

BAND-WIDTH

AUDIO

## 2845 Monaural Amplifier



### Owner's Manual

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## WARNING



**FAILURE TO FOLLOW THE INSTRUCTIONS & WARNINGS BELOW  
WILL VOID YOUR WARRANTY. READ THEM!**

High Voltage! Risk of electrical shock. To prevent fire and shock hazard, do not expose this device to rain or moisture. Do not place objects containing water or liquid on top of the amplifier.

**DO NOT REMOVE THE BACK COVER UNLESS YOU ARE QUALIFIED TO DO SO**

**THE AMPLIFIER CONTAINS VOLTAGES WHICH CAN CAUSE SERIOUS INJURY OR DEATH**

Do not operate with the covers removed. High voltage can be stored in the power supply even if it is unplugged and not in use. For service, contact Bandwidth Audio.

**HIGH VACUUM TUBE TEMPERATURES MAY RESULT IN BURNS**

845 vacuum tubes are some of the hottest running tubes found in audio amplifiers. They will get extremely hot. Do not touch tubes while in operation.

**DO NOT ENCLOSE, OBSTRUCT, OR BLOCK IN THE AMPLIFIER.**

Do not use the amplifier in enclosed furniture with cubbies, doors, or obstruction above the tubes (like a shelf) as this may result in overheating and fire.

**DO NOT PLACE THE AMPLIFIER ON A SOFT SURFACE THAT WILL REDUCE THE GAP BETWEEN THE FEET AND THE BOTTOM COVER.**

Proper cooling of the amplifier is required to avoid component and tube damage. Vents in the bottom cover are crucial for drawing in air and cooling the tubes and components.

### **CHECK AMPLIFIER BIAS IMMEDIATELY AFTER FIRST POWER ON**

Make sure to check amplifier bias during the first time powering up your amplifier and periodically after. Not all 845 tubes can handle the same bias setting! If you see the tubes starting to glow red (red plating) in a normally illuminated room, reduce the bias immediately! A very dull red glow in a dark room is acceptable.

With the volume turned all the way down, the bias should be set between 50 - 60mA once the 845 output tubes are fully hot. This current can be read directly off the two analog meters on the back of the amplifier. See Section 3.4 – Biasing.

### **INSPECT ALL VACUUM TUBES FOR PHYSICAL SIGNS OF DAMAGE BEFORE INSTALLING**

Check for visual damage to the structures, or loose parts floating inside the tubes. Carefully turn the tube upside down to check for any loose parts. **DO NOT SHAKE VACUUM TUBES.** Roughly handled 845s have been known to develop visible cracks in the graphite plate structure and/or filament breakage with pieces of the filament rattling inside the glass.

### **NEVER POWER ON THE AMPLIFIER WITHOUT FIRST CONNECTING A PROPER LOAD TO THE SPEAKER TERMINALS**

Failure to do so may result in permanent damage to the output transformer and potentially other components in the output stage.

### **DO NOT RUN THE AMPLIFIER UNATTENDED AND DO NOT LEAVE THE AMPLIFIER RUNNING IF YOU DO NOT INTEND TO LISTEN TO IT**

### **DO NOT QUICKLY POWER CYCLE (HOT CYCLE) THE AMPLIFIER. LET THE AMPLIFIER COOL COMPLETELY BEFORE CYCLING POWER BACK ON.**

Power cycling causes extreme inrush current. Let the amplifier rest for 30 minutes or more.

### **REPLACEMENT GZ34 / 5AR4 RECTIFIER TUBES MUST BE EITHER PURCHASED FROM BANDWIDTH AUDIO OR TESTED BY BANDWIDTH AUDIO PRIOR TO INSTALLATION IN THE AMPLIFIER.**

Quality control issues with modern rectifiers and/or old used rectifiers have been known to cause rectifier tube arcing. We have developed an in-house high voltage tube rectifier tester specifically for screening out bad rectifier tubes before they are installed into the amplifier. **See Section 3.2 – Replacing Tubes**

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# 1.0 Amplifier Setup

## Pre-Operation Checklist

- Connect speakers to proper load impedance output.
- Insert tubes into proper sockets. **See Section 3.1 – Installing Tubes.**
- Turn the volume all the way down.
- Connect Mains receptacle to wall outlet. Ensure a proper outlet ground connection with a ground tester.
- Familiarize yourself with the biasing procedure **See Section 3.4 – Biasing.**
- Power on the amplifier; and while warming up, check power tube bias without attempting to play an audio signal. **Ensure the speaker load is connected before powering on!**

## 1.1 Amplifier Placement

For the best operation and longest life of components, the amplifier must be set up and used in a well-ventilated area with good air circulation. **Do not use the amplifier in enclosed furniture with cubbies, doors, or obstructions (like a shelf) above the tubes as this may result in overheating and fire.**

**Do not place the amplifier on a soft surface. The weight of the amplifier will reduce the gap between the feet and bottom cover.** Vents in the bottom cover are crucial for drawing in air and convection cooling the tubes and components. Overheating can damage the amplifier and diminish tube life.

It is always recommended to place the amplifier on a sturdy, substantial shelf to help minimize vibrations coupled in from the floor.

## 1.2 Mains AC Grounding

**Always share the same AC mains ground circuit with all other audio equipment.**

For lowest noise, it is always recommended to share the same AC mains ground circuit between all audio equipment in a system. The easiest and best way to achieve this is to share a common outlet or known common circuit from the breaker panel and use a high-quality power strip to power all pieces of equipment. This ensures the ground reference of all audio equipment is at the same potential.

## 1.3 Speaker Connection and Setting the Load Impedance

**Never turn on your amplifier without speakers connected to the proper output load impedance terminals.** Operation of the amplifier without a speaker load or an open circuited loudspeaker voice coil can permanently damage the output transformers as well as other major components. To be safe, always ensure your speakers are connected before plugging amplifiers into an outlet. Likewise, always unplug the amplifier from the outlet before removing the speaker load.

This amplifier comes equipped with 4 $\Omega$ , 8 $\Omega$ , and 16 $\Omega$  output impedance binding posts for maximum flexibility. If you are unsure of your speaker's impedance, contact the manufacturer.

Connect speakers between either the 4Ω, 8Ω, or 16Ω binding post on the back of the amplifier and the common “Comm.” binding post.

## 1.4 Powering ON and OFF

The analog backlit VU meter on the front face of the amplifier illuminates when the amplifier is powered on.

Initial warm up time is typically 30 seconds. It will take at least this long for music to play from speakers. Best performance is achieved after the amplifier has been running for a period of time and the 845 tubes are up to a steady temperature, typically 20 minutes.

**The physical size of 845 tubes means they have a long thermal time constant.** The Hum Balance potentiometers and Bias settings can only be properly set once the 845 tubes are fully warmed up. This means that the hum from the speakers may be slightly elevated during the first few minutes after powering on.

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**Note:** Hum Balance potentiometers are factory set. No adjustment should be needed if the 845 tubes are installed in the indicated positions as marked on the tube boxes and/or tube bases.

If adjustment is needed or 845 tubes are replaced, final adjustment of the hum balance potentiometers should only be made with the tubes fully hot and at the target bias settings. Changes in bias adjustment may also require re-tuning the hum balance potentiometers since the output tube operating temperature has also changed.

**See Section 3.3 - Setting Hum Balance Pots**

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**Note:** Amplifier bias will continue to rise (more current) until the 845 tube temperature is stable. If the Bias is too high immediately after power on, it will only go higher. It must be reduced before it can be properly set.

**Setting the final bias without the tubes fully hot can lead to a gross overshoot in the bias setting.** This can cause red plating and severe damage!!

**See Section 3.4 – Biasing**

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When powering off, music may still play for a few seconds. This is normal. While the tubes are hot, do not move or knock into the amplifier since hot tubes are more susceptible to internal damage.

**Do not quickly power cycle the amplifier, known as “hot cycling.”** Fast power cycling causes extreme inrush current since the tubes are hot and ready to conduct current and the power supply capacitors may be fully discharged. The power supply must support this massive current demand which is hard on the power supply components and may blow the external mains fuses, or the internal amplifier safety fuses.

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**Note:** Let the amplifier rest for 30 minutes after it was powered off before turning back on, **even if it was not fully warmed up.**

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**Do not leave the amplifier running if you do not intend to listen to it.** There is a common misconception that tube gear should be left on for the best sound and tube longevity. While this may be true for esoteric 1KW and higher RF tubes, we have taken great care and consideration to make the amplifier startup well controlled and kind to both the tubes and electronic components, **so long as the amplifier is not hot cycled.** Heat is one of the biggest factors in the lifespan of electronic components. This is especially true of the expensive power supply capacitors.

## 1.5 Input Setup

Input connections are made by connecting an analog audio source to either the “Single Ended” RCA jack or the optional “Balanced” XLR connector - if equipped. This amplifier is designed to drive a speaker load to its full rated output power based on typical line level input signals via the RCA or the optional XLR connector on the back.

Depending on the input source components, an additional preamp may be needed to achieve full output power.

**See Section 3.4 – Typical Specifications.**

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**Note:** The input source switch must be set to “Single Ended” for playback from the RCA jack or “Balanced” for playback from the XLR jack. – if equipped

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The XLR Balanced input option uses a high-performance line input transformer for a true balanced connection. This transformer has a very high Common Mode Rejection Ratio (CMRR) to noise picked up by long cable runs to the amplifier.

**For Units with RCA Input Only:**

If the optional balanced input is not equipped, the XLR Jack, input selection switch, and line input transformer mounting locations will be blocked off with black decorative plugs. This allows the option to be installed in the future, if so desired.

## 2.0 Controls and Layout

### 2.1 Front Features



#### 1. Volume:

The volume knob controls the overall output of the amplifier by attenuating the input signal. Rather than a normal variable potentiometer, a stepped attenuator is used. A stepped attenuator uses a precision fixed resistor network which reduces noise during rotation and maintains perfect volume balance between a pair of amplifiers driving separate speakers. Due to its construction, the volume knob will click into each setting, giving precise volume control.

#### 2. VU Meter:

The VU meter, or Volume Unit meter, gives the user an indication of the relative output power to the speakers. The backlight also illuminates when the amplifier is on.

The VU meter is calibrated to indicate the amplifier's maximum rated RMS output power (approximately 50 Watts) when it is indicating +0dB.



Driving the output beyond this region will cause amplifier distortion. Although this is not harmful to the amp, there is a significant increase in the average output power as distortion increases. This can damage speakers rated close to the amplifier's maximum RMS output power capability.

3. Power Switch: The power switch is used to turn the amplifier on and off. **ON** is in the up position, and **OFF** is in the down position.

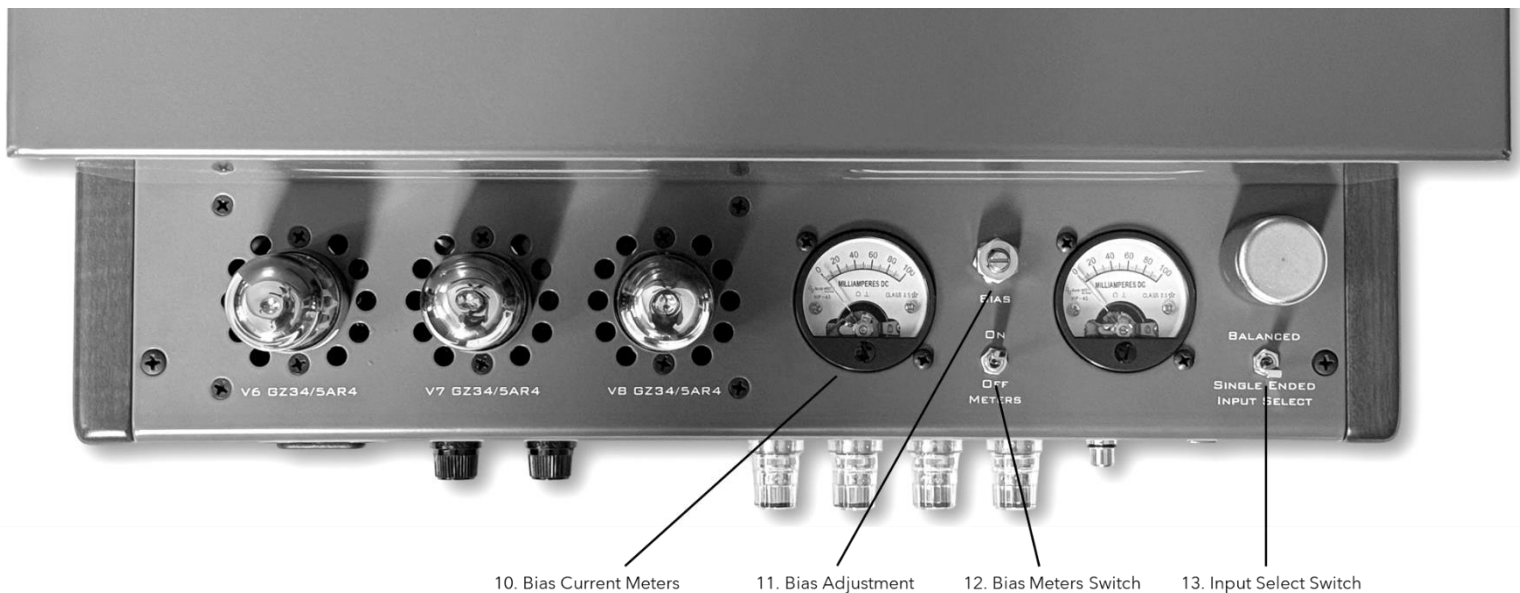
## 2.2 Back Features



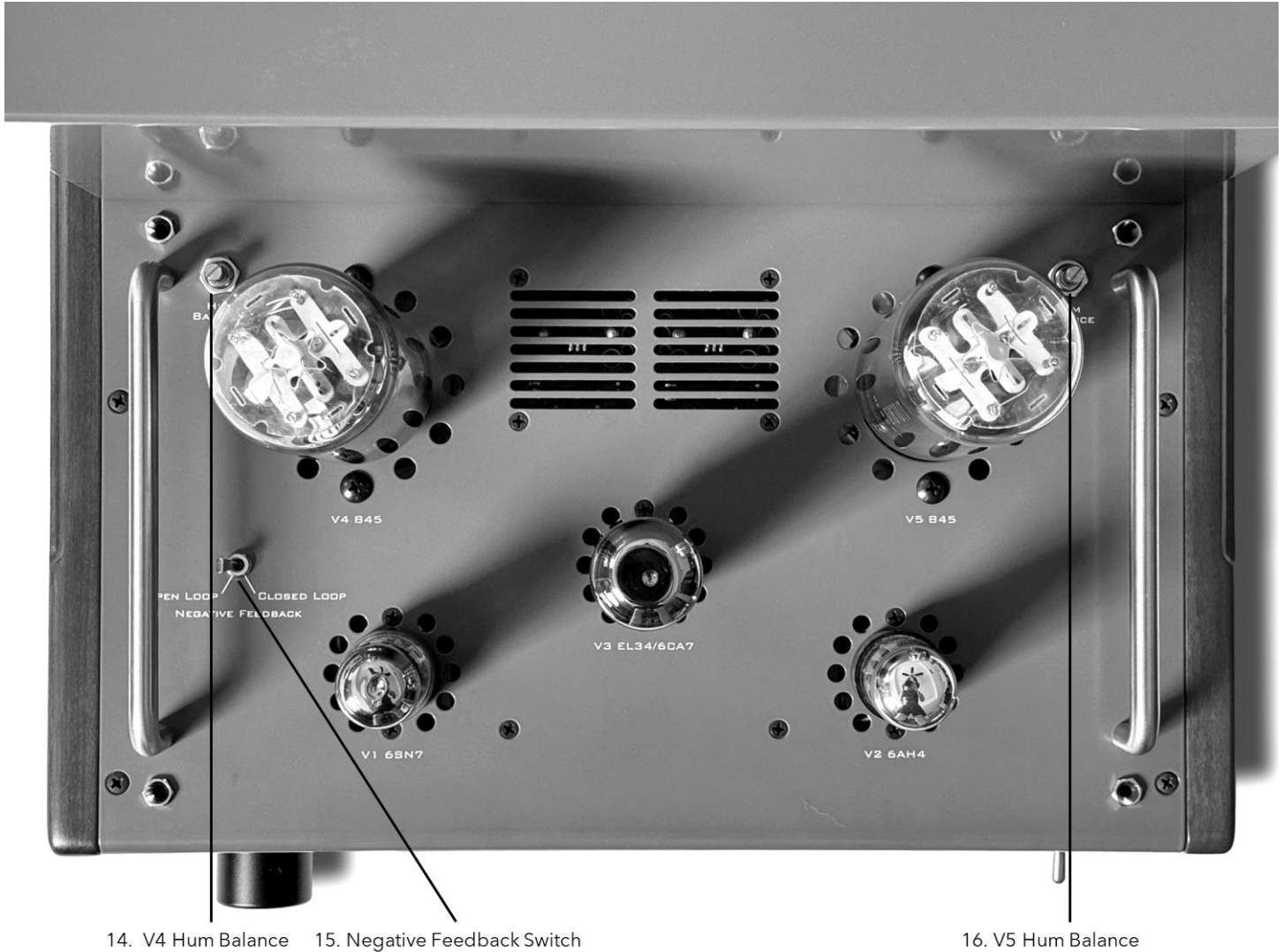
4. Mains Input: IEC Mains AC receptacle to connect removable power cord to the amplifier. **Use only the mains voltage indicated on the serial number tag below the mains input.** This will be listed as either 115/120VAC or 230/240VAC.

5. Mains Fuse: For 115-120VAC: **Use only 5 Amp Slow Blow Fuse**  
 For 230-240VAC: **Use only 3 Amp Slow Blow Fuse**  
**Check serial number tag for correct mains voltage and Fuse type.** Fuse size is 1/4" x 1-1/4" glass cartridge. The Mains Fuse is in series with the mains input to protect the user and amplifier from a short circuit failure.
6. Cathode Fuse: **Use only 300mA (0.3A) Slow Blow Fuse.** Fuse is in series with V4 and V5 output tubes to protect the output transformers and other circuitry from a shorted or bad tube. If blown, it is recommended to test the output tubes before replacing the fuse to prevent damage from a failed tube.
7. Speaker Outputs: Used for connecting the speaker load to the amplifier. Make sure the selection matches the speaker's rated impedance to avoid damage to the amplifier. **See Section 1.3 – Speaker Connection and Setting the Load Impedance.**
8. SE Input: Single Ended RCA line level input jack designed to accept audio signals from common audio components. **See Section 1.5 – Input Setup.**
9. Bal Input: **\*If Equipped\*** XLR Balanced line level input jack designed to accept balanced audio signals from common audio components. Offers true differential to SE conversion through a high-performance line input transformer for high Common Mode Rejection Ratio (CMRR) to remove noise picked up on long input cable runs. **See Section 1.5 – Input Setup.**

## 2.3 Top Features



- 10. Bias Current Meters: Measures the cathode current in milliamps of each power tube (V4 and V5, respectively). At idle, with no input signal, their displayed value represents the power tube bias or idle current.
- 11. Bias Adjustment: Screwdriver-adjustable potentiometer that is used to set the bias of the power tubes. **See Section 3.4 – Biasing.**
- 12. Bias Meters Switch: This switch enables or disables the bias current monitoring meters. With the switch off, the meters are bypassed and therefore removed from the signal path.
- 13. Input Select Switch: **\*If Equipped\*** This switch selects either the Single Ended RCA input source or the Balanced XLR input source.



14. V4 Hum Balance

15. Negative Feedback Switch

16. V5 Hum Balance

14. & 16.

Hum Balance:

Screwdriver adjustable potentiometers that form the center taps for filaments on output tubes V4 and V5, respectively. Since the 845 tube is a directly heated triode, the center tap of the filament forms the cathode connection to signal ground. This pot is tuned from the factory for best performance with output tubes shipped. If 60-cycle hum is audible through the speakers, adjust this with screwdriver. This setting will directly impact the SNR and background noise of the amplifier. **See Section 3.3 – Setting Hum Balance Pots.**

15. Negative

Feedback Switch:

Feedback switch to select between “Open Loop” Mode for feedback-free operation, or “Closed Loop” Mode for operating the amplifier with feedback. Closed Loop Mode will reduce distortion (THD+N) and output noise as well as help to maintain linearity near full power. While the switch can be toggled while the amplifier is running, a pop or thud will be heard through the speakers. This is low enough in amplitude not to cause damage, but can be avoided, if desired, by toggling this setting with the amplifier powered off.

Note that by closing the feedback loop, the gain of the amplifier will be reduced by 5.5dB. This is a side effect of all negative feedback circuits. It is recommended to bring the volume back to normal listening levels after the change of switch position.

The increased linearity and reduction of distortion is not caused by the change in volume, but instead by sampling the output and correcting for error. Increasing the volume back after moving to “Closed Loop” mode will still realize all the benefits of a feedback topology.

## 3.0 Technical Information

### 3.1 Installing Tubes

Tubes are installed in the following amplifier positions (V1 – V8), with the tube type and function listed below:

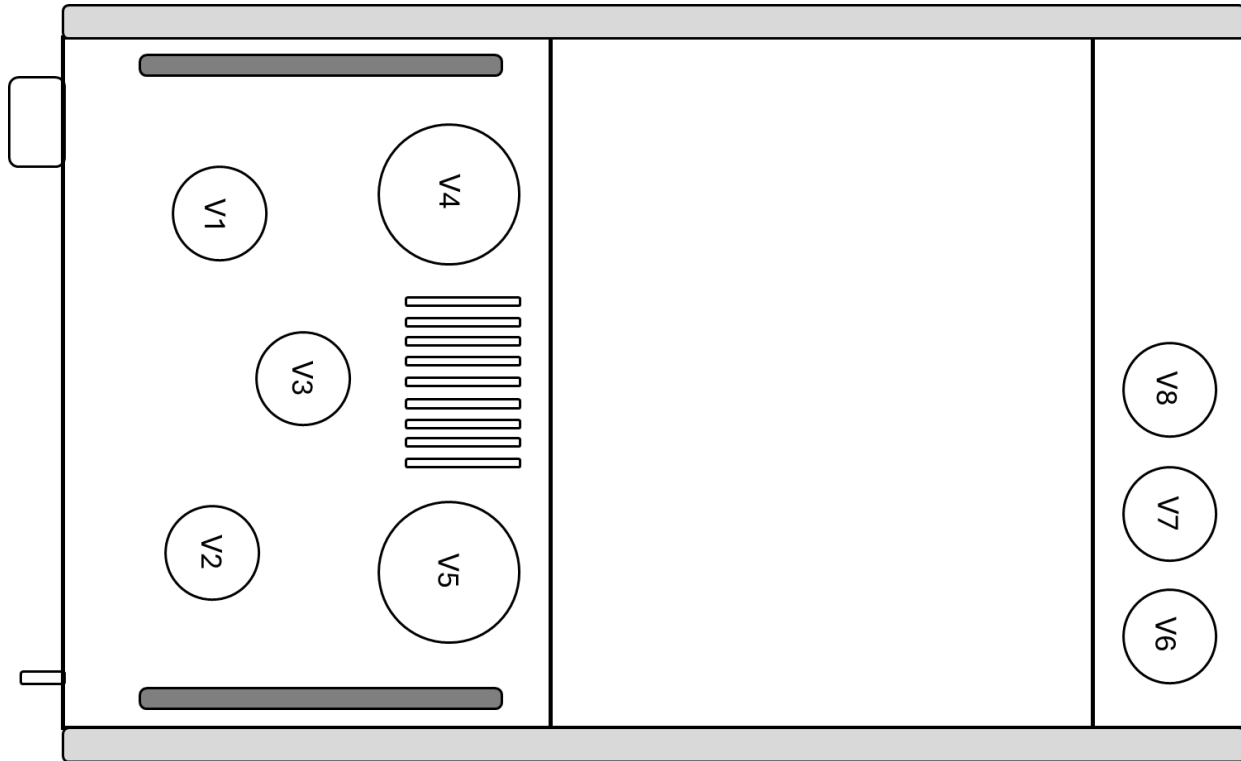


Figure 1: Position of vacuum tubes is as indicated in this top view (V1-V8)

- V1: 6SN7 – First Preamp Stage
- V2: 6AH4GT - Second Preamp Stage
- V3: EL34/6CA7 – Triode Connected Driver for Output Stage
- V4 & V5: 845 – Parallel Output Tubes
- V6 & V7: GZ34 / 5AR4 – Output Stage Power Supply (HVB+) Rectifier Tubes
- V8: GZ34 / 5AR4 – Preamp Stage Power Supply (LVB+) Rectifier Tube

**845 tubes V4 & V5 as well as GZ34/5AR4 V6 & V7 will have an ID number indicated on the tube boxes and/or bases.** Look for the label. Check the Tube Report printout, which shows the socket position “Vx” for each tube ID, if it is not already indicated directly on the tube box. The amp was tested with the tubes in these positions.

**Octal tubes with plastic bases (V1, V2, V3, V6, V7, & V8)** Should always be installed and removed by handling the base of the tube, rather than the glass. Match the keyway in the tube socket with the molded key in the tube base and install with a slight and gentle circular rocking motion until the tube is fully seated against the socket. Follow the same procedure for removal.

**845 Tubes (V4 & V5)** - These jumbo 4-pin tubes use a bayonet style ‘twist-to-lock’ socket. To install, align the pin in the tube base with the slot in the socket. The tube should easily “fall” into the socket. **DO NOT PUSH.**

Once sitting in the socket, keep the tube vertical and gently twist the glass envelope clockwise to lock the tube into place. This will engage the socket contacts with the tube's electrical connection pins. As you twist, you will feel spring resistance until the tube goes into its 'home' locked position.

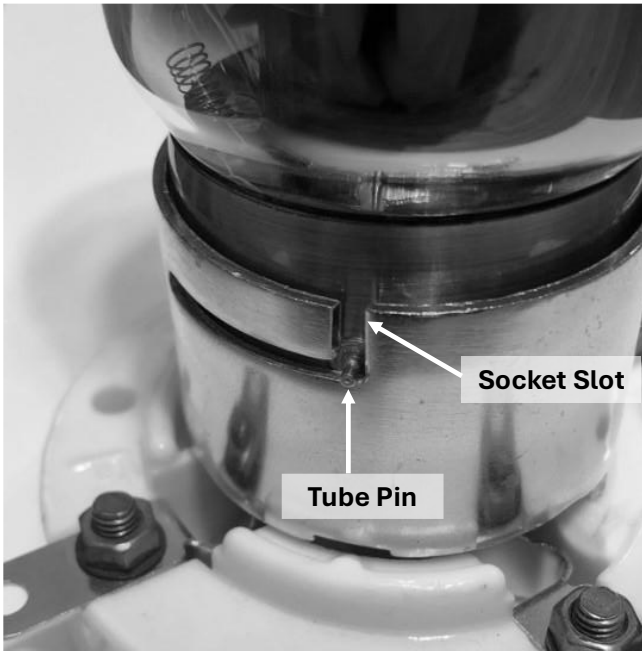


Figure 2: Unlocked

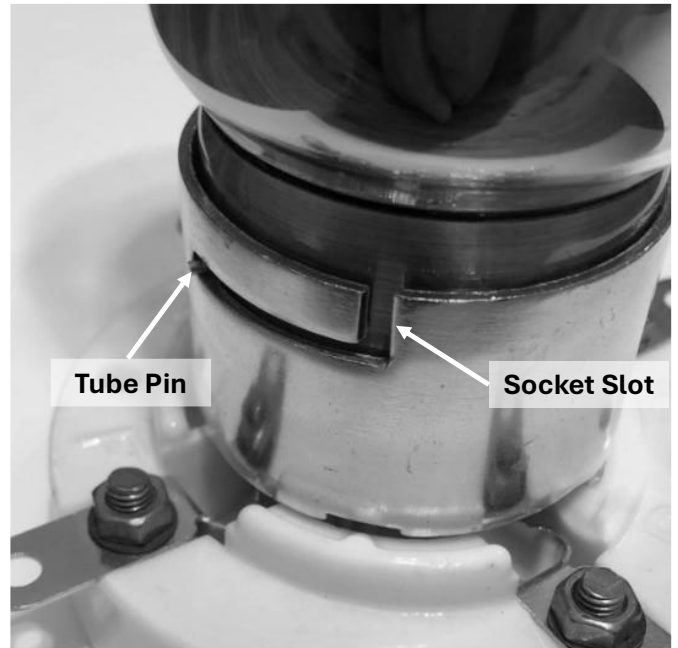


Figure 3: Locked, Tube Rotated Clockwise

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**Tip:** While it is generally ok to touch tubes with your bare hands during installation (they do not get nearly as hot as automotive halogen bulbs), keep your hands clean to avoid excessive contamination of the glass surface. Some prefer to wear cloth gloves. The biggest risk is discoloration of any markings or logos on the glass that will appear after a few heat cycles.

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## 3.2 Replacing Tubes

Output tubes should be replaced when a lack of power becomes apparent. Dynamics and transients may seem lazy and less crisp compared to how they sounded when new. Under extreme cases, tubes may become noisy. A crackling or rustling sound from your speakers will indicate that an **immediate** tube change is necessary.

**We recommend the following tube replacement guidelines:**

- Under normal bias conditions, power tubes typically last 3-4 years or longer depending on hours of use and average listening volume. Speakers demanding maximum power may push the lifespan below 3 years. With very efficient speakers, which require little power for acceptable listening levels, tubes can last much longer than 4 years.
- Preamp tubes will last longer than power tubes, assuming no premature failures. We recommend changing preamp tubes every other time the power tubes are changed unless the utmost performance is demanded, or they have gone noisy or bad.
- The tube rectifiers in the 2845 amplifier should be replaced every 3-4 years. This is especially required if the amplifier sees a high number of power cycles, or the amplifier has seen a lot of vibration from

transportation. As tube rectifiers age, the likelihood of arcing increases. If either V6 or V7 rectifier tubes develop an arc, these tubes must be replaced as a pair since they work in tandem.

**REPLACEMENT GZ34 / 5AR4 RECTIFIER TUBES MUST BE EITHER PURCHASED FROM BANDWIDTH AUDIO OR TESTED BY BANDWIDTH AUDIO PRIOR TO INSTALLATION IN THE AMPLIFIER.** Quality control issues with modern rectifiers and/or old used rectifiers have been known to cause rectifier tube arcing. We have developed an in-house high voltage tube rectifier tester specifically for screening out bad rectifier tubes before they are installed into the 2845 amplifier.

While we have designed the 2845 to be generally protected against rectifier arcing with internal fuses for each of the power supplies, rectifier arcing is still hard on the power supply components. If an *internal* fuse blows, it must be replaced by a qualified technician. **See Section 3.5 - Internal Fuses - For Qualified Service Technicians Only**

**The bias of the amplifier should be checked immediately after replacing the 845 Power tubes or GZ34/5AR4 rectifier tubes. Adjustment of the Hum Balance potentiometers may also be needed after changing 845 tubes.**

**Tube Matching** - Matching tubes between a stereo pair of amplifiers is critical for identical channel performance. For the 845 power tubes, V4 on one amplifier should match V4 of the other amplifier. Likewise, V5 should match V5 of the other. A quad of matched 845 tubes is recommended for best performance. In a pinch, two matched pairs can be used if they are split between channels as described above and their bias currents are close to each other (approximately +/-7mA from the first pair).

Preamp tubes V1, V2, & V3 should also be tightly matched between amplifier channels. Using matched tubes ensures that the amplifier gain is identical between amplifier channels in a stereo configuration and therefore maintains a perfect stereo image. This is critical in the 2845 Amplifier, especially when running in Open Loop Mode due to the lack of negative feedback.

All tubes from Bandwidth Audio are matched in this fashion.

### 3.3 Setting Hum Balance Pots

If adjustment of the hum balance pots are needed, use a flat blade screwdriver to turn the shaft of the pots. Only slight adjustment (+/- 1 turn or less) from the center setting is typically needed. As you approach the setting that gives minimum hum, only very fine adjustment is needed.

The 2845 Amplifier uses precision 10-turn potentiometers. These take very little force to turn, so use a light touch. If you feel the hum balance settings are out of whack, **with the amplifier off**, you can find the approximate starting point by first turning the pots in one direction until they stop. Then count 5-turns in the opposite direction. This will set the pots roughly into their center position.

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**Note:** Hum Balance potentiometers are factory set. No adjustment should be needed if tubes are installed in the indicated positions as listed on the tube boxes and/or

If adjustment is needed or the 845 tubes are replaced, final adjustment of the hum balance potentiometers should only be made with the tubes fully hot and at the target bias settings. Changes in bias adjustment may also require re-tuning the hum balance potentiometers since the output tube operating temperature has also changed.

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**Tip:** Best results may be achieved if you divide the amount of adjustment needed between both hum balance pots. For example, if you need  $\frac{1}{2}$ -turn on the V4 hum balance pot from center to get minimal hum, reduce the amount of adjustment to  $\frac{1}{4}$ -turn, and then also adjust the V5 hum balance pot by  $\frac{1}{4}$ -turn.

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### 3.4 Biasing

Your amplifier has been biased from the factory. However, the 845 tube bias setting should be checked on first startup and periodically thereafter to maintain performance as well as longevity of the power tubes.

Due to the very high operating voltage of the output stage, **small changes in bias current have a large impact on the tubes' plate dissipation! Mains voltage variations may cause the need for adjusting the bias setting.**

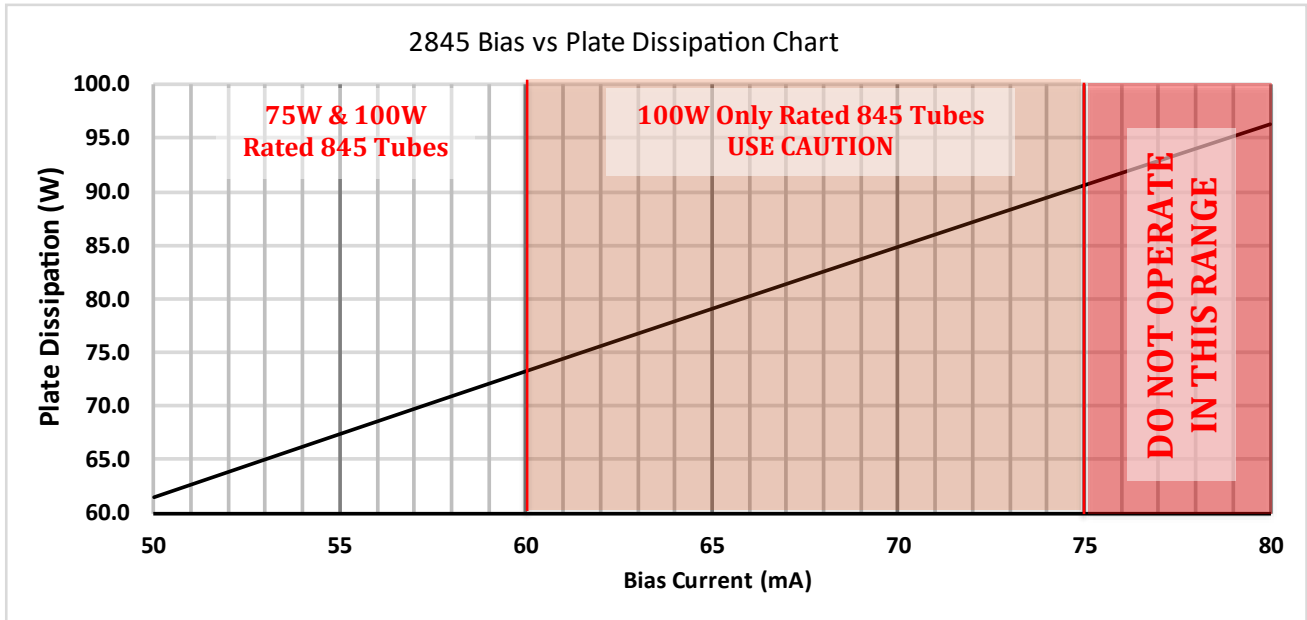


Figure 4: Bias Current vs Plate Dissipation for 120VAC or 240VAC Mains

Figure 4 shows the sensitivity of bias current setting to tube plate dissipation. Ranges shown may not cover all circumstances such as elevated mains voltage. Read section 3.4 completely!

**If the 845 tubes show any signs of glowing red (red plating) in a normally illuminated room, reduce the bias setting immediately. A very dull red glow in a fully dark room is acceptable.**

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**Note:** Preamp tubes are automatically biased. No adjustment is needed.

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### 3.4.1 Checking the Bias:

To check the bias of the 845 output tubes, set the “**Meters**” switch on the back of the amplifier to “**On**.” The analog meters will now indicate the bias of each 845 tube. When you are done monitoring, set the “**Meters**” switch to “**Off**.” It is recommended to leave the switch in the “**Off**” position during normal use.

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**Note:** Amplifier bias will continue to rise (more current) until the 845 tube temperature is stable. If the Bias is too high immediately after power on, it will only go higher. It must be reduced before it can be properly set.

**Setting the bias without the tubes fully hot can lead to a gross overshoot in the bias setting.** This can cause red plating and severe damage!

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#### **Recommended Bias Set Point: 50 to 60mA** (for 75W Rated 845 tubes)

With the volume turned all the way down, the bias should be set between 50 - 60mA using the screwdriver adjustment potentiometer labeled “**Bias**” on the back of the amplifier.

If using 2 matched pairs split between each amplifier as discussed in **Section 3.2**, each meter should ideally read +/- 7mA from each other or less.

845 tube mismatch will limit how high you can set the overall bias. The tube with the higher bias current must not be set greater than the recommended limit. The 2845 Amplifier has dual ammeters so this tube mismatch can be readily observed.

### 3.4.2 Not all 845 Tubes have the same plate dissipation:

**Tube Manufacturers have been quite varied in the actual power dissipation rating of their 845 tubes:**

- **75W 845 Tubes** - The bias setting of 50 to 60mA is the recommended bias point for 845 tubes that meet the 75W plate dissipation specification. This is the majority of modern 845 tubes.
- **100W 845 Tubes** - Some original US-made 845 tubes were rated for 100W plate dissipation and had typical operating condition in the datasheet specified at this power level. In recent years, there have been a couple of new production 845 tubes that claim to meet the 100W specification.

With these tubes, the bias can theoretically be set higher than 60mA, however this should be approached with extreme caution and under close surveillance of the output tubes. Tubes that are truly 100W rated should run at 70 to 75mA without red plating, however tube life is uncertain.

- **Other “845” Tubes** – Some specialty and boutique “845” tubes are not really an 845. They don’t meet any of the original power handling specifications. Some of these tubes have plate dissipation ratings as low as 57W and can only handle a power supply voltage of 1000V or less. **These tubes are not suitable in the 2845 Amplifier, regardless of bias settings! DON’T RUN THEM!**

See Figure 4 for the bias setting (mA) vs 845 plate dissipation (W).

If in doubt which category your 845 tubes fall under, ask the manufacturer!

### 3.4.3 Bias Drift:

Under normal operation and with the 845 tubes fully hot, the bias current may slowly increase or decrease as the tube characteristics change with age. This is normal and it is encouraged to bring the idle bias back to the target point whenever it is noticed to be off.

### 3.4.4 Bias Ranges and Operating with Incorrect Bias:

Running the amplifier with a bias setting below 50mA will cause no damage to your amplifier or tubes. In fact, the power tubes can last longer. However, distortion will rise steeply, causing significant distortion figures, less power, and bad sound.

Running the amplifier with a bias setting over 55mA begins to decrease the life of the power tubes since they will run hotter. 55 to 60mA is the best compromise between tube life and performance for 75W rated 845 tubes.

Bias settings of 60 to 65mA will increase amplifier performance, reducing output stage distortion, but this will start sacrificing tube life and also runs the risk of red plating or glowing of the internal plate structure of the tube due to excessive heat. This setting is not recommended for 75W rated 845 tubes.

Bias settings of 70 to 75mA continue to show performance gains in our testing with lower output distortion. This is only recommended for 100W rated tubes **which have first been closely monitored and do not show signs of red plating at these power levels**, however tube life is uncertain.

**Regardless of tube lifespan tradeoffs, 75mA is the maximum continuous bias the 2845 Amplifier can handle due to its power supply ratings.**

**Experimentation with tube bias should only be done knowing the plate dissipation ratings of your 845 tubes.**

### 3.5 Internal Fuses – For Qualified Service Technicians Only

The information provided here is for qualified persons who have the necessary qualifications to work on high voltage vacuum tube equipment.

**DO NOT REMOVE THE BACK COVER UNLESS YOU ARE QUALIFIED TO DO SO**

**DO NOT REMOVE THE BACK COVER UNLESS THE POWER CORD IS DISCONNECTED FROM THE AC MAINS RECEPTICAL ON THE BACK OF THE UNIT**

Since the 2845 requires such a massive power transformer with many different internal power supplies, a fault with any one of the power supply circuits may not necessarily blow the mains fuse fast enough to prevent damage. Therefore, in addition to the external mains and cathode fuses, there are three fuses internal to the amplifier.

**USE ONLY THE FUSE TYPES AND RATINGS LISTED AND IN THEIR CORRECT LOCATIONS!**

- **HVB+ Fuse:**                    **Type: 1A 1000VAC, Ceramic, Fast Blow, 1/4" x 1-1/4"**
  - Isolates the high voltage 845 output stage power transformer winding from the rectifiers and downstream output stage power supply during overcurrent conditions, including arcing of V6 and/or V7 rectifier tubes.
  
- **LVB+ Fuse:**                    **Type: 1A 1000VAC, Ceramic, Fast Blow, 1/4" x 1-1/4"**
  - Isolates the preamp stage power transformer winding from the rectifier and downstream preamp power supply during overcurrent conditions, including arcing of V8 rectifier tube.
  
- **DC Filament Fuse:**        **Type 3A, Slow Blow, 1/4" x 1-1/4"**
  - Isolates the DC filament power transformer winding for 6SN7 & 6AH4 preamp tubes from the rectifier and power supply during overcurrent conditions, including a shorted filament.

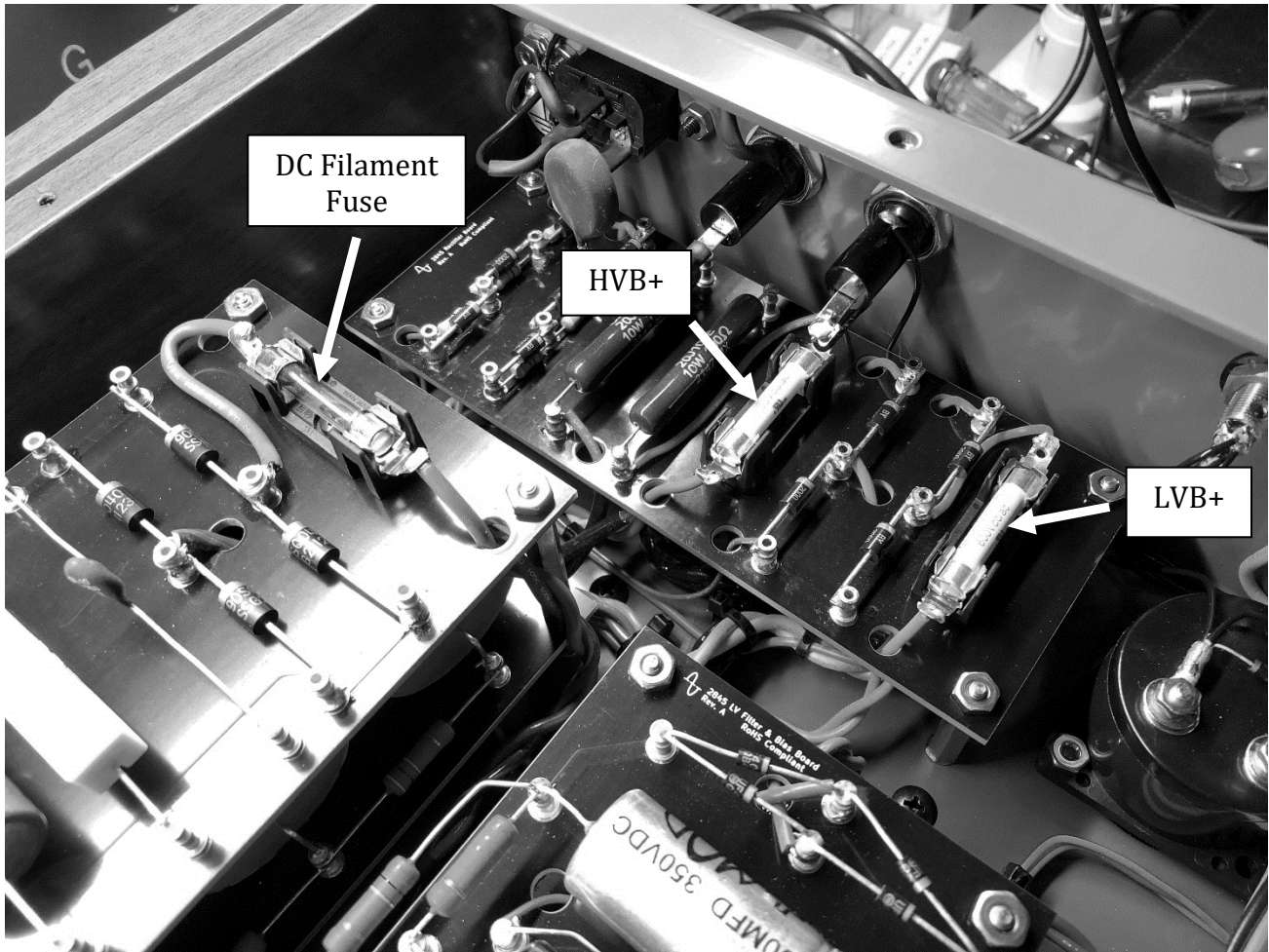
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**Note:** Spare fuses of each type are included with the amplifier to ease sourcing as a courtesy to technicians. HVB+ and LVB+ fuses are specialty items since they are rated to safely open at the operating voltages of the power transformer windings. **DO NOT USE ANY FUSE OTHER THAN THOSE LISTED!**

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Before replacing any of the internal fuses, thoroughly check the circuit in which the fuse has blown for faults or damaged components. If the HVB+ or LVB+ fuses blow, first test their associated rectifier tubes on a tube tester capable of running these tubes at high voltage. Many cheap low voltage testers will not catch rectifier arcing faults or soft shorts since they often occur at high voltage, as they would be operated in a real circuit.

**Internal Fuse Locations:**



## 3.6 Typical Specifications

### Rated Output Power

50-Watts RMS

### THD+N at 50-Watts 1kHz

2.75% Open Loop

2.5% Closed Loop

### Full Power Bandwidth (50-Watts)

15Hz – 26kHz at -3dB Open Loop

<10Hz – 27kHz at -3dB Closed Loop

### THD+N at 1-Watt 1KHz

0.3% Open Loop

0.2% Closed Loop

### 1-Watt Bandwidth

11Hz – 36kHz at -3dB Open Loop

<10Hz – 45kHz at -3dB Closed Loop

### Input Voltage for Rated Output - Single Ended RCA

1.25V RMS Open Loop

2.35V RMS Closed Loop

### SNR 1-Watt into 8ohms

82dB A-Weighted Open Loop

88dB A-Weighted Closed Loop

### SNR 50-Watts into 8ohms

99dB A-Weighted Open Loop

105dB A-Weighted Closed Loop

### Gain Single Ended Input - RCA

24.0 dB Open Loop

18.5 dB Closed Loop

### Gain Balanced Input – XLR (if equipped)

21.8 dB Open Loop

16.3 dB Closed Loop

### Negative Feedback (in Closed Loop mode only)

5.5 dB

### Input Impedance

100K ohms

### Speaker Taps

4, 8, & 16 ohms

### Power Tubes

2x 845

### Preamp Tubes

1x 6SN7, 1x 6AH4, 1x EL34/6CA7 (triode connected)

### Rectifier Tube

3x GZ34/5AR4

