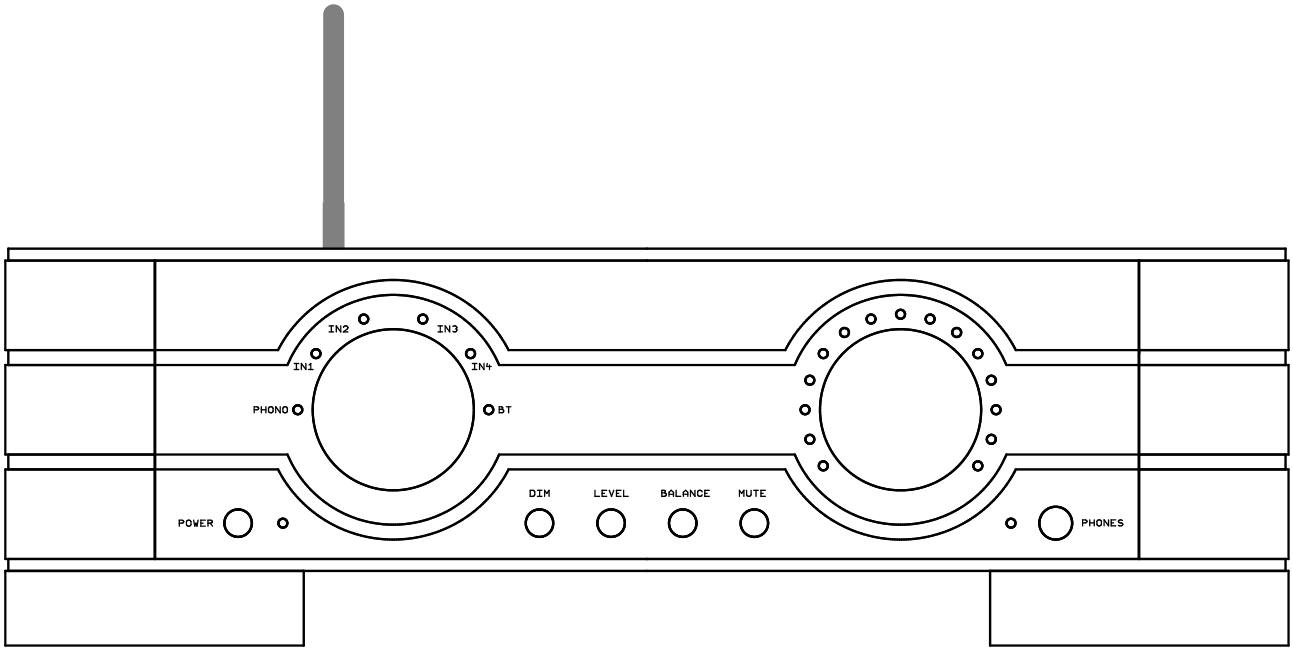
Operating instructions

Integrated tube amplifier

WESTEND AUDIO LEO



Dear Customer,

Thank you for placing your trust in us with the purchase of the WESTEND AUDIO LEO. You have acquired an innovative, versatile integrated amplifier with outstanding sound quality.

We understand that you are eager to start listening to music right away. However, we kindly ask you to be patient for a few moments. You will see that it is worth it! Please read this operating manual carefully before switching on the device for the first time to ensure that you can use it optimally and enjoy it for many years to come.

We have made every effort to include everything you need to know about using your new integrated amplifier in this manual. If you have any questions that are not answered here, please contact us in writing or by phone. We will do our best to help you.

We are here for you!
Your WESTEND AUDIO team

Declaration of conformity

We confirm that the device to which this operating manual belongs complies with the EC directives valid at the time of printing for obtaining the CE mark.

CE

. The necessary tests have been carried out with positive results.

WESTEND AUDIOSYSTEMS GmbH, Siegenburger Straße 10, D-81373 Munich
Website: www.westendaudiosystems.de, email: info@westendaudiosystems.de

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SAFETY

With the WESTEND AUDIO LEO, you have an integrated amplifier with excellent sound quality and operational reliability. As long as the device is used as intended, you can enjoy your favorite music without interruption.

The housing and connections are connected to a protective earth conductor so that no dangerous electrical voltages can occur on the outside, even if there is a fault inside the device.

PLEASE NOTE

The WESTEND AUDIO LEO is a tube amplifier. In addition to parts that carry mains voltage, the components for the high-voltage supply of the tubes are also accessible inside the housing. These can cause life-threatening or even fatal electric shocks if touched. Serious burns are also possible due to the tubes becoming very hot during operation.

Therefore, in your own interest, we ask you to observe the following safety instructions.

- **Service and repair work may only be carried out by trained specialists who must take the appropriate precautions.**
- **We urge you not to open the device yourself for servicing or in the event of a defect, but to contact your specialized dealer or us directly.**
- **We accept no liability for any personal injury or damage to property resulting from unauthorized or improper work on the device.**

1 Unpacking, checking for completeness

The WESTEND AUDIO LEO is delivered in a sturdy flight case. This contains the device and accessories. Open the flight case, remove the device, and check that all accessories are included.

The package contains:

1 WESTEND AUDIO LEO integrated amplifier
2 One pair of gloves
3 LEO RC3 remote control
4 Power cord
5 Bluetooth antenna
6 Bag with 9 Allen screws for securing the device cover
7 2 mm Allen key
8 These operating instructions

1.1 Notes on inserting the output tubes

For transport safety reasons, the 300B output tubes are not installed in the device, but are securely packed inside the housing. The device cover is not completely screwed down, but is only secured with four Allen screws. The remaining screws and the appropriate key are included.

⚠ CAUTION! Do not connect the device to the mains power supply at this stage. Otherwise, life-threatening voltages could build up inside the device, which are fatal if touched!

If you do not feel comfortable installing the output tubes yourself, ask your dealer to do this for you.

The tubes are marked with stickers "L" for left and "R" for right. Since each channel is matched to the individual tube, insert the "L" tube (as seen from the front of the device) into the left slot and the "R" tube into the right slot.

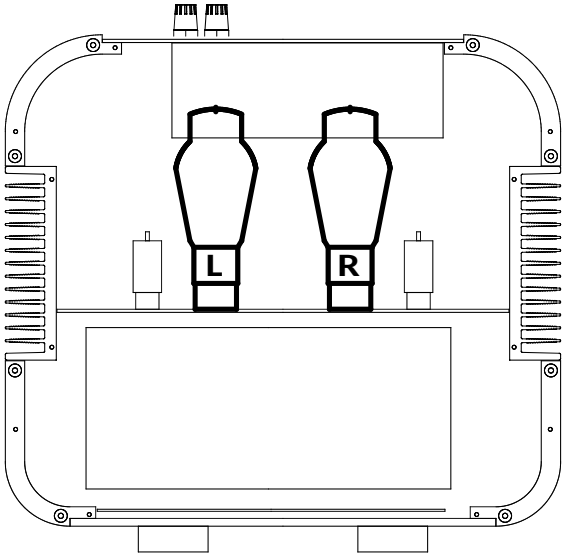
NOTE: Incorrect insertion will not damage the tubes or your device, as the tubes are automatically adjusted to the correct operating point when switched on. However, slight differences in the steepness of the individual tubes may cause the channel balance to shift.

Instructions for installing the output tubes can be found on the next page. Please follow these instructions carefully to ensure that your WESTEND AUDIO LEO works properly and that you can enjoy listening to music for many years to come.

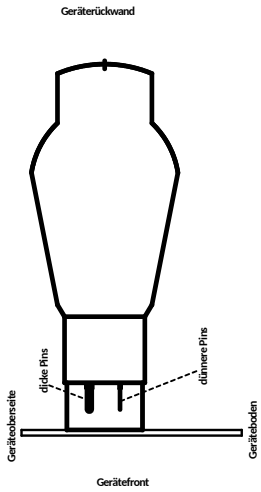
1.2 Installing the output tubes

CAUTION! Never open the device when the power plug is connected. Life-threatening voltages are present inside the device. The power plug must be disconnected before opening. Then wait at least 15 minutes until the voltages have dissipated.

- Remove the four screws securing the cover using the enclosed Allen key.
- Lift off the cover and remove the 300B output tubes
- Remove the plastic packaging from the output tubes



View from above



Side view

NOTE: The contact pins on the tubes have different diameters. The two pins with the larger diameter must face the cover side of the device, and the two thinner pins must face the bottom (see drawing above). Since the sockets also have different contact diameters, it is not possible to insert the tubes incorrectly. Therefore, DO NOT use force when inserting the tubes. If the tubes cannot be inserted, check that the pins are in the correct position.

- Insert the end tubes into the corresponding sockets, paying attention to the "L" and "R" markings on the tube bases.
- To insert the tubes, move them slightly back and forth. Do not use force!
- To insert the tubes, hold them by the glass bulb. Use the gloves provided to avoid contaminating the glass bulb.
- Make sure that the tubes are fully inserted into the sockets.

Once the tubes are installed, place the cover on the device so that the mounting threads for the screws are aligned with the holes in the cover.

Now screw the cover tightly using the Allen key provided. To avoid tension, we recommend first loosely screwing in the left front screw, then the right rear screw, so that the cover is in the correct position. Now loosely screw in the remaining screws. Then tighten all 13 screws (not too tightly) one after the other.

2. Important information about the technology of the WESTEND AUDIO LEO

First, a preliminary remark: Unlike semiconductors, tubes are highly "lively" components. Over the course of their service life, they develop in a similar way to good wines: A new tube already gives you a hint of its character when playing music. However, it only develops its full musicality after a certain running-in period. This can take over 100 hours. We therefore ask you to be patient with your LEO. We naturally allow all amplifiers to run in for over 24 hours after final testing. However, your amplifier will continue to develop in your listening room and will then unfold its full musicality over a long period of time.

For us as developers, the technical details and considerations are important in order to build an amplifier that is both musical and powerful. But for listening to music, they are only a means to an end. If you are not interested in this section, you can safely skip it. Nevertheless, we ask you to read the rest of this manual carefully so that you can relax and enjoy music with the WESTEND AUDIO LEO and make the most of your amplifier's capabilities.

The technology of tube amplifiers is so fascinating in itself that we hope you will find it interesting and allow us to introduce you to our approach to tubes. This is especially true because, when designing our amplifiers, we adopt many tried-and-tested features, but in the interest of optimal music reproduction, we also stray from well-trodden paths and introduce innovations that were not available to developers in previous decades.

Like semiconductors, tubes are components whose function follows certain physical laws. Only those who apply these laws correctly and take the limiting factors into account can develop an amplifier that reproduces music optimally and presents the listener with a reproduction that is close to the live experience.

We make no secret of our technology and do not try to conceal certain things (which, on closer inspection, are often shortcomings) with voodoo. So before you listen to music, follow us on a journey into the technology of your WESTEND AUDIO LEO!

2.1 Mechanics

The housing of the WESTEND AUDIO LEO consists of intricately milled solid aluminum parts. Its heavy weight makes it immune to external vibrations. This ensures that the tubes, which are naturally sensitive to microphony, are decoupled as effectively as possible from air vibrations and structure-borne noise from the surface on which it is installed.

The pure aluminum construction allows for many surface variations, such as anodizing or powder coating in various colors, chrome plating, gold plating, and much more. All of these surfaces are resistant to dirt, scratches, and sunlight. This allows you to customize your desired device from a wide range of options.

2.2 Connections, equipment

All signal connections have gold-plated contact surfaces. The speaker terminals accept 4 mm banana plugs, spades, or bare cable ends. The high-quality RCA and XLR sockets with gold-plated surfaces ensure long-term stable connections to the connected devices.

The phono input with LOAD sockets and MM/MC switch allows almost all cartridges to be operated and precisely adjusted. Two RCA high-level inputs and two additional balanced XLR sockets provide access for any source device.

The WESTEND AUDIO LEO even has a "small" streaming solution on board: the high-quality Bluetooth input (standard 4.2 with APTX) can be used in conjunction with almost all smartphones and tablets to stream music or radio programs.

Regulated preamplifier outputs, together with the switching voltage outputs, allow for easy operation with subwoofers or bi-amping. A fixed-level output is available for recording purposes or for connecting an external headphone amplifier.

The standard infrared remote control allows you to operate all functions:

- Switching between operation and standby
- Selecting the input
- Adjusting the volume
- MUTE/UNMUTE function
- Adjusting the channel balance
- Leveling the inputs to the same volume
- Adjusting the brightness of all display LEDs

2.3 Inputs, volume control

The various input signals are fed directly behind the respective sockets by a low-impedance buffer stage, making them immune to external interference and crosstalk.

Relays with gold contacts switch the selected signal to the electronic volume control. This consists of a purely passive, electronically controlled resistor network and attenuates the signal in precise 0.5 dB steps to the desired level.

The electronic adjustment of the signal level allows individual level adjustment of the inputs as well as balance adjustment with consistent precision from very low volumes to the maximum level without the synchronization problems of mechanical potentiometers.

A highly linear buffer stage transmits the signal to the tube output stages with low impedance.

2.4 Power amplifiers

The power amplifiers of the WESTEND AUDIO LEO are built using state-of-the-art tube technology as "single ended" amplifiers.

One matched double triode (ECC81) per channel amplifies the input signal and passes it on to the output tube. The double triode systems do not operate in two stages (two systems connected in series), but in parallel. This reduces their output impedance by a factor of 2.

The output tubes are directly heated triodes of the 300B type. This triode type was developed in the 1930s by WESTERN ELECTRIC and used in their amplifiers for cinema sound systems. Even back then, reliability and durability were important criteria in the development and manufacture of this tube.

Thanks to its very musical sound and comparatively high power, the legendary 300B has won the hearts of many music lovers, including ours, since its introduction. For these reasons, only this tube was considered for use as the output tube in the development of the LEO – matched in pairs, of course.

Like other developers, we have recognized that despite (or because of!) its simple design with only four connections (anode, grid, heater/cathode), the 300B presents circuit designers with some difficult challenges on the path to a good-sounding and reliable power amplifier.

We were happy to take on this challenge! Below you will find our thoughts and solutions:

TUBE-FRIENDLY, NOISE-FREE DC HEATING:

Since the 300B is a directly heated tube, the cathode and heating winding are identical. This means that in the case of AC heating, significant hum interference can interfere with the music signals. These disturbances are usually balanced by a power potentiometer (the heating current is between 1.2 and 1.5 A!) in the cathode circuit. This solution, which is used in many circuit designs, generates considerable heat loss and requires frequent readjustment because the wire potentiometer used is not particularly stable over long periods. In addition, the potentiometer must be bridged with large electrolytic capacitors to ensure that the cathode is connected to the signal ground.

Therefore, only a DC heating system was an option for us. This is completely hum-free and allows the cathode to be directly coupled to the signal ground. This ensures optimal amplification of the tube while eliminating hum in the cathode circuit. Due to the high heating currents and the high demands of the 300B on the accuracy of the heating voltage, we use a precise, high-efficiency switching power supply as the heating source. Of course, the heating voltages are "cleaned" by means of choke/electrolytic capacitor filtering before they reach the cathode of the tube.

As long as the tube is cold, the heating winding has a very low resistance. This means that high surge currents flow when the power is switched on. These can reduce the service life of the heating coil. We therefore switch the heating voltage on gradually during start-up so that the heating coil is not subjected to unnecessary stress. We use the same procedure for heating the preamp tubes.

PROCESSOR-CONTROLLED OPERATING POINT SETTING

Setting the correct operating point is particularly important in single-ended amplifiers, where one and the same tube transmits both half-waves of the signal. To achieve perfect symmetry and maximum power output, the operating point must be exactly in the middle of the control range.

The operating point is usually set using potentiometers, which must be readjusted frequently during the life of the tube to compensate for gradual wear. In addition, a complete readjustment must be carried out after replacing the tubes.

The operating points of the preamp tubes are therefore set in the LEO using two long-term stable semiconductor current sources (per tube) in the cathode circuit. The control grids are always at ground potential in terms of DC voltage. The cathode current sources ensure that the preamp tubes always maintain their predetermined operating point, regardless of scattering or aging effects.

The operating point of the 300B output tubes is set via the (negative) grid bias voltage because their cathodes are constantly at ground potential. The operating points are measured each time after switching on by a microprocessor using an A/D converter. This then generates the exact grid bias voltage required for the desired operating point via a D/A converter.

The procedure is as follows: After switching on, the tubes are first gently heated up. As soon as the heating currents are stable (after about half a minute), the anode voltage is switched on. The microprocessor then measures the voltage at the anode and sets the operating point exactly to the desired value. This process is repeated every second until the operating points are stable. After about another half minute, the amplifier switches on and is ready for operation.

DC COUPLING OF THE DRIVER STAGE

The grids of output tubes are normally controlled by coupling capacitors. These components have the task of coupling the grid bias voltage, which sets the operating point, and the music AC voltage without mutual interference. This is how most circuits found in current tube amplifiers, on the Internet, and in old tube books work.

The problem with such circuits is that even brief overloading of the output tubes causes the coupling capacitor to charge up suddenly due to the grid current flowing when the grid voltage is positive. In order for the circuit to function normally again, the capacitor must first discharge. This process takes much longer than the preceding overdrive, which is generally not audibly noticeable due to its short duration.

During this discharge time, the operating point of the output tube is shifted into an unfavorable range and the music reproduction is significantly impaired. In other words, such amplifiers have a "memory" and remember previous overloads.

For this reason, we have opted for DC coupling of the 300B output tubes. Although this requires some additional circuitry, it avoids the otherwise unavoidable recovery time after overdrive. In addition, our driver stage is capable of supplying the necessary current at positive grid voltages to continue driving the tube, thus drastically reducing the tube's saturation voltage. This gives us a significantly increased linear control range and thus considerably more power than conventional designs.

INTELLIGENT POWER SOURCE, DOUBLING OF OUTPUT POWER

The output power of single-ended tube amplifiers is limited by the maximum power dissipation of the output tube used. If this is exceeded, the amplifier will deliver more power, but the tubes will reach the end of their service life after a short time due to overload.

Of course, this approach was not an option for us to increase the power limit of 7-8 watts otherwise available with single-ended 300B amplifiers. But we weren't satisfied with that either. Instead, with the WESTEND AUDIO LEO we wanted to create an amplifier that reproduces music with the charm of the 300B while delivering enough power to not have to rely on extremely efficient (and often sonically compromised) speakers.

To achieve this, we started with the anode current source. In single-ended amplifiers, this has the task of supplying the tube with the required quiescent current. Three solutions are common and widely used here:

- Quiescent current via the primary winding of the output transformer: Quiescent current AND signal current flow together through the primary winding of the transformer. This has the disadvantage that the transformer is loaded with a DC magnetic field by the quiescent current, causing the transfer curve to shift into an unbalanced part of its hysteresis curve (a source of unwanted distortion!). In addition, the DC pre-magnetization causes saturation to occur earlier and, as a result, the transformer requires a linearizing air gap in the core and must be significantly larger than is actually necessary for the LF power to be transmitted, because the air gap weakens the magnetic flux.

- A choke in the anode circuit supplies the quiescent current, and the output transformer is capacitively coupled, i.e., DC-free. This requires a very linear choke that processes the quiescent current and signal current simultaneously without reaching saturation. This choke is also very large and can cause distortion (because it is unbalanced due to the quiescent current). Another disadvantage of the choke solution is the finite hum suppression. The electrical impedance of a choke decreases with decreasing frequency. Therefore, with a reasonable amount of components, it cannot completely suppress the inevitable 100 Hz hum of the power supply, and the hum reaches the loudspeaker as an interference signal via the output transformer. The advantage of this circuit is that the capacitively coupled transformer now operates free of direct current.

- A constant current source in the anode circuit supplies the quiescent current, and the output transformer is capacitively coupled, i.e., DC-coupled. A disadvantage of this circuit is that the current source requires voltage to operate, as it is not capable of generating voltage itself like a choke. The voltage required across the current source is approximately equal to the anode voltage of the tube at the operating point. This means that when the amplifier is idle, the current source converts approximately the same amount of power into heat as the tube. This requires a heat sink and a power supply that is twice as powerful. However, because the focus of single-ended Class A amplifiers is on musical performance rather than efficiency, many developers are willing to accept this disadvantage of the current source solution, as it offers enormous musical advantages in return: The output transformer can be capacitively coupled (DC-free) AND the power source is extremely high-impedance up to the DC range, thus virtually eliminating mains hum. In addition, a well-designed semiconductor power source operates almost perfectly linearly (i.e., without distortion), making the output tube the only component of the amplifier that determines the sound.
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All these solutions are known in many variations. However, they do not change the output power of such amplifiers, which is limited by the permissible power dissipation of the output tube!

For the output stage of the WESTEND AUDIO LEO, we have developed a circuit that offers the advantages of a constant current source while at the same time relieving the tube through a servo function: The constant current source is connected in parallel to an electronically implemented NEGATIVE RESISTANCE. The tube only has to cope with half the quiescent current (i.e., half the power dissipation) at the operating point. When current flows into the loudspeaker (connected to the output transformer) during the positive half-wave, the negative resistance supplies the additional portion. When current flows back from the loudspeaker to the amplifier (negative half-wave), the negative resistance takes over part of the current and the tube conducts almost only the current from the loudspeaker and not the additional quiescent current from the power source. The circuit is designed so that the sum of all currents remains constant at all times, meaning that the amplifier always operates in class A. Compared to conventional single-ended amplifiers, the WESTEND AUDIO LEO can deliver more than twice the output power without exceeding the power limits of the output tubes.

This concept was developed in collaboration between Günther Mania and the American tube manufacturer Western Electric, which, among other things, launched the legendary 300B in the 1930s and is now manufacturing it again. Naturally, a great deal of development work and expertise has gone into this circuit technology. Western Electric therefore filed a worldwide patent application for it in 2018. We are proud that the WESTEND AUDIO LEO is the first product to receive a license for it.

DC-FREE TRANSMITTER

Tube amplifiers usually work with transformers. These transformers have the task of transforming the high impedance of the tube to the level of the connected loudspeaker. In the WESTEND AUDIO LEO, the music power is coupled capacitively to the transformer. This means that the transformer is free of direct current and only transports the music signal – i.e., pure alternating current. Distortions caused by unbalanced passage through the hysteresis curve are thus eliminated. In addition, the transformer does not require an air gap for linearization.

We use a specially wound toroidal transformer for the LEO. This is distinguished from conventional transformers by its very compact design. This, together with the closed toroidal core, makes it highly resistant to magnetic interference from the mains transformer. The coils mounted coaxially on the toroidal core ensure optimum, virtually loss-free coupling between the anode circuit and the secondary connected loudspeaker. This gives the WESTEND AUDIO LEO a comparatively high damping factor.

DISTORTION COMPENSATION WITHOUT NEGATIVE FEEDBACK

The LEO's power amplifier circuit operates with only two tube stages connected in series. Both are constructed with triodes in cathode connection. The driver stage inverts the music signal and passes it directly to the power amplifier tubes, which also invert it. This ensures that the phase at the input and output is the same.
The distortion of the driver and output stages is similar (since both are triodes) but occurs with a phase shift of 180 degrees, i.e., inverted. This compensates for a large part of the distortion in the output signal and makes it possible to completely dispense with negative feedback. This is not the case with conventional three-stage designs (input amplifier – driver – output tube), because one of the three stages cannot be compensated.

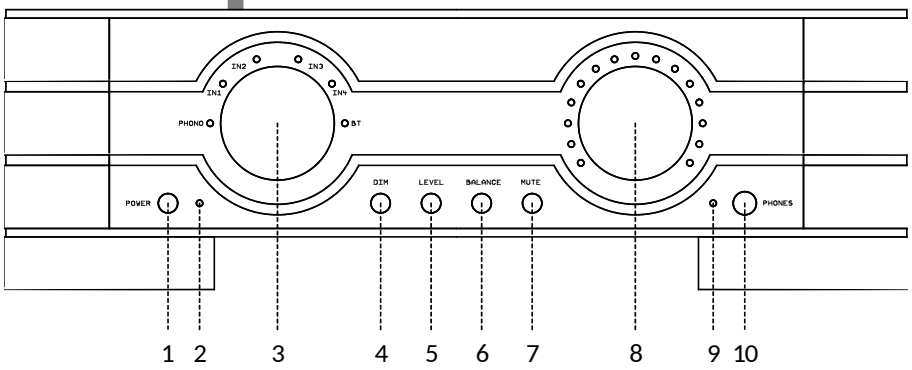
POWER SUPPLY

As mentioned above, switching power supplies are installed for heating the tubes and for the input stages. Their high efficiency allows for a compact design and standby consumption of well below 0.5 watts. All voltages are filtered via choke/electrolytic capacitor combinations and cleaned of HF residues from the switching power supplies.
A low-scatter, oversized toroidal transformer feeds the power supply for the tubes and ensures stable operating voltages. To protect the tubes, these are only switched on when the amplifier is switched on and the tubes are already fully heated.
A total of over 3000µF of filter capacity keeps the hum of the power supply low. The current sources in the anode circuit of the output tubes reliably suppress the minimal residual hum of the power supply.

3. Controls and connections

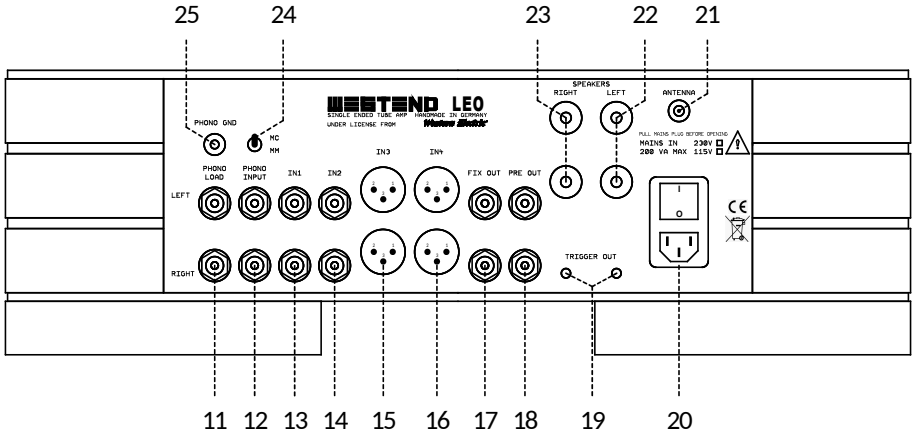
In this manual, the names of the individual controls and connections are followed by numbers that refer to the drawings below.

3.1 Front



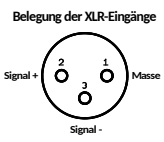
1 On/off button
2 Operating status LED
3 Input selector switch with indicator LEDs
4 DIM button (brightness adjustment)
5 LEVEL button (input level adjustment)
6 BALANCE button (channel balance adjustment)
7 MUTE button (mute)
8 Volume control with indicator LEDs
9 Infrared sensor (remote control)
10 Headphone jack

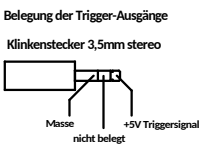
3.2 Rear panel



11 Socket for LOAD plug
12 Phono input jacks
13 High-level input IN1 (RCA)
14 High-level input IN2 (RCA)
15 High-level input IN3 (XLR)
16 High-level input IN4 (XLR)
17 Fixed level output
18 Preamplifier output
19 Switching voltage outputs
20 Mains connection with switch
21 Socket for Bluetooth antenna
22 Speaker outputs LEFT
23 Speaker outputs RIGHT
24 Phono selector switch MM/MC
25 Ground connection for turntable

3.3 Pin assignment





4. Installing the WESTEND AUDIO LEO in your system

4.1 Positioning and cooling

The tubes in the WESTEND AUDIO LEO naturally generate more heat than the semiconductors in a transistor amplifier. When set up correctly, the openings in the base and lid ensure adequate cooling. Please observe the following instructions to ensure that your device is safe to operate and will provide you with many years of uninterrupted listening pleasure.

The cooling openings in the base and lid ensure adequate heat dissipation when the device is set up freely. Rack mounting is possible without any problems, provided that the shelf above the device is at least 15 cm away from the device lid. We do not recommend storing the device in a cabinet.

Ensure that air can circulate freely around the device. We also recommend choosing a location that is protected from direct sunlight so that you can read the displays easily and the remote control does not malfunction due to extremely bright sunlight or direct exposure to strong lamps.

The amplifier should not be placed in direct proximity to a heating source or in a particularly humid environment.

INSTALLATION INSTRUCTIONS

- **The device is intended exclusively for use in dry, heated rooms . Never operate it outdoors or in damp rooms.**
- **If the device is cold (e.g., from transport), condensation may form inside. Therefore, wait until the device has reached room temperature before switching it on.**
- **Do not operate the device in the immediate vicinity of radiators.**
- **Direct sunlight can cause the device to overheat.**
- **There must be no easily flammable materials, liquids, or flammable gases near the device.**
- **Do not place the device on a soft surface or thick carpet. This will impair the air supply from the floor and the device may overheat.**
- **Do not place any other components directly under or on the device.**
- **Do not place any objects (record sleeves, books, etc.) on the device. These could block the cooling opening in the cover and cause overheating.**

4.2 Mains connection

CAUTION! Before connecting to the mains, make sure that your mains voltage corresponds to the value marked on the rear panel above the device's mains connection (20).

CAUTION! If you use other power cords, they must be equipped with a protective earth connection for operational safety.

Set the power switch (20) on the rear of the device to "0" (off) and connect the device's power connection to a power outlet using the power cord supplied.

Leave the amplifier switched off for the time being until all cable connections to the rest of the system have been made.

4.3 Attaching the Bluetooth antenna

Screw the supplied Bluetooth antenna onto the corresponding socket (21). If the joint on the stick is bent, straighten it to make it easier to screw on.

Then bend and position the antenna as vertically as possible for optimal reception.

4.4 Connecting external components, channel assignment

When connecting your components, make sure that the channels are assigned correctly:

The RCA jacks on the WESTEND AUDIO LEO are marked red (for the right channel) and white (for the left channel). On the XLR inputs, the lower jacks are for the right channel and the upper jacks are for the left channel. The assignment of the XLR jacks is explained in chapter 3.3 "Pin assignment."

4.4.1 Turntable

Connect the RCA cable from the turntable to the phono sockets (12). Connect the ground cable from the turntable to the ground terminal (25).

Set the phono selector switch (24) to MM or MC according to your pickup.
NOTE: For loud MC systems (1 mV and above), we recommend the "MM" setting.

ADJUSTMENT: The MM connection has an impedance of 47 kOhm // 100 pF, the MC connection has 1 kOhm. These values are generally suitable for all common cartridges.
If your pickup system requires special adjustment, you can do this by inserting suitable RCA plugs with soldered capacitors or resistors into the LOAD sockets (11). Please contact your dealer for assistance.

4.4.2 High-level sources

Connect high-level sources such as CD players, D/A converters, tuners, and others to inputs IN1 to IN4 (13–16).

4.4.3 Recording devices

The fixed-level outputs (17) are available for connecting a recording device. These are also active when the device is muted or headphones are plugged in. The level corresponds to the input level at the selected input and is independent of the volume setting on the device.

4.4.4 External headphone amplifier

External headphone amplifiers with their own volume control can be connected to the "FIX OUT" outputs (17). These are also active when the device is muted. The level corresponds to the input level at the selected input and is independent of the volume setting on the device. To listen via the external headphone amplifier, set the volume on the WESTEND AUDIO LEO to minimum or press the MUTE button (7).

4.4.5 Subwoofer, switching voltage outputs

If you are using a subwoofer, connect it to the "PRE OUT" outputs. These control their volume in parallel with the volume at the speaker output via the volume control (8) or the remote control.

If your subwoofer has a remote trigger input, connect it to the trigger outputs (19) of the WESTEND AUDIO LEO using a suitable cable. The assignment of the sockets is explained in chapter 3.3 "Connection assignment."

Refer to the operating instructions for your subwoofer to find out how to set the correct balance between the subwoofer and the main speakers. If in doubt, ask your dealer.

4.4.6 Bi-amping

If you are operating your speakers with a second amplifier for the bass range in bi-amping mode, or if you have a semi-active speaker, connect it as described in section 4.4.5 "Subwoofer."

4.4.7 Connecting the speakers

Only use high-quality speaker cables with a sufficient cross-section to connect the speakers to the output sockets (22, 23). If in doubt, ask your dealer to recommend the best cable for your speakers.

Ensure correct polarity when connecting the speakers. The upper output sockets of the WESTEND AUDIO LEO marked in red must be connected to the speaker terminals marked in red or with a plus sign. The right and left channels must have the same polarity for the speakers.

NOTE: The WESTEND AUDIO LEO is equipped with gold-plated 4 mm banana sockets. Use spades to connect cables without soldered banana plugs. If these are not available, you can also insert the bare ends of the speaker cables into the cross holes of the sockets (22, 23) and secure them by tightening the sleeves.

In any case, make sure that no short circuits occur due to frayed cable ends.

4.4.8 Headphone operation

Stereo headphones can be used with the WESTEND AUDIO LEO. A 6.3 mm jack socket (10) is provided on the right-hand side of the front panel for this purpose. As long as the headphones are connected, the speaker outputs and the "PRE OUT" output (22, 23, and 18) are automatically switched off.

The headphone output is universal. It drives both low-impedance and high-impedance headphones. The output level adjusts automatically.

5. Operation

5.1 Switching on and off

Once all connections have been made, set the rear power switch (20) to "I." The power indicator LED (2) will light up to indicate that the device is in standby mode.

Press the "POWER" button (1) on the device or on the remote control. The power LED goes out, the device switches on and initially heats up the tubes. The LEDs around the input selector switch (3) and the LEDs around the volume control (8) light up one after the other. This process takes about half a minute.

Then the high voltage is switched on and the operating points of the output tubes are set. During this time, the input indicator LEDs (3) gradually go out. This process takes another half minute.

Once the amplifier has started up, one of the LEDs around the source selector switch (3) indicates the current input, and an LED on the volume control (8) indicates the set volume. The amplifier is now ready for operation.

To switch off, press the "POWER" button (1) on the device or on the remote control again. The WESTEND AUDIO LEO is now in power-saving standby mode. During standby, the operating indicator LED (2) lights up.

⚠ **ATTENTION! The device is not completely disconnected from the mains when in standby mode. To avoid damage, we therefore recommend that you disconnect your amplifier from the mains by pulling out the mains plug during thunderstorms or if you are away for a longer period of time.**

5.2 Selecting the program source

You can set the program source by turning the selector switch (3). The corresponding LED in the circle around the source selector switch lights up.

To select the source using the remote control, use the "<INPUT>" buttons.

5.2.1 Bluetooth function

SELECTING THE BT FUNCTION

The Bluetooth module built into the WESTEND AUDIO LEO is selected using the source selector switch (3) (position "BT") or the remote control ("<INPUT>").

The corresponding "BT" indicator LED will now flash, indicating that the module is ready to be paired with an external device (smartphone, tablet, etc.). The Bluetooth module will identify itself on your Bluetooth device as "LEO-300B BT".

PAIRING A BT-ENABLED DEVICE

Now pair your Bluetooth-enabled device (the Bluetooth function must be activated on the device) with the LEO. Please refer to the operating instructions for your tablet or smartphone for details.

Once the device is paired, the "BT" indicator on the LEO will light up continuously.

PLAY

You can now play music stored on your Bluetooth device, radio stations (requires a radio app), or content from streaming providers (requires the appropriate app) in high quality via the WESTEND AUDIO LEO. On most tablets and smartphones, the volume can also be adjusted directly on the device without having to change the volume on the LEO. For more information, please refer to the operating instructions for your tablet/smartphone.

AUTOMATIC PAIRING

When you select a different input on the LEO, the Bluetooth module switches to passive mode so that no interference from the antenna affects the other sources. As soon as you switch back to Bluetooth, the built-in module automatically connects to the last paired device within range.

PAIRING ANOTHER DEVICE

The LEO's Bluetooth module can only be paired with one device at a time. To switch to another device, you must disconnect from the currently connected device. The "BT" LED will then flash again and the module is ready to connect to another device.

RANGE

Bluetooth is a short-range connection. The range depends on the environment. In normal homes, it is approximately 8-10 meters, and significantly more in large rooms.

5.3 Volume adjustment

Use the rotary knob (8) to adjust the volume. The volume change increment depends on the speed at which you turn the knob. Turning slowly changes the level in increments of 0.5 dB, while turning quickly changes the volume in larger increments. The LEDs in the circle around the volume control indicate the current setting.

NOTE: The number of volume settings is greater than the number of LEDs. Therefore, when adjusting the volume, the next LED to the right or left of the current display LED flashes briefly and then goes out again.

To adjust the volume using the remote control, use the "<VOLUME>" buttons. Pressing the buttons briefly changes the volume in fine 0.5 dB steps, while pressing and holding them changes the volume in larger steps.

NOTE: The current volume setting is permanently saved when switching to standby, even if you disconnect the device from the mains later. However, to avoid a setting that is too loud, the volume is limited when the device is switched on again if the previous setting exceeds a certain level. The same applies when switching from one source to the next.

5.3.1 MUTE function

Press the "MUTE" button (7) on the device or on the remote control to mute the amplifier temporarily. The device will now switch off the outputs (except "FIX OUT" (17)). Pressing the "MUTE" button (7) again, changing the volume, or switching the source will cancel the MUTE setting.

5.4 Setting the input sensitivity

Select one of the inputs and set the listening volume to a comfortable level. Switch to other inputs to check whether the levels are the same. If you notice a difference, press and hold the "LEVEL" button and adjust the volume of the current input to match the other input by turning the volume control (8).

By switching back and forth between the individual sources (selector switch (3)), you can compare the set levels and adjust the levels of all sources.

To adjust the level using the remote control, use the "<LEVEL>" buttons. The "LEVEL" button (5) on the device must not be pressed.

NOTE: The WESTEND AUDIO LEO permanently stores the selected settings for each input, even if you later disconnect the device from the mains.

5.5 Adjusting the balance

This function allows you to shift the balance to the left or right by 10 dB to compensate for imbalances.

Press and hold the "BALANCE" button (6). While holding it down, use the volume control to set the desired channel balance.

To adjust the balance using the remote control, use the "<BALANCE>" buttons. The "BALANCE" button (6) on the device must not be pressed.

5.6 Adjusting the display brightness

The brightness of the source and volume LEDs (3, 8) and the power LED (2) can be adjusted separately. The WESTEND AUDIO LEO permanently stores the settings, even if it is disconnected from the power supply.

5.6.1 Brightness of the source and volume LEDs

NOTE: The WESTEND AUDIO LEO must be in operation (not in standby) for this setting.

Press and hold the "DIM" button (4). All LEDs on the front panel will light up except for the power indicator LED. Now turn the volume control (8) to set the desired brightness.

To adjust the brightness using the remote control, use the "<DIM>" buttons. The "DIM" button (4) on the device must not be pressed.

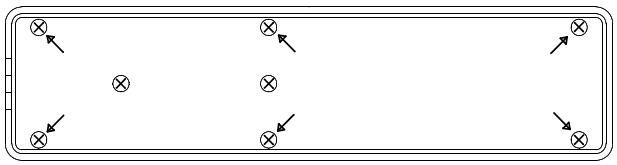
5.6.2 Brightness of the operating indicator LED

NOTE: The brightness of the operating indicator LED (2) can only be adjusted when the WESTEND AUDIO LEO is in standby mode.

Since the controls on the front of the device are de-energized in this operating mode, with the exception of the remote control receiver, for energy-saving reasons, the brightness can only be adjusted using the "<DIM>" buttons on the remote control: Press and hold one of the buttons and adjust the brightness of the LED to the desired value. It is also possible to press the button several times briefly.

6. Maintenance and care

6.1 Replacing the remote control batteries



Bottom view

If the range of the remote control decreases significantly, new batteries must be inserted. Remove the 6 screws marked with arrows on the bottom (CAUTION: do not open the two middle screws without arrow markings!). Now turn the remote control over and remove the base with the circuit board. Remove the used batteries and replace them with two new ones of the same type (3V lithium button cell, type CR2032). When inserting the batteries, make sure that the polarity is correct (mark "+" facing up), as otherwise the electronics may be damaged.

6.2 Care of the housing

The surface and print of the housing are largely scratch-resistant. The aluminum parts of the housing, the chrome-plated buttons, and any other chrome-plated housing parts (optional) are best cleaned with a microfiber cloth sprayed LIGHTLY with window cleaner.

Please do not apply pressure and use clean cloths to avoid scratches.

⚠ ATTENTION!

- **Be sure to switch off the WESTEND AUDIO LEO and disconnect it from the mains before cleaning.**
- **Do not use cloths that are too damp. Under no circumstances should liquid get inside the device.**
- **If liquid accidentally gets inside the device, do not switch on the amplifier under any circumstances, as this could destroy the device. Contact your dealer or us for further instructions.**

7. Just in case – troubleshooting

Your WESTEND AUDIO LEO has been carefully assembled and tested by us. The devices only leave our premises after a 24-hour test run followed by a final inspection. Nevertheless, it is possible that something may not work. However, alleged defects can often be traced back to incorrect operation, incorrect cabling, or a connected third-party device and can be remedied without repair. Before contacting us, please check the following list to see if you can fix the malfunction yourself. If you cannot find the answer, please contact us by phone or email before sending in the device. We will be happy to help you.

7.1 No music playback

- The MUTE function is active. Press the MUTE button (7).
- Accidental switch to standby via the remote control.
  Press the POWER button (1).
- If none of the LEDs on the front panel light up after switching on, the mains fuse may be defective. As this is usually caused by a defect in the mains transformer or the amplifier electronics (e.g. as a result of a lightning strike), please contact your dealer.

7.2 Humming during music playback

- Phono input: The turntable is located near an electrical device whose magnetic interference is affecting the pickup or cable.
- Phono input: The turntable's ground wire is not connected. Connect the ground wire from the turntable to the ground terminal (25).
- General: Ground loop caused by an antenna amplifier or postal wiring. Check whether the humming stops when you disconnect the antenna cable from the tuner (if connected, also from the TV, video recorder, and satellite receiver at the same time!). If this helps, a shield current filter must be inserted into the antenna cables of the connected receivers. (Available from specialist retailers).
- Incorrectly soldered XLR cable. For correct assignment, see chapter 3.3.

7.3 Undefined sound

Poor stereo imaging or a lack of spatial depth are usually due to speakers with reversed polarity. However, an incorrectly soldered XLR cable can also cause this error.

- Check that the speakers are connected with the correct polarity. See section 4.4.7
- Incorrectly soldered XLR cable. For correct assignment, see section 3.3

7.4 Crackling or distortion during playback

This is usually caused by the XLR outputs of some external devices being set too high (contrary to studio standards). To remedy this, you can connect such devices via one of the RCA inputs (13, 14).

If you still prefer to use the XLR connection, please contact us. We can reduce the sensitivity of the affected XLR input with a minor modification.

7.5 Remote control not working

- The batteries in the remote control transmitter are empty. See section 6.1
- There is no direct line of sight between the remote control transmitter and the device (signals are transmitted via infrared light).

8. Warranty

We have taken the utmost care in manufacturing your device and have subjected it to extensive testing. In the unlikely event that a fault occurs that you or your dealer cannot remedy, we will repair your device free of charge within the statutory warranty period of 24 months. Please understand that we would like to draw your attention to the following warranty conditions to ensure smooth processing. Thank you very much!

The warranty covers materials and labor; any transport costs incurred after six months from the date of purchase shall be borne by the owner.

Regardless of the country in which you purchased the device, German law applies to the warranty and guarantee. Should any of the following provisions be legally invalid, it shall be replaced by a provision that complies with the law.

Prerequisites for your warranty/guarantee claim are:

1. The device must have been purchased from a specialized dealer authorized by WESTEND AUDIO SYSTEMS GmbH. Devices from other sources will not be repaired, even for a fee.

2. The dealer's purchase receipt serves as proof of purchase.

3. The defect must not have been caused by improper handling or tampering with the device.

4. The device must be returned to us in its original packaging. If this is not the case, we are entitled to refuse acceptance. In any case, we accept no responsibility for transport damage.

If you no longer have the original packaging, please contact your specialized dealer. On request, we can also provide you with packaging directly. However, we will have to charge a fee for this.

5. The returned device must be accompanied by a brief description of the fault and a telephone number or email address where we can contact you if we have any questions.

6. In cases of doubt, we reserve the right to request a copy of the purchase invoice. In the event of an unauthorized return or if there is no damage to the device, we reserve the right to charge a processing fee to cover our costs.

NOTE: If you are not shipping your device from Germany, please ensure that you have the proper export documents. We cannot accept any costs incurred due to improper export, failure to declare, or customs clearance. If the documents are not in order, we reserve the right to return the shipment at your expense.

If you purchased your device from a dealer outside Germany, please contact them or the responsible importer for warranty processing.

9. Technical data and dimensions

Output power / 4 ohms / THD 1%	13
Output power / 4 ohms / THD 5%	20
Output power / 8 ohms / THD 1%	9
Output power / 8 ohms / THD 5%	11
Frequency response 5V / 4 ohms (-3 dB)	<25 Hz–> –35 kHz
Frequency response 5V / 8 ohms (-3 dB)	<20 Hz–> 35 kHz

Input impedance RCA	10 kOhm
Input impedance XLR	20 kOhm (balanced)
Input impedance phono MM	47 kOhm // 100 pF
Input impedance Phono MC	1 kOhm

Sensitivity RCA	30 - 100 - 300 mV (adjustable)
Sensitivity XLR	30 - 100 - 300 mV (adjustable)
Sensitivity Phono MM	300µV - 1 mV - 3 mV (adjustable)
Phono MC sensitivity	30µV – 100µV - 300 µV (adjustable)

Signal-to-noise ratio high level (10W / 4 ohms)	98 dB(A)
Signal-to-noise ratio Phono MM (10W / 4 ohms)	84 dB
Signal-to-noise ratio phono MC (10W / 4 ohms)	74 dB

Bluetooth input	
Bluetooth standard:	V4.2
Codecs:	BC, MP3, AAC, Faststream, APTX
Sample rate (adaptive):	up to 96 kHz/16 bit
Frequency response:	20 Hz – 20 kHz
Signal-to-noise ratio:	96 dB

Tube configuration:	2x ECC81, 2 x 300B (matched)
Operating voltage	230V (internally switchable to 115V)
Power consumption	Operation: 160W, standby < 0.5W
Primary fuses	2 A slow-blow (at 230V AND 115V)
Dimensions (WxHxD)	430 x 430 x 135 mm (including connections)
Weight	14 kg (chrome or gold finish extra)

Issue date: 01/01/2019

Errors, changes to data and equipment reserved

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