Starwood

28W Guitar Amplifier
User Manual v1.2 10/25/2026

Bartel Amplifiers LLC
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Baltimore, MD 21224
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Safety Instructions

1. Please read these instructions and keep them for reference.

2. Please follow all instructions described here.

3. Do not use this apparatus near water. Do not expose the amplifier to rain, dripping or splashing water, or place containers of liquid on or above it.

4. Clean only with a dry cloth. Unplug the AC power cord before cleaning.

5. Do not block any ventilation openings. Do not cover the amplifier or operate it in an enclosed cabinet without adequate ventilation.

6. Do not operate near any heat sources such as radiators or heat registers. Keep combustible materials away from hot surfaces and ventilation openings.

7. Protect the power cord from being walked on or pinched, particularly at the plugs and at the point where they exit from the apparatus.

8. Only use attachments/accessories specified by the manufacturer.

9. Unplug this apparatus during lightning storms or when unused for long periods of time.

10. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way. For example, if the power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

11. CAUTION: To disconnect the unit completely from the MAINS, unplug the unit.

Turning the power switch off does not disconnect the unit completely from the MAINS. Keep the AC power plug readily accessible.

12. WARNING — ELECTRIC SHOCK: Dangerous voltages inside the amplifier can cause serious injury or death. Do not remove the chassis or protective covers or touch internal electrical components. Capacitors may retain dangerous voltages even after the amplifier is unplugged.

13. WARNING — GROUNDING: Connect only to a properly grounded AC outlet using a suitable three-conductor power cord with an intact protective-earth connection. Never defeat the grounding pin.

14. WARNING — HOT TUBES: Vacuum tubes can become extremely hot. Switch off the amplifier, unplug it, and allow it to cool before touching or replacing tubes.

15. WARNING — HEARING: This amplifier can produce sound levels capable of causing permanent hearing damage. Avoid prolonged exposure to high volume; use hearing protection where appropriate.

16. SPEAKERS: Never operate the amplifier without a suitable speaker load. Make or change speaker connections only with power switched off. Set the impedance selector to match the combined speaker load.

17. STABILITY: Place the amplifier on a stable, secure surface. Use only adequately rated stands or supports, and prevent the amplifier from tipping or falling.

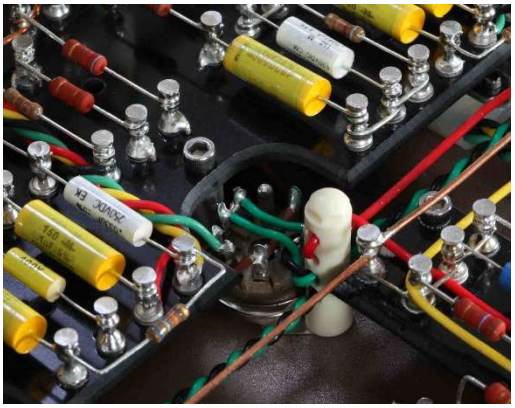
Design Notes from the Builder

Thank you for choosing the Starwood amplifier. This amplifier represents the culmination of nearly 30 years of research and development in amplifier design. It is by far the finest work I've produced in all my years as an amplifier designer/builder. The Starwood was conceived as a craft made, masterbuilt product in which every aspect of production work is performed either by me or by an assistant under my direct supervision. This includes all woodworking and upholstery operations, all electronic assembly operations, and also many custom fabrication operations as well. By developing the Starwood as a masterbuilt product, I had the freedom to consider impractical production methods and to select the finest components regardless of cost. The result is an uncompromising and unique amplifier that goes beyond traditional "boutique" amplifiers in terms of sound quality, build quality, artistry, and design innovation.

The Starwood's finely tuned cabinet produces a tonal response with exceptional depth, clarity, dynamics, and balance. The cabinet body and the baffle board are constructed from a combination of solid woods (not plywood) and are glued up as a unified resonating body so that the entire cabinet participates in the acoustical behavior of the cabinet. This type of design delivers a deep, rich, dimensional sound with a uniquely natural and unconstricted tonal response – like an acoustic instrument.

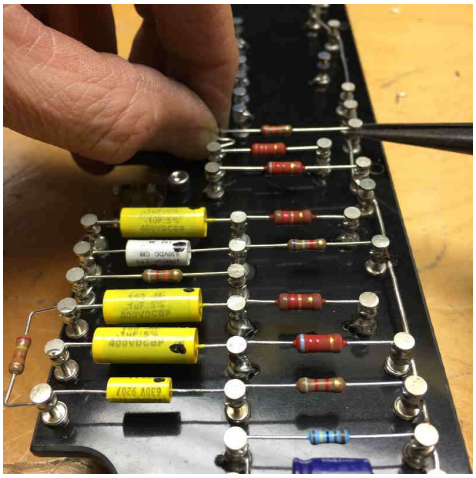
This cabinet design is quite different from traditional guitar speaker cabinets, which use a plywood baffle board attached to the cabinet with screws and wooden cleats. By comparison, the Starwood's unified solid wood construction is significantly more difficult and time consuming to build, but the results are quite extraordinary – an example of impractical methods that help the Starwood move beyond the performance of typical "boutique" amplifiers.

The Starwood's circuit design is also very different from conventional guitar amplifiers. I started from scratch (rather than beginning with classic vintage designs) and ended up with a uniquely uncompromising purist design with exceptional tonal purity, harmonic richness, and voicing range. This design achieves these improvements through unique design features such as a custom made interstage transformer, a single channel multi-voice preamp, and rigorously engineered board layout.

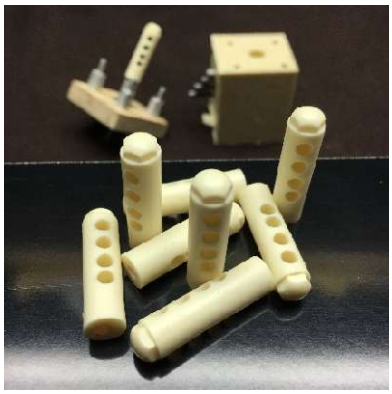


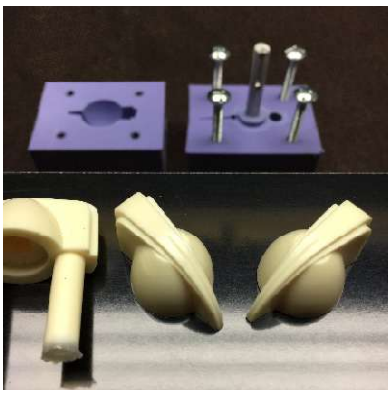
The multi-voice preamp is a unique creation. Although it's a purist single-channel design with a minimal number of controls (volume, bass, treble), it offers a wide range of classic voicings – from 60's sparkly clean tones, to thick tweed sounds, to plexi crunch and beyond. It does this by implementing the treble and bass controls with a new form of circuitry that provides a more complex tone control behavior than a conventional guitar preamp. While conventional treble/bass controls offer simple variations of a single voice, the Starwood tone controls vary the voicing, gain, and overdrive characteristics all at once, for much greater tonal variety.

The circuit layout is executed with skill and precision for durability and reliability, but underneath these practical considerations lie a significant amount of rigorous engineering. The Starwood's circuit layout is an ideal physical implementation of the electrical circuit design. The physical location of each component and the routing of every wire have been optimized to achieve ultimate tonal purity and low noise. This was done by first determining the ideal layout of circuit components and wire routing, and then developing the chassis and turret boards to implement the layout. Custom turret boards and aluminum chassis are purpose-made for this specific design.



As a masterbuilt amplifier, special attention is given to all details of construction, both inside and out. You will find the same level of artistry and craftsmanship in the circuitry inside the chassis as in the cabinetry, upholstery, and external appointments. This level of artistry naturally requires skills gained over decades of work, but also often requires the fabrication of custom made components. For example, I custom mold a number of components, including a set of “wire trees” to help implement a tidy, secure wire layout, and custom molded knobs with a more refined appearance than off-the-shelf types. Even the footswitch receives special attention, with a lacquered tweed enclosure and bakelite top plate. Custom made components such as these are another example of impractical techniques that achieve results that go beyond typical “boutique” guitar amplifiers.





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1. Specifications

General Characteristics

Configuration:	1x12 Combo with Reverb
Circuitry:	Hand-wired; Turret Board

Preamplifier

Channels:	Single Channel
Controls:	Volume, Treble, Bass
Tubes:	2x12AX7A, 2x12AU7

Reverb

Type	Full Size 2-Spring Reverb Pan
Controls:	Dwell (drive level), Mix (receiver / mix level)
Footswitch:	Footswitch control (on/off)
Tubes:	12AT7 (driver), 12AX7A (receiver)

Master Volume

Type	Modified Post Phase Inverter Design

Power Amplifier

Output Power	28W R.M.S.
Tube Type	2x6L6GC
Biasing	Cathode Bias
Operating Mode	Class AB
Output Impedance	Selectable: 4, 8 Ohms

Power Supply

Type	Tube Rectified
Tubes	1xGZ34/5AR4

Cabinet

Body	Solid Eastern White Pine, Finger Jointed
Construction	Unified Body/Baffle

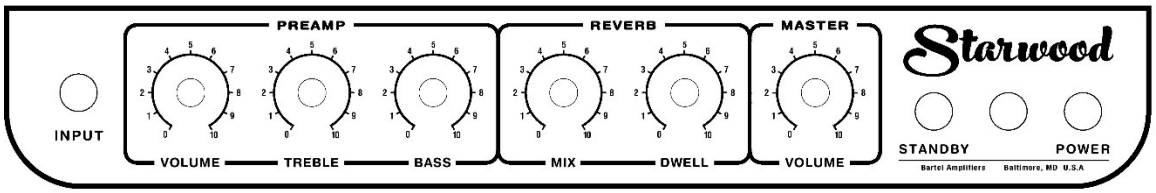
Speaker

Manufacturer	12" Fane A60
Impedance	8 Ohms

Specifications (cont'd)

Footswitch	
Type	1-Button Footswitch with L.E.D. Indicator
Function:	Reverb on/off
Tube Complement	3x12AX7A, 2x12AU7, 1x12AT7, 2x6L6GC, 1x5AR4
Dimensions	22-1/2" (W) x 18" (H) x 11-1/2" (D)
Weight	42lbs (approximate – may vary with wood density variation)

2. Top Panel Controls



Guitar Input

The Starwood provides a single input jack on the top panel for connecting your guitar or pedalboard. This jack is a standard ¼" mono type which is compatible with any standard guitar or instrument cable.

Preamp Controls

The Volume control adjusts the input gain of the preamplifier. Generally, this control is used to determine the level of overdrive (if any) from the amplifier. Regardless of the setting of the Master Volume control, you'll find that the amplifier begins to break up at some point as you turn up the Volume control.

Although the Treble control performs the function you expect (i.e. increasing/decreasing the amount of high-frequency content in the signal), it has a more complex and profound effect than a conventional Treble control. It also affects the balance of the treble frequencies, midrange, and bass frequencies, and affects the overall gain as well.

As with the Treble control, the Bass control likewise performs its intended function (increasing/decreasing low frequency content), but also has a more complex and profound effect. It affects the balance of bass frequencies, midrange, and treble frequencies, and affects the overall gain and overdrive characteristics as well.

The specific use of the preamp controls will be discussed in detail in the section below addressing "dialing in your sound".

Reverb Controls

The Starwood's reverb circuit is a tube driven design that offers exceptional depth, dimension, and detail extraction from its full-size spring pan. The circuit includes both Dwell and Mix controls. The use of each should be understood in order to dial in the best possible reverb sound.

Dwell Control

The Dwell control determines the level of the signal driving the spring reverb pan. In general, this control can be thought of as controlling the "character" of the reverb sound as follows:

- at lower Dwell settings, the reverb is darker, smoother, and more subtle and controlled.

- at higher Dwell settings, the reverb sound is brighter and 'splashier', and you begin to hear more 'flutter', more overtones, and more of the unique character of the spring reverb pan.

A good nominal setting for this control is ‘5’.

Mix Control

The Reverb (Mix) control determines the amount of reverb signal from the reverb pan that is mixed with the dry signal. This is the same function performed by the "Reverb" knob on most amplifiers that have a single knob reverb circuit (e.g. deluxe reverb). In general, this control can be thought of as controlling the "amount" of reverb you hear.

NOTE ! Turning both the Dwell and Mix controls up all the way will result in an over-the-top, surf guitar kind of reverb sound, with a lot of brash overtones and a long reverb tail. This extreme setting is intended for special purpose uses, where an over-the-top, out-of-control kind of reverb sound is desired as a special effect. It's not intended for general use.

A good nominal setting for the mix control is ‘4’.

Footswitch Control of Reverb

When the footswitch is connected to the amplifier, the “reverb” button (on the footswitch) is used to turn the reverb on and off. The LED indicator on the footswitch displays the status of the reverb (LED on = reverb on).

When the footswitch is disconnected from the amplifier, the reverb is always on, but you can disable it by turning the Mix control all the way down.

Master Volume

While the Volume control sets the input gain of the preamplifier, the Master Volume control adjusts the output level of the preamplifier. It's important to understand the different functions of the Volume and Master Volume controls in order to dial in the sound you need.

In general, the Volume control determines the amount of overdrive and distortion, and the Master Volume determines the overall volume level.

So, if you are dialing in an overdriven or distorted sound, you would use the Master Volume to set the overall volume of the amp and use the Volume control to set the amount of overdrive/distortion.

However, if you are dialing in a clean tone with maximum headroom and no breakup, you would use these controls a bit differently. In this case, you should turn the Master Volume all the way up and use the Volume control to set the overall volume level.

In cases where you are seeking a clean tone at extremely low volume (i.e. "bedroom volume"), it's often useful to set the volume control to at least '1' on the dial and reduce the volume level in the room by turning the master volume control down as needed. This will help maximize the signal to noise ratio and will generally provide the best tone.

Power and Standby Switches

The **Power** switch is used to control the application of AC power to the amplifier. In the OFF position, the amplifier is switched off but remains connected to the AC mains until the power cord is unplugged. In the ON position, power is applied to the amplifier, and the mode of operation is determined by the Standby switch.

The **Standby** switch offers the ability to disable the operation of the amplifier while allowing a portion of the circuitry to remain active (i.e. the tube filaments) so that the amplifier can be quickly be made ready for use (without waiting for the tubes to heat up). When the Standby switch is in the OFF position, the amplifier is in "standby" mode, meaning that the tubes remain heated but the operation of the amplifier is disabled. When the Standby switch is in the ON position, the amplifier is in the "operate" mode, and is fully functional.

The sequencing of the power and standby switches is not important to the use or reliability of the amp. If desired, the standby switch can be left on at all times and the amp can simply be powered up and powered down with the power switch. In fact, doing so will help extend the lifetime of the rectifier tube as it will eliminate the sudden current impulse seen by the rectifier tube as you turn on the standby switch.

3. Back Panel Controls

AC Line

The AC Line input is an IEC type connection for use with an appropriate IEC-terminated line cord for connection to an AC power source. The line voltage specification printed underneath the connector outlet indicates the required voltage and frequency of the power source. This specification will vary depending on the country to which the amplifier was shipped, so please refer to the voltage specification printed on the back panel of your amplifier, as it may be different from that shown in the illustration above. Use only a properly grounded three-conductor power cord with an intact protective-earth connection. Do not defeat the grounding conductor.

IMPORTANT: The MAINS power applied must match the voltage and frequency specification printed on the back panel of your amplifier. Keep the mains plug readily accessible so the amplifier can be disconnected completely from AC power.

Fuse

It is essential that the correct fuse be installed for proper operation and safety. The mains fuse helps protect against excessive current from certain equipment faults. It is not intended to provide protection against AC voltage surges.

The fuse rating varies depending on the country to which the amplifier was shipped, so please refer to the fuse specification printed on the back of your amplifier. You must use a fuse that matches the fuse specification printed on the back panel of your amplifier (which may be different than that shown in the illustration above). Switch off and unplug the amplifier before replacing the fuse. Replace only with the exact type and rating specified on the back panel, including the time-current characteristic. Never bypass the fuse or increase its rating. If a replacement fuse blows, stop using the amplifier and contact Bartel Amplifiers for service.

Footswitch

The footswitch jack is used to connect the external footswitch with the included cable. The cable used for this purpose must be a mono (TS) ¼" cable. It need not be a shielded cable.

When connecting the footswitch jack to an external switching device, please note the following specs:

Tip terminal	Reverb on/off; tip connected to sleeve = reverb ON
Sleeve terminal	Switching return (not chassis ground; do not connect to ground)

Speaker

The Extension speaker jack is provided for connecting additional speakers to the amplifier. This jack is wired in parallel with the main speaker jack (located on the underside of the chassis). When you attach a speaker using the external speaker jack, it will be connected in parallel with the internal speaker, and the internal speaker will remain operational. Connect or disconnect speakers only when the amplifier is switched off. Use proper speaker cable, not shielded guitar cable.

If you wish to drive only an external speaker, and to disconnect the internal speaker, then you must unplug the internal speaker from the main speaker jack location on the underside of the chassis and connect the external speaker to main speaker jack (not the extension speaker jack). Never operate the amplifier without a suitable speaker or properly rated load connected.

Impedance Selector (4 / 8 Ohms)

The Impedance selector should be set to match the total combined impedance of all speakers connected to the amplifier. For example: Switch the amplifier off before changing the impedance selector. Do not select a setting that does not match the connected load.

When driving only the internal 8-ohm speaker, the Impedance selector should be set to 8 ohms.

When an external 8-ohm speaker is connected, this speaker will be connected in parallel with the internal speaker, resulting in a total combined impedance of 4 ohms. In this case, you would set the impedance selector to 4 ohms. If only an external speaker is used, connect it to the main speaker jack and select the corresponding 4- or , 8-ohm setting.

4. Footswitch

The included 1-button footswitch is used to control the Reverb function of the amplifier.

Here are a few notes regarding its use:

- The amplifier is fully functional without the footswitch connected, so if you are using the amp at home or in a situation where you don't need footswitch control of the reverb, then it's not necessary to plug in the footswitch.

- To use the footswitch, it must be connected to the Footswitch jack on the back panel of the amplifier with the ¼" mono cable supplied with the amplifier (or any suitable ¼" Mono cable).

- The Reverb button turns the reverb receiver on and off. When the red status LED above the Reverb switch is ON, the reverb effect is ON.

5. Operation

Unpacking

When unpacking, you should find the following items included:

- Amplifier
- Footswitch
- AC Line Cord
- Footswitch Cable

The footswitch, ac line cord, and footswitch cable are located in a small white box packed adjacent to the amplifier.

Setting Up

To begin, insert the power cable into the IEC AC inlet on the back of the amplifier (labelled “AC Line”). Note the voltage specification printed underneath the AC inlet (on the back panel of the amplifier) and ensure that it matches the line voltage to which you intend to connect the amplifier. Then, connect the line cord to the AC power source (i.e. wall outlet).

Next, if you wish, you can connect the footswitch to the footswitch jack on the back panel of the amplifier, using the included cable. If you use a different cable, make sure that it is of the same general type (1/4” mono TS cable). The footswitch allows you to turn the reverb on and off. It isn’t necessary to connect the footswitch to use reverb. If you don’t connect the footswitch, reverb is still fully functional.

Connecting your guitar or pedalboard

The Starwood has a single instrument level input on the top panel of the amplifier. It is intended to be connected directly to your guitar or to your effects chain / pedalboard.

Powering Up, Powering Down

The sequencing of the power and standby switches is not important to the use or reliability of the amp. If desired, the standby switch can be left on at all times and the amp can simply be powered up and powered down with the power switch. In fact, doing so will help extend the lifetime of the rectifier tube as it will eliminate the sudden current impulse seen by the rectifier tube as you turn on the standby switch.

6. Dialing in Your Sound

Preamp

The preamp design was conceived as a purist 1-channel design with a minimal number of controls but capable of an unusually wide range of classic voicings. Voicings range from a sparkling late-1960s clean tone to a thick, woody tweed sound and a crunchy plexi tone. This full range of voicings can be dialed in using only the bass and treble controls.

The bass and treble controls operate much differently than conventional tone controls. Of course, they perform their intended function (i.e. turning the treble control up gives you more treble, etc.), but they also simultaneously affect other parts of the frequency spectrum and affect gain/headroom as well.

If you turn the bass and treble controls all the way up, you obviously get a tone with a lot of bass and a lot of treble, for a "mid-scooped" voicing that's very much like the classic 60's clean tone (e.g. Deluxe Reverb for example). Since this type of setting is usually best for clean tones, you'll find that the overall gain is lowest at this setting, for maximum clean headroom.

If you turn the bass and treble controls to their midpoint (5), you get less low bass and less high treble, which has the effect of making the midrange more prominent. This voicing can be compared to a vintage Tweed tone, and can be tweaked by adjusting bass and treble slightly one way or the other. Compared to the previous setting, you will note that the gain is higher (with less headroom) so that it's easier to push the amp into overdrive.

Moving on, if you turn the bass control all the way down (while leaving the treble control at its midpoint – 5), you will get even less bass for a sound that's dominated by upper midrange and treble for a plexi voicing that's great for an edgy crunch tone. The gain is significantly increased at this setting so it's easy to overdrive the amp and dial in a classic plexi crunch.

Going further, if you turn both the treble and bass controls all the way down, you get a voicing that's centered on the midrange and upper mids, but you also get even more gain as well. This adds up to a saturated plexi tone that is more "singing" than "crunchy".

To get started, I suggest trying these sample settings:

1) 60's Clean Tone 1 (more "mid-scooped"): Vol 3; Treble 10; Bass 10; Master 10

2) 60's Clean Tone 2 (less "mid-scooped"): Vol 3; Treble 6.5; Bass 6.5; Master 10

3) Tweed Clean: Vol 3; Treble 5.5; Bass 5; Master 10

4) Tweed Overdrive: Vol 7; Treble 5; Bass 5; Master [as desired]

5) Plexi Overdrive: Volume 4; Treble 5; Bass 0; Master [as desired]

6) Saturated Plexi: Vol 7; Treble 0; Bass 0; Master [as desired]

7) Vox Bright Clean: Vol 1; Treble 9; Bass 4; Master 10

Reverb

The reverb circuit is tube-driven and uses a conventional spring pan to create the reverb effect. This circuit includes both Mix and Dwell controls to provide more flexibility in dialing in a great reverb sound.

The Dwell control determines how much signal is sent to the reverb pan. Higher settings of the Dwell control result in a brighter, splashier, more surf-like sound. Lower settings of the dwell control produce a mellower, more subtle and controlled effect.

The Mix control determines how much of the reverb signal is added to the signal path, and is equivalent to the function of the "Reverb" knob on a typical 1-knob reverb circuit (e.g. Fender Deluxe Reverb).

A good default setting for reverb on clean tones is: Mix 3 or 4; Dwell 5

When overdriving the amp, you may want to adjust the Dwell and Mix controls for the best reverb sound.

7. Getting a Great Sound at Home

The Effect of Your Acoustical Environment

When playing in a large room at high volume, getting a great sound from your amp is easy. Playing at home (or in any small room) at low volume is a different story. The acoustic properties of a small room can have a big influence on the sound you hear and can often cause problems.

A number of different problems can occur at low volume, in a small room. Here are a few suggestions for dealing with them:

Floor Reflections

If the amplifier is placed on a hardwood, tile, or concrete floor in a small room, it may sound harsh in the upper midrange, because of reflections off the floor directly in front of the amp. To help solve this problem, you might try placing a small piece of carpet (or a doormat, for example), directly in front of the amp.

Where to Place the Amp

The Starwood was designed to sound best sitting directly on the floor. In general, it will have the best tonal balance when sitting on the floor. However, if you find that the low bass is overly exaggerated in your room, then elevating the amp a few inches off the floor may help.

In a small room, the sound you hear is greatly influenced by the location of the amp in the room and by the orientation of the amp with respect to the listening position (i.e. if the amp is pointing at you or away from you).

To get the best sound in your room, it can be quite helpful to experiment with placing the amp in different locations and/or orientations with respect to the listening position

Carpeting

Carpeting can cause problems as well. The usual problem is a muting or rolling-off of the high frequencies, but you may also experience a dip in a certain region in the midrange which makes the amp sound harsh and brittle in the top end. This problem generally can't be helped by moving the amp to a different location in the room but can often be helped by elevating the amp a few inches off the floor or tilting it back slightly. When tilting the amp back, you'll likely find that just a few degrees of tilt is all you need. If you tilt too far, you may end up hearing too much of the direct on-axis sound from the speaker which can be comparatively harsh and glaring. It's best to select a tilt-back angle and listening position that places the listener slightly off axis with the speaker. Use a stable, purpose-designed support when elevating or tilting the amplifier. The amplifier must remain secure and must not be at risk of tipping or falling.

8. Tube Installation and Replacement

Tube Quality

Currently manufactured tubes are built in China, Russia, and the Czech Republic, and are not built to the same quality standards as tubes manufactured by U.S. manufacturers in the "glory days" of tube manufacturing.

We musicians choose to use vacuum tubes because of their tonal qualities, but we need to accept that the tubes available to us these days can be imperfect devices and are most certainly the least reliable component in the entire amplifier. Tubes made these days can fail at any time, even after only a few hours of use. They are quite sensitive to mechanical shock and can fail as a result of the amplifier being dropped sharply as happens often in shipping.

Aside from simply failing outright (causing the amplifier to produce no sound), tube defects can create a number of different noises (such as crackling, hissing, humming, etc.) and these noises can occur either continuously, intermittently, or in response to your playing (e.g. a crackling or other type of noise which occurs only when you hit a note).

Tube defects/failures are the number one cause of problems with any tube amplifier. If you experience a problem with your amplifier, the first step in debugging involves consideration of the possibility of a tube problem.

I subject all tubes to a thorough burn-in and test procedure to ensure that they are up to spec and operating perfectly. However, it should be known that the majority of tube failures occur early in their life and may occur as a result of the jostling and jarring that an amp can receive in shipping. In spite of these efforts to ensure tube quality, early-life tube problems are often not detectable by any form of testing.

Tube Installation

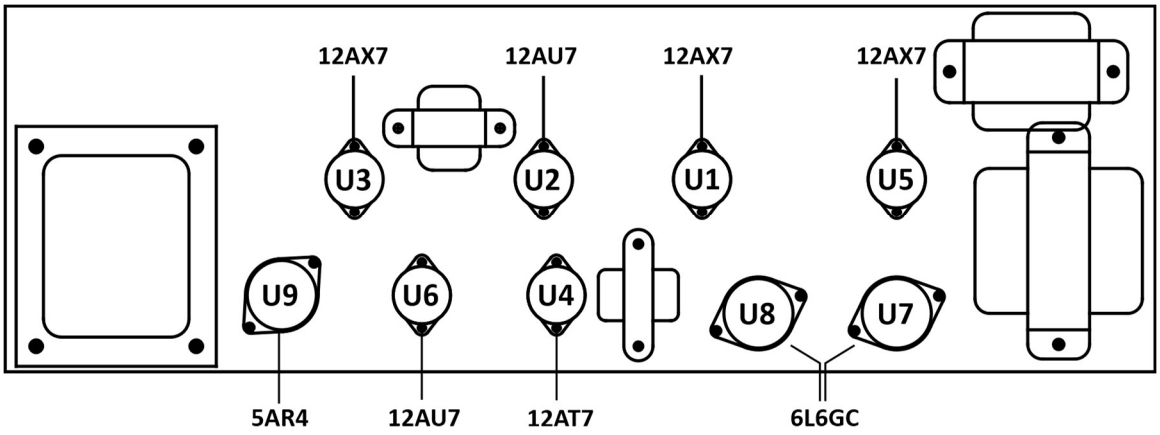
WARNING — Before replacing any tube, switch the amplifier OFF, disconnect the AC power cord, and allow at least 15 minutes for the tubes to cool. Do not remove the chassis or touch tube socket contacts or internal wiring. Dangerous voltages may remain inside the chassis after unplugging. If access requires removing the chassis, refer the work to qualified service personnel.

To replace the preamp tubes of your amplifier, you must first remove the metal shield covering the tube. This is done by pressing the shield toward the chassis and turning it counter-clockwise to release it. Once the shield is removed, the tube can be removed by grasping it and pulling it straight out of the socket. You may need to rock the tube slightly from side to side to free it from its socket.

To replace the output tubes or rectifier tube, you should hold back the "butterfly" tube clips which grab the base of the tube, and pull the tube straight out, grasping it from the base. It may be necessary to rock the tube slightly in its socket while pulling, but be sure to rock it only slightly or you may break off the center post in the base of the tube.

Tube Locations

The diagram below shows the location of the tubes on the amplifier chassis:



Tube position guide: U1 – 12AX7 (1st gain stage); U2 – 12AU7 (2nd gain stage); U3 – 12AX7 (3rd gain stage); U4 – 12AT7 (reverb driver); U5 – 12AX7 (reverb receiver); U6 – 12AU7 (phase inverter); U7 and U8 – 6L6GC (output); U9 – 5AR4 (rectifier).

12AX7 Tubes

The preferred brand for 12AX7 tubes is the TAD 7025 Redbase Highgrade. This is a specially selected version of their 12AX7A-C with very low microphonics and noise. Many of the Russian made 12AX7 tubes (such as the Tung Sol and EH brand 12AX7s, and the Sovtek 12AX7LPS) will fail when used as a cathode follower, and therefore they are not recommended for use in the U1 position.

NOTE: Although a 12AX7 is specified for the U1 position, the circuitry has been designed so that a 12AU7 tube may be used instead for lower gain and more headroom. If you primarily play clean without overdrive, you may prefer to use a JJ ECC802S in the U1 position. It will significantly increase clean headroom and deliver a fuller, fatter sound.

12AU7 Tubes

The JJ ECC802S is the preferred 12AU7 type tube for both positions U2 and U4 in this amplifier. This tube has a full, ruch sound and very low noise / microphonics.

12AT7 Tubes

The EH brand 12AT7 is the preferred 12AU7 type tube for position U4.

6L6 Tubes

The preferred brand for 6L6 tubes is the TAD 6L6WGC. When replacing 6L6 tubes, no biasing is necessary. The output tubes are cathode biased and have no bias adjustment.

Rectifier Tubes

The preferred brand for the rectifier tube is the Sovtek 5AR4.