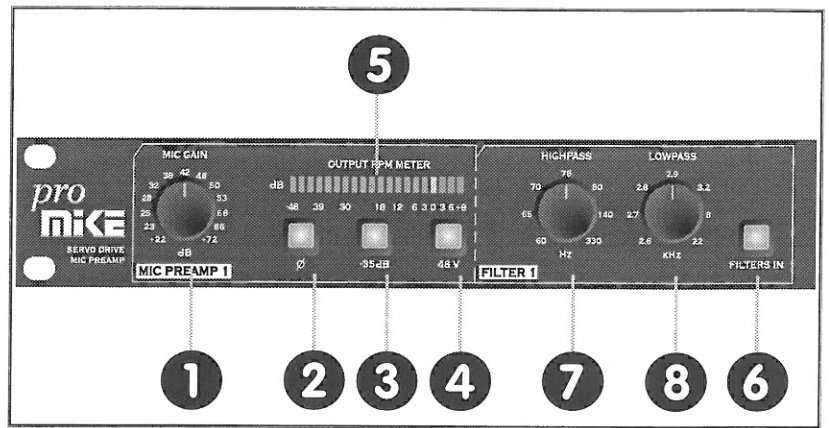
FITTING INPUT AND OUTPUT TRANSFORMERS

The PROMIKE can be equipped with input and output transformers optionally. These transformers can easily be fitted without sending the unit back to the factory. The following modification although has to be carried out by authorized service personnel. The transformers are manufactured by beyerdynamic. Once the transformers are installed you can compare the sonic implications of transformers in comparison to transformerless input and output stages simply by switching dip-codes on the printboard.

1. Disconnect power!
2. Open cover and bottom.
3. Insert input transformers in sockets 1 and 3.
4. Insert output transformers in sockets 2 and 4.
5. Right besides the sockets you find the dip-codes. All switches point to the rear of the unit, so that the electronically balanced input and output are active. Switch all dip-codes to the front of the unit and the transformers are activated.



THE CONTROL ELEMENTS



MIC GAIN

1 The preamplifier stage of the PROMIKE is based on the SSM 2017 semiconductor. The strengths of this particular component are its extremely low noise and distortion characteristics. Unlike discretely designed circuits, the SSM 2017 has 64 transistor functions (discretely up to 24), thus achieving a very high common mode rejection.

Preamplification of the input signal is determined by the MIC GAIN control. The control range of the preamplification values ranges from +22 dB to +72 dB. The maximum amplification value specified is a minimum value. The preamplifier stage provides up to +75 dB. This value can be lower, depending on the tolerance of the potentiometer, but it never falls below a value of +72 dB.

The maximum input level is +25,7 2dB! This high input capability reduces the need of limiting.

When setting the MIC GAIN value, take note of the transducer type (condenser or dynamic microphone) and the free-field transmission factor of the microphone type. The sound pressure level of the sound source to be recorded, the distance to the microphone and the room acoustics are other factors which also have to be taken into account when setting the MIC GAIN potentiometer. The free-field transmission factor of a dynamic microphone is around 2 mV/Pa, that of a condenser microphone can be up to 20 mV/Pa, which equals an increase in the output level of 20 dB.

PHASE REVERSE

2 Pressing the phase switch (PHASE REVERSE) inverts the polarity of the microphone signal. When the switch has not been pressed (status LED is off), the polarity is »in phase«. Pressing the switch means that the polarity is »out of phase«.

Phase inversion can be used for a number of different reasons:

1. If, for example, the microphone signal of a singer or speaker is preamplified in the PROMIKE and the monitor signal is folded back to the headphones, the singer or speaker cannot hear himself very well. Pressing the phase switch inverts the polarity of the microphone and consequently, of the headphone signal, and the singer or speaker can then hear himself on

his headphones without having to increase the level.

2. The phase inversion feature is also very useful when the polarity of the XLR input jack has to be inverted to match the polarity of the microphone or the microphone cable. The pin assignment of the XLR connector is as follows: Pin 2 = hot (+) and Pin 3 = cold (-).

3. Sometimes it is desirable to swop the polarity of a microphone because of the sound.

The PROMIKE can also be used as a gain-on amplifier for line signals. The input sensitivity of the preamplifier stage is reduced by 35 dB by pressing the -35 dB switch. The corrected preamplification value on the MIC GAIN control can be ascertained by subtracting 35 dB from the value set on the potentiometer.

3

-35 dB

Condensor microphones require a supply voltage of 48V DC which supplies the microphone via the balanced audio lines (pins 2 and 3).

When the supply voltage is switched on, a phantom circuit is formed whereby the 48VDC supply voltage is applied simultaneously to the two supply lines (+/-) of the microphone and fed back via the cable screen.

There is no DC voltage between the two modulation lines which is why dynamic microphones can be used when the phantom voltage is switched on, without this doing the microphones any harm.

The influences of noise voltages which can superpose the DC supply voltage such as hum loops and parasitic currents in the cable screen are reduced by the phantom power supply. Moreover, this type of connection is particularly resistant towards RF.

As there is no potential difference between the +/- supply lines, the connection technique of the phantom supply is compatible with moving coil and ribbon microphones.

All microphones with balanced floating output, i.e. also microphones equipped with tubes can be used when the phantom voltage is switched on.

4

48V

*Phantomspeisung nach
DIN 45 596 / IEC 268-15*

WARNING: It is essential to switch the phantom supply off if other types of microphones are used.

A line signal source or an unbalanced microphone may only be used if the phantom supply is switched off.



The output peak levels (PPM values) are indicated on the LED display. The levels are indicated in steps of 3 dB from -48 dB to + 9 dB.

5

PPM METER

FILTERS IN

6 The Filters In switch switches the high-pass and low-pass filters in and out of the signal path utilizing a hard-bypass circuitry. If the switch is deactivated the input signal is routed directly pass the filter section to the outputs.

HIGHPASS

7 The high-pass filter has a Butterworth characteristic of 2nd order, which indicates that the frequency drops with 12dB per octave. The roll-off frequency can be varied between 35Hz and 220Hz.

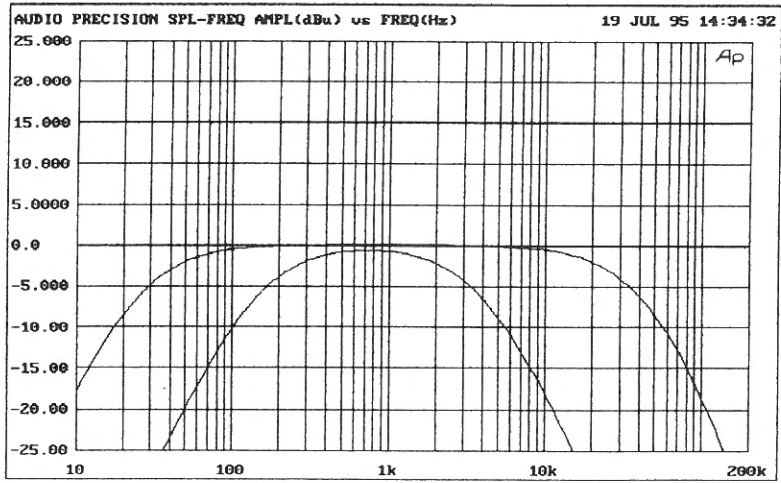
The high-pass filter is used to eliminate disturbing low frequencies such as rumble or pop frequencies.

LOWPASS

8 The low-pass filter has a Butterworth characteristic of 2nd order, which indicates that the frequency drops with 12dB per octave. The roll-off frequency can be varied between 2,6kHz and 22kHz.

The low-pass filter is used to eliminate disturbing high frequencies.

The diagram shows the frequency response curves for the maximum and minimum adjustments for the high and low-pass filters.



PROMIKE rear panel

SPECIFICATIONS

- balanced (XLR/+6 dB) inputs with GND lift switch pin 1
- balanced (XLR/+6 dB), unbalanced (jack/0 dB) & unbalanced (RCA/0 dB) outputs
- balanced in- & outputs with transformer option
- voltage selector: 220-240 V/50 Hz or 100-120 V/60 Hz
- detachable 3-wire, U-grounds power cord
- GND-lift switch

Specifications

Frequency range	15 Hz - 40 kHz +/- 0,1 dB
Overall frequency range	10 Hz - 100 kHz +/- 0,5 dB
E.I.N.	126,6 dBm/dBu

CMRR (common mode rejection)

(Measuring set-up: load ohms 150Ω, 0 dB, measured at XLR-output)

	<u>CMRR -20 dBu</u>	<u>CMRR -60 dBu</u>
100 Hz	-80 dBu	-80 dBu
1 kHz	-80 dBu	-80 dBu
10 kHz	-73 dBu	-80 dBu
20 kHz	-68 dBu	-80 dBu

THD & N (total harmonic distortion & noise)

(Measuring set-up: load ohms 150Ω, measured at XLR-output)

Measurement A:

Varying amplifications up to 0 dBu

-60 dBu to 0 dBu	= 0,064%
-50 dBu to 0 dBu	= 0,028%
-40 dBu to 0 dBu	= 0,017%
-30 dBu to 0 dBu	= 0,015%
-20 dBu to 0 dBu	= 0,062% (-35 dB activ)
-10 dBu to 0 dBu	= 0,025% (-35 dB activ)
0 dBu to 0 dBu	= 0,017% (-35 dB activ)

Measurement B:

60 dB amplifications; increase of generator output in 10 dB steps

-60 dBu	= 0,064%
-50 dBu	= 0,058%
-40 dBu	= 0,018%
-30 dBu	= 0,006%
-20 dBu	= 0,002%
-10 dBu	= clipping

Signal to noise

(Measuring set-up: load ohms 150Ω, measured at XLR-output)

amplification	CCIR-469-2	A unweighted
72 dB	-55,85 dBqp	-60,07 dB
60 dB	-60,66 dBqp	-69,75 dB
50 dB	-68,57 dBqp	-77,55 dB
40 dB	-73,11 dBqp	-81,75 dB
30 dB	-74,79 dBqp	-83,18 dB
mit -35dB Pad:		
20 dB	-62,56 dBqp	-71,85 dB
10 dB	-69,83 dBqp	-78,68 dB

Input stage

Instrumentation amplifier, electronically balanced (differential)	
transformerless, optional with »beyerdynamic« transformers	
Nominal input level	+6 dB
Input impedance	200 Ω to 1,2 kΩ
headroom before clip	+25,72 dBu

Output stage

Output 1: XLR, Instrumentation amplifier, electronically balanced (differential) transformerless, optional with »beyerdynamic« transformers	
Nominal output level	+6 dB
Output 2: Klinke, unsymmetrisch	
Nominal output level	0 dB
Output impedance (XLR/Klinke)	< 600 Ω

Size	EIA 19"/1U, 482 x 44 x 237mm
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Weight	2,7kg
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WARRANTY

SPL electronics GmbH (hereafter called SPL) products are warranted only in the country where purchased, through the authorized SPL distributor in that country, against defects in material or workmanship. The specific period of this limited warranty shall be that which is described to the original retail purchaser by the authorized SPL dealer or distributor at the time of purchase.

SPL does not, however, warrant its products against any and all defects:

1) arising out of materials or workmanship not provided or furnished by SPL, or 2) resulting from abnormal use of the product or use in violation of instructions, or 3) in products repaired or serviced by other than authorized SPL repair facilities, or 4) in products with removed or defaced serial numbers, or 5) in components or parts or products expressly warranted by another manufacturer.

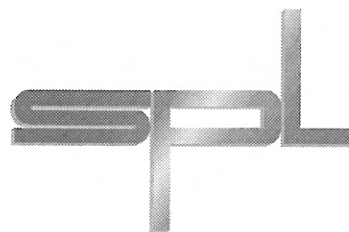
SPL agrees, through the applicable authorized distributor, to repair or replace defects covered by this limited warranty with parts or products of original or improved design, at its option in each respect, if the defective product is shipped prior to the end of the warranty period to the designated authorized SPL warranty repair facility in the country where purchased, or to the SPL factory in Germany, in the original packaging or a replacement supplied by SPL, with all transportation costs and full insurance paid each way by the purchaser or owner.

All remedies and the measure of damages are limited to the above services. It is possible that economic loss or injury to person or property may result from the failure of the product; however, even if SPL has been advised of this possibility, this limited warranty does not cover any such consequential or incidental damages. Some states or countries do not allow the limitations or exclusion of incidental or consequential damages, so the above limitation may not apply to you.

Any and all warranties, express or implied, arising by law, course of dealing, course of performance, usage of trade, or otherwise, including but not limited to implied warranties of merchantability and fitness for particular, are limited to a period of 1 (one) year from either the date of manufacture. Some states or countries do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state, country to country.

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