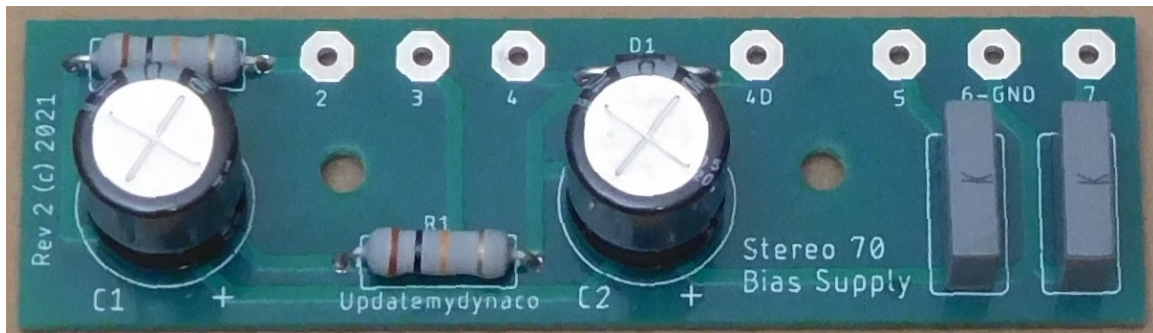


Updatemydynaco



Dynaco Stereo 70 Power Amplifier Replacement Bias Power Supply [ST70BPS]

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Section 1: About This Manual

This manual gives the information needed to build and install a new bias supply into Dynaco's Stereo 70 vacuum tube amplifier. This kit drops into the place taken by the original power supply, but it's much neater than the original, and a lot less work to install. In addition it has a ground plane as well as larger value capacitors for the lowest possible noise.

Who Should Attempt this Project?

You can build this kit if you can:

1. Solder (using normal rosin core solder and a soldering iron).
2. Use simple hand tools like screwdrivers, wire cutters, and pliers.
3. Read and follow directions.

It helps if you:

1. know a bit about electronics, or
2. have a friend who knows a bit about electronics
3. can get to YouTube to watch a few helpful videos about the assembly process (none are posted as of this version of the manual).

Tools you'll need

You'll need the following tools:

1. Phillips screwdriver (#1 and #2), regular screw-drivers.
2. Pliers or nut drivers suitable for #4 and #6 hardware
3. needle nose pliers (helpful, but not strictly necessary)
4. pencil type soldering iron of 25 to 50 Watts (no huge honking soldering guns or blowtorches)
5. wire cutters and strippers
6. DC volt-meter to measure bias-settings.

Helpful Tools

These tools aren't strictly necessary but make building the kit easier.

1. magnifying glass, if you're over 42!

Project Overview

The project consists of the following steps:

1. Building the new bias power supply board.
2. Opening up the Stereo 70 and removing the original bias power supply.
3. Installing and adjusting the new bias power supply.
4. Reassembling the Stereo 70 and returning it to service.

Important Safety Notes

Why is the text below in red? Because the ST70 has hundreds of volts accessible when the cover is off. Following these instructions may save your life! Please be careful.

By purchasing, using, or assembling this kit, you have agreed to hold Akitika LLC harmless for any injuries you may receive in its assembly and/or use. To prevent injuries:

- Wear safety glasses when soldering or clipping wires to prevent eye injuries.
- Always unplug the power before working on the amplifier.
- Large capacitors hold lots of energy for a long time. Before you put your hands into the amplifier:
 - Pull the AC plug!
 - Wait 2 full minutes for the capacitors to discharge!
- Remove jewelry and rings from your hands and wrists, or anything that might dangle into the amplifier.
- If working on the equipment with the power on, keep one hand in your pocket, especially if you're near the power supply or power supply wires. This can prevent serious shocks.
- Build with a buddy nearby. If you've ignored all the previous advice, they can dial 911 or get you to the hospital.
- Read and understand the safety manuals of all the tools you use.

About Components

We reserve the right to make design/or component changes at any time without prior notification.

Recommended Solder

The kit must be assembled with 63/47 Rosin Core solder. The recommended diameter is 0.031 inches. Among many such sources of solder, I have used Radio Shack part number 64-009. It contains 8 oz. of solder, which is *much more* than you'll need to assemble this kit.

Warranty

With the exception of fuses, Akitika LLC will replace for free any parts of a correctly assembled product that fails within one year of the date of purchase when the equipment has been used in home stereo applications. It is the responsibility of the kit builder to install the replacement part(s). This warranty applies to the original purchaser only. It does not apply to units that have been physically or electrically abused, modified without prior factory authorization, or assembled with other than 63/37 Rosin Core solder. Akitika LLC's liability shall in no event exceed the cost paid to Akitika LLC for the kit.

Section 2: Kit Building Hints

Yes, I know you want to ignore this section and jump right into building the kit. However, please ***take a minute and read the advice***. I've condensed it into bullets so that even you guys who are in a hurry can benefit.

- Stop any time you're feeling confused, tired, or anxious. Taking breaks at those strategic times will keep the build enjoyable and greatly enhance your chances of first-time success.
- A soup bowl is your friend. Before you build, carefully empty the parts for just that board into a broad, flat, light colored soup bowl. That makes it easy to find the parts and keeps them from getting lost.
- Is something in this manual confusing? Does something look wrong? Send your questions by email to dan@akitika.com or dan@updatemydynaco.com. You'll help yourself and everyone who builds the kit.

Section 3: Building the New Bias Power Supply

General Procedure

Building the PCB follows these general steps:

- Empty the envelope of parts into a broad, flat soup bowl.
- A table in the next section will guide you through installing the components in the correct order.
 - You will install components into the silk-screen side of the PCB, starting with the lowest profile components.
 - As each component is installed flat to the silk-screen side, you will solder the leads on the opposite, or solder side of the PCB.
 - Cut each lead about 1/16" longer than the "solder volcano" that surrounds each lead.

Installing the Components

Install the components in the order shown below. Check off each component as it is installed.

Diode Installation

Diodes have a polarity. Make sure to match the banded end of the diode with the banded end of the silk screen.

Desig	Value	Marking	Done <input checked="" type="checkbox"/>
D1	400 PIV 1 amp	4004	<input type="checkbox"/>

Resistor Installation

Resistors are not polarized. Either orientation is fine.

Desig	Value	Marking	Done <input checked="" type="checkbox"/>
R1	10K, 1 Watt	Brown, Black, Orange, Gold	<input type="checkbox"/>
R2	10K, 1 Watt	Brown, Black, Orange, Gold	<input type="checkbox"/>

Non-polar Capacitor Installation

The capacitors listed in this table are not polarized. Either orientation is fine.

Desig	Value	Marking	Done <input checked="" type="checkbox"/>
C3	0.022 μ F, 630V	.022 630	<input type="checkbox"/>
C4	0.022 μ F, 630V	.022 630	

Polarized Capacitor Installation

The capacitors listed in this table are polarized. Make sure that the negative marked side of the capacitor is away from the positive marking on the PCB.

Desig	Value	Marking	Done <input checked="" type="checkbox"/>
C1	100 μ F/100V	100uF100V	<input type="checkbox"/>
C2	100 μ F/100V	100uF100V	

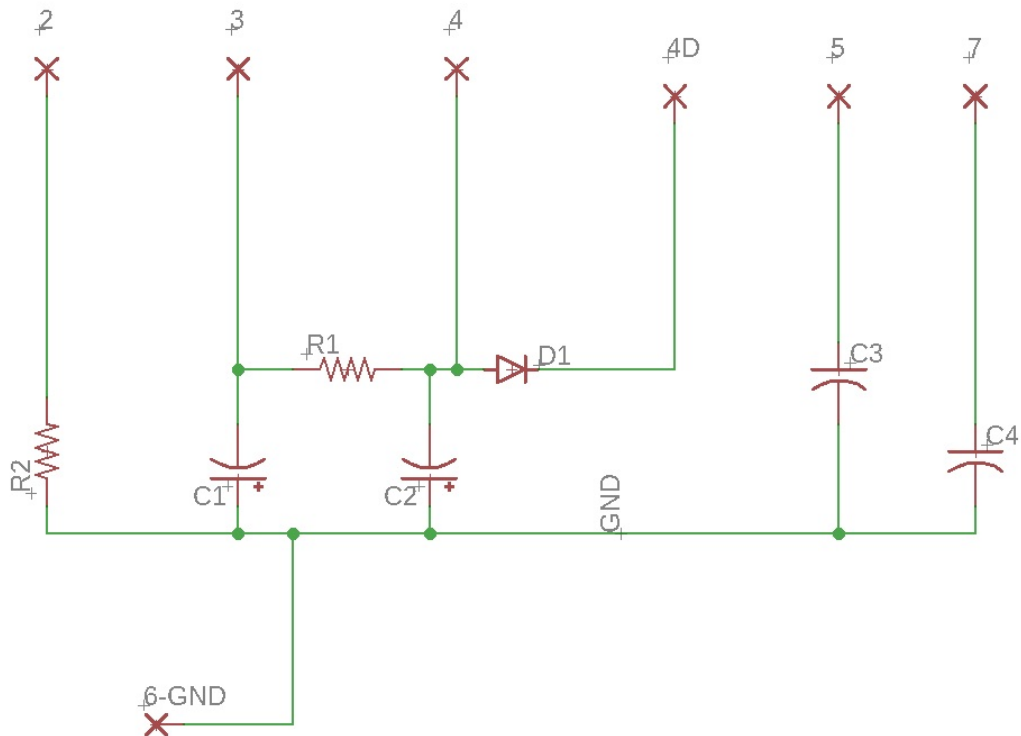


Figure 1-Stereo 70 Bias Supply Schematic

Section 4: Removing the Old Bias Supply

Safety First

Disconnect your Stereo 70 from your stereo system and speakers. Unplug it from the wall socket (mains). Assuming that the amplifier was operating somewhat normally, and that the tubes were installed, walk away from the unpowered amplifier for 5 minutes to allow the capacitors to discharge.

If the tubes were removed at some point, the capacitors might still be holding a charge that could surprise you. In this case, please be careful and discharge the capacitors before beginning any work.

Remove the Cover and Bottom Plate

Please be careful as you rotate the amp to remove the covers. The unbalanced nature of its rather significant weight can lead to you dropping the amp if you aren't careful!

Both the cover and the bottom plate must be removed to install the new board. Carefully flip over your Stereo 70 and locate the four screws on the sides holding the chassis together. Remove these four screws and lift off the bottom plate from the rest of the unit. Reinstall two of the screws in opposite corners and carefully flip the unit over once again, it will be sitting upright with the bottom exposed. Remove the two screws again and remove the cover.

Loosen the Transformer

With the cover removed, you will see the tubes, a PCB, and three transformers. The transformer nearest to the fuse is located directly above the bias supply, and while it cannot be removed with the wires attached, there is typically enough wire length to wiggle it around a little bit.

Remove the four screws and nuts holding it in – you may find this easier to do if you hang the corner of the unit over the edge of your table and get a nut driver on the bottom. Now try and wiggle it around, possibly feeding some wires into the two holes from the bottom. With luck, you should be able to fit at least a finger between the bottom of the transformer and the chassis.

Loosen the Bias Supply Strip

Locate the old bias supply terminal strip and note the locations of the two nuts. Figure 2 below highlights their locations, one of them being hidden behind one of the electrolytic capacitors. This cap and the terminal strip will be removed, so you can clip it out to gain access to the nut.

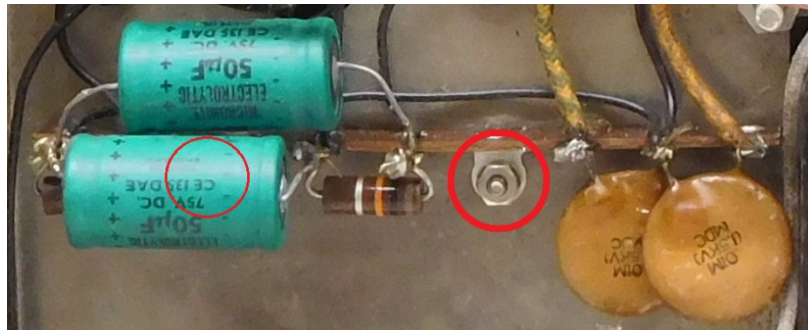


Figure 2-Nut Locations/Old Bias Supply

Assuming you were able to wiggle the transformer a little bit, you should be able to find the two screws that are hiding under there to hold in the bias supply. Place one finger on a screw and use a nut driver to unscrew it from the bottom. Remove the screws and nuts. They will not be re-used.

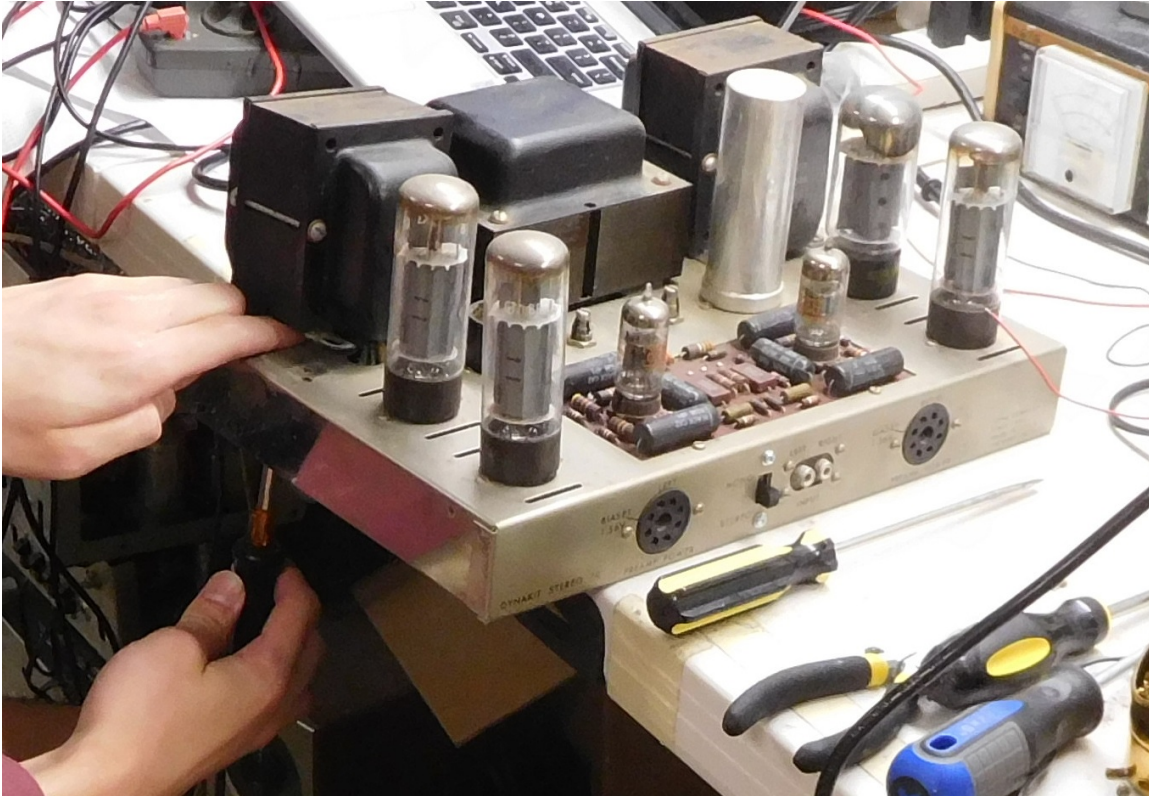


Figure 3-Finishing the transformer position to access the bias supply mounting screws
Next, replace the screw and nut for both mounting holes with the supplied 4-40x1/4” sems screw¹ and a 1/2” 4-40 hex shaped standoffs.

- Insert the screws into the tube-side of the chassis.
- Install the 4-40 standoffs into the underside of the chassis. Tighten the standoffs.
- Mount the transformer again using the four screws and nuts it was originally installed with, and if desired, reinstall the cover – we will only be working on the underside of the unit from here on (until we set the bias point).

Section 5: Installing the New Bias Supply

The following photos show the seven-lug terminal strip forming the old bias supply, which we loosened up in the previous section. Six of these seven terminals have wires that will be moved over to their corresponding designations on the new bias supply board, since terminal 1 is a jumper for ground.

¹ Sems screws have built-in lockwashers.

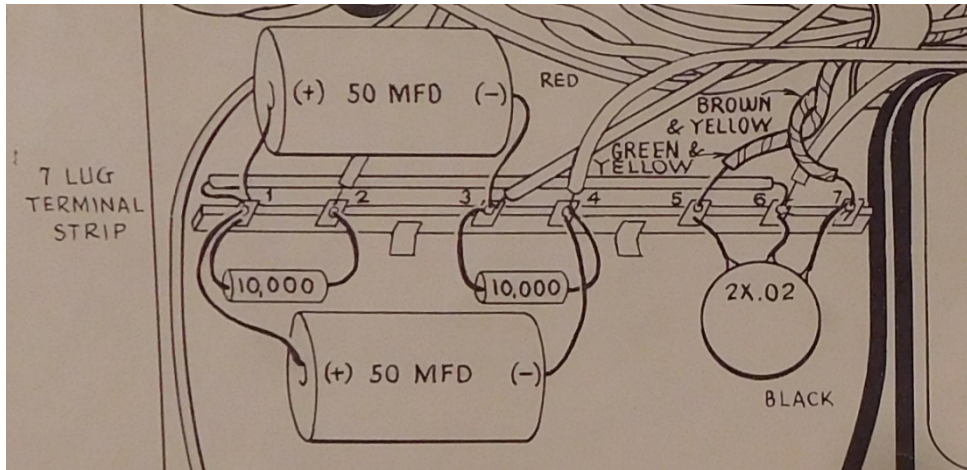


Figure 4-Stereo 70 original Bias Supply Diagram

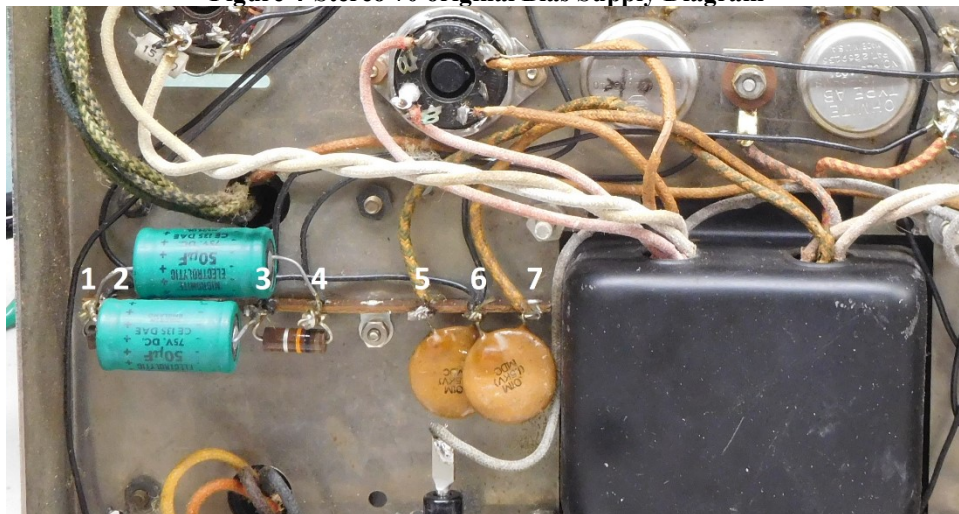


Figure 5-Stereo 70 Bias Supply Photo

Starting from terminal 7, move the wires from 7, 6, and 5 one at a time from the lug strip to the new board. Insert the wire from the solder side and solder it on the component side. Skip over terminal 4 for now and continue moving the wires over for eyelets 3 and 2.

Selecting Preferred Diode

The original Stereo 70 bias supply includes a selenium diode (rectifier) found in the center of the chassis between the two bias pots. You have the option to either keep using this original diode, or you can choose to use the new silicon diode included on the new bias supply board.

I think that there will be less issues in the long run using the new silicon diode, but I leave the choice up to you.

Selenium Diode

If you decided to keep using the original diode, simply move the wire from terminal 4 on the seven-lug strip and solder it to **eyelet 4** (not 4D) of the new bias supply board. Insert from the solder side and solder on component side.

Move on to “Mount the New Bias Supply Board”.

Silicon Diode

If you decided to replace the original selenium rectifier with the new silicon diode included with this kit, then locate the two wires connected to the two terminals of the selenium diode in the center of the chassis. One wire is connected to terminal 4 of the seven-lug strip, and the other wire goes into the transformer directly in front of it. Snip off these two wires as close to the terminals as you can, and strip back about 1/3” of insulation from the transformer wire. Don’t twist and tin the wires yet.

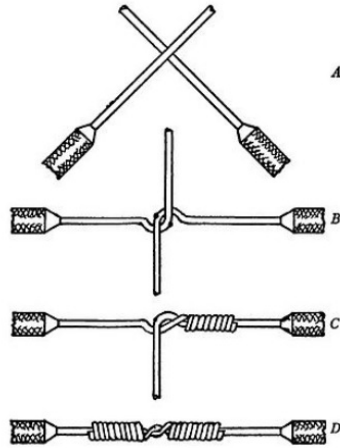


Figure 6-Western Union Splice

Locate the supplied 6” piece of blue solid 22 AWG wire and strip back about 1/3” of insulation from one end. Form a Western Union splice to join the blue wire and the transformer wire.

Cover the splice by sliding the supplied 1” piece of heat-shrink tubing over the splice. Using the barrel of your soldering iron to cause the heat shrink tubing to shrink down over the splice. This shrinking action holds the heat-shrink tubing in place around the splice. Check your work for smoothness before moving on, as a jagged splice might punch through the heat shrink tubing.

Cut the new blue wire to an appropriate length to reach eyelet 4D (not 4). Strip back 1/4” of insulation from the free end of your newly spliced blue wire. Insert the wire into **eyelet 4D** (not 4) from the solder side and solder on the component side.

Mount the New Bias Supply Board

Now that all the wires are connected to their proper terminals, use two of the supplied 4-40x1/4” sems screws to mount the new bias supply board on the standoffs that were installed in the previous section.

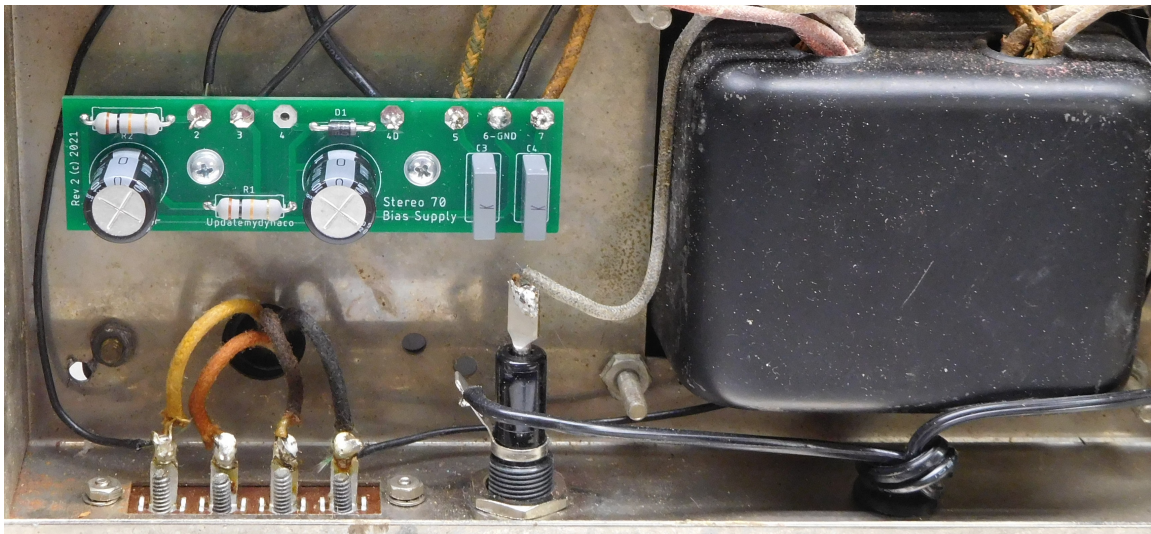


Figure 7-New bias supply installed

Reinstall Bottom Plate

Using the four chassis screws, reinstall the bottom plate and flip the unit over again so that it is sitting right side up. Remove the cover in preparation for setting the bias point.

Section 6: Setting the Bias Point

With the new bias supply board installed, the bias point will need to be adjusted. You'll need a DC volt-meter.

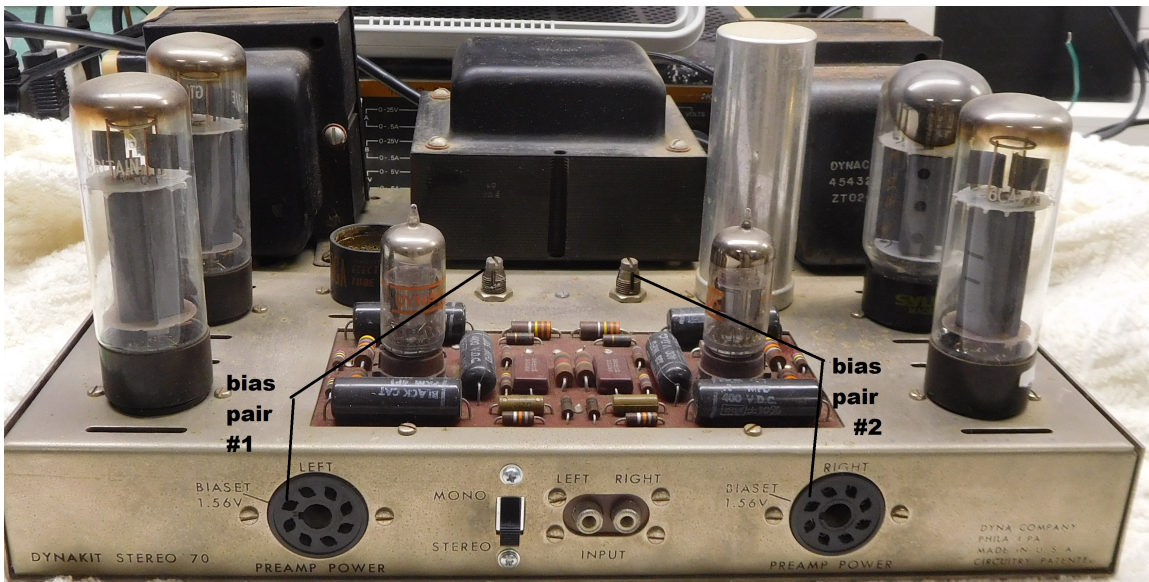


Figure 8-bias control pairs

Here is the procedure:

1. Power up the amplifier. Allow the amplifier to warm up. Be careful not to touch a hot tube or a high voltage.
2. For bias pair 1 (left channel):
 - a. Connect the positive lead of the meter to the LEFT BIASET 1.56 volt terminal.

- b. Connect the negative meter lead to the chassis (ground).
 - c. Measure the DC voltage and adjust the associated potentiometer until your have 1.56 Volts, plus/minus 0.05 Volts.
3. For bias pair 2 (right channel):
 - a. Connect the positive lead of the meter to the RIGHT BIASSET 1.56 volt terminal.
 - b. Connect the negative meter lead to the chassis (ground).
 - c. Measure the DC voltage and adjust the associated potentiometer until your have 1.56 Volts, plus/minus 0.05 Volts.

Notes about the adjustment process

1. Clockwise pot motion increases the voltage on the BIASSET terminals.
2. If the pot's action seems especially tweaky, then:
 - a. Note the pot's rotation.
 - b. Power down.
 - c. Wiggle the pot in a narrow range about its nominal position. This will clean the pots track and make it less touchy.
 - d. Power up again and re-set the pot.
3. Re-check both left and right channel bias to make sure they are still within tolerance.
4. If the plates of the tall power output tubes turn cherry red, and/or the BIASSET voltage greatly exceeds 1.56 Volts for all positions of the bias pots, then Power Down! Unplug the amp and walk away from it to allow the caps to discharge.
 - a. You may have an assembly error in the new bias supply. Please re-check your work.
 - b. You may have a defective (shorted or leaky) 0.1 μ F coupling capacitor that is upsetting the bias voltage.