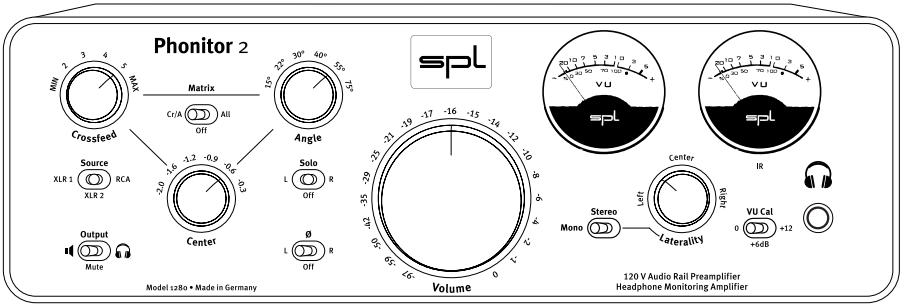
Manual



Phonitor 2

Models 1280/1281

120 Volt Amplifier for Headphones, Active Speakers and Power Amps

Version 1.5 – 3 /2014

Developer: Bastian Neu

This manual contains a description of the product SPL Phonitor 2, Model 1280. In no way it represents a guarantee of particular characteristics or results of use. The information in this document has been carefully compiled and verified and, unless otherwise stated or agreed upon, correctly describes the product at the time of packaging with this document.

Declaration of CE Conformity

The construction of this unit is in compliance with the standards and regulations of the European Community.

Notes on Environmental Protection

At the end of its operating life, this product must not be disposed of with regular household waste but must be returned to a collection point for the recycling of electrical and electronic equipment. The wheelie bin symbol on the product, user's manual and packaging indicates that. The materials can be reused in accordance with their markings. Through reuse, recycling of raw materials, or other forms of recycling of old products, you are making an important contribution to the protection of our environment. Your local administrative office can advise you of the responsible waste disposal point.

WEEE Registration: 973 349 88

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Content

Symbols and Notes

IN THIS MANUAL A LIGHTNING SYMBOL WITHIN A TRIANGLE WARNS YOU ABOUT THE POTENTIAL FOR DANGEROUS ELECTRICAL SHOCKS – WHICH CAN ALSO OCCUR EVEN AFTER THE DEVICE HAS BEEN DISCONNECTED FROM A POWER SOURCE.

AN EXCLAMATION MARK (!) WITHIN A TRIANGLE IS INTENDED TO MAKE YOU AWARE OF IMPORTANT OPERATIONAL ADVICE AND/OR WARNINGS THAT MUST BE FOLLOWED. BE ESPECIALLY ATTENTIVE TO THESE AND ALWAYS FOLLOW THE ADVICE THEY GIVE.

The symbol of a lamp directs your attention to explanations of important functions or applications.

Attention: Do not attempt any alterations to this device without the approval or supervision of SPL electronics GmbH. Doing so could void completely any and all of your warranty rights and claims to user support.

Scope of Delivery

- Phonitor 2, Model 1280
- This manual and the guarantee card
- Power cord

Please read and keep this manual. You should carefully follow all of the safety and operating instructions before you use the device. Please also note all warnings and special safety instructions noted in this manual and on the unit.

Connections: Only use the connections as described. Other connections can lead to health risks and damage the equipment.

Water and humidity: Do not use this device anywhere near water (for example in a bath room, a damp cellar, near swimming pools, or similar environments). Otherwise your are dealing with an extremely high risk of fatal electrical shocks!

Insertion of objects or fluids: Be careful to not insert any object into any of the chassis openings. You can otherwise easily come into contact with dangerous voltage or cause a damaging short circuit. Never allow any fluids to be spilled or sprayed on the device. Such actions can lead to dangerous electrical shocks or fire!

Opening the unit: Simply put: DON'T, if you are not a certified SPL technician or engineer.Really: Do not open the device housing, as there is great risk you will damage the device, or – even after being disconnected – you may receive a dangerous electrical shock!

Electrical power: Operate the device only from power sources that can provide proper power. When in doubt about a source, contact your dealer or a professional electrician. To be certain you have isolated the device, disconnect all power and signal connections. Make sure that the power supply plug is always accessible. When not using the device for a longer period, make sure to unplug it from your wall power socket.

Cord protection: Make sure that your power and audio signal cords are arranged to avoid being stepped on or any kind of crimping and damage related to such event. Do not allow any equipment or furniture to crimp the cords.

Power connection overloads: Avoid any kind of overload in connections to wall sockets, extension or splitter power cords, or signal inputs. Always keep manufacturer warnings and instructions in mind. Overloads create fire hazards and risk of dangerous shocks!

Lightning: Before thunderstorms or other severe weather, disconnect the device from wall power; do not do this during a storm in order to avoid life threatening lightning strikes. Similarly, before any severe weather, disconnect all the power connections of other devices and antenna and phone/network cables which may be interconnected so that no lightning damage or overload results from such secondary connections.

Air ventilation: Chassis openings offer ventilation and serve to protect the device from overheating. Never cover or otherwise close off these openings. Never place the device on a soft surface (carpet, sofa, etc.). Make sure to provide for a mounting space of 4-5 cm/2 inches to the sides and top of the unit when mounting the unit in racks or on cabinets.

Controls and switches: Operate the controls and switches only as described in the manual. Incorrect adjustments outside safe parameters can lead to damage and unnecessary repair costs. Never use the switches or level controls to effect excessive or extreme changes.

Repairs: Unplug the unit from all power and signal connections and immediately contact a qualified technician when you think repairs are needed – or when moisture or foreign objects may accidentally have reached inside the housing, or in cases when the device may have fallen and shows any sign of having been damaged. This also applies to any situation in which the unit has not been subjected to any of these unusual circumstances but still is not functioning normally or its performance is substantially altered. In cases of damage to the power supply and cord, first consider turning off the main circuit breaker before unplugging the power cord.

Replacement/substitute parts: Be sure that any service technician uses original replacement parts or those with identical specifications as the originals. Incorrectly substituted parts can lead to fire, electrical shock or other dangers, including further equipment damage.

Safety inspection: Be sure always to ask a service technician to conduct a thorough safety check and ensure that the state of the repaired device is in all respects up to factory standards.

Cleaning: Do not use any solvents, as these can damage the chassis finish. Use a clean, dry cloth (if necessary, with an acid-free cleaning oil). Disconnect the device from your power source before cleaning.

Be very careful to check that the rear chassis power selection is set correctly before using the unit (230 V position: 220-240 V/50 Hz, 115 V position: 110-120 V/60 Hz)! When in doubt about a source, contact your dealer or a professional electrician.

Read page 15 for instructions on how to set the correct voltage.

Before connecting any equipment make sure that any machine to be connected is turned off. Follow all safety instructions from page 5.

Place the unit on a level and stable surface. The unit's enclosure is EMC-safe and effectively shielded against HF interference. Nonetheless, you should carefully consider where you place the unit to avoid electrical disturbances. It should be positioned so that you can easily reach it, but there are other considerations. Try not to place it near heat sources or in direct sunlight, and avoid exposure to vibrations, dust, heat, cold or moisture. It should also be kept away from transformers, motors, power amplifiers and digital processors. Always ensure sufficient air circulation by keeping a distance of 4-5 cm/2 inches to other units and to the sides of the unit.

Before You Begin

Make sure the Volume control is turned hard left before you power up the unit. Now control Volume. Note that too high levels can damage headphones and hearing!

Phonitor

When we brought out the first Phonitor — the first ever headphone amp with 120 Volt technology — back in 2008, the professional audio world seemed to have been eagerly awaiting it. The success of this unique headphone preamp was overwhelming. In hindsight, we also had to wonder how none of us had come to the idea of combining basic monitoring options, speaker simulation capabilities and a headphone preamp. Ever since we call this new species a „Headphone Monitoring Amp," which inspired the product name itself: Phonitor.

Interestingly enough, the Phonitor not only became best friends with thousand of professional users, it also won a lot of fans in the Hi-Fi market segment. But that was by no means a coincidence — ultimately, the Phonitor can be counted among the best headphone preamps in the world thanks to our unique 120-volt technology. With its exceptional technical specifications and a huge power margin, it can reproduce any musical material without the slightest modification, since signal processing is not limited and, thus, signals are not altered at all. Music sounds more natural and hearing fatigue is drastically reduced. Given all that, it was easy to understand the enthusiasm with which musicians, sound engineers and music lovers received the Phonitor worldwide.

The New Heart Of Music Playback: Phonitor 2

Many Phonitor users told us they wished they could also use the unmatched signal quality that the Phonitor provides to feed their speakers. And so began to take form the idea of making its successor a full-fledged stereo preamp that could become the heart of modern professional and home systems alike where headphones have a preeminent importance. Moreover, we have achieved enormous advances with our 120-volt circuits, making the technical specifications of the Phonitor 2 a new standard in all respects: 141dB dynamic range, 107dB signal-to-noise ratio (A-weighted in both cases), -112/-114 dB THD (headphone/speaker output with +30dBu output level). Mind you, the THD measurements define the limits of the measuring equipment but not those of the Phonitor 2.

Other improvements concern specially the operation of virtually all headphone types and impedances: the Phonitor 2 works seamlessly with low-impedance headphones with load impedances as low as 10 Ohm (40 Ohm with balanced headphones).

The Two Sides Of The 120 Volt Amp

As always, the Phonitor 2 remains first and foremost a headphone preamp, which is easy to identify given the elaborate loudspeaker simulation for headphones. Considering that the 120-volt amp provides everything needed to preamplify, manage and control the volume of line level signals, the latter are now also available at the output on the rear panel.

Besides headphones, it is now possible to connect active loudspeakers and power amps directly at the output. If there is the need for more than one stereo speaker set, it is recommended to use a passive distribution module. It is important to know that all controls can be used for both outputs with headphones and loudspeakers. Obviously, loudspeaker simulation makes no sense when using real loudspeakers. However, owners of electrostatic headphones could connect their headphones to the output and use the simulation feature as well. Likewise, all monitoring options (phase reverse, solo, mono, mute) can be selected for both outputs, so that the Phonitor 2 can be used as Monitor Controller for up to three different sources.

Remote Control

The volume can be controlled remotely. Naturally, the audio signal is controlled via a high-quality motor potentiometer in that case. In comparison, electronic adjusting with or without AD/DA converter – very common these days – would have a significant influence on the signal quality.

To control it you can use any IR remote control: the remote must not learn the Phonitor 2, but rather the Phonitor 2 learns to understand your remote's signal (see page 16).

Home Listening

Home users can enjoy a central control unit for modern music playback of stereo signals that supports all known formats – and that with an unheard-of price/performance ratio. As such, the Phonitor 2 does justice to its central position. It is comforting to know that there is no need to fear a sound bottleneck limiting your system in such a critical spot in the chain.

The Phonitor 2 matches perfectly modern playback concepts: minimalist chains with active speakers and almost any pair of headphones can be centrally fed via three different paths, thanks to an integrated high-quality amplifying and signal-managing concept.

Sound Engineers

Besides being a reference-quality Monitor Controller, the Phonitor 2, together with a carefully matched pair of headphones, offers professional users an excellent monitoring alternative to their main speakers. The audio quality and features of the Phonitor 2 provide the best conditions to work effectively without hearing fatigue.

120 Volt Technology

The foundations of this high-end-development is our 120 Volt reference technology: specially developed and manufactured op-amps that run on an operating voltage of 120 volts, which corresponds to approximately twice that of most modern analog audio semiconductor technologies. Thanks to our 120-volt circuitry and processing we reach outstanding performance levels, especially in terms of dynamic range and headroom. As such, the technical specifications of the Phonitor 2 exceed all known analog and digital standards (please refer to the “End Of Ear Fatigue” chapter on page 12).

Special Features

- The Reference – the Phonitor 2 sets new technical and sound standards.
- For loudspeakers and headphones – two-channel 120 Volt amp for headphones and active loudspeakers or power amps
- For all types of headphones – dynamic, balanced, electrostatic
- Optimally suited for low-impedance headphones starting from 10 Ohm (40 Ohm for balanced headphones)
- Remote volume control with motor potentiometer
- High-resolution laterality correction compensates right/left volume differences.
- Switchable level adjustment (consumer to professional level, 1:1, +6dB, +12 dB)

Applications

- Stereo preamplification and headphone amplification for three sources
- High-quality music playback at home
- Central monitoring unit in professional environments with all classic features like phase reverse, solo, mono
- Re-Amping (for example, level boost after analog master processing)
- Headphone amplifier for all headphone systems and impedances
- Loudspeaker simulation with headphones
- Monitoring alternative in studios and mobile units
- Adjustment of headphone playback to match familiar monitor speakers
- Mobile reproduction of usual monitoring conditions

Phonitoring: With And Without Magnifiers

Already for the headphone monitoring – or phonitoring – part alone, the Phonitor 2 encompasses advantages of both kinds of traditional monitoring methods: On one hand the analytical headphone monitoring is like working with an acoustic magnifier but without external room influences; on the other hand, loudspeaker simulation allows for monitoring which forgoes the microscopic effect, but provides for room ambiance.

Working with the magnifier effect of headphones has the advantage of safely hearing clicks or similar defects and helps in fine tuning crossfades or to judge tonal problems in individual tracks. On loudspeakers such analyses are much more difficult, as such problems just are not as apparent when one is working without being able to "zoom in" aurally. Conversely, loudspeakers provide monitoring with the advantage of spatial balance in a (definable through placement) stereo width, which in turn provides the illusion of an acoustic stage.

Traditional headphone reproduction produces one 180-degree stereo width in the middle of the head, and it is exactly this which creates the very problematic-to-impossible headphone mixing environment. An essential reason for such unnatural ambiance is the complete separation of the channels, which does not exist either in natural hearing or in stereo loudspeaker reproduction. This makes it nearly impossible to judge tonal balance, a stereo image and the phantom center level. Panorama adjustments as well as related EQ settings that one attempts with headphones, typically just do not function on loudspeakers.

Moreover, what is often called the "super stereo effect" with headphones usually creates a great deal of ear fatigue in the long run. Over loudspeakers the sound stage is felt in front, while in contrast, when monitoring through headphones, the stage is present on the left and on the right – but frontal and rear information is lost.

The End Of Ear Fatigue

Aside from these unnatural headphone ambiance there are further disadvantages with fatigue when mixing or listening with headphones. First, some cans themselves may not be that comfortable to wear ...

Moreover, a standard headphone amplifier is often an additional important reason for premature ear fatigue. Almost without exception, present-day headphone amplifiers employ comparatively undemanding IC's. In the best cases they might work with symmetrical voltages of +/-15 V to +/-18 V, and in less favorable cases, with only a simple supply of 9 or 12 V from cheaper external "wall-wart" power supplies.

But the voltage level acts in circuitry much like the cubic inch capacity to the productive power of a combustion engine: Cubic inch capacity is replaceable with nothing but more cubic inch capacity – and in the productive power of electronics, voltage level functions similarly.

For some years, now, SPL has addressed this issue in all of its mastering product series through its own specifically developed 120 volt technology. Consoles and signal processors of the SPL Mastering Series appear as central elements in installations of today's most renowned mastering houses (for example Bob Ludwig's Gateway Mastering & DVD in the USA, Simon Heyworth's Super Audio Mastering in Great Britain, the Galaxy Studios in Belgium and the legendary Wisseloord in the Netherlands). This 120 volt technology is based on discrete operation amplifiers from SPL's own production, developed and perfected over many years by SPL's co-founder and chief developer, Wolfgang Neumann. These OPs work with high-performance semiconductors in Class A technology at a symmetrical voltage of +/-60 V.

The Phonitor 2 is the first unit to employ the 2nd generation of our 120 Volt OPs with improved specifications once again. They have Signal To Noise Ratio of 116 dB and offer a nearly 34 dB headroom – that yields an unequalled 150 dB dynamic range.

The musical result is not to be mistaken: Regardless of the monitoring means, regardless of how loud you monitor – the Phonitor 2 always remains a distant, impartial factor unaffected when used to capacity and beyond being overloaded. The phase stability is always perfect, its THD next to immeasurable.

The Phonitor 2's OPs cannot be stressed in the most stressful circumstances, and for precisely this reason its musical sound is always relaxed and spacious. All frequencies are reproduced in balance, basses are stable and tight, mids are clear and differentiated and highs remain transparent and soft. Particularly striking is the fact that you can easily listen to every detail. Hearing fatigue makes it usually harder to carefully listen to and understand complex signals over a long period of time. The Phonitor 2 reverses this situation turning it into a pleasant listening experience that leaves you longing for more.

Such supreme and heretofore unreachable neutrality in audio reproduction is the direct consequence of our technical approach and basis in 120 volt technology: Possible disturbances from such as noise or distortion are so slight that we even arrive at the boundaries of the best measuring equipment, and what remains is quite simply unaltered musical sound.

120 Volt operating voltage and its effects

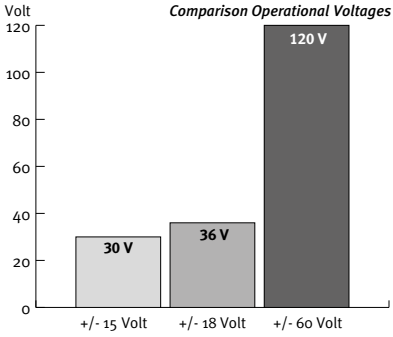
These diagrams clearly show how our 120-volt technology compares to other circuits with a lower operating voltage. The direct relation between operating level and maximum level is fundamental for the classification: the higher the operating level, the higher the maximum level a circuit can handle. And since virtually all essential acoustic and musical parameters depend on this relation, a higher operating voltage also has a positive impact on the dynamic range, distortion limit and signal-to-noise ratio.

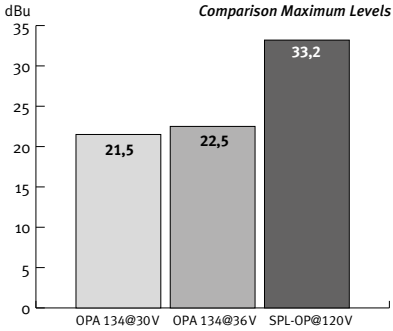
Do bear in mind that dB scales do not represent linear but rather exponential increases. A 3dB increase corresponds to doubling the acoustic power, +6dB correspond to twice the sound pressure level, and +10dB correspond to twice the perceived loudness.

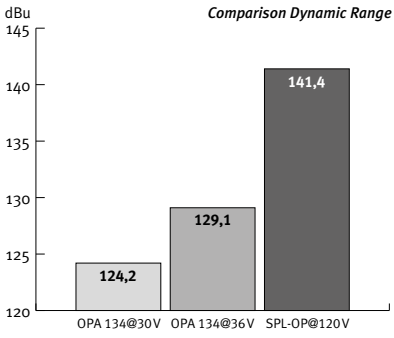
When it comes to volume, the 120-volt technology exhibits a performance, in regard to maximum level and dynamic range, that is twice that of common components and circuits given that its values are approximately 10dB higher.

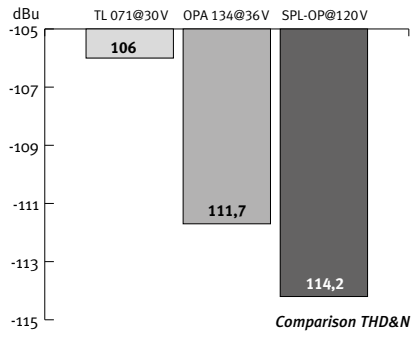
THD measurements of the SPL op-amp show a difference of more than 3dB compared to the OPA134 at 36V — in terms of sound pressure level, that corresponds to an improvement of more than 50%.

The operating level most commonly used for audio equipment is 30 volts.

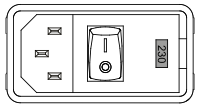








Voltage Select

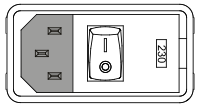


Before connecting the Phonitor 2 to the mains, make sure that the voltage selection corresponds to the values of your local power grid (230 or 115 volts).

The mains connector on the rear panel integrates a fuse box that includes fuses for both voltage ranges. To select the voltage take out the fuse box, turn it around and place it back again. Inside the power connector, to the right, next to the on/off switch, there is an opening that displays the voltage selected. If the voltage indicated does not correspond to the one required, change it by following this procedure:

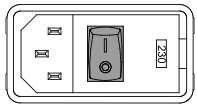
Open the power connector lid with a small screwdriver (use the tiny slots on the right hand side). Use the screwdriver to lever the red fuse box from above until you can grab it. Take the fuse box out, turn it around 180 degrees and place it back again. When you close the lid again, you should see the correct voltage displayed in the opening.

Power Connection



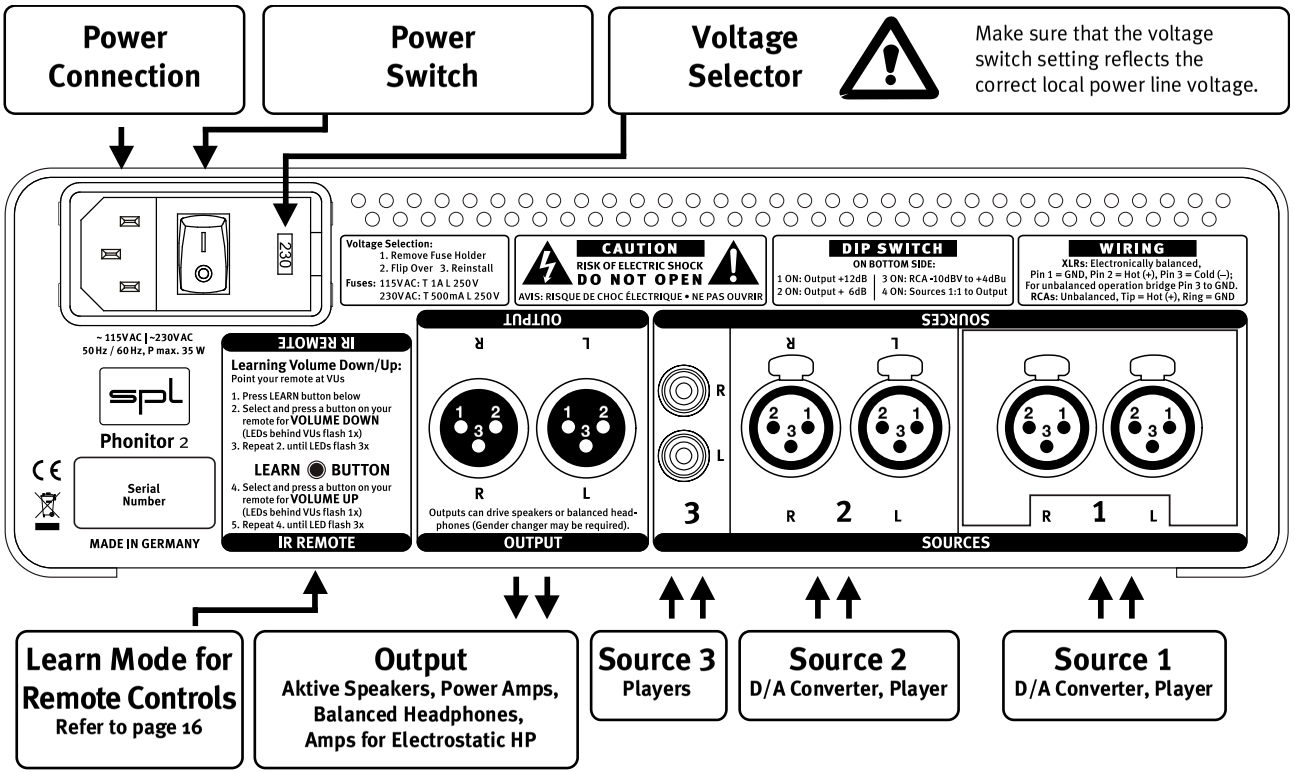
Connect the included power cord to the rear, 3 pin power input. The transformer, power cord and inlet of the appliance conform to VDE, UL and CSA requirements.

On/Off Switch



Use the rear on/off switch to activate and deactivate the unit. The operational status is indicated by the illuminated VU meters on the front panel. We deliberately chose to place the switch on the rear panel in order to avoid interferences from power wiring through the unit to the front panel. When switching on and off, you do not need to follow any particular sequence with connected devices in the periphery of the unit. There is, however, a general rule for audio devices connected together: always turn on power amplifiers last and turn them off first. If sufficiently specified, you can also switch the unit on and off through a multiway connector or other main switches.

Caution: Before connecting any other equipment – and in all other cases where you are connecting cables with or from other sources – you should be sure to switch off the Phonitor 2 and all other devices you want to connect it to. Otherwise you risk damaging the unit, other connected gear and/or your ears.



NOTE ON XLR SOCKETS: You can establish unbalanced connections easily and without adaptors e. g. from and to RCA sockets. In any case we recommend readily configured cables from XLR to RCA or TS/TRS connector to dispense with adaptors. Ask your dealer for configured cables and forward the XLR pin wiring of the Phonitor 2 (refer to page 16).

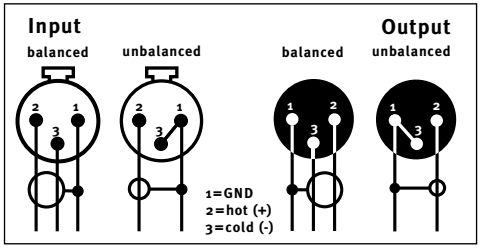
Signal Connections

Inputs are always female and accept male connectors; outputs are always male. All in all, a very comprehensible principle. Turn off the unit before connecting or disconnecting any cable or equipment to it. Otherwise you risk the possibility of damaging your ears or equipment.

XLR Sockets

The diagram shows the pin wiring of all XLR sockets (3 pin, balanced).

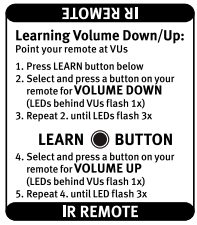
The diagram also shows how to wire the balanced XLR connections if unbalanced connections are required, for example to RCA or TS inputs and outputs (see next section).



Connecting XLR to other socket formats

Unbalanced connections from and to RCA or 1/4" TS sockets, for example from CD players or to power amps, are no problem and can be made without adaptors. We recommend to use individually configured cables from XLR to RCA or TS sockets instead of adaptors. The correct wiring is important. The diagram shows the pin configuration of the XLR sockets and how to correctly configure them for unbalanced connections. You can get cables in any needed configuration from audio dealers. With the diagram above, the dealer can ensure to provide the appropriate cable for your application.

Learn Button: Learn a remote control



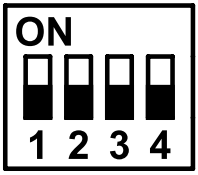
The volume potentiometer of the Phonitor 2 is motorized and can be controlled with any remote control. But you must first activate the Learn Mode in the Phonitor 2. Afterwards you must choose any two buttons on the remote that will be used to increase or decrease the volume. Then you simply have to save them on the Phonitor 2.

1. Press the LEARN BUTTON on the rear panel. The VU-meters light up red.

2. Point your remote towards the VU-meters and press the button you want to use to decrease the volume. The VU-meters will light up once every time you press a button. Press the same button repeatedly until the VU-meters flash three times consecutively, which means the button has been programmed.

3. Now follow the same procedure once again to program the button to increase the volume.

Bottom: DIP Switches

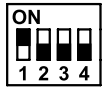


Output level adjustment

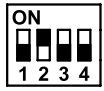
The DIP switches on the bottom of the unit give you the possibility to increase the output level in multiple steps. This is something that ought to be considered basically in two cases: when the input level is very low and when using high-impedance and especially power-hungry headphones.

By default, the normal setting is active, all switches point down towards the numbers 1-4. The output level can be increased for all outputs in two steps: +6dB and +12dB. Additionally, the RCA input offers the possibility to bring the level from consumer level (-10 dBV, for CD players, for example) to professional level (0 dBu). **IMPORTANT:** If the level has been increased by +6dB or +12dB, this increment and the conversion of the RCA input to professional level will be summed (see 4.).

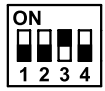
1. Increase of +12dB for all outputs: Switch 1 set to ON.



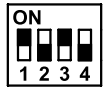
2. Increase of +6dB for all outputs: Switch 2 set to ON.



3. RCA input level conversion to professional level (-10dBV to odBu): Switch 3 set to ON.



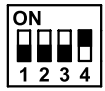
4. Example Summed Levels: +12dB increase for all input PLUS RCA input level conversion to professional level (-10dBV to odBu): Switch 1 and 3 set to ON.

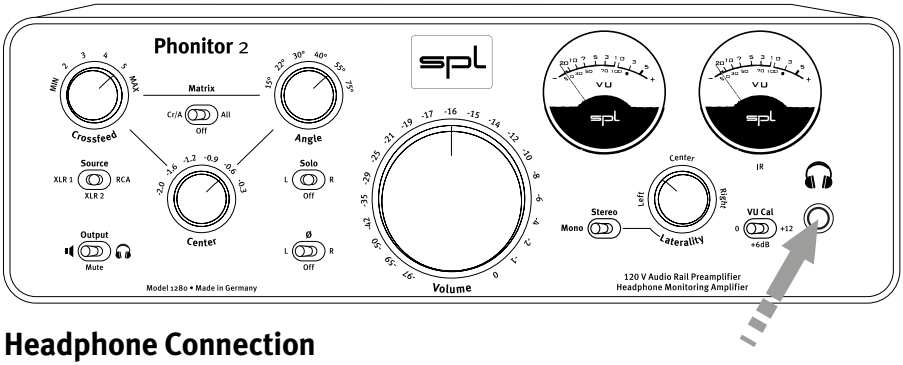


Phonitor 2 Insert Loop

The Insert Loop mode for the line input is a particularity of the Phonitor 2. Switch 4 allows you to route the input signal directly to the line output without it being processed by the level or any other settings of the Phonitor 2. This mode is particularly interesting when the Phonitor 2 is not used as a preamp or monitor controller and the source signal ought to pass through unaltered.

5. Direct signal loop-through at the line output. This circuit of the XLR output corresponds to that of the Phonitor 1 (Model 2730, 2730B).





Headphone Connection

Connect headphones to the standard 1/4" (TRS) stereo plug on the lower right front panel. The layout is: Tip =left channel, Ring = right Channel, Sleeve = ground.

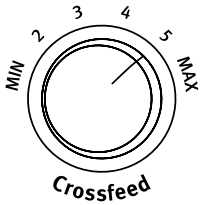
Make sure that the plug firmly seated for a solid connection.

Recommendations

Reduce volume level before you remove or plug in the headphone (or when switching headphones). This excludes louder clicks and pops reaching the ear. In addition, this can avoid unpleasant surprise that follows when a headphone's lower impedance suddenly reproduces an otherwise acceptable Phonitor 2 volume setting of a first headphone at a much higher – even painful – level.

Warning

NEVER plug in a mono 1/4" (TS) connector to the stereo headphone output. The use of a mono connector produces a short-circuit and destroys the final amplifier stage! Standard headphone connectors always have stereo plugs, and thus a correct connection will be assured when you only connect headphones directly.

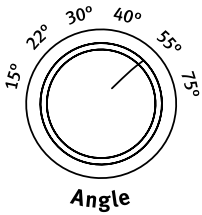


Crossfeed

The Crossfeed switch allows you to adjust the frequency-dependent crossfeed simulation of both channels by adjustments of interaural level difference – as if this characteristic would be heard from monitors when in their own room ambiance. One can compare variations in crossfeed values as approximating the influence of different room sizes and characteristics on a given loudspeaker setup.

This adjustment can be made in six steps ranging from “minimum” to “maximum”. Crossfeed interacts with the Angle value to simulate the width of a stereo image (please refer to the next section).

For further information regarding simulation of a specific loudspeaker playback setup, please refer to “Adjust Headphone Reproduction To Loudspeaker Monitoring“ on page 26.



Angle

The Angle switch provides for frequency-dependent simulation of your stereo image width by adjustments of interaural time difference. This influences the moment in time at which a signal‘s wave form arrives at the ear and corresponds to a particular variation in the angle of an actual loudspeaker pair.

The time constants of the interaural time differences between the left and right channels occur within a range of 90 to 635 microseconds. Compare the table “Crossfeed and Angle Parameters” on page 21. We recommend to start with the figures of the accentuated lines from this mathematically-based table for a given monitoring setup. As you might expect, however, the best results can only occur when you follow the recommendations and then as needed, carefully engage in your own additional fine tuning, especially between Angle and the Crossfeed value.

For further information on the simulation of a specific loudspeaker playback, please refer to “Adjust Headphone Reproduction To Loudspeaker Monitoring“ on page 26.

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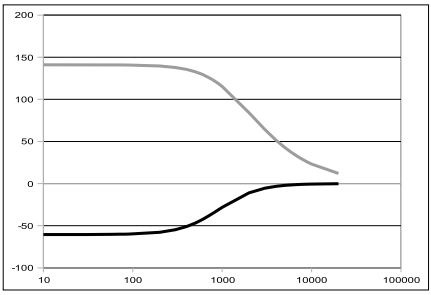
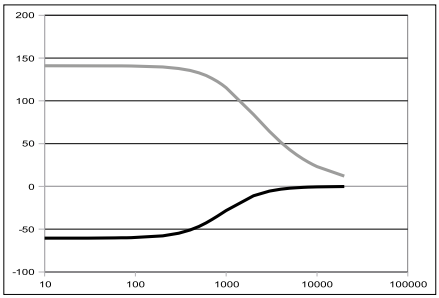
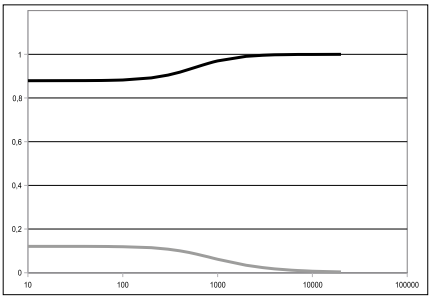
Interaural Level and Time Differences as Related to Crossfeed Setup

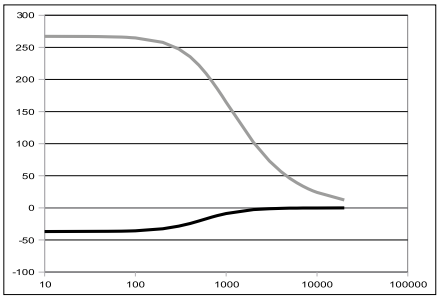
The following two diagrams show, respectively (on the left), the frequency response of interaural level differences and (on the right) the interaural time difference at **maximum Crossfeed** value and at an Angle of 30 degrees.





The following two diagrams show, respectively (on the left), the frequency response of the interaural level difference and (on the right) the interaural time difference, at **minimal Crossfeed** value and an Angle of 30 degrees.



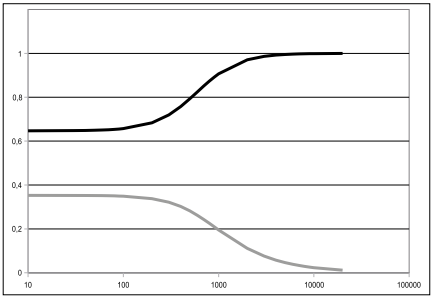


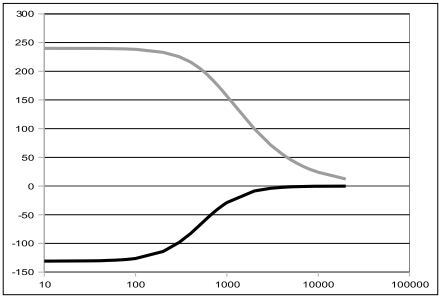
The black curves stand for the side of the direct sound wave front, while the gray curves stand for the opposite side. It is clearly recognizable that corrections are usually done for frequencies below 1 kHz.

You should also note that the Crossfeed control functions mainly level dependent. Effects with respect to time differences are comparatively slight. However, that they, too, may be altered is an indicator of interaction between Crossfeed and Angle control.

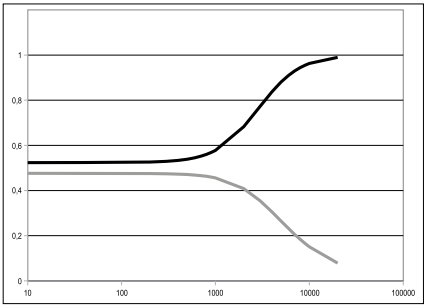
Interaural Level and Time Differences as Related to Angle Setup

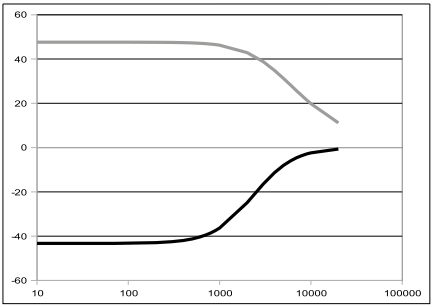
The following two diagrams show (on the left) the frequency response of interaural level difference with respect to the interaural time difference (on the right) at maximum Crossfeed value and an **Angle of 75 degrees.**





The following two diagrams show, respectively (on the left), the frequency response of the interaural level difference and the interaural time difference (on the right) at a maximum Crossfeed value and an **Angle of 15 degrees.**





The black curves stand for the side of the direct sound wave front, while the gray curves stand for the opposite side.

The larger the Angle value (and/or angle of an actual loudspeaker placement), the greater the effect will be of shifting the opposite side toward more deeply lying frequencies, since with an increased spatial arc around the head only lower frequencies will undergo proportionate modification.

It should also become apparent that the Angle control is primarily depending on interaural time differences. Its influences on level differences are in contrast, comparatively slight.

Crossfeed and Angle Parameters

Angle Switch	Crossfeed Switch	Level Difference	Time Diff. (µs)	Speaker Angle (Result)
15°	MAX	0,03	90	10°
	5	**0,06**	**130**	**15°**
	4	0,08	165	20°
	3	0,12	210	25°
	2	0,16	250	30°
	MIN	0,2	320	35°
22°	MAX	0,24	133	15°
	5	0,35	165	20°
	4	**0,4**	**210**	**20°**
	3	0,47	220	25°
	2	0,5	230	25°
	MIN	0,6	250	30°
30°	MAX	0,4	205	20°
	5	0,49	235	25°
	4	0,56	260	30°
	3	**0,64**	**280**	**30°**
	2	0,7	300	30°
	MIN	0,76	335	40°
40°	MAX	0,26	290	30°
	5	**0,34**	**355**	**40°**
	4	0,4	400	45°
	3	0,49	455	45°
	2	0,5	480	55°
	MIN	0,6	535	70°
55°	MAX	0,34	350	40°
	5	0,44	405	45°
	4	0,5	450	50°
	3	**0,58**	**490**	**55°**
	2	0,52	525	65°
	MIN	0,7	555	70°
75°	MAX	0,31	375	40°
	5	0,4	450	50°
	4	0,44	505	60°
	3	**0,54**	**560**	**70°**
	2	0,6	600	80°
	MIN	0,64	635	90°

The accentuated lines show at which Crossfeed values the Speaker Angle most precisely matches the theoretically determined time difference values. These, of course, are mainly a starting point to reproduce a real monitoring setup.

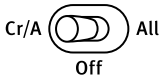
Formulae for calculations from http://www.sengpielaudio.com/LaufzeitdifferenzenBeimNatuerlichenHoeren.pdf

Source

The Phonitor 2 provides three different source connections. Use the Source switch to select one. All three switches are named after the inputs on the rear. The RCA input is usually used to connect consumer products. Do note, however, that the XLR inputs can also be used to connect any unbalanced outputs. For more information on this topic, please refer to page 16, „Connecting XLR to other socket formats."

Output

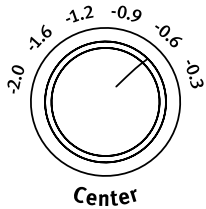
This switch merges the output selection and mute options. You can choose directly on the Phonitor 2 whether you want to listen to the output signal on your headphones or speakers. There is no need to unplug the headphones when you listen through your speakers, nor to turn off the power amp when you use headphones.



Cr/A, Off, All

With Cr/A, Off, All you switch on or off Crossfeed and Angle functions globally. "Cr/A" switches Crossfeed and Angle in, "All" activates Crossfeed, Angle and Center, "Off" deactivates all three functions. This provides for direct A/B comparisons.

Your impression may at first be that the results are not so spectacular as expected – until you consider that the Phonitor 2 is not an effects machine. Instead, reevaluate your aural impression by thinking about this: normal headphone monitoring confronts you with a 180-degree sound stage – the "super stereo width" has so little to do with loudspeaker playback. Now you can gradually reduce this in 15 degree steps with the Angle switch. Subsequently, using the Crossfeed function, you can simulate the acoustic effect of room size and ambient characteristics on a given listening device.



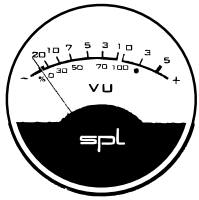
Center

With the Center control you may regulate the intensity of center signals to compensate for the stereo signal processing with Crossfeed and Angle. This Center signal is produced as a mono sum of the left and right channels. Changes in these values are regulated through a finely graduated, six steps switch (0.3, 0.6, 0.9, 1.2, 1.6 and 2 dB).

In a normal headphone listening experience, the center signal is typically quieter than the stereo signals, which appear louder due to the super stereo effect. If the sound stage width is narrowed through changes in Crossfeed and Angle (so as to correspond to your actual loudspeaker setup), the headphone center may likely sound too intense now. Lowering the center level will again return the center signal to the correct volume in relation to the L/R stereo image.

If you are an audiophile listener you may find that you will not need the Center function as you are mainly listening to finished recordings that were mixed to sound well on loudspeakers. As a mix engineer you will appreciate the center function as an essential tool for successful mxing on headphones. The Center function helps to mix the phantom center signals such as lead vocals, bass, kick and snare with the correct level to sound great on loud-speakers.

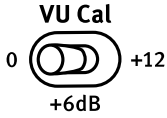
VU Meter



The VU meter displays the input level for each channel. Calibration is set to +4dBU at 0 VU. The gauge indicates levels from -20 dB to +5 dB. If necessary you can lower the sensitivity by 6 dB so that the gauge goes up to +11 dB output level (see "VU Cal." below).

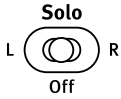
The VU meter is custom made to meet SPL specifications and assures a balanced optical perception thanks to it's optimized ballistics. The integration time of the display complies with BBC requirements, rise time up to 0 dB is approximately 300 ms.

VU Cal.



With this switch you can change the sensitivity of the VU display. If you choose the +6 dB position, the range of the display is extended by 6 dB. With the +6 dB switch activated and the needle at 0 dB, a value of +6 dB input level is displayed.

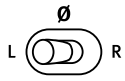
Solo



You can engage the Solo switch to monitor only the left or right channel of the stereo signal.

The Solo switch has three positions: L, R and OFF. The middle or OFF position allows monitoring the stereo signal. Switch to L or R, and you will hear only the left or right channels, respectively.

A selected solo channel defaults to retain in its respective left or right position, and we call this function "Solo-in-Place". However, should you prefer to hear a chosen solo channel in both ears ("Solo-to-Center"), you can additionally activate the Mono switch. This Solo-to-Center variant also allows some interesting possibilities for comparison between two channels. You can, for instance, recognize immediately whether the sound of both channels contains comparably equal highs and mids. Likewise you may ascertain quickly whether a signal such as a voice, snare, kick or bass track (that you wished to locate in the middle of the stereo field) has been placed properly – if not, this setting will reveal different levels in the left and right channels.

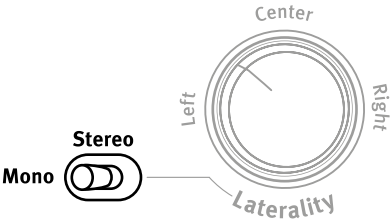


Phase ø

The phase reversal control is another important monitoring function. As with the solo function, you can choose between L, R and OFF. Choose the middle position, OFF, to hear the stereo signal. Switching to L reverses the left channel phase (thus inverts by 180°). The same effect occurs in the right channel when switching to R.

With phase reversal and a simultaneous activation of the Mono switch, you can generate the difference between both audio channels. Depending on which channel's phase reversion you have activated, what remains will be the channel's available stereo information. In this differentiated signal you can, for instance, now judge whether signals to be placed in the middle "sit" properly or not. If not, a remainder of the center signal will not be cancelled out by the phase reversal – something which should happen with a true mono signal. Before you undertake this test, you should eliminate any stereo effects on the channel you wish to test, as such reverb processing will tend to be retained and invalidate the results.

However, even more important for precision testing of the center signal can be to discern the intrusion of artifacts. For example through this process you can easily detect distortion which may be introduced digitally (via converters or internal DAW mixing).



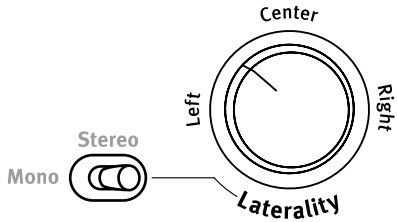
Stereo and Mono

Usually this toggle switch is set to Stereo for regular monitoring of stereo signals. The Mono switch creates a sum of the stereo channels.

If, per the above description, you employ this Mono switch along with the Solo, the overall signal level will be approximately 6 dB below a stereo signal and mono-switch only. This is normal, since in Solo mode only a single mono channel is active.

Aside from the above scenario, the Mono switch also offers important and useful functions in combination with Phase and Solo switches in its ability to examine the mono compatibility of a mix. While such compatibility tests are essentially the same as in earlier eras, they nonetheless remain an important standard in radio mixing or vinyl production.

Laterality

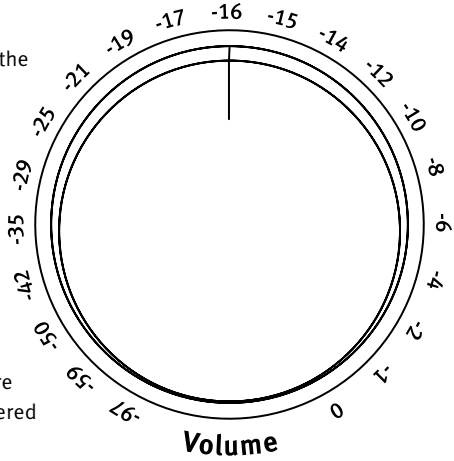


In acoustics, laterality refers to the deviation of sound perception to either of our ears. With the Laterality control you can compensate perceived volume differences between channels that may be due to hearing loss.

In contrast to conventional balance controls, in this case the control values are lower and the arrester does not correspond to zero. Its resolution is very high, which means it can be finely adjusted. Further, Laterality works like a scale with values ranging from +3dB to -3dB. This means that, when hard left, the level of the right channel is reduced 3dB while that of the left channel increases 3dB.

The maximum difference amounts to 6dB, which is more than enough to compensate for significant differences: +6dB equates to doubling the sound pressure level (to achieve a doubling of the perceived loudness, the overall level ought to increase 10dB).

Volume



The Volume level control allows you to decrease the signal level from between 0 and -97 dB.

To this end we employ a high-grade ALPS RK27 motorized potentiometer. It distinguishes itself through a high headroom, very low tolerance and excellent handling that on the one hand offers sufficient resistance while, on the other, avoids stickiness.

The Volume control is calibrated in a relative dB scale that references the input level. The fully clockwise position represents 0dB, where the input signal is led to the output with an unaltered level (unity gain).

Adjust Headphone Reproduction To Loudspeaker Monitoring

The Phonitor 2 offers foremost a complete set of options required for professional monitoring: Solo L/R, Phase Reverse L/R, Mono, Volume, VU Metering.

In addition, new functions such as Crossfeed, Angle and Center Level transform the Phonitor 2 from a traditional headphone amplifier into a headphone monitoring amplifier, with which it is possible to achieve reproduction equivalent to studio monitors, if essential factors of music production are considered.

We recommend proceeding with the following five steps:

1. Initially choose your audio material from sources you know well, and in a first production, that which is similar to what you wish to mix. It is not sensible to listen to classic music while planning a Phonitor 2 setup to mix a pop production. Classic music stereophony recording involves a much more restricted stereo width than pop or rock music, where artificial "panorama stereophony" often provides for a much broader imaging. Compare and match the volume of speakers and headphones.

2. Note that you should be able to switch quickly and smoothly between speaker and headphones when making comparison tests. It is also important that you can switch off the loudspeakers quickly to avoid crosstalk into the headphone. The degree of loudspeaker crosstalk into the headphones will of course depend on whether you have open, half -open or closed headphones.

3. As starting points, first choose the following adjustments: Crossfeed: 3, Angle: 30°, Center Level: -1,2dB.

4. Activate Crossfeed, Anlge and Center. The audio channels will now be mixed with time, level and frequency corrections calculated precisely to match what you hear when monitoring over loudspeakers. You should now compare what you hear with headphones and loudspeakers. First, whether or not you have the correct width in your stereo image. If this appears too narrow or too broad with the headphone, you have always two ways for further adjustments.
Increase Crossfeed. With this approach more of each channel is mixed to the opposing side, but the Angle remains unaffected. Technically speaking, this process changes the interaural level difference. However, the interaural time difference on the contrary changes only minimally.

Alternatively you can keep the Crossfeed adjustment identical (thus keeping the interaural level difference), but for example increase the Speaker Angle. This way the interaural time difference is increased, which in turn has the effect of a broader image. The interaural level difference is only slightly altered. Do not be misled by the scaled Speaker Angle degree numbers so that you think you need to follow only those exact values given for your loudspeakers. These values are to be considered as approximations for the determination of interaural time differences. In an individual installation, a loudspeaker pair set up at a 30° angle may in fact be perfectly represented with a 40° Speaker Angle switch adjustment at the Phonitor 2.

If you are uncertain about the angle your loudspeakers are set up, you can calculate this as follows: You'll need a pocket calculator with pi functions (in this case ‚arctan' = arc tangens) and a measuring tape. Measure the distance between both loudspeakers, that is, between the cone midpoints, and divide the distance by 2. We call this result A. Now measure the distance between the loudspeaker centers and the location of your ears at the listening position. This result we call B. The angle W, in which the loudspeakers are set up is calculated according to the formula: W = arctan A:B.

5. After you have set up Crossfeed and Angle you can then determine your Center Level setting. Although at normal hearing levels over headphones the center signal generally seems too quiet, after Crossfeed and Speaker Angle processing it then can seem too loud. Therefore the center level can be lowered to avoid this effect.

After finishing these adjustment you should have achieved a very good initial headphone equivalent of your loudspeaker reproduction.

But as a final bit of advice we'd like to emphasize that monitoring over loudspeakers remains important. Every studio offers alternative monitoring with distinctive sounds (near field, mid field and full range). Experienced engineers hear a mix on the portable radios and through car and home stereos. And everywhere a mix will sound different – just as it will over headphones. But for mixing, the Phonitor 2 gives results with headphones that are as close to (near field) monitoring as possible.

Specifications

Inputs

XLR connectors, electronically balanced

Impedance:	bal. ca. 20 kOhm, unbal. ca. 10 kOhm
Max. Input Level:	+32,5 dBu

Outputs

Monitor/Line Outputs: XLR connectors, electronically balanced

Frequency Range:	4 Hz to 480 kHz (-3 dB)
CMR:	-82 dBu

At 1 kHz, odBu input level and unity gain

Crosstalk at 1 kHz:	-106 dB
THD&N at 1 kHz:	0,00085 %

At odBu input level and unity gain, 1 kHz, 100 kOhm load

Noise:	Unweighted -101,87 dB
	A-weighted - 104,76 dB
	CCIR: -96,1 dB
Dynamic Range:	134,37 dB

Headphone Output

6,3-mm TRS connector

Pin wiring: Tip = Left, Ring = Right, Sleeve = GND

Impedance:	0,18 Ohm
Attenuation Factor:	180 @ 40Ohm
Frequency Range:	‹10 Hz to ›480 kHz (-3 dB)
CMR:	-82 dBu

At 1 kHz, odBu input level and unity gain

Crosstalk at 1 kHz:	-106 dB
THD&N at 1 kHz:	0,00091 %

At odBu input level and unity gain, 1 kHz, 100 kOhm load

Noise:	Unweighted -101,12 dBu
	A-weighted - 103,98 dBu
	CCIR -95,02 dBu
Dynamic Range:	133,62 dB

Power Amplifier

Max. Output Power:

65 mW (+20 dBm) at 1 kHz and 600 Ohm connected impedance

560 mW (+20 dBm) at 1 kHz and 40 Ohm connected impedance

Power Supply

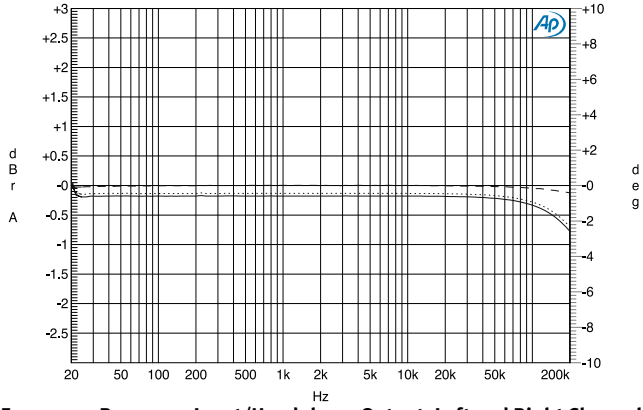
Voltages:	230 V AC, 50 Hz / 120 V AC, 60 Hz
Power Consumption:	max 23,7 VA
Fuses:	100-120 V AC: T 1 A/200-240 V AC: T 500 mA

Measurement & Weight

Height x Width x Depth (mm):	99 x 277 x 305
Weight:	4,3 kg

o dBu = 0,775 V. Specifications subject to change without notice.

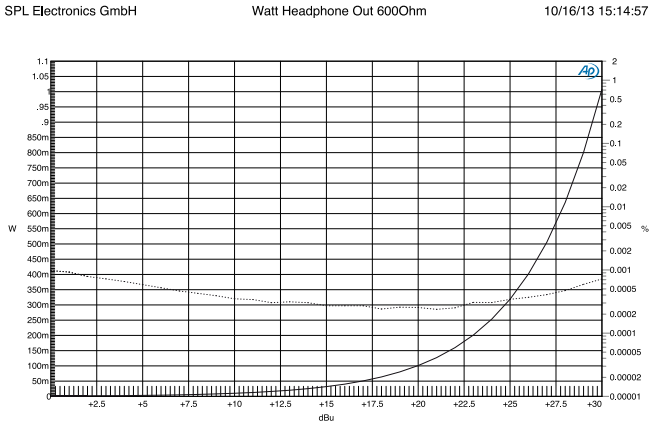
SPL Electronics GmbH A-A FREQUENCY RESPONSE Headphone Out 10/16/13 15:36:21



Frequency Response Input/Headphone Output, Left and Right Channel
Measuring output and input 600 Ohm, Volume control Phonitor 2 0 dB: ‹10 Hz to ›200 kHz (-0.2dB; ‹10 Hz to ›480 kHz @-3dB).
The large frequency response range excludes that the frequency spectrum is limited at any point. Formants and octaves of an instrument's sounds cannot be narrowed.

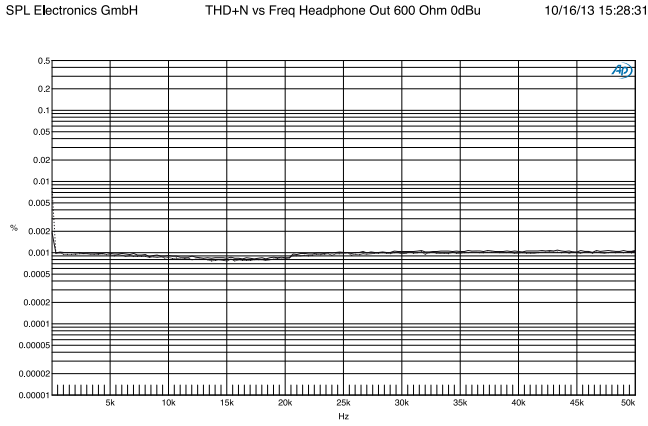
Phase Response Input vs. Output, Left and Right Channel
Measuring output and input 600 Ohm, Volume control Phonitor 2 0 dB. This measurement shows the minimum deviation of phase in the upper frequency range. Phase response describes the time difference between input and output signal – the less, the better. The extremely tight phase response up to 50 kHz excludes any audible effects.

Measurements



THD vs. Output Level (W)

Measuring output and input 600 Ohm, Volume control at 0 dB. This measurement represents an analysis of THD values over the complete output level range. High THD values can be perceived as rough sounds and overemphasized highs. In usual operating ranges around 0 dBu, the Phonitor's THD values are extremely low. Volumes that would result from 10 dBu are already far above healthy levels.



THD vs. Frequency

Measuring output and input 600 Ohm, Volume control at 0 dB. THD vs. frequency range from 10 to 20 kHz at 0 dB over both channels. Values are extremely low below 0.001% throughout the whole range; even in long sessions this ensures listening without ear fatigue.

Copy Master: Recall Sheet

Studio/Listening Room

Headphones

Date

Speakers