

HEADPHONE AMPLIFIER PHONE-AMP G111 Mk II



USER 's MANUAL



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manufacturing of
audio electronic*

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Content

Theme	Page
About Lake People	2
Safety Instructions	4
The Earth / Grounding Concept	6
Connection / Connectors	7
General	8
Operation	9
Things to Know	12
Disposal	14
Internal Settings	15
PRE-GAIN	17
Settings on the PCB	19
Technical Data	20

Cordial thanks for your decision in favour of a Lake People product !

Lake People electronic GmbH develops, manufactures and distributes products in the professional range, for broadcast, television, airports, exhibition halls, festival venues, theatres, large-scale installations, private studios and more. In the private sector as well, Lake People products become increasingly popular due to their outstanding quality.

Who develops Lake People equipment ?

The devices are exclusively developed in Germany by the engineers of Lake People electronic GmbH. In doing so, the team of developers can draw on thirty years of experience and countless products for the pro-audio domain.

Among others, the first German-made 20-bit A/D and D/A converters were developed by Lake People in the early nineties of the past century.

Who manufactures Lake People equipment ?

The devices are exclusively manufactured in Germany by Lake People electronic GmbH or contractors in the company's vicinity.

Lake People puts high emphasis on domestic manufacturing. As well, all component suppliers are chosen in order to achieve the main part of added value inland.

How do Lake People devices get to the customer ?

Lake People devices can be obtained from respective specialist suppliers. If there is none such accessible regionally, the customer is supported by transregional distribution partners (google may help...) and, of course, by Lake People on-line shop.

... and if it doesn't work like it should ?

Lake People devices are covered by a 24-month warranty. In case of any malfunction during this period, they can be shipped to the manufacturer directly. Of course, the client will benefit from Lake People's full technical support even when warranty has expired. Any technical questions or need for advice is welcome.



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General Safety Instructions / WARNING

For your protection, please read the following:

Water, Liquids, Moisture:

This appliance should not be used near water or other sources of liquids. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

Power Sources:

The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

Grounding:

Care should be taken that this appliance is operated with proper grounding only.


Power Cord:

Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

This unit is equipped with a 3-pole mains cable with German 3-pin mains plug.

In some countries this unit must be operated with a mains adaptor, supplied by the owner.

Please refer to the table below to connect a mains plug:

OVERVIEW: POWER CORD FUNCTION AND COLORS			
CONDUCTOR		COLOR	Alternativ
L	LIVE	BROWN	BLACK
N	NEUTRAL	BLUE	WHITE
E 	PROTECTIVE EARTH	GREEN+YELLOW	GREEN

U.K. Mains Plug Warning:

A moulded mains plug that has been cut off from the cord is unsafe. Discard the mains plug at a suitable disposal facility.

NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAINS PLUG INTO A 13 AMP POWER SOCKET. Do not use the mains plug without the fuse cover in place. Replacement fuse covers can be obtained from your local retailer. Replacement fuses are 13 amps and **MUST** be ASTA approved to BS 1362.

Mains Fuse:

The mains fuse of this appliance is soldered in place and accessible from the inside only !!

A blown fuse may indicate an internal problem and should be replaced during qualified servicing or repair work !!

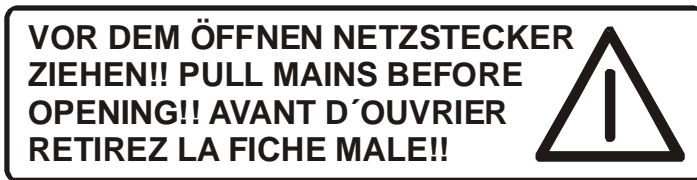
Switchable Power Supply:

Connect this unit to the power source indicated on the equipment rear panel only to ensure safe operation !!

This unit is provided with an internally settable mains supply for 115 or 230 V AC. Ex works the unit is normally set to 230 V AC.

Service / Repair:

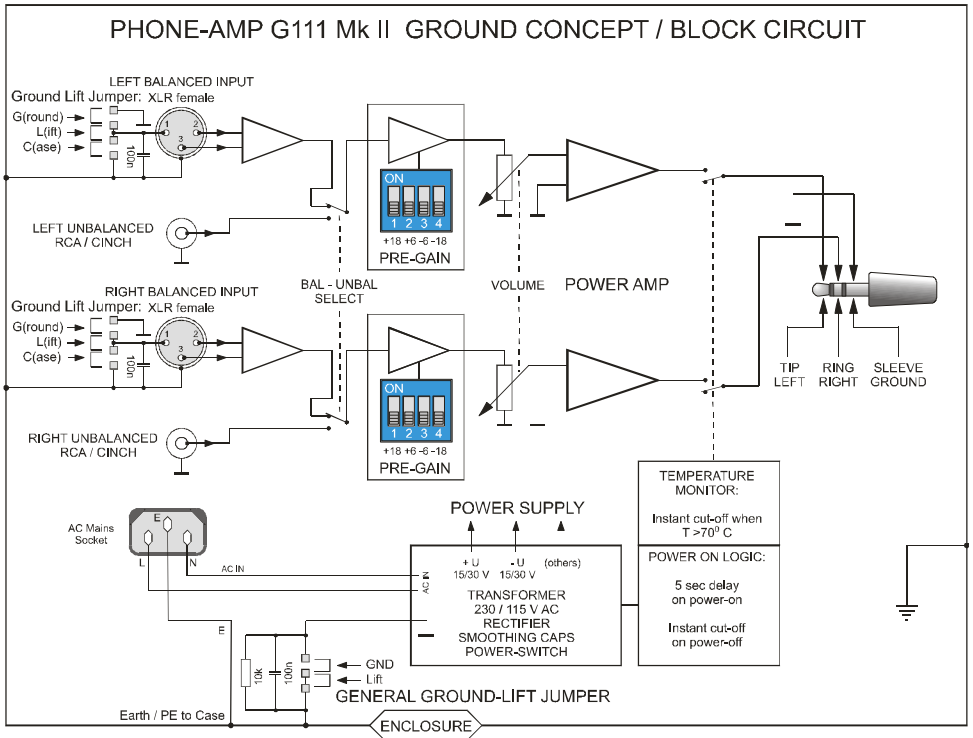
To reduce the risk of fire or electric shock, the user should not attempt to service the appliance beyond the measures described in the operating manual. All other servicing or repair should be referred to qualified personnel !!

**Electromagnetic Compatibility**

This unit conforms to the Product Specifications noted as **Declaration of Conformity** at the end of this manual. Operation is subject to the following conditions:

- this device may not cause harmful interferences
- this device must accept any interference received, including interference that may cause undesired operation
- this device must not be operated within significant electromagnetic field

The Earth / Grounding Concept



General GROUND-LIFT Jumper - accessible from the inside.

Mind the SECURITY INSTRUCTIONS !!

Ex-works this jumper is set to the **LIFT** position.

The internal ground potential is "lifted" by means of this jumper.

As a result, the interconnection for DC voltages and lower frequencies ($< 150\text{ Hz}$) will be cut. Higher frequencies will be bled off to earth potential through the RC filter. The LIFT position is helpful in case of hum or jitter caused by different ground/earth potentials. Of course full electrical protection is granted as the case is always connected to ground/earth potential !

See more on page 18.

Ex works the GENERAL GROND LIFT JUMPER is set to **LIFT** position.

XLR GROUND-LIFT Jumper (Page 18)

(accessible from the inside. Mind the SECURITY INSTRUCTIONS !!):

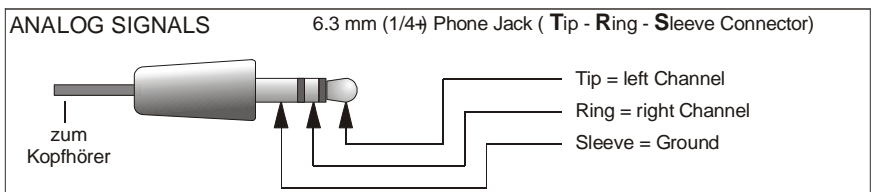
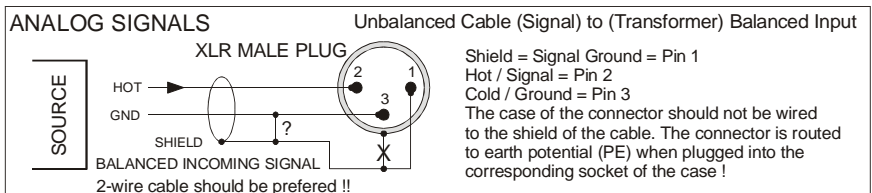
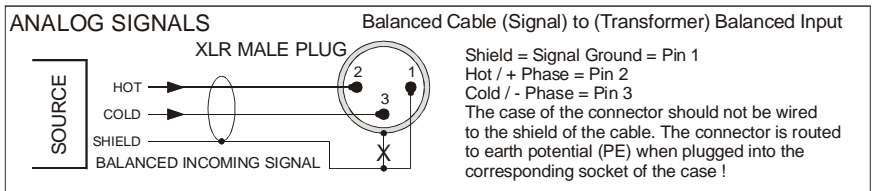
G(ROUND): Ex-works all jumpers are set to "G" (ground) position. Pin 1 is connected to the internal ground reference. High frequency interference is deflected to the case via a 100 nF capacitor.

L(IFT): The interconnection between Pin 1 and ground is open. High frequency interference is deflected to the case via a 100 nF capacitor. This jumper position is specifically useful if the unit is equipped with transformers !!

C(ASE): Pin 1 is connected to the case, the 100 nF capacitor is bridged. This jumper position may be varied together with the **General GROUND-LIFT jumper**.

**Please note that with jumpers not in the ex-works position
EMC emission might occur,
for which the user is responsible only !**

Connection / Connectors for Analog Signals



CAUTION !!

**THE HIGH OUTPUT LEVELS
ACHIEVABLE WITH THIS UNIT MAY
DAMAGE YOUR HEARING
OR THE HEADPHONES
IF OPERATED CARELESSLY !!**

GENERAL

The PHONE AMP G111 Mk II is a stereo headphone amplifier designed for low-, medium- and high-Z loads (16 ... 600 ohms), as typical for most high-quality headsets.

Due to its circuitry layout optimized in terms of noise/THD and specially adapted to the headphones mentioned above, the PHONE-AMP G111 Mk II fulfils highest quality demands.

Its features comprise:

- Balanced inputs via XLR connectors
- Unbalanced inputs via RCA connectors
- **PRE-GAIN** = seven internally selectable gain presets
- High-grade volume control for enhanced linearity and lowest crosstalk
- Discrete amplifier design
- Two headphone sockets
- Delayed switch-on/instant switch-off of headphone outputs
- Thermal overload protection
- toroidal transformer and large smoothing capacity

Despite its compact dimensions, the PHONE-AMP G111 Mk II offers optimum flexibility and highest output power. Reliability even under

rough or improper handling conditions has been another important goal of development.

Thus, the unit is absolutely long-term short-circuit-proof.

In addition, the PHONE-AMP G111 Mk II is equipped with internal filters to prevent overload by inaudibly high frequencies.

THE CASE

of the PHONE-AMP G111 Mk II including the front and back panels is made is made from aluminium. Due to the rugged materials used, the unit is well protected against mechanical damage.

EARTH AND GROUND

The Case of PHONE-AMP G111 Mk II is connected to earth potential. The internal ground potential may be connected to earth by means of a jumper. If required, the jumper may be set to "GND" position (see page 6: "The earth/grounding concept" and page 18: "Settings").

THE POWER SUPPLY

Mains is connected via a three-pin IEC/CEE socket and a matching three-wire mains cable with Schuko-type mains connector.

The unit is factory-set to a mains voltage of 230 VAC. It may be set to 115 V AC operation internally (see page 18). Mains voltage may vary between 190 and 240 V or 80 and 120 V respectively without any effect on flawless operation. The built-in toroidal mains transformer provides the internal supply voltages of +/- 30 Volt and +/- 18 V.

THE MAINS FUSE

The internal 0,25 AT fuse is soldered in place on the PCB.

IMPORTANT !!

FOLLOW THE SAFETY INSTRUCTIONS:

A blown fuse may indicate internal problems and should be replaced during qualified servicing work only !!

THE INPUTS



The signal inputs on the rear are equipped with XLR female-type sockets, allowing balanced signal injection. They are marked "BAL IN LEFT" and "BAL IN RIGHT" respectively.

Balanced Signals XLR Input Wiring:	
PIN 1	GND
PIN 2	(+) PHASE
PIN 3	(-) PHASE

For unbalanced signals, two RCA connectors are provided. With the "SELECT" switch on the back panel either the unbalanced or balanced inputs are activated.

OPERATION



POWER SWITCH

This switch activates the unit. Power-on status is indicated by the blue "ON"-LED under the switch.



VOLUME CONTROL

The "VOLUME"-control pot determines the headphone volume for both left and right channel.

THE AMPLIFIERS

The input signals are fed to a stereo amplifier specially designed for this purpose. Its operating range covers nearly DC to 200 kHz (-3dB corner frequency) in order to ensure optimum linearity within the audible frequency spectrum.

Overall gain is set to +8 dB to enable the unit to drive high-Z headphones at sufficient volume.

HEADPHONES OUTPUTS

The PHONE-AMP G111Mk II offers two stereo headphone outputs, each equipped with a standard 1/4" phone jack.

1/4" Phone Jack:	
TIP	Left Channel
RING	Right Channel
SLEEVE	GND

When turning the unit on or off, the outputs are cut from the remaining circuitry by means of a relay to protect the connected headphones.

Due to the thermal overload protection the outputs are also cut from the electronics when the power section reaches 70° degrees Celsius or more. After cooling down the unit will start proper work again automatically.

Things to know ...

Why makes it sense to make such huge efforts ?

A headphone amplifier is a device designed to condition audio signals with regards to the very specific requirements of headphones. This doesn't sound too spectacular at the first glance and can be achieved relatively easily. As with many things however, the devil is in the details and much more effort is required to design **one** amplifier for **all** current headphone models.

Headphones per se are quite diverse, and there are two essential parameters: impedance and sensitivity.

In general, headphones with higher impedance can be regarded as less sensitive than headphones with low impedance (which is not generally true, but in the majority of cases). The sensitivity of headphones is usually stated in dB (sound pressure level) per Milliwatt.

Extremes in this sense are the AKG K1000 with 74dB/mW on the one hand, and the Sennheiser HD25 with 108 dB/mW on the other hand: The K1000 requires 2500 times the power to achieve the same sound pressure as the HD25.

There is also the fact that headphones with high impedance usually require much higher voltage to achieve high loudness. Thus, the amplifier *must* be designed with high internal supply voltages.

Why does frequency bandwidth limiting make sense ?

In signal processing, sound is represented by AC voltages. Sound is audible - for young people - from about 20 to 20000 Hz. The elder the listener, the less he will hear high frequencies in particular.

In order to transmit these frequencies at optimum quality, the frequency response of an amplifier should be as wide and as "flat" as possible. At the low end of the scale, this limit is represented by DC, as there is no frequency lower than zero. In upward direction, the limit can be set to practically any frequency, but the higher, the more susceptible the device becomes concerning electro-magnetic interference. This is not audible in the first place but, may interfere with the useful signal and then become evident. Therefore, unrestricted frequency response attests thoughtlessness rather than remarkable engineering skill.

Why is a low output impedance essential ?

When actuated, electro-dynamic systems respond with a counterforce. When the voice coil of a headphone has been displaced by the signal, an (error-) current will be induced when it swings back to its initial position. This current must be suppressed as far as possible, which is effected best if the amplifier's output impedance is the lowest possible. The damping factor describes nothing but the ratio between output impedance of an amplifier and a given load.

Since there is no known technical specification, we define the load (voice coil impedance) as 50 ohms. With G111 Mk II having an output impedance of <0.125 Ohm this results in a damping factor 400.

Why are high supply voltages essential ?

A headphone doesn't really require high power, but from the equation $P = U^2 / R$ we can see that the square of the supply voltage determines the power into a given load resistance. The higher the headphone's impedance, the more voltage will be needed. But this deals with the achievable loudness to a limited extent only: Technically spoken, music lives on fast transients which put high demands on signal processing. And thus, a fast transient can easily push an average amplifier with +/-15 volts supply to its limits (90 % of all headphone amps in the market are operated with these or even lower supply voltages). Due to the high supply voltage of G111 Mk II you will benefit from more than doubled output voltage swing capability.

Why does a relay make sense when switching power ?

Amplifiers generate unwanted output signals when applying or removing power, which can damage the connected headphones. The relay breaks the connection between amplifier and headphone and thus protects the latter until electrical conditions have stabilized.

DISPOSAL

Disposal of Old Electrical & Electronic Equipment
(Applicable in the European Union and other
European countries with separate collection
systems)



DE 26076388

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead, it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product.

The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local Civic Office, your household waste disposal service or the shop where you purchased the product.

INTERNAL SETTINGS

Please note:

The following chapters refer to internal settings of the PHONE-AMP G111 Mk II. To alter these settings, a TORX screwdriver T10 or 2,5 mm Allen Key is required. The more, you should by all means

PULL THE MAINS CORD !!!

after which all settings can be performed without any hazard.

Dismantling

1. Screw out two upper screws from the front panel
2. Screw out to upper screws on the back panel
3. Now lift the lid to make your settings
4. Afterwards re-assemble the unit

There's hum...

Among other reasons, hum results from equalising currents caused by ground loops, e. g. due to the system being connected to separate mains outlets. This can be avoided by "soft" or "hard" grounding of the PHONE-AMP G111 Mk II: It is achieved by setting the ground lift jumper to either the "LIFT" or the "GND" position.

See page 18 in the technical appendix.

In "LIFT" position the internal reference ground becomes insensitive to low-frequency interference. High-frequency interference however is still bled off to ground or case respectively.

Full electrical safety is granted all the time since the case is permanently grounded via the 3-pin mains plug !!

Why does PRE-GAIN make sense ?

Two extreme examples (with the G111 Mk II at +8 dB gain (x 2,5), volume control set to full):

1st example:

The (pre-) amplifier provides 4V output voltage, whereas the headphone requires only 2V for 100dB sound pressure level.

With the control fully turned up, the G111 Mk II would deliver 10V output at +8 dB gain. Therefore the volume control would have to be operated very carefully in order to avoid hearing damage. Moreover, any interference at the input should be avoided since it would be "unforgivingly" amplified as well. With PRE-GAIN, the input level can be reduced by -12dB (a fourth), with 1 V instead of 4 V input level as the result. This 1 V is again amplified by 2,5, then equalling 2.5 V. Now the volume control can be turned over the entire range.

2nd example:

The (pre-) amplifier provides 2 V, whereas the headphone requires 16V to release 100dB of sound pressure.

With the volume control fully clockwise, the G111 Mk II would provide 5 V at +8 dB gain only - much too low for the headphone. By means of PRE-GAIN, input level can be boosted by 12dB (four times), resulting in effective 8 V input voltage instead of 2 V. These are again multiplied by 2,5 now equalling 20V. This will drive the headphones perfectly.

Too loud ? Too soft ? The PRE-GAIN concept

The G111 Mk II is specially designed to drive headphones. However, these can present loads between 8 ... 2000 ohms and efficiency factors between 85 ... 115 dB/mW. This makes it a little bit difficult to fulfil all desires, because ...

... owners of high-efficiency headphones may rarely turn the volume control over the nine o'clock position without risking hearing damage, while even the max setting may be too soft for low-efficiency headphones ...

... all users expect maximum quality at lowest noise and distortion ...

Therefore the circuitry must be able to adapt to these conditions, since headphones won't!

THAT'S WHAT WE CALL PRE-GAIN

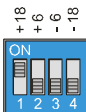
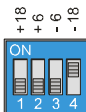
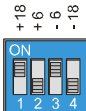
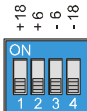
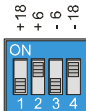
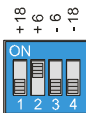
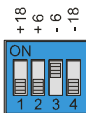
The adjustment is made in the preamp section, where the signal can be boosted or attenuated in five 6-dB steps.

See page 14 in technical appendix.

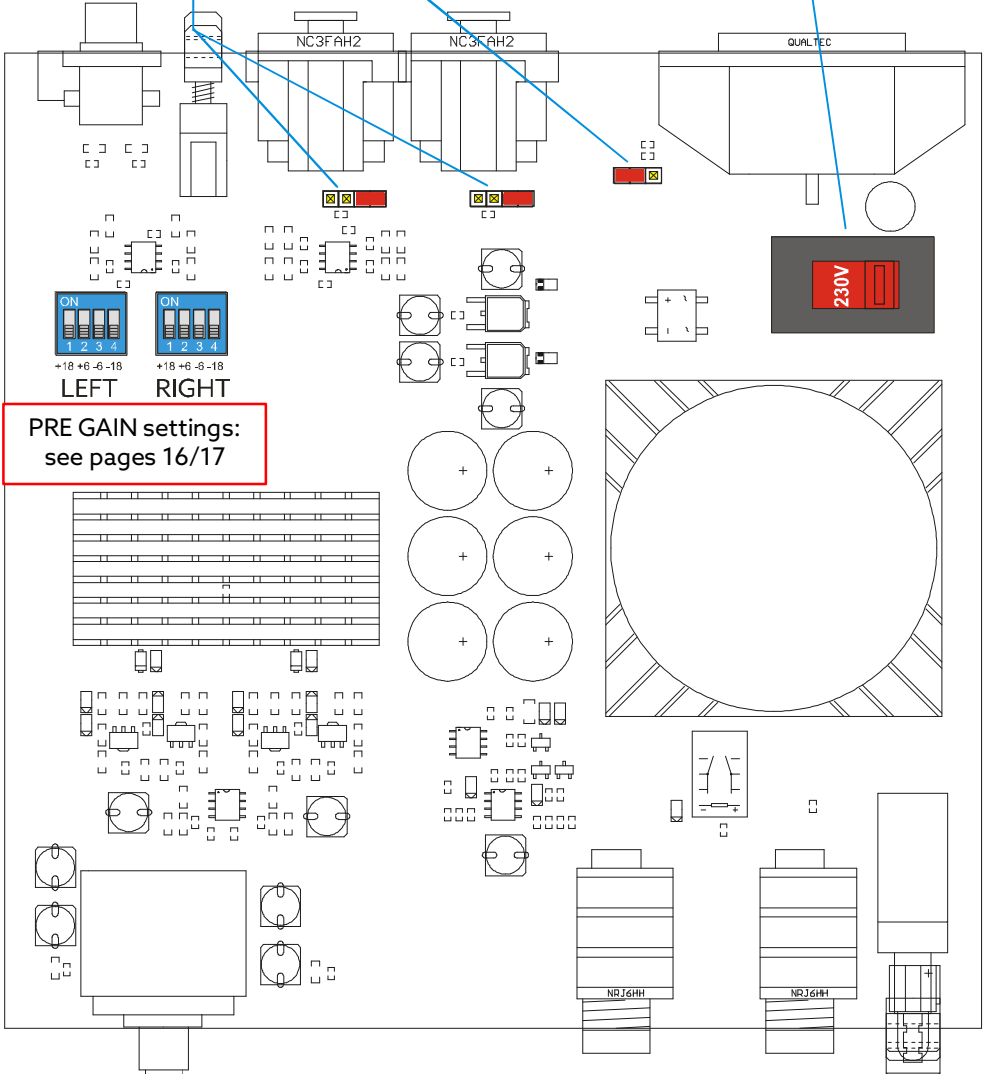
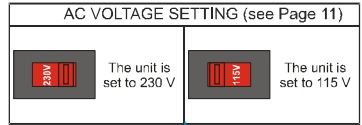
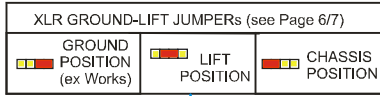
In case you find that the G111 Mk II could well be somewhat softer - e. g. in order to widen the setting range of the volume control - set the corresponding jumper to the -6dB or -12dB position.

If you find that your G111 MK II could do with some more gain, set the corresponding jumper to the +6dB or +12dB position.

The unit is factory-preset to the EX-WORKS (0dB), which should be suitable for the majority of applications.

 <p>PRE-GAIN +18 dB 1 = ON</p>	EX WORKS SETTING	 <p>PRE-GAIN -18 dB 4 = ON</p>
 <p>PRE-GAIN +12 dB 1 + 3 = ON</p>	 <p>PRE-GAIN +/- 0 dB All OFF</p>	 <p>PRE-GAIN -12 dB 2 + 4 = ON</p>
 <p>PRE-GAIN +6 dB 2 = ON</p>	EINSTELLUNG AB WERK	 <p>PRE-GAIN -6 dB 3 = ON</p>

JUMPER SETTINGS PHONE-AMP G111 Mk II



PRE GAIN settings:
see pages 16/17

TECHNICAL DATA PHONE-AMP G111 Mk II

All measurement RMS unwtcd., 20 Hz - 20 kHz, Pre-Gain set to 0 dB

Inputs:	2 x XLR female bal, 2 x Cinch, unbal
Max. Input Voltage:	+ 21 dBu, Impedanz 10 kOhms
Input Impedance:	10 kohms
Nom. Input Sensitivity:	+6 dBu
Amplifier Gain:	+8 dB
PRE-GAIN:	-18 / -12 / -6 / 0 / +6 / +12 / +18 dB
Overall gain with PRE-GAIN:	-10 / -4 / +2 / +8 / +14 / +20 / +26 dB
Frequency Range:	5 Hz - 50 kHz (- 0,5 dB) - 200 kHz (-3 dB)
Slew Rate:	8 V / usec
Dynamic Range 2x 600 R:	> 126 dB / 129 dB (A-wtd)
Dynamic Range 2x 100 R:	> 123 dB / 126 dB (A-wtd)
Noise:	< -98 dBu / -101 dBu (A-wtd)
THD+N (1kHz/2x10V/100R = 1W)	< -100 dB / < 0.001 %
THD+N (1kHz/2x18V/600R = 0,5W)	< -102 dB / < 0.0008 %
Output Impedance :	< 0,125 Ohm
Damping Factor :	> 400
Crosstalk:	< -110 dB (1 kHz) / -95 dB (15 kHz)

Max. Output Level:
(1kHz / < 0.1% THD+N)

R _L (x 2)	U _a (dBu)	U _a (V)	P _a (mW)
600	27,8	18,9	600
300	27,3	17,8	1050
240	26,5	16,3	1100
100	24,6	13,2	1750
60	23,1	11,1	2050
40	20,5	8,5	1800
32	18,7	6,7	1450
16	13,1	3,5	770

Mains Supply Voltage: 230 V AC / 115 VAC max. 10 VA

Case, Front, Back: Aluminium

Dimensions (Case with front and back): 168 x 47 x 165 mm (W x H x D)