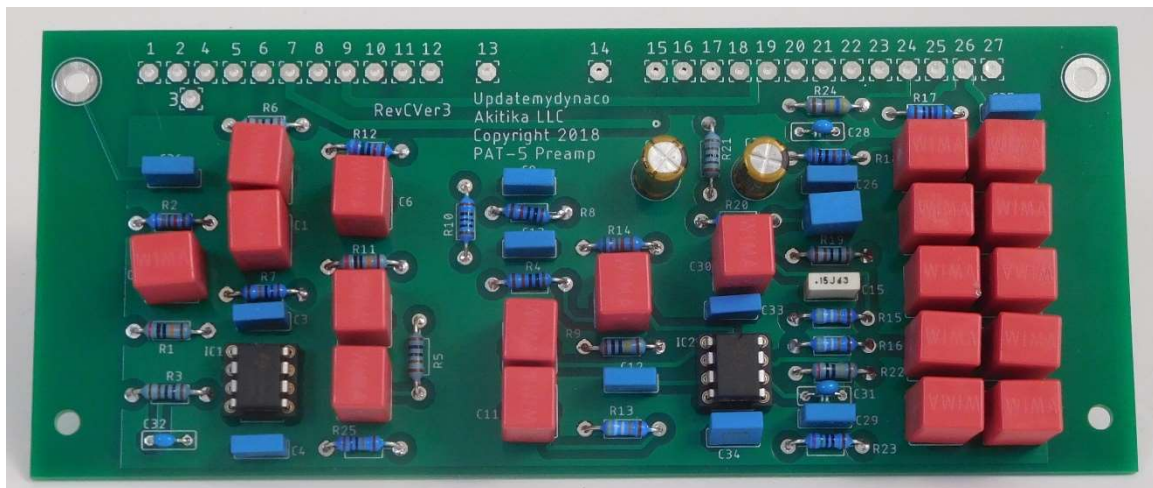


# ***PAT-5 PREAMP NEW LINE STAGE INSTALLATION MANUAL***



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## Table of Contents

Table of Contents .....	2
Table of Figures .....	2
Section 1: About This Manual .....	4
Who Should Attempt these Projects? .....	4
Tools and Supplies You'll Need .....	4
Recommended Solder .....	4
Project Overview .....	4
Important Safety Notes .....	5
A Note About Supplied Parts.....	5
Section 2: Building the New Preamp PCBs.....	6
Overview.....	6
Use a Soup Bowl.....	6
Install the resistors .....	7
Install the small capacitors.....	8
Install the Electrolytic capacitors.....	9
Install the Opamps (or sockets).....	9
Section 3: Removing the Old Preamp PC Boards .....	11
Removing the Cover .....	11
Initial Sanity Check.....	11
Preparing to Remove the Circuit Boards .....	13
For the Back PCB-34:.....	13
For the Front PCB-34: .....	15
Remove the PCB's and the U-brackets.....	15
Inspection and Preliminary Reassembly .....	16
Installing the Board-to-Board Power and Ground Wires .....	17
Reinstall the U-bracketed boards .....	17
Hint about re-installing the u-bracket fasteners .....	17
Re-attach the wires.....	17
Wire-routing.....	18
Re-attach the Front PCB wires .....	18
Re-attach the Rear PCB wires.....	19
Final Sanity Checks .....	19
Prepare to Reconnect your PAT-5 to your Music System.....	19
A Note About Hum.....	20
Specifications.....	23
Appendix 1: The Toothpick Trick .....	24

## Table of Figures

Figure 1-Use a soup bowl with the contents of 1 channel envelope to build 1 channel.....	6
Figure 2-Silk screen (component) side of PCB .....	6
Figure 3-IC installation (half-moon in IC package highlighted for clarity). IC1 mark indicates pin 1. ....	9
Figure 4-Socket Installation.....	10

Figure 5-Measuring power supply DC Voltage. Note that black meter lead is held in contact with the chassis (ground)..... 11  
Figure 6-Identifying front and back PC-34's, and eyelet 1 ..... 12  
Figure 7-After the wires have been de-soldered and tagged..... 13  
Figure 8-Showing the proper position of brackets, PCBs, screws, and nuts ..... 16  
Figure 9-Schematic of PAT-5 new preamp PCB's..... 21  
Figure 10-PAT-5 Original Wiring ..... 22

## **Section 1: About This Manual**

This manual gives the information you need to replace and upgrade the line stage boards (PC-34) of a Dynaco PAT-5 preamp, either the original or the BI-FET version. When you install this kit, you'll get better sound as you:

- Build onto a circuit board with a ground plane and decoupling capacitors, assuring greater stability and more rejection of high frequency interference,
- Replace noisy 10% carbon composition resistors with quiet 1% metal film resistors,
- Replace 40+ year old electrolytic capacitors with new film capacitors
- Maintain compatibility with all the original controls and functions
- Reduce distortion and noise by using metal film resistors, better opamps, and more linear capacitors.

### ***Who Should Attempt these Projects?***

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, and
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 (not available as of this version of the manual)

### ***Tools and Supplies You'll Need***

You'll need the following tools:

1. flat blade screwdrivers for #4 and #6 screws, #2 Philips head screwdriver
2. needle nose pliers (helpful, but not strictly necessary)
3. pencil type soldering iron of 25 to 50 Watts (no huge honking soldering guns or blowtorches)
4. wire cutters and strippers
5. de-soldering tools (see Appendix 1)
6. Magnifying glass, if you're over 42!
7. A multi-meter for measuring Ohms and DC volts is a really good idea, but not strictly necessary. With it, you can double-check your reading of the color code, making sure you get the right resistors in the right location.

### ***Recommended Solder***

The kit must be assembled with 60/40 Rosin Core solder. The recommended diameter is 0.032 inches.

### ***Project Overview***

Broadly, the project consists of the following steps:

1. Building the new circuit boards.

2. Unplugging the PAT-5 and removing the cover.
3. Labeling, then de-soldering all the wires from each line stage circuit board. Each kit comes with a supplied set of labels to mark the wires, making it easy to get the wires back in the right places.
4. Installing the newly built circuit boards.
5. Re-attaching the wires to the circuit boards.
6. Reassembling the PAT-5.

### ***Important Safety Notes***

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 to prevent eye injuries.
- Always unplug the power before working on the equipment.
- Large capacitors hold lots of energy for a long time. Before you put your hands into the equipment:
  - Pull the AC plug!
  - Wait 1 full minute for the capacitors to discharge!
- Remove jewelry and rings from your hands and wrists, or anything that might dangle into the amplifier.
- If working in the amplifier, 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.

### ***A Note About Supplied Parts***

We try to keep the parts we supply for the kits consistent from batch to batch. Sometimes this isn't possible, and we will supply an equivalent part that is marked differently or may have a different appearance. We try to catch most of these with additional notes in the manual. Sometimes we'll miss one. Feel free to email us if you have a question.

## Section 2: Building the New Preamp PCBs

### Overview

The listed procedure will be repeated for both left and right channel PC boards. In general, you will:

- Install the indicated component from the component (silk-screen) side.
- Solder the component on the solder side of the PCB.
- Make a check-mark the left or the right channel board as you complete the step.

You may find it convenient to install all resistors of one value first, as they will usually (but not always) be found taped together.

You'll begin with the components that sit closest to the board, and eventually move to the taller components. Begin with the resistors.

### Use a Soup Bowl

Empty the contents of ***just one*** of the Channel parts envelopes into a broad, flat soup bowl. It will make it easier to find the parts. This will make building the PC boards more pleasant. It also minimizes the chance of losing a part on the floor.

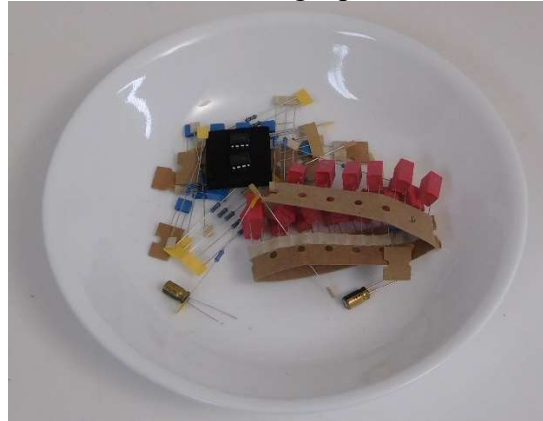


Figure 1-Use a soup bowl with the contents of 1 channel envelope to build 1 channel

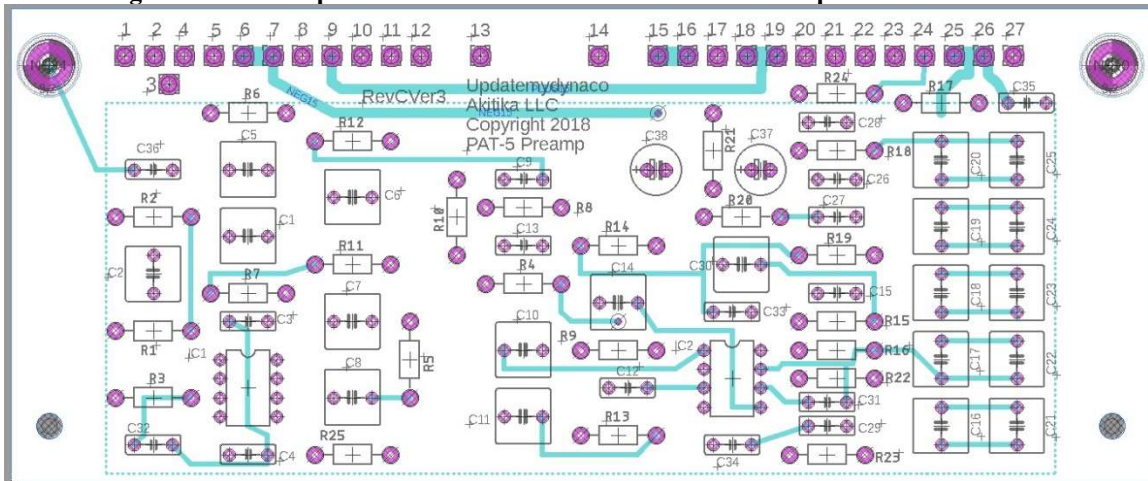


Figure 2-Silk screen (component) side of PCB

## ***Install the resistors***

If you like to use a lead-bender for the resistors, 0.4” works well for all the resistors. I strongly recommend using good light, magnification if necessary, and a digital ohm-meter to verify the correct resistor value before you install it.

Desig	Value	Color Code	LEFT Done ✓	RIGHT Done ✓
R10	100	Brown, Black, Black, Black, Brown		
R7	100K	Brown, Black, Black, Orange, Brown		
R25	100K	Brown, Black, Black, Orange, Brown		
R18	10K0	Brown, Black, Black, Red, Brown		
R20	10K0	Brown, Black, Black, Red, Brown		
R4	10K0	Brown, Black, Black, Red, Brown		
R8	10K0	Brown, Black, Black, Red, Brown		
R3	1K0	Brown, Black, Black, Brown, Brown		
R5	1K0	Brown, Black, Black, Brown, Brown		
R6	1K0	Brown, Black, Black, Brown, Brown		
R19	1K0	Brown, Black, Black, Brown, Brown		
R21	1K0	Brown, Black, Black, Brown, Brown		
R9	1M00	Brown, Black, Black, Yellow, Brown		
R1	200K	Red, Black, Black, Orange, Brown		
R11	200K	Red, Black, Black, Orange, Brown		
R22	2M0	Red, Black, Black, Yellow, Brown		
R13	499K	Yellow, White, White, Orange, Brown		
R15	499K	Yellow, White, White, Orange, Brown		
R16	499K	Yellow, White, White, Orange, Brown		
R24	4K64	Yellow, Blue, Yellow, Brown, Brown		
R14	51K1	Green, Brown, Brown, Red, Brown		
R17	560	Green, Blue, Black, Black, Brown		
R2	68K1	Blue, Gray, Brown, Red, Brown		
R23	750	Violet, Green, Black, Black, Brown		
R12	75K0	Violet, Green, Black, Red, Brown		

### **Install the small capacitors**

Install these axial-leaded small capacitors. They are non-polar. Either orientation works fine. All the non-polar capacitors in this section have 10% or better tolerance unless otherwise indicated.  $\mu$

Desig	Value	Identification	LEFT Done ✓	RIGHT Done ✓
C3	0.1 $\mu$ F	$\mu$ 1J100, may also be marked 104		
C4	0.1 $\mu$ F	$\mu$ 1J100, may also be marked 104		
C33	0.1 $\mu$ F	$\mu$ 1J100, may also be marked 104		
C34	0.1 $\mu$ F	$\mu$ 1J100, may also be marked 104		
C35	10 nF	10nJ100		
C36	10 nF	10nJ100		
C31	12 pF	12J		
C32	100 pF	101J		
C15	150 nF	.15J63		
C12	1 nF	1nJ63		
C9	22 nF	22nJ100		
C27	470 nF	$\mu$ 47J100		
C26	47 nF	47nJ100		
C13	4.7 nF	4n7J63		
C1	4.7 $\mu$ F	4,7 $\mu$ F		
C2	4.7 $\mu$ F	4,7 $\mu$ F		
C5	4.7 $\mu$ F	4,7 $\mu$ F		
C6	4.7 $\mu$ F	4,7 $\mu$ F		
C7	4.7 $\mu$ F	4,7 $\mu$ F		
C8	4.7 $\mu$ F	4,7 $\mu$ F		
C10	4.7 $\mu$ F	4,7 $\mu$ F		
C11	4.7 $\mu$ F	4,7 $\mu$ F		
C14	4.7 $\mu$ F	4,7 $\mu$ F		
C16	4.7 $\mu$ F	4,7 $\mu$ F		
C17	4.7 $\mu$ F	4,7 $\mu$ F		
C18	4.7 $\mu$ F	4,7 $\mu$ F		
C19	4.7 $\mu$ F	4,7 $\mu$ F		
C20	4.7 $\mu$ F	4,7 $\mu$ F		
C21	4.7 $\mu$ F	4,7 $\mu$ F		
C22	4.7 $\mu$ F	4,7 $\mu$ F		
C23	4.7 $\mu$ F	4,7 $\mu$ F		
C24	4.7 $\mu$ F	4,7 $\mu$ F		
C25	4.7 $\mu$ F	4,7 $\mu$ F		
C30	4.7 $\mu$ F	4,7 $\mu$ F		
C28	820 pF	821J		
C29	8.2 nF	8n2J63		



## Install the Electrolytic capacitors

Electrolytic capacitor are polarized. You must observe the correct polarity. Make sure that the negative sign on the capacitor is at the opposite end from the positive sign on the silk-screen.

Desig	Value	LEFT Done ✓	RIGHT Done ✓
C37	47 $\mu$ F@50V		
C38	47 $\mu$ F@50V		

## Install the Opamps (or sockets)

The installation procedure has two possible variations at this step.

- If you purchased the basic kit, you will solder the NE5532 opamps directly into the PC boards.
  - Refer to Figure 3 for the correct orientation of the opamps.
  - Make sure it is correctly oriented. They are no fun to remove.
  - Solder just two diagonal corner pins first. Inspect your work to be sure that the IC sits flat on the board. Re-heat and adjust the pins if necessary.
  - Solder the remaining pins once you're sure that the IC sits flat.
- If in addition, you purchased gold plated sockets, then you will instead solder the sockets into the board, and then install the opamps into those sockets in a later step. If you're installing the sockets, refer to Figure 4.
  - Make sure the socket is correctly oriented. They are no fun to remove.
  - Solder just two diagonal corner pins first. Inspect your work to be sure that the socket sits flat on the board. Re-heat and adjust the pins if necessary.
  - Solder the remaining pins once you're sure that the socket sits flat.

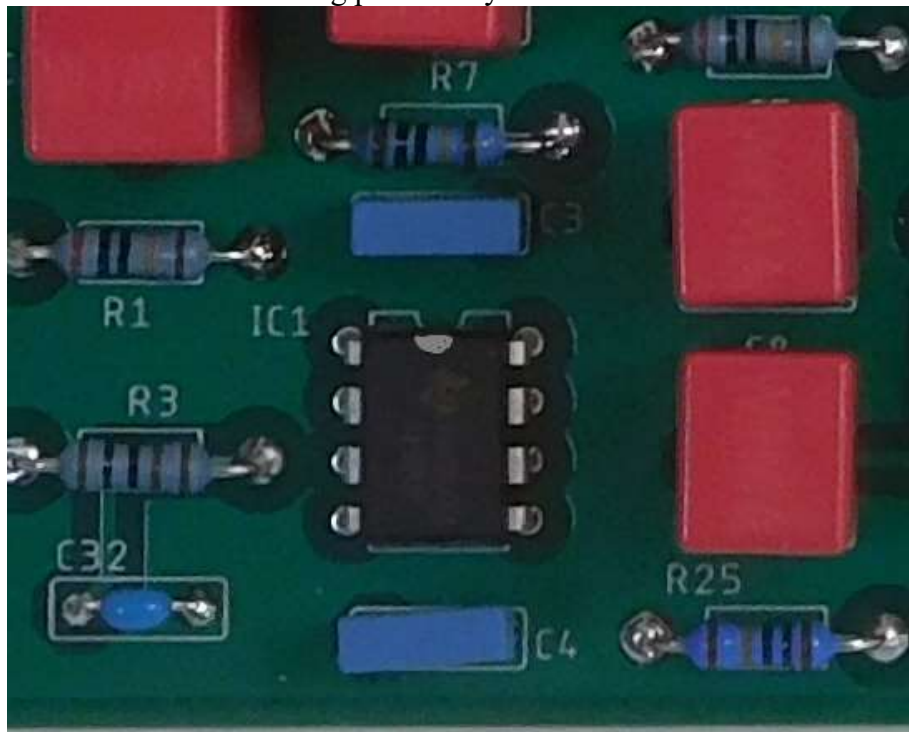
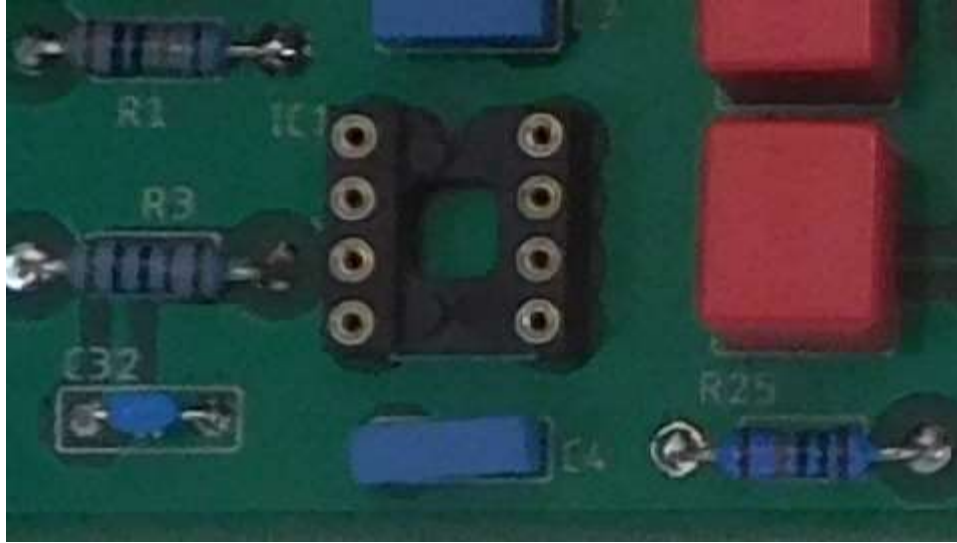
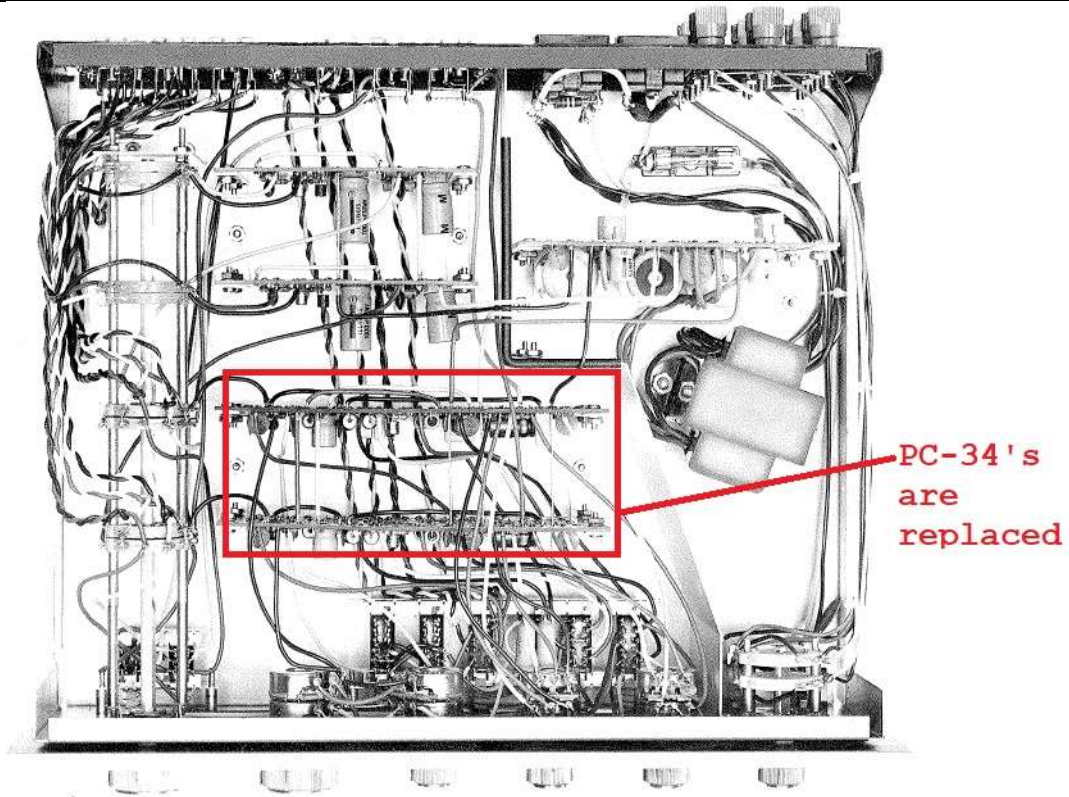


Figure 3-IC installation (half-moon in IC package highlighted for clarity). IC1 mark indicates pin 1.



**Figure 4-Socket Installation**

Desig	Value	Marking <sup>1</sup>	LEFT Done ✓	RIGHT Done ✓
IC1	Dual Opamp, NE5532	5532		
IC2	Dual Opamp, NE5532	5532		



<sup>1</sup> There may be more numbers and letters on the package, but the presence of these numbers is enough to correctly identify these parts.

## Section 3: Removing the Old Preamp PC Boards

### Removing the Cover

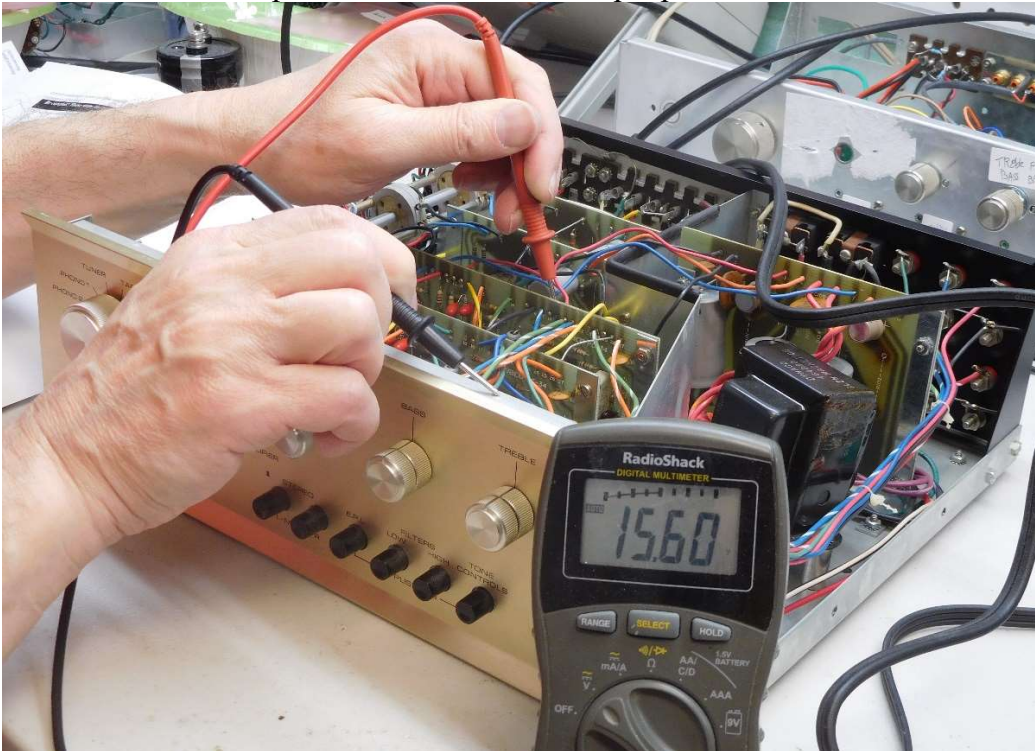
1. Disconnect the PAT-5 from your music system.
2. Unplug the power cord and allow the PAT-5 to sit for one minute before moving on.

Caution: Be sure that the power is unplugged! 120 VAC can be lethal! 240 VAC can be lethal!

3. Remove the 5 screws that hold the cover in place, 2 on the left side, 2 on the right side, and one in the center of the back cover. Do you need more screws? Here's a link: <https://www.updatemydynaco.com/storeindex.html#5CS>
4. Lift the cover straight up and set it aside in a safe place.

### Initial Sanity Check

Before you install the new boards, we'll check the power supply voltages so we can at least be aware of the possible existence of multiple problems.



**Figure 5-Measuring power supply DC Voltage. Note that black meter lead is held in contact with the chassis (ground)**

With the top still off, plug in the AC mains. The PAT-5 circuits are always powered once the preamp is plugged in<sup>2</sup>. Set your meter to DC volts. Connect one lead of the meter to circuit common (some people would say ground). Please note that the chassis is circuit common (ground)<sup>3</sup>.

<sup>2</sup> Some early PAT-5's switched power to the preamp circuits.

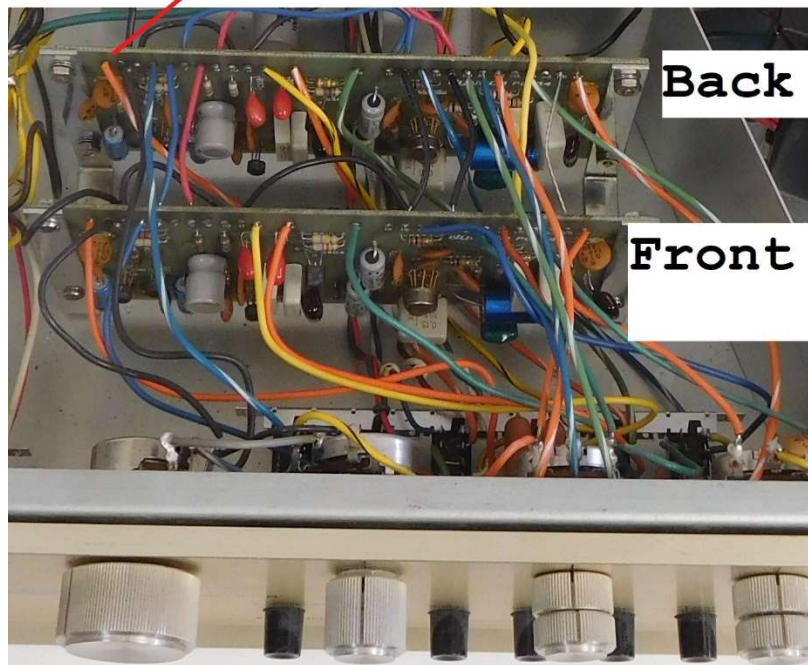
<sup>3</sup> It has no connection to "Green Wire Ground", but that's another story.

<b><i>Be careful! These steps are performed with the power connected and turned on!</i></b>	Done ✓	Done ✓
The voltage on eyelets 18 and 19 of both preamp (PC-34) PCB's should measure +15+/-1.5 Volts (with respect to ground).	<input type="checkbox"/>	<input type="checkbox"/>
The voltage on eyelets 15 and 16 of both preamp (PC-34) PCB's should measure -15+/- 1.5 volts (with respect to ground).	<input type="checkbox"/>	<input type="checkbox"/>

If your voltage readings are significantly different, it could indicate either a power supply problem, or a problem with your original PCB's. There are a couple of possibilities:

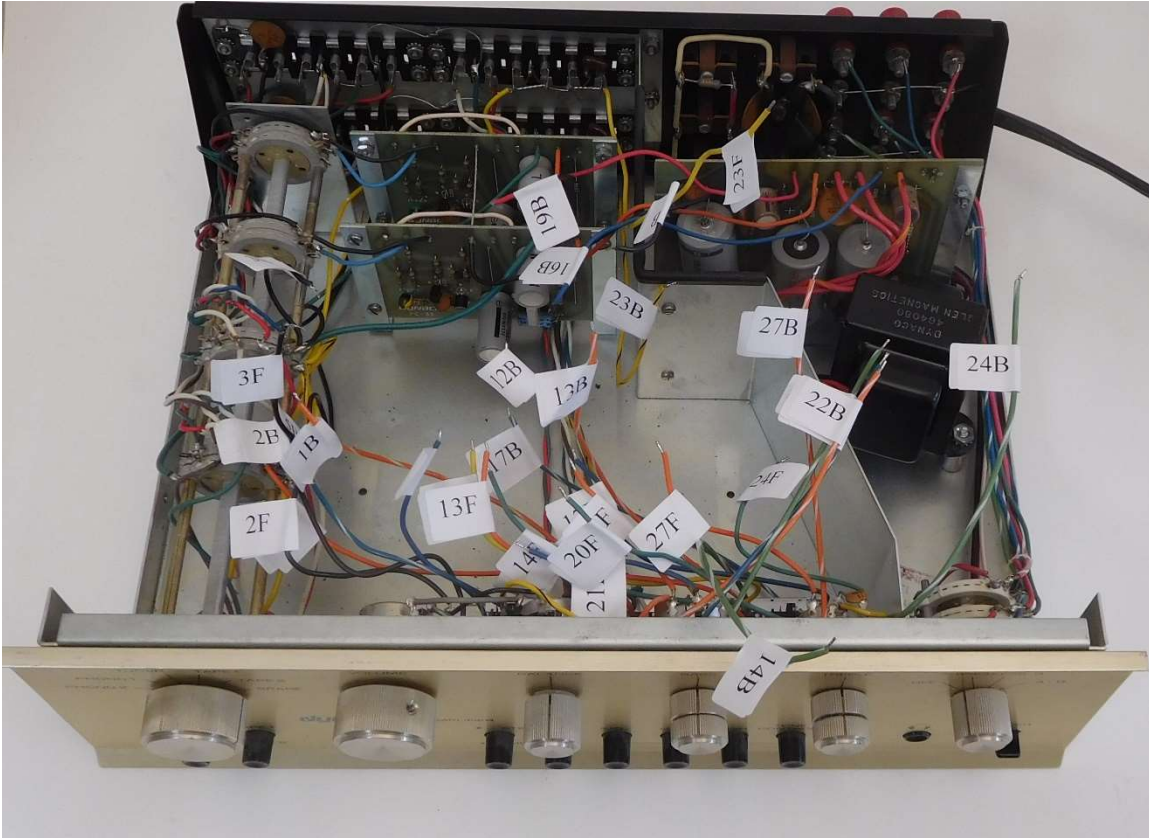
1. The voltages are in tolerance. Move on to the next section.
2. The voltages are too low:
  - a. The problem could be with the power supply. A replacement power supply can be purchased at <http://updatemydynaco.com/storeindex.html#PAT5PWR>
  - b. The problem could be with components on the preamp circuit boards. Best thought is to continue on to the next section to install the new PC boards.
3. The voltages are too high:
  - a. The problem could be with the power supply. A replacement power supply can be purchased at <http://updatemydynaco.com/storeindex.html#PAT5PWR>

**This is eyelet 1**



**Figure 6-Identifying front and back PC-34's, and eyelet 1**

## Preparing to Remove the Circuit Boards



**Figure 7-After the wires have been de-soldered and tagged**

All of the follow directions refer to the PC-34 circuit boards. In this section:

- We'll do some power supply diagnostics.
- We'll remove and label all the wires from the old PC-34 PCBs.

Here we go:

1. Unplug the power cord and allow the PAT-5 to sit for one minute before moving on.

**Caution:** Be sure that the power is unplugged! 120 VAC can be lethal! 240 VAC can be lethal!

2. As you de-solder each wire, label it, and let it remain near the place from where it was removed. This will make it easier to re-attach it to the new PCB.
3. The kit is supplied with wire number labels. We recommend that you de-solder and label these wires in the following order:

### For the Back PCB-34:

Figure 6 identifies the front and back PCB-34's and shows you the location of eyelet 1. That is the eyelet you will de-solder and label first.

PCB and Eyelet	Label	Function
Back 1	1B	Input from selector/EPL
Back 2	2B	Selector Switch Ground
Back 3	3B	Volume Control Ground
Back 4	No Label needed, leave wire alone	Old PCB ground strap

Back 5	5B	Input Buffer Output
Back 6	No Label needed, leave wire alone	Old PCB -15V strap
Back 7	No Label needed, leave wire alone	Old PCB -15V strap
Back 8	No Label needed, leave wire alone	Old PCB +15V strap
Back 9	No Label needed, leave wire alone	Old PCB +15V strap
Back 10	No Label needed, leave wire alone	Old PCB Ground strap
Back 11	No Label needed, leave wire alone	Old PCB Ground strap
Back 12	12B	Low pass filter input
Back 13	13B	Low pass filter output
Back 14	14B	Tone Control Input
Back 15	No Label needed, leave wire alone	Old -15 V strap
Back 16	16B, cut and label the wire that runs to the power supply. Cut it right next to the back of the PCB-34, leaving it as long as possible for easy re-attachment when the new boards are installed.	-15V to power supply
Back 17	17B	Tone Control Switch
Back 18	No Label needed, leave wire alone	Old +15V strap
Back 19	19B, cut and label the wire that runs to the power supply. Cut it right next to the back of the PCB-34, leaving it as long as possible for easy re-attachment when the new boards are installed.	+15V to power supply
Back 20	20B	Bass control, power switch side terminal
Back 21	21B	Bass control, center terminal
Back 22	22B	Bass control, selector switch side terminal
Back 23	23B	Preamp Output
Back 24	24B	Treble control, power switch side terminal
Back 25	No Label needed, leave wire alone	Old Ground strap
Back 26	26 B, cut and label the wire that runs to the power supply. Cut it right next to the back of the PCB-34, leaving it as long as possible for easy re-attachment when the new boards are installed.	Ground to power supply
Back 27	27B	Treble control, selector switch side terminal

### For the Front PCB-34:

Now it's time to perform a similar operation for the Front PCB.

PCB and Eyelet	Label	Function
Front 1	1F	Input from selector/EPL
Front 2	2F	Selector Switch Ground
Front 3	3F	Volume Control Ground
Front 4	No Label needed, leave wire alone	Old ground strap
Front 5	5F	Input Buffer Output
Front 6	No Label needed, leave wire alone	Old PCB -15V strap
Front 7	No Label needed, leave wire alone	Old PCB -15V strap
Front 8	No Label needed, leave wire alone	Old PCB +15V strap
Front 9	No Label needed, leave wire alone	Old PCB +15V strap
Front 10	No Label needed, leave wire alone	Old PCB Ground strap
Front 11	No Label needed, leave wire alone	Old PCB Ground strap
Front 12	12F	Low pass filter input
Front 13	13F	Low pass filter output
Front 14	14F	Tone Control Input
Front 15	No Label needed, leave wire alone	Old -15 V strap
Front 16	No Label needed, leave wire alone	Old -15V to rear PCB
Front 17	17F	Tone Control Switch
Front 18	No Label needed, leave wire alone	+15V
Front 19	No Label needed, leave wire along	Old +15V to rear PCB
Front 20	20F	Bass control, power switch side terminal
Front 21	21F	Bass control, center terminal
Front 22	22F	Bass control, selector switch side terminal
Front 23	23F	Preamp Output
Front 24	24F	Treble control, power switch side terminal
Front 25	No Label needed, leave wire alone	Ground
Front 26	No Label needed, leave wire alone	Old Ground to rear PCB
Front 27	27F	Treble control, selector switch side terminal

### ***Remove the PCB's and the U-brackets***

1. Prepare to remove the two PCB's and the brackets that hold them in place by carefully dressing the wires out of the way.
2. Remove the two 4-40 nuts, lock washers, and screws that hold the U-shaped brackets that retain the circuit boards to the bottom of the chassis.
3. Remove the assembly of the brackets and the two PCB's from the chassis.
4. Remove the 4-40 hardware that holds the PCB's to the U-shaped bracket. Keep track of the lock washers, and remove them so they don't float around inside the preamp or on the PC board. The kit has keps nuts, which include captive lock-

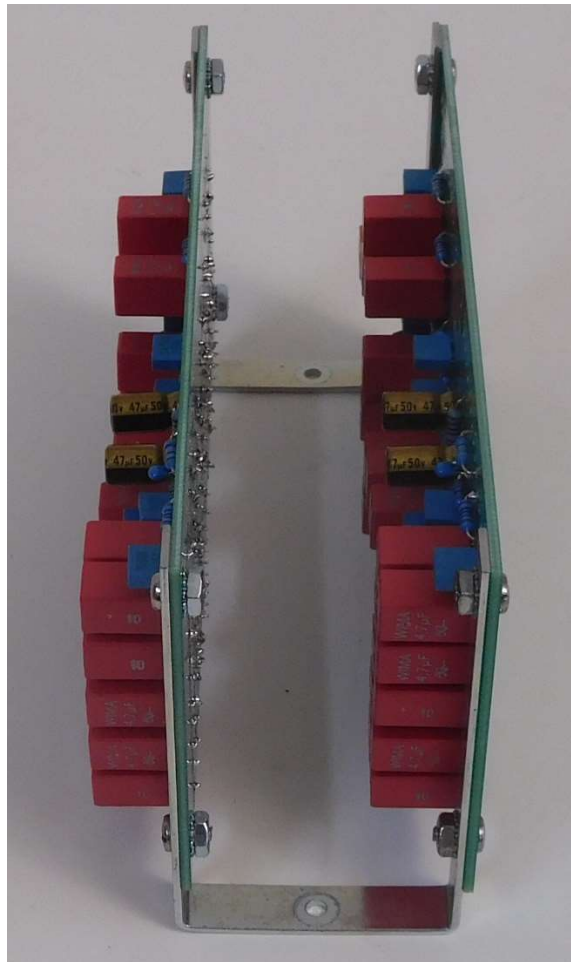
washers. You'll use these keps nuts when you reassemble the PCB's and U-brackets in a later section of the manual.

5. Once both boards are removed, set them aside. They will not be used any further.

### ***Inspection and Preliminary Reassembly***

Inspect the new PCB's you built for good solder joints and freedom from solder bridges. Touch up any questionable connections now. It will be painful to have to disassemble things to repair something later.

Attach the PC boards to the U-shaped bracket. Use the supplied 4-40 keps nuts and the original screws. They have built-in lockwashers, and will make reassembly easier. Note the placement of the boards with respect to the brackets in the original assembly. You'll duplicate the positions of boards, screws and brackets when you put this together. Please refer to Figure 8.



**Figure 8-Showing the proper position of brackets, PCBs, screws, and nuts**



## ***Installing the Board-to-Board Power and Ground Wires***

The new, improved PC-34's are double-sided boards. This allows us to remove many of the jumper wires that the old single-sided PCB's required. That will simplify your re-wiring of the new boards. That makes for a cleaner looking installation with less wires.

The wires you're about to add carry power and ground connections from the back pcb to the front PCB.

1.  Cut a 2" length of the supplied red 22 AWG wire. Remove ¼" of insulation from both ends.
2.  Install and solder the wire between the two PCBs, from eyelet 18 of the back PCB to eyelet 18 of the front PCB.
3.  Cut a 2" length of the supplied blue 22 AWG wire. Remove ¼" of insulation from both ends.
4.  Install and solder the wire between the two PCBs, from eyelet 15 of the back PCB to eyelet 15 of the front PCB.
5.  Cut a 2" length of the supplied black 22 AWG wire. Remove ¼" of insulation from both ends.
6.  Install and solder the wire between the two PCBs, from eyelet 25 of the back PCB to eyelet 25 of the front PCB.

## ***Reinstall the U-bracketed boards***

Screw the assembly of PC-boards and U-shaped bracket back into the PAT-5 chassis. Use the original 4-40 screws and the supplied 4-40 keps nuts. Make sure that the component side of both PCBs is closest to the front panel.

### **Hint about re-installing the u-bracket fasteners**

Fold over a small piece of masking tape on the plain (not-lock-washed) side of the keps nut. Push the nut and tape into a ¼" nut-driver. That will tend to keep the nut from falling out. Further, use gravity to your advantage by turning the PAT-5 on one side. Between the tape on the nut, and turning the PAT-5 on its side, you'll get it all back together without increasing your contributions to the "swear jar".

## ***Re-attach the wires***

Re-solder each numbered wire to its proper eyelet and PCB. Here are some hints that may help keep you out of trouble:

1. Remove just one wire label at a time, then re-connect that wire to its proper place.
2. The new PCB pads have holes sized at 1 mm, or 0.0394". These are sized to properly accommodate the old wires, whose diameters were measured at 26 mils (22 AWG) and 33 mils (20 AWG), but there isn't a lot of slop. This was done to assure the best possible solder connections. However, the old wires will have to be fairly clean to fit in the holes. If they have too much solder you can either:
  - a. Clean the tip of your iron, and remove the extra solder with the clean tip,
  - or

- b. If the nose of the wire will poke into the hole, but won't go through, then you can heat the wire as you poke it into the hole, and it will usually continue to insert.
  - c. If needed, cut back the existing, exposed part of the wire, and strip back a fresh ¼" of wire.
  - d. There was some variation in the wire supplied to PAT-5's thru the years. I may not have seen the worst of it. If yours has some really fat wire, you may have to replace a wire or two with a thinner gauge. In this case, please send me data so only the required holes might be adjusted on future production.
3. Be gentle...don't yank on the wires, but rather form them carefully.
  4. If you need a reminder about where something goes, please refer to Figure 10.

### **Wire-routing**

The following wires that go to the back PCB are typically routed underneath the front PCB. Make sure they are so routed now, and your re-assembly will be easier:

- Back PCB wire 1
- Back PCB wire 12
- Back PCB wire 13
- Back PCB wire 14
- Back PCB wire 17

### **Re-attach the Front PCB wires**

PCB and Eyelet	Label	Function
Front 1	1F	Input from selector/EPL
Front 2	2F	Selector Switch Ground
Front 3	3F	Volume Control Ground
Front 5	5F	Input Buffer Output
Front 12	12F	Low pass filter input
Front 13	13F	Low pass filter output
Front 14	14F	Tone Control Input
Front 17	17F	Tone Control Switch
Front 20	20F	Bass control, power switch side terminal
Front 21	21F	Bass control, center terminal
Front 22	22F	Bass control, selector switch side terminal
Front 23	23F	Preamp Output
Front 24	24F	Treble control, power switch side terminal
Front 27	27F	Treble control, selector switch side terminal

## Re-attach the Rear PCB wires

PCB and Eyelet	Label	Function
Back 1	1B	Input from selector/EPL
Back 2	2B	Selector Switch Ground
Back 3	3B	Volume Control Ground
Back 5	5B	Input Buffer Output
Back 12	12B	Low pass filter input
Back 13	13B	Low pass filter output
Back 14	14B	Tone Control Input
Back 16	16B	-15V to power supply
Back 17	17B	Tone Control Switch
Back 19	19B	+15V to power supply
Back 20	20B	Bass control, power switch side terminal
Back 21	21B	Bass control, center terminal
Back 22	22B	Bass control, selector switch side terminal
Back 23	23B	Preamp Output
Back 24	24B	Treble control, power switch side terminal
Back 26	26B	Ground to power supply
Back 27	27B	Treble control, selector switch side terminal

## Final Sanity Checks

Here are a few last tests *before* you reconnect your PAT-5 to your music system. With the top still off, plug in the AC mains. Turn on the power switch. Set your meter to DC volts. Connect one lead of the meter to ground.

<b><i>Be careful! These steps are performed with the power connected and turned on!</i></b>	Done ✓	Done ✓
The voltage on eyelets 8, 9, 18 and 19 of both preamp PCB's should measure +15 Volts (with respect to ground).	<input type="checkbox"/>	<input type="checkbox"/>
The voltage on eyelets 6, 7, 15 and 16 of both preamp PCB's should measure -15 volts (with respect to ground).	<input type="checkbox"/>	<input type="checkbox"/>

If your voltage readings are significantly different, it could indicate either a power supply problem, or a problem with your re-assembled PCB's. Re-inspect your work, looking for disconnected or swapped wires.

## Prepare to Reconnect your PAT-5 to your Music System

- Turn off the power.
- Remove the AC plug from the wall socket.
- Replace the cover. Before you test your work, it's important to replace the cover. Without the cover in place, there will likely be a lot of hum. With the cover in

place, the PAT-5 quiets down very nicely (unless of course you have power supply problems).

- Reinstall the five screws that hold the cover in place.
- Reinstall the PAT-5 to your music system.

### ***A Note About Hum***

To keep overall hum low, it's very important that the cover be in place with at least one screw tightened down. Assuming that your power supply capacitors are good, the hum will be very low in the upgraded preamp so long as the cover is screwed in place.

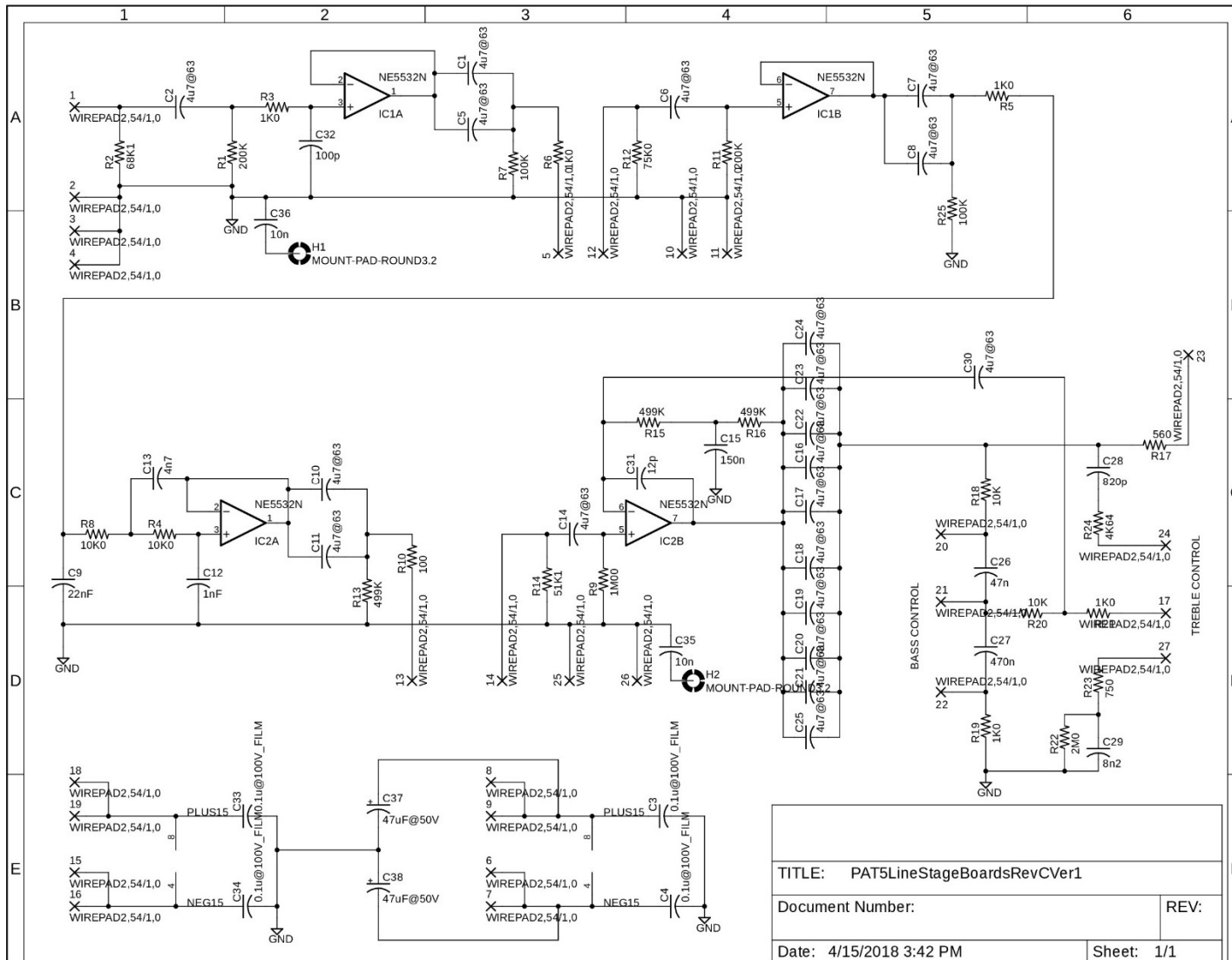


Figure 9-Schematic of PAT-5 new preamp PCB's

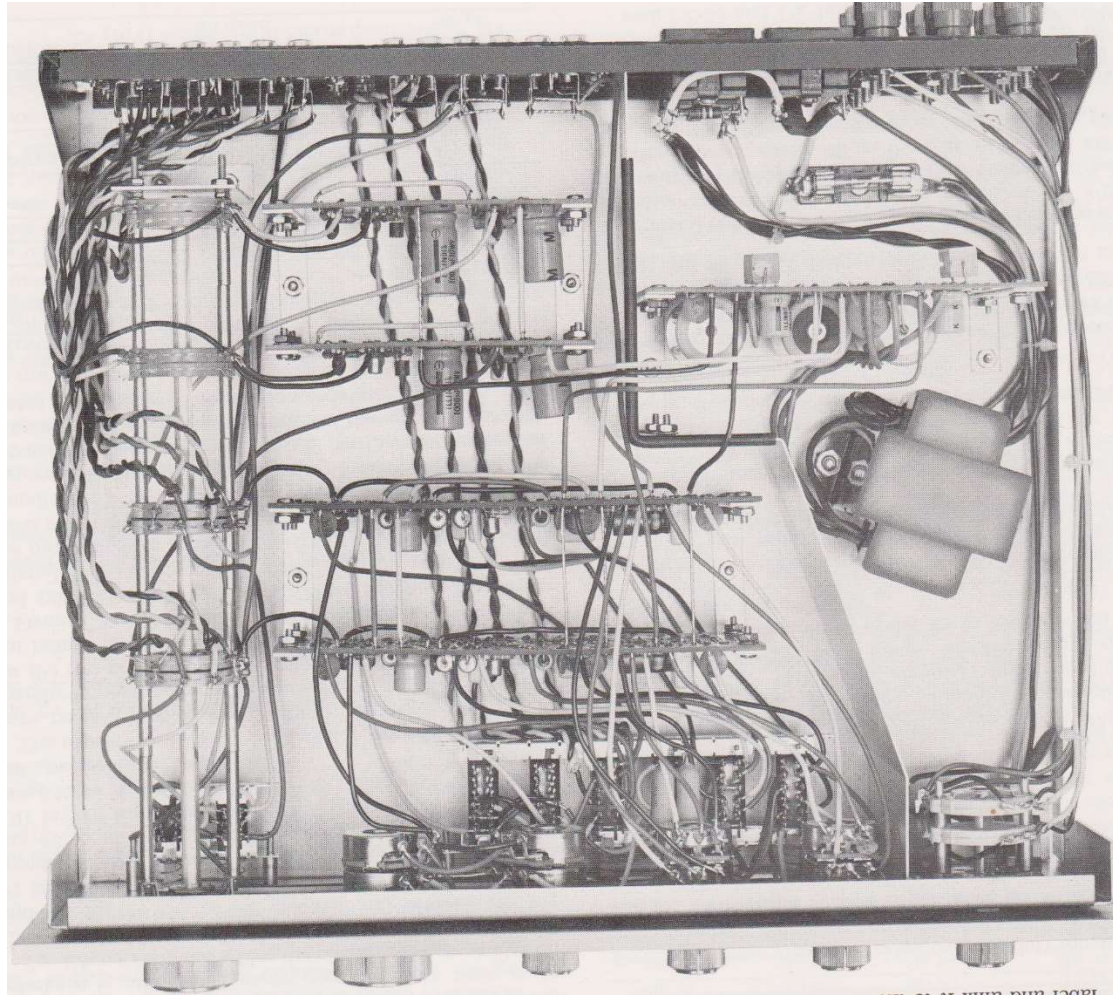


Figure 10-PAT-5 Original Wiring

## ***Specifications***

Specifications listed here are based on NE5532 opamps

Current Drain<sup>4</sup>:

- +15 Volts, per board – 16 mA
- -15 Volts, per board – 16 mA

Compatibility:

- Drop-in replacement for original PAT-5 Line stage PC-34 Circuit boards

Distortion:

- Harmonics of 1 kHz into 100 K-Ohms nearly 120 dB below 1 Volt output level

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<sup>4</sup> For the original boards, each PC-34 took 17 mA of -15 Volts and 21 mA of +15 Volts.

## ***Appendix 1: The Toothpick Trick***

This appendix describes an easy way to clear the solder from a hole in the PCB. It can also be used to clear the solder from terminals on pots or jacks. Doing so makes it easier to install a new component, or reinstall wires that were temporarily removed to allow access to some other component.

All you'll need is a soldering iron and some toothpicks with sharp points. The diameter of the pointed part of the toothpick must be smaller than the diameter of the hole that you're trying to clear.

Heat the solder land on the component side of the board until the solder flows. Insert the toothpick from the component side of the board while pushing and twisting the toothpick. If the solder has melted, the toothpick should push through the board, displacing the solder. Remove the soldering iron, but let the toothpick remain in the hole until the solder has solidified. Now remove the toothpick. There should be a hole through the solder sufficiently large to allow you to insert the component lead or wire.

Sometimes, a bit of the toothpick will break off in the hole. If this happens, use a stiff piece of wire to push the toothpick fragment out of the hole.