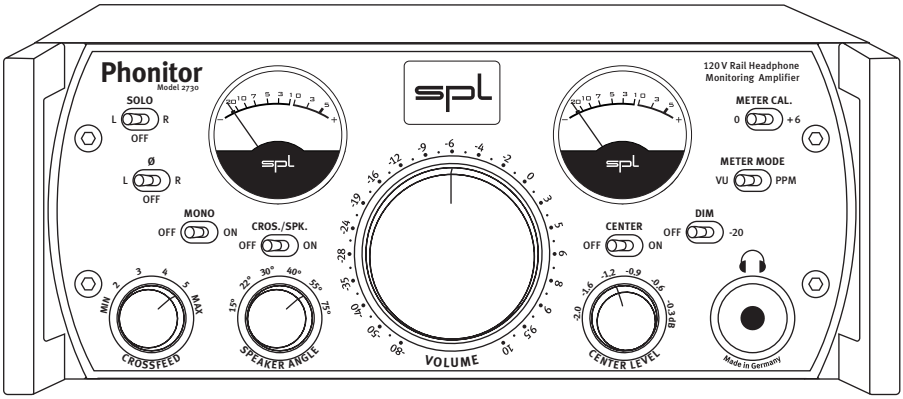
Manual



Phonitor

Model 2730

Headphone Monitoring Amplifier

Version 1.0 – 5/2008

Designer: Wolfgang Neumann, Hermann Gier

This user's guide contains a description of the product. It in no way 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.

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CE Declaration of Conformity

Manufacturer: SPL electronics GmbH, Type of Equipment: Audio Signal Processor, Product: Phonitor, Model 2730, Compliance Engineer: Wolfgang Neumann

Test Basis: EN50081-1:1992, EN50082-1:1992, EN60065:1993, EN61000-3-3:1995, EN60065:2002, EN55013:2001, EN55020:2002, EN61000-3-2:2000, 73/23 EWG; 93/68 EWG. We herewith declare, that the construction of the Phonitor, Model 2730, is in compliance with the standards and regulations mentioned above.

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 re-used in accordance with their markings. Through re-use, 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

Contents

Symbols and Notes

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 MACHINE 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 machine without the approval or supervision of SPL electronics GmbH. Doing so could nullify completely any and all of your warranty/guarantee rights and claims to user support.

Scope Of Delivery

- Phonitor, Model 2730
- This manual
- Power cord

Please note and retain this manual. Carefully read and follow all of the safety and operating instructions before you use the machine. Be doubly careful to follow 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 equipment damage.

Water And Humidity: Do NOT use this machine anywhere near water (for example near a wash basin or bath, in a damp cellar, near swimming pools, or the like). In such cases there is an extremely high risk of fatal electrical shocks!

Insertion Of Foreign Objects Or Fluids: NEVER allow a foreign object through any of the machine's chassis openings. You can easily come into contact with dangerous voltage or cause a damaging short circuit. NEVER allow any fluids to be spilled or sprayed on the machine. Such actions can lead to dangerous electrical shocks or fire!

Opening the Machine: Do NOT open the machine housing, as there is great risk you will damage the machine, or – even after being disconnected – you may receive a dangerous electrical shock!

Electrical Power: Run this machine ONLY from sources which can provide proper power at the prescribed rating. When in doubt about a source, contact your dealer or a professional electrician. To be sure you have isolated the machine, do so by disconnecting the power cord from your wall connection. Be sure that the power cord plug is always accessible. When not using the machine for a longer period, make sure to unplug it from your wall power socket.

Power Cord Protection: Make sure that your power cord is 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 this power cord.

Power Connection Overloads: Avoid any kind of overload in connections to wall sockets, extension or splitter power cords. 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 machine from wall power (but to avoid life threatening lightning strikes, not during a storm). Similarly, before any severe weather, disconnect ALL the power connections of other machines and antenna and phone/network cables which may be interconnected so that no lightning damage or overload results from such secondary connections.

Important Security Information

Air Circulation: Chassis openings offer ventilation and serve to protect the machine from overheating. NEVER cover or otherwise close off these openings. NEVER place the machine on a soft surface (carpet, sofa, etc.). Make sure to provide for a mounting space of 4-5 cm/2 inches when mounting the machine in racks or 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 machine and immediately contact a qualified technician when you think repairs are needed – or when moisture or foreign objects may accidentally have gotten in to the housing, or in cases when the machine may have fallen and shows any sign of having been damaged. This also applies to any situation in which the machine 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 cord or its plug, 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 machine is in all respects up to factory standards.

Cleaning: In 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 machine from your power source before cleaning.

Be very careful to check that the rear chassis power selection switch is set to the correct local line voltage position 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.

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!

Introduction

There is more than meets the eye in working with headphones. A reason for this surely lies in that modern audio production often necessitates decentralized processes. In turn, production phases following such plans more often take place in acoustically questionable rooms. In such circumstances, a mix might occur in an acoustically deficient ambiance (for example, in an extremely modal room), and employing headphones then begins to make sense when a successful mix would otherwise turn out to be impossible.

But another fact is that many musicians or producers might wish to – or be able to – mix at home (to say nothing of having to). Then the headphone becomes a clear must, enabling an evening or late night session that can only take place thanks to its being unhindered by the local acoustic environment.

Each and every careful headphone user should know about the analytical advantages of headphone monitoring, but also about the main disadvantage: the difficulty (if note impossibility) in properly judging room ambiance.

Therefore, several years ago SPL began planning the development of a compact, professional headphone amplifier design based on its 120 volt technology. The essential inspiration came from project manager Hermann Gier‘s desire to eliminate the major disadvantage in working with headphones. It therefore meant transferring essential ambient parameters of loudspeaker monitoring to the headphone monitoring.

After several years of development and painstaking optimization, we can now introduce the Phonitor, whose derivative name from combining “Headphone“ and “Monitor“, conveys the successful conclusion of this process.

At first glance the Phonitor‘s functional range makes immediately clear that this is not just another headphone amplifier. With the usual (monitoring) parameters there are new functions such as “Crossfeed“, “Speaker Angle“ and “Center Level“. These are the essential parameters to create what with loudspeaker monitors are perception of width, balance and overall space and how we recognize them coming from the loudspeaker. Crossfeed simulates the frequency dependent interaural level differences from both channels. Speaker Angle determines the stereo width caused by frequency dependent interaural time differences. Center Level regulates the balance between phantom center and L/R stereo signals.

Applications

Aside from its outstanding abilities as loudspeaker substitute the Phonitor offers well equipped studios a fully functional monitoring alternative.

In addition one can take along the Phonitor into an unfamiliar studio or production environment that always provides the engineer's own monitor sound.

Furthermore, with the Phonitor one can simply enjoy music as it was originally mixed, namely for playback over loudspeakers.

A New Kind Of Headphone Amplifiers: The Headphone *Monitoring* Amplifiers

The Phonitor design is our high-end interpretation for what a complete headphone amplifier should be. A well chosen system of Phonitor and headphones can by and large replace loudspeakers and offers best requirements for a fatigue-free hearing and successful work sessions. We therefore refer to the Phonitor as a headphone monitoring amplifier system.

The basis for this high-end development is our proved 120 volts reference technology based upon our own, handmade operation amplifier. It corresponds to approximately twice that of most modern analog audio semiconductor technologies. Through such 120 volts circuitry and processing we reach performance levels far beyond conventional designs in dynamic range and distortion levels.

Such technical specifications exceed all known analog or digital standards (please also refer to the chapter "The End of Ear Fatigue" from page 10).

With And Without Magnifiers

The Phonitor encompasses advantages of both kinds of 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 monitoring 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.

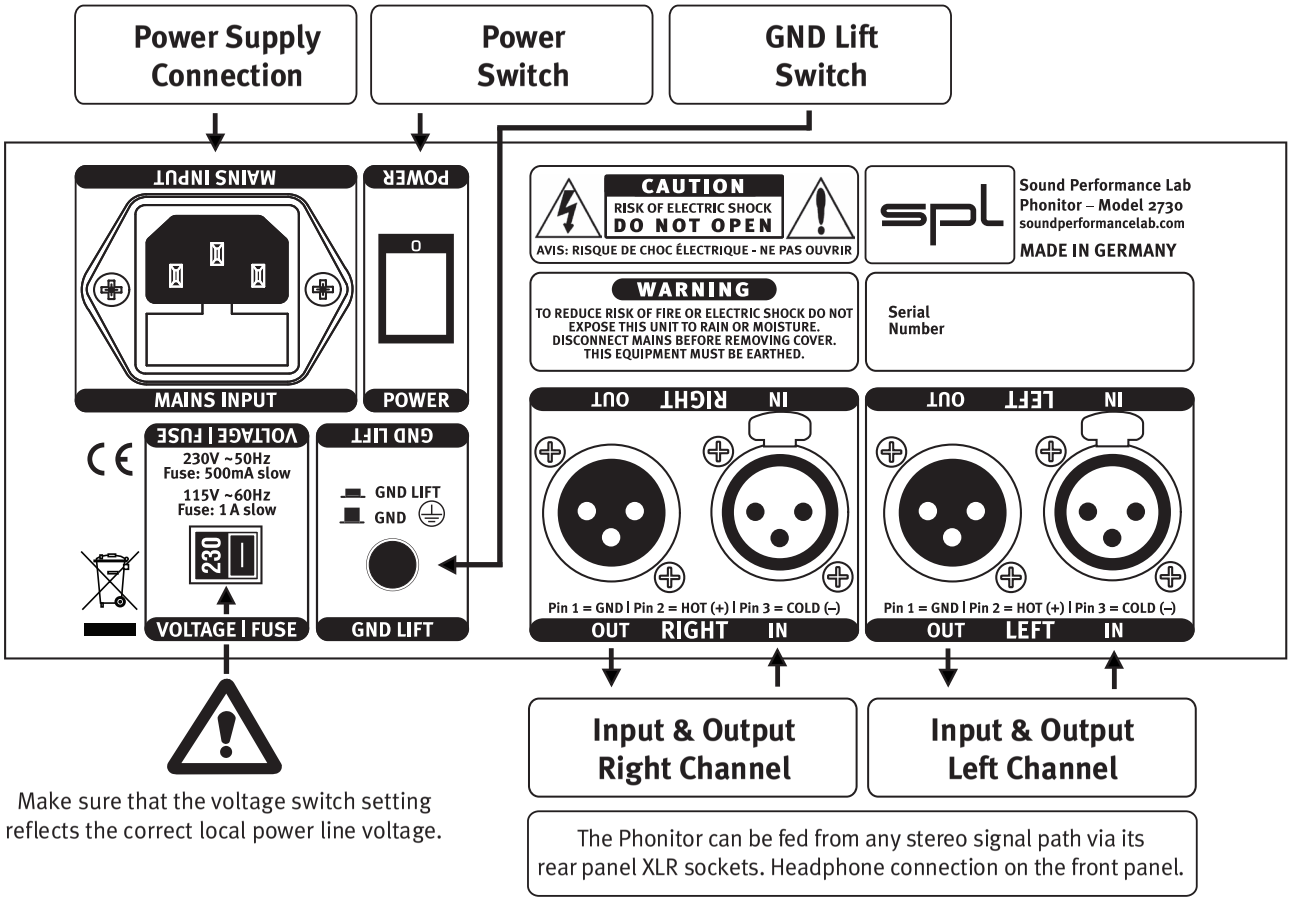
For some years, now, SPL has addressed this issue in all of its mastering product series through its own specifically developed 120 volt technology. Consoles and signal processors of the SPL Mastering Series appear as central elements in installations of today's most renowned mastering houses (z. B. Bob Ludwig's Gateway Mastering & DVD in the USA, Simon Heyworth's Super Audio Mastering in Great Britain or the Galaxy Studios in Belgium).

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 SUPRA OPs work with high-performance semiconductors in Class A technology at a symmetrical voltage of +/-60V.

In the Phonitor nine SUPRA OPs are employed. The SUPRA OPs have a 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 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's SUPRA 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.

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.



Make sure that the voltage switch setting reflects the correct local power line voltage.

The Phonitor can be fed from any stereo signal path via its rear panel XLR sockets. Headphone connection on the front panel.

Voltage

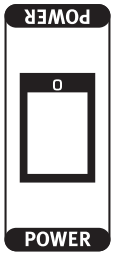
The rear panel voltage selector switch serves to let the user switch to the local line voltage standard.

IMPORTANT ADVICE: Before you use the Phonitor, make sure that this switch setting reflects the correct local power line voltage (115 V position: 110-120 volts/60 Hz, 230 V position: 220-240 volts/50 Hz).

Power Connection

Connect the included power cord to the rear Mains Input. Transformer, power cord and case connection conform to VDE, UL and CSA requirements. Power fuse ratings are 500 mA slow blow (220-240 volts) or 1 A slow blow (110-120 volts).

Power



The rear panel Power switch activates the unit, confirmed by the lighted VU meters.

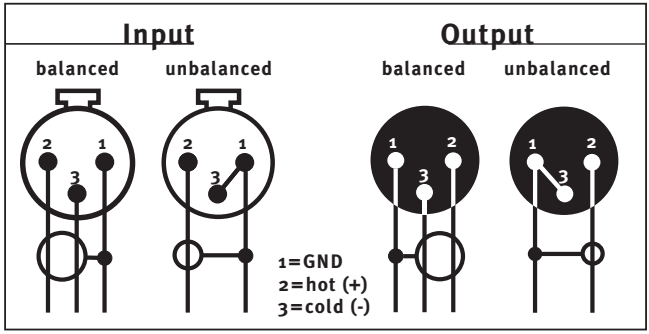
IMPORTANT ADVICE: Switch on the unit only after you have turned the Volume control fully left, and wait to set your desired volume level until the unit is powered on. Neglecting this can damage either or both your ears and your headphones!

XLR Connections

Switch off the unit before you begin the process of making the first or any subsequent connections (rear panel Power switch). Neglecting this can damage either or both your ears and your headphones!

Connect the monitoring signal to the left and right channel XLR input sockets. Both XLR outputs transmit the monitoring signal unaltered so that no additional monitoring output is needed for insertion of the Phonitor. Input and output stages are electronically balanced. They ensure high common mode rejection and drive long cable connections (depending on cable capacities and following input stages).

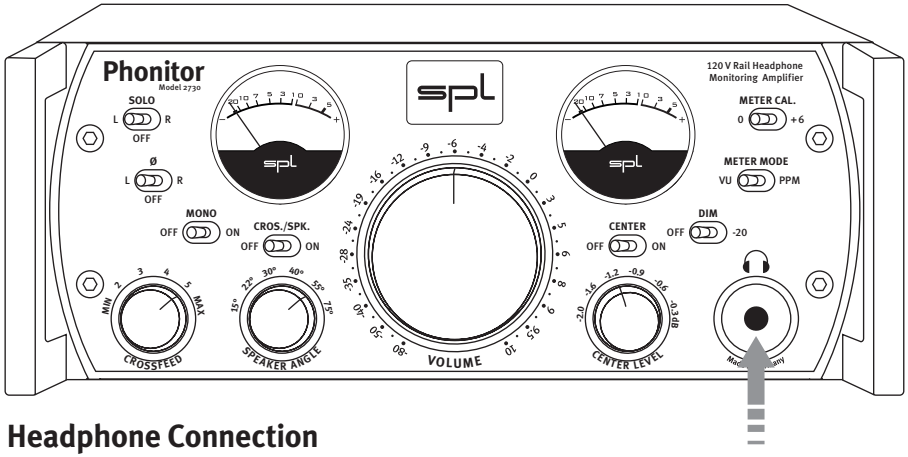
Pin Wiring XLR Connectors



The diagram shows how to wire the balanced XLR connections if unbalanced connections are required.

GND Lift

The rear panel GND lift switch eliminates hum by separating the internal ground from the unit's housing ground. Hum can, for example, result when this unit's housing has a common ground connection with other machines that might have a different ground potential.



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.

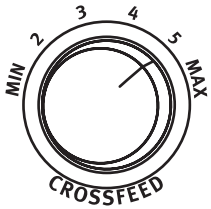
Recommendations

Unplug the headphone when you switch off the Phonitor. Otherwise discharging residual voltages can cause beeping sounds. We did not add a circuitry to avoid that phenomenon as it would have compromised sound quality.

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 volume setting of a first headphone at a much higher – even painful – level.

Warning

NEVER plug in a mono 1/4" to the headphone output. The use of a mono 1/4" will lead to a short-circuit that will destroy 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 Speaker 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 the “Quick Guide To Headphone Monitoring“ on page 25.

Speaker Angle

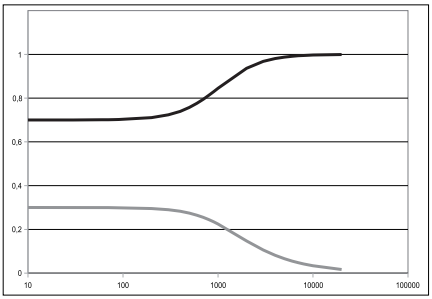
The Speaker Angle switch provides for frequency-dependent simulation of your stereo image width by adjustments of interaural time difference. This influences the moment in time at which a signal‘s wave form arrives at the ear and corresponds to a particular variation in the angle of an actual loudspeaker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

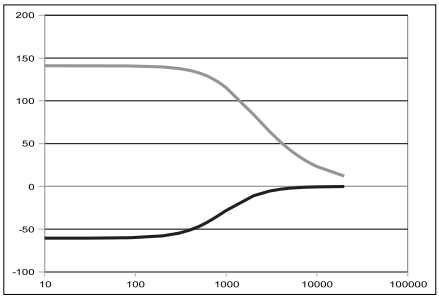
The time constants of the interaural time differences between the left and right channels occur within a range of 90 to 635 microseconds. Compare the table “Crossfeed and Speaker Angle Parameters” on page 19. We recommend to start with the figures of the accentuated lines from this mathematically-based 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 Speaker Angle and the Crossfeed value.

For further information on the simulation of a specific loudspeaker playback, please refer to the “Quick Guide To Headphone Monitoring“ on page 25.

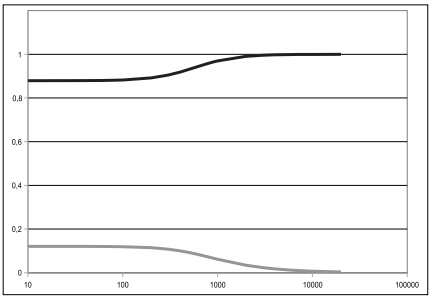
Interaural Level and Time Differences as Related to Crossfeed Setup

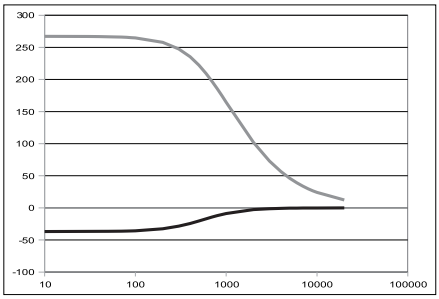
The following two diagrams show, respectively (on the left), the frequency response of interaural level differences and (on the right) the interaural time difference at **maximum Crossfeed** value and at a Speaker Angle of 30 degrees.





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 a Speaker Angle of 30 degrees.



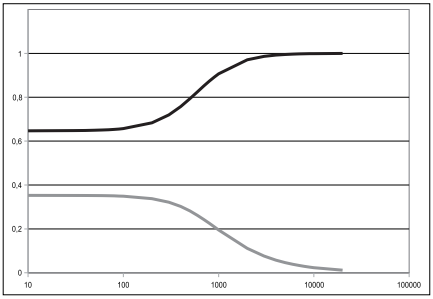


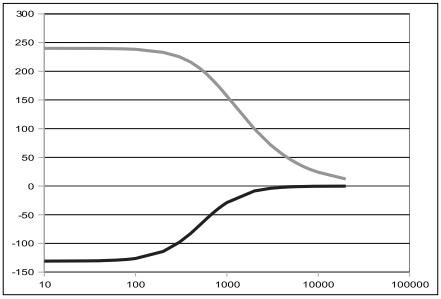
The black curves stand for the side of the direct sound wave front, while the gray curves stand for the opposite side. It is clearly recognizable that corrections are usually done for frequencies below 1 kHz.

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 Speaker Angle control.

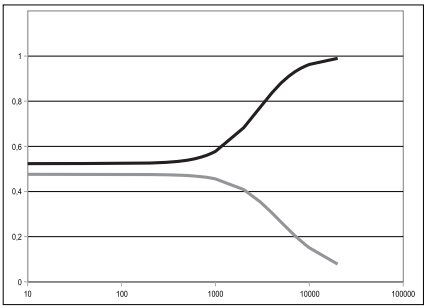
Interaural Level and Time Differences as Related to Speaker Angle Setup

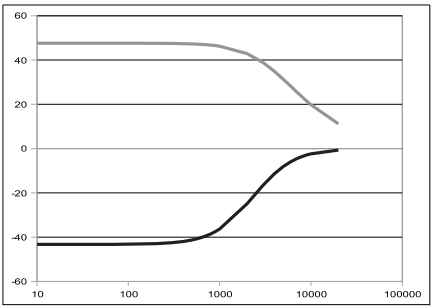
The following two diagrams show (on the left) the frequency response of interaural level difference with respect to the interaural time difference (on the right) at maximum Crossfeed value and a **Speaker Angle of 75 degrees.**





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 a **Speaker 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 Speaker 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 Speaker Angle control is primarily depending on interaural time differences. Its influences on level differences are in contrast, comparatively slight.

Crossfeed and Speaker Angle Parameters

Speaker 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°

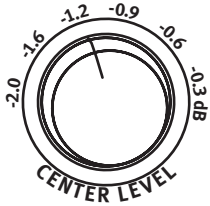
The accentuated lines show at which Crossfeed values the Speaker Angle most precisely matches the theoretically determined time difference values. These, of course, are mainly a starting point to reproduce a real monitoring setup.

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

CROS./SPK.

With CROS/SPK. you switch on or off Crossfeed and Speaker Angle functions globally. 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 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 Speaker 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 Level

With the Center Level control you may regulate the intensity of center signals to compensate for the stereo signal processing with Crossfeed and Speaker Angle.

This Center Level 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 much louder due to the super stereo effect. If the signal width is narrowed through changes in Crossfeed and Speaker Angle (so as to correspond to your actual loudspeaker setup), the headphone center may likely sound too intense now.

Lowering the center levels will again return the center signal to the correct volume in relation to the L/R stereo image.

Center Off/On

This switch activates or deactivates the Phonitor Center Level circuitry. In conjunction with both CROS./SPK. Off/On and CENTER Off/On switches, it offers the choice between (conventional) headphone amplifier setup and the Phonitor's unique headphone monitoring amplifier setup.

VU Meter

The VU meter displays the input level for each channel. 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 “Meter Cal.“ on page 22).

The VU meter is custom made to meet SPL specifications and assures a balanced optical perception thanks to it’s optimized ballistics.

An especially interesting feature is the option to switch between two display modes: VU mode and PPM mode. The VU mode (VU=Volume Unit) displays average levels to provide information on the overall loudness. The PPM mode (PPM=Peak Program Meter) displays the peak levels.

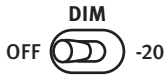
The integration time of the display complies with BBC requirements. In VU mode the rise time up to 0 dB is approximately 300 ms. In PPM mode the rise time up to 0 dB is about 2 ms and the release time down to -20 dB is at a “slow” 1,5 seconds. This calibration ensures to display even short peaks up to about +5 dB since the needle does not have to travel the entire distance of the gauge every time.

Meter Mode

The Meter Mode switch allows to switch the VU metering characteristics from VU display mode to PPM display mode. In PPM mode, peak levels are displayed – comparable for example to A/D converter displays. Monitoring peak levels is for example most important to avoid overloading and to prevent audible distortion. Peak levels are always above the average levels. It may make sense to choose the Meter Cal. +6 dB switch position to extend the metering range.

Meter 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.



Dim

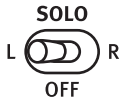
The Dim function reduces the listening level (Volume) by around 20 dB. Normally you employ this function when mixing to choose between two defined volumes to avoid having to move the Volume control. A dim value of 20 dB has established itself as good standard.

You can also use the Dim function to adjust among differences in headphone impedance and the resulting sensitivity differences. The Phonitor output and the optimal Volume level is based on the studio standard, 600 Ohms headphone impedance.

However, there are many headphones which employ a lesser impedance, for example 250 Ohms or even only 50 Ohms. Such headphones effect a much louder level. A 50 Ohms headphone thus yields a relatively loud minimum volume level. In such a case, the useful range of an amplifier's output level control or potentiometer is much more limited. Here you may use the Dim function to reestablish a useful range for the volume control. The high component and circuitry quality of the Phonitor guarantees that despite activating the Dim function there is no measurable degradation of the signal quality.

Please note that the VU meter always displays the -20 dB damping when Dim is activated. You may activate the +6dB Meter Cal. setting to avoid that the needle sticks to the left – and add 14 dB to the displayed values to translate to actual input levels.

Solo

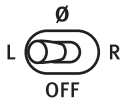


You can engage the solo switch to monitor only the left or right channel of the stereo signal.

The Solo switch has three positions: L, R and OFF. The middle or OFF position allows monitoring the stereo signal. Switched 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 additional active 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.

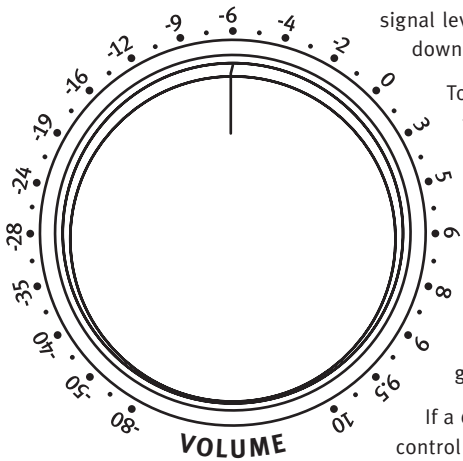
However, even more important for precision testing of the center signal can be to discern the intrusion of artifacts. For example through this process you can easily detect distortion which may be introduced digitally (via converters or internal DAW mixing).

Mono

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 6dB 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.

Volume



The Volume level control allows you to increase or decrease the signal level at the headphone output from between +10dB down to -80dB.

To this end we employ a high-grade ALPS RK27 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 2-o'clock position represents 0dB, where the input signal is led to the output with an unaltered level (unity gain).

If a 600 Ohms headphone is connected, a 0dB Volume control setting results in ca. 80dB sound pressure level, measured at a distance of 3cm from a headphone transducer. With a stereo signal the sound pressure level is then at ca. 83dB.

Adjust Headphone Reproduction To Loudspeaker Monitoring

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

In addition, new functions such as Crossfeed, Speaker Angle and Center Level transform the Phonitor from a traditional headphone amplifier into a headphone monitoring amplifier, with which it is possible to achieve reproduction equivalent to studio monitors.

However, these new functions also require that you take some time and acquaint yourself with these functions.

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 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, Speaker Angle: 30°, Center Level: -1,2dB.

4. Activate CROS./SPK. and CENTER (switches to the On position). 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:

A. Increase Crossfeed. With this approach more of each channel is mixed to the opposing side, but the Speaker Angle remains unaffected. Technically speaking, this process changes the interaural level difference. However, the interaural time difference on the contrary changes only minimally.

B. 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.

Tip

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 Speaker 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 radio, in the car and through a Hi-fi setup. And everywhere a mix will sound different – just as it will over headphones. But for mixing, the Phonitor gives results with headphones that are as close to (near field) monitoring as possible.

Specifications

Audio

Frequency Response:	‹10 Hz to ›200 kHz (-3dB)
CMR:	-80 dBu
@ 1 kHz, odBu input level and unity gain	
Crosstalk @ 1 kHz:	-67 dB
THD @ 1 kHz:	0,005 %
@ odBu input level and unity gain	
Noise (A-weighted):	-97 dBu
Dynamic Range:	129,5 dB
@ connection with 600 Ω Impedance	

Inputs (XLR connections, electronically balanced)

Impedance:	ca. 20 kΩ balanced ca. 10 kΩ unbalanced
Maximum Input Level:	+24 dBu

Outputs

XLR Connections:	Input thru, electronically balanced
Headphone Output:	6,3 mm stereo TRS connection
Pin Wiring Tip = left, Ring = right, Shaft = GND	
Impedance:	9 Ω

Power Amplifier

Max. Output Performance:	1,7 W (+32,2 dBm) *@ 1 kHz and 600Ω connection*
	360 mW (+25,6 dBm) *@ 1 kHz and 30Ω connection*

Display Elements

VU Meter:	Input levels from -20 dB to +5 dB
Signal LED:	Input signals from -22 dBu
Overload LED:	Displays input overload from +21 dBu

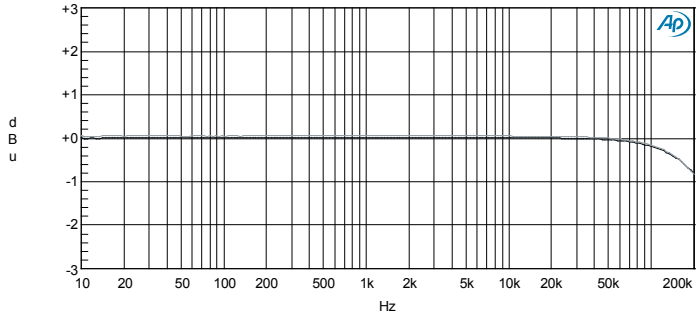
Power Supply

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

Dimensions & Weight

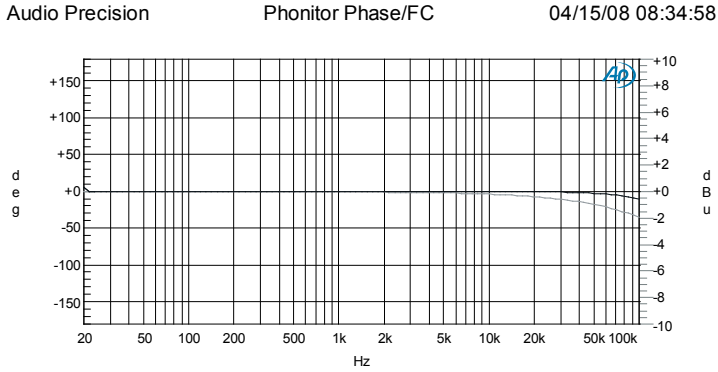
H x W x D (mm):	106 x 216 x 393 (H w/o Feet 88 mm/2U)
Weight:	4,05 kg

0 dBu = 0,775 V. Subject to change without notice.



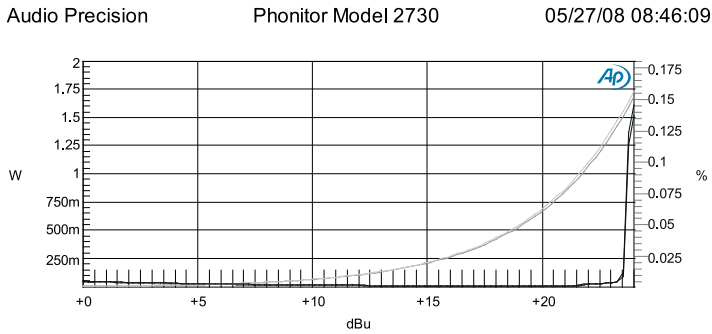
Frequency Response Input/Headphone Output, Left and Right Channel

Measuring output and input 600 Ohm, Volume control Phonitor 0 dB: ‹10 Hz to ›200 kHz (-3dB).
The large Frequency response range excludes that the frequency spectrum is limited at any point. Transmission of formants and octaves of an instrument's sounds can not be narrowed.



Phase Response Input vs. Output, Left and Right Channel

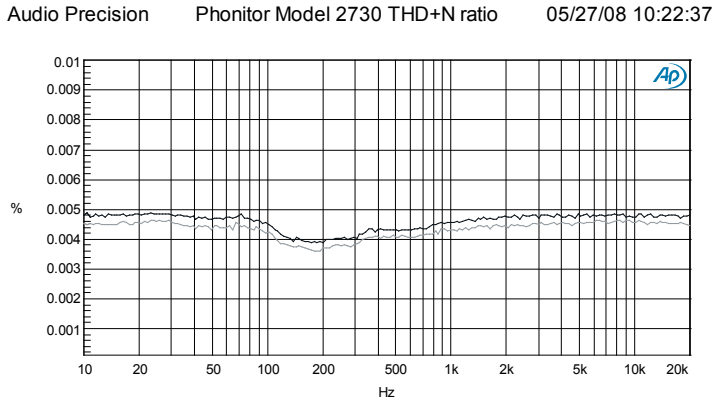
Measuring output and input 600 Ohm, Volume control Phonitor 0 dB. This measurement shows the minimum deviation of phase in the upper frequency range. Phase response describes the time difference between input and output signal – the less, the better. The extremely tight phase response up to 50 kHz excludes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



THD vs. Output Level (W)

Measuring output and input 600 Ohm, Volume control Phonitor 0 dB.

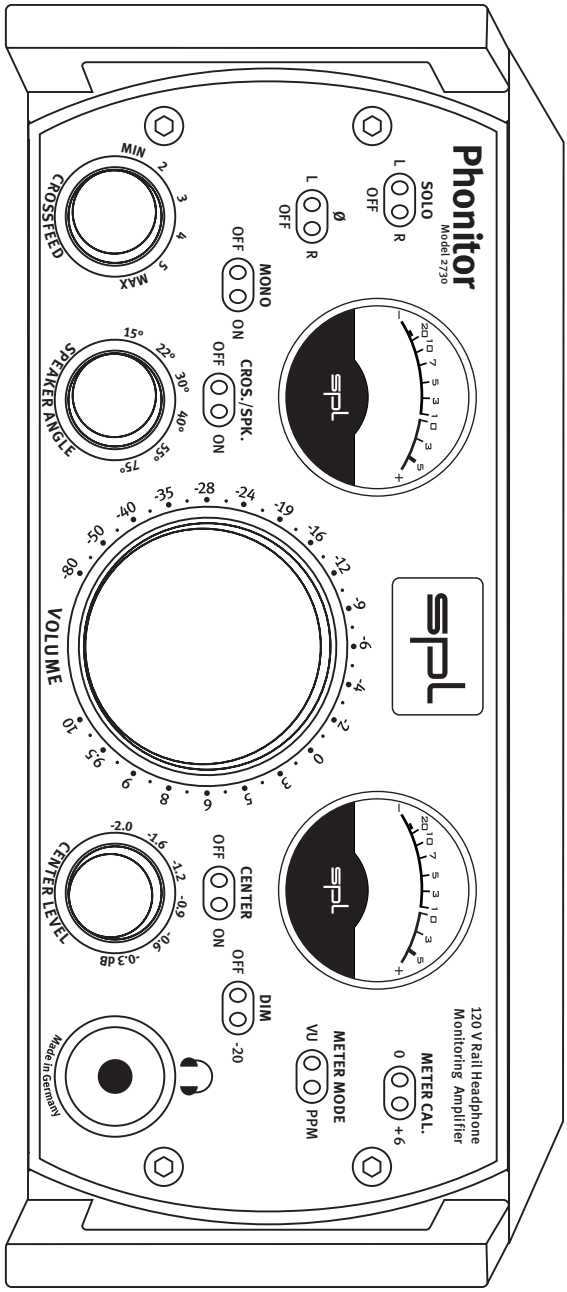
This measurement represents an analysis of THD values over the complete output level range. High THD values can be perceived as rough sounds and overemphasized highs. In usual operating ranges around 0 dBu, the Phonitor's THD values are extremely low. With a 0 dB input signal and 600 Ohm headphones the SPL is at ca. 83 dB (stereo signal in 3 cm distance). Volumes that would result from 10 dBu are already far above healthy levels.



THD vs. Frequency

Measuring output and input 600 Ohm, Volume control Phonitor 0 dB.

THD vs. frequency range from 10 to 20 kHz at 0 dB over both channels. The values are extremely low below 0.005% throughout the whole range; even in long sessions this ensures listening without ear fatigue.


Phonitor
Model 2730
SOLO
L
OFF
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OFF
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MONO
OFF
ON
CROS./SPK.
OFF
ON
CROSSFEED
MIN
MAX
SPEAKER ANGLE
15°
22°
30°
40°
55°
75°
VOLUME
CENTER
OFF
ON
CENTER LEVEL
-2.0
-1.6
-1.2
-0.9
-0.6
-0.3 dB
DIM
OFF
-20
METER MODE
VU
PPM
METER CAL.
0
+6
120 V Rail Headphone
Monitoring Amplifier
Made in Germany

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