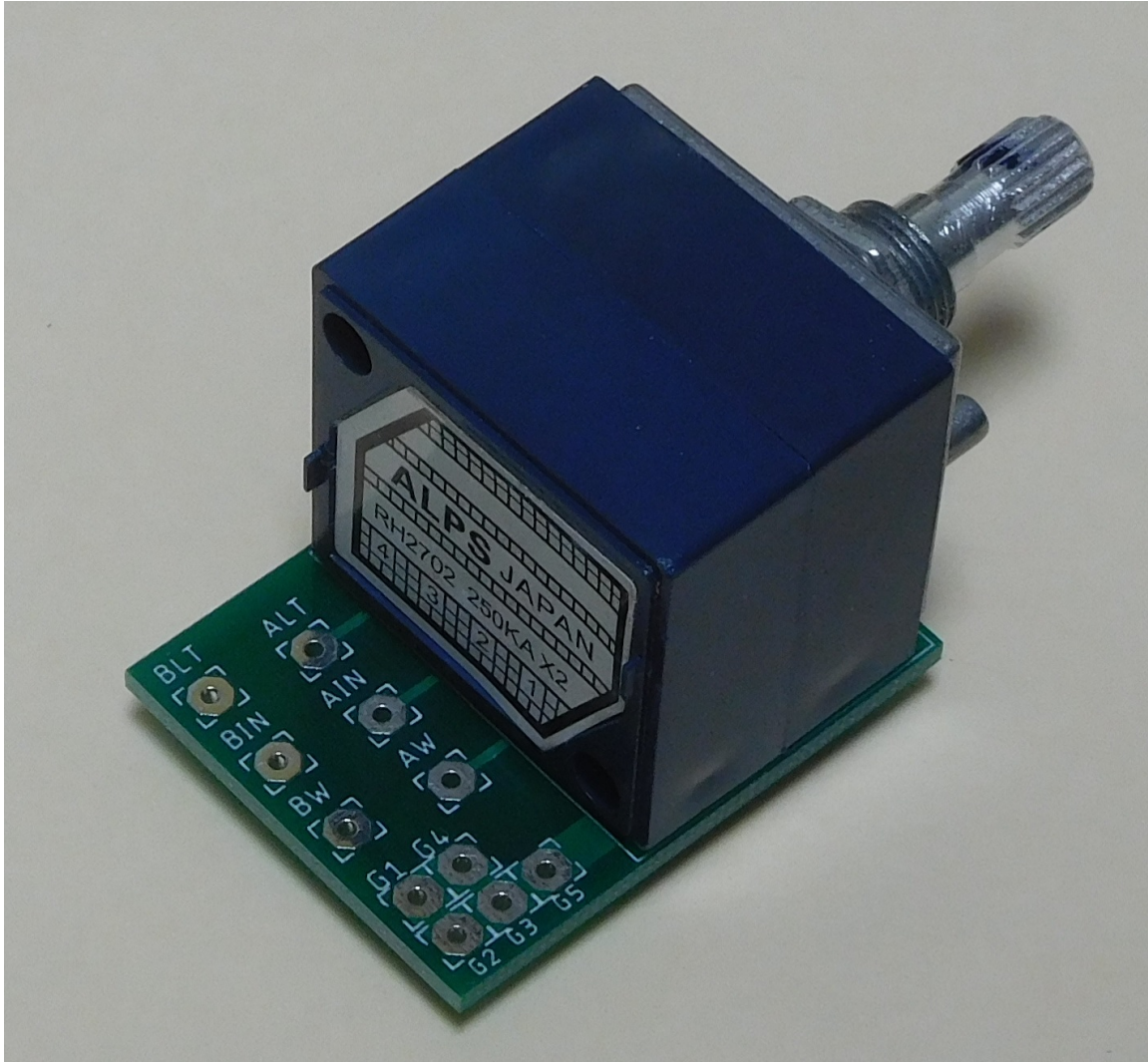


# *Update my dynaco*



## ***Dynaco PAT-4 Preamp and SCA80(Q) Volume Control Replacement (VCR480)***

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

This manual gives the information needed to build and install a new volume control into either Dynaco's PAT-4 Preamp or SCA80(Q) integrated amp. The replacement is an Alps/Alpine 250K detented pot with a loudness tap. This is just like the original pot, but with the addition of the detent feature.

### ***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 typically need the following tools:

1. Phillips screwdriver (#1 and #2), regular screwdrivers.
2. Pliers or nut drivers suitable for #4 and #6 hardware as well as the control mounting nuts
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

### ***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. Labeling the wires on the volume control.
2. Removing the old volume control.
3. Installing and testing the new volume control.
4. Note: Some PAT4 and SCA80's might have wiring between the balance and volume control that are too short. For that reason, we have included extra wire and directions for rebuilding the balance and volume control assembly.

## ***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 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 63/37 Rosin Core solder. 60/40 solder is also OK. The recommended diameter is 0.031 or 0.032 inches. Kester 24-6337-0027 does a fine job, but please note it's a 1-pound spool, enough to assemble very many kits.

## ***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 the recommended solder. Akitika LLC's liability shall in no event exceed the cost paid to Akitika LLC for the kit.

## Section 2: Kit Building Hints

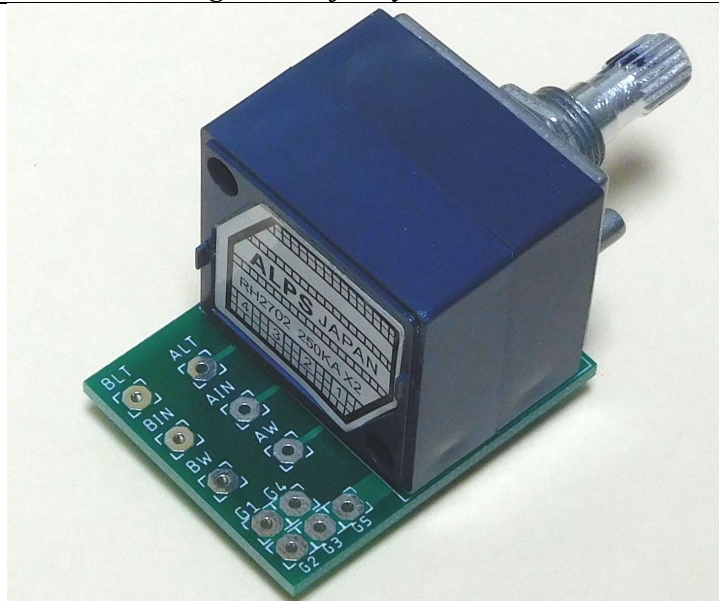
Yes, I know you want to ignore this section and jump right into building the kit. However, please ***take a minute and read the advice.*** I've condensed it into bullets so that even you guys who are in a hurry can benefit.

- Stop any time you're feeling confused, tired, or anxious. Taking breaks at those strategic times keeps the build enjoyable and enhances your chance of first-time success.
- Is something in this manual confusing? Does something look wrong? Send your questions by email to [dan@akitika.com](mailto:dan@akitika.com) or [dan@updatemydynaco.com](mailto:dan@updatemydynaco.com). You'll help yourself and everyone who builds the kit.

## Section 3: Building the volume control

Fit the PCB to the volume control. The leads will be a bit snug, so line them up carefully and don't force things. A little patience and craft will be well rewarded. Make sure that your assembly looks like Figure 1, then solder the 8 pot terminals on the bottom side of the PCB.

***Make sure that the combination of the circuit board and potentiometer looks just like Figure 1 before you solder<sup>1</sup>!***



**Figure 1-Pot attached to the PCB**

### PCB Eyelet Descriptions

ALT and BLT - “A” and “B” Channel Loudness Tap

AIN and BIN – “A” and “B” channel volume control inputs (top of control)

AW and BW – “A” and “B” channel volume control wipers (volume control output)

G1-G5 – various interconnected grounds that also connect the ground terminals of the volume controls.

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<sup>1</sup> This advice comes from a customer who installed the PCB upside down. He found that the upside down PCB installation seemed to work, but it made it such that “for the first 11 steps on the volume control there is NO sound”.

## Section 4: Replacing the PAT-4 Volume Control

This section covers the PAT-4. Section 5 covers the SCA-80(Q).

### Removing the Cover

1. Disconnect your PAT-4 from your system.
2. Pull your PAT-4's power cord out of the AC wall socket.
3. Pull any power cords that are plugged into your PAT-4's convenience outlets.
4. Remove the 4 screws (two on each side) that hold the cover in place. Note that some PAT-4's have a 5<sup>th</sup> screw in the center of the back-panel cover.
5. Remove the cover and set it aside in a safe place.
6. Set up a bowl to receive the parts that you remove.

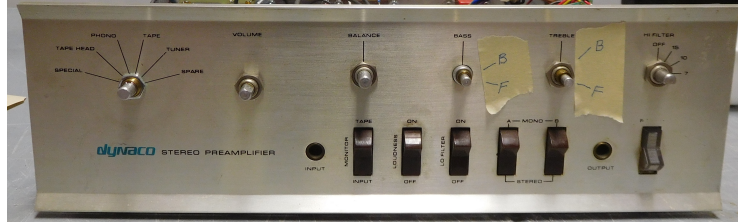
### Gaining Access to the Old Volume Control



Figure 2-Mark the fully clockwise positions of the front and back tone control knobs

Here's the procedure:

1. Start with the two bass control knobs. Turn both knobs fully clockwise. Put a piece of masking tape on the front panel. Use a pen to mark the fully clockwise position on the masking tape. Use "B" and "F" to mark the end-stops of the Back and Front knobs, respectively. See Figure 3. Remove the two bass control knobs by loosening their set-screws.
2. Move on to the two treble control knobs. Turn both knobs fully clockwise. Put a piece of masking tape on the front panel. Use a pen to mark the fully clockwise position on the masking tape with B and F. Remove the two treble control knobs by loosening their set-screws.
3. Note that the clockwise end stops of your equipment may be rather different than the ones shown here. If, upon reassembly, you'd like to check and recalibrate your unit's tone controls, please refer to Appendix 2.
4. Remove the 4 remaining front panel knobs by loosening the set-screws in the knobs. Store the knobs in a safe place. There is no need to mark their positions as it will be evident when they are re-installed.
5. Note the locations of the nuts that hold the cosmetic front panel in place. Remove those nuts and save them into your bowl.
6. Remove the front panel and store it in a safe place.



**Figure 3-knobs removed, note markings for clockwise positions of tone controls**

The nuts that hold the controls into the structural front panel are now visible. Remove the nut that holds the volume control in place. Back the volume control out of the front panel. Hopefully there is enough slack to allow you access to the wires. Depending upon the wire lengths, it might be helpful to also remove the nut that holds the balance control so the balance control and volume control could be removed as a pair.



**Figure 4-Viewing the structural front panel with the cosmetic front panel removed**

### ***Take A Deep Breath***

The existing wiring between the volume and balance controls *might* be long enough to re-use. There is an equally likely chance that a few of the wires will be too short. I started out trying to save the old wires before concluding it just wasn't possible in my unit. Thus I've included wire and directions to re-build the connections between the balance and volume controls.

If you think you'll get lucky, feel free to just transfer the wires from the old volume control to the new volume control. The following table should help that process. But, I'm warning you that it's likely that this "shortcut" may be frustrating and not end well.

***If you'd like a slower, surer method that may actually take less time, skip ahead to the next section.*** Anyway, if you have long wires, and are feeling brave, here's the wire-move table:

Old connection point	New connection point
18K resistor to pin 4	18K resistor to G5
Ground wire from input jack to pin 4	Ground wire from input jack to G3
Ground wire from balance pin 6 to volume pin 4	Ground wire from balance pin 6 to G2
18K resistor to pin 1	18K resistor to G4
Ground wire from balance pin 1 to volume pin 1	Ground wire from balance pin 1 to G1
Wire previously on volume control pin 3	Now connects to AIN
Wire previously on volume control pin 2	Now connects to AW
Wire previously on volume control pin 6	Now connects to BIN
Wire previously on volume control pin 5	Now connects to BW
Wire previously on volume control pin 7	Now connects to ALT
Wire previously on volume control pin 8	Now connects to BLT

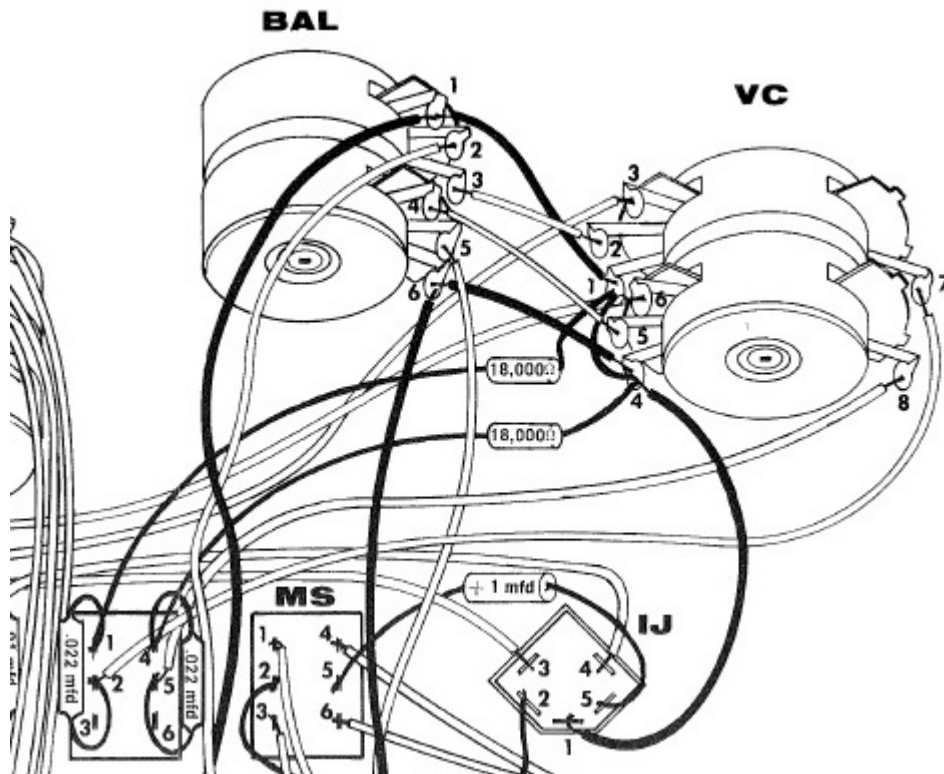


Figure 5-Closeup of original volume control wiring

Insert the wires into the solder side of the PCB and solder them on the silk-screen side.

### ***Rebuilding the Volume-Balance Control Assembly***

This is the slower, surer method we alluded to earlier. If you have any question about the length of the wires in your unit, I recommend using the method shown in this section.

#### **Label and remove the following wires**

Label and remove the following wires. Refer to Figure 5. Clip them as close as possible to the volume and balance controls to preserve the maximum possible length.

Old connection	New Label	Done (✓)
Volume pin 7	ALT	
Volume pin 8	BLT	
Volume pin 3	AIN	
Volume pin 6	BIN	
Volume pin 4 down to input jack, clip close to pin 4	G2	
18K resistor to pin 4, clip close to pin 4	No label necessary, the resistor itself uniquely identifies the point.	
18K resistor to pin 1, clip close to pin 1	No label necessary, the resistor itself uniquely identifies the point.	
Front PCB pin 9, desolder and remove	No label needed	



Front PCB pin 10, desolder and remove	No label needed	
Rear PCB pin 9, desolder and remove	No label needed	
Rear PCB pin 10, desolder and remove	No label needed	

Remove the nuts that hold the volume and balance controls to the front panel. Remove the volume and balance controls with their remaining wires as a complete unit.

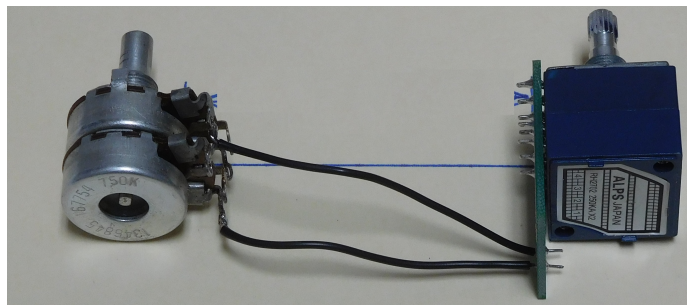
### Clean up the Balance Control

We will re-use the balance control. Clip and/or desolder the balance control wires. With a little care and persistence, you can get the balance control to the point where all of the eyelets are clear. We've given this step its own heading because it may take some time and care to perform this step without harming the balance control.

Set the old volume control aside. It will not be used.

### Re-wire the volume/balance assembly

You will now wire the old balance control to the new volume control.



**Figure 6-Balance control connects to new volume control**

Position the balance and volume control as shown in Figure 6. Now perform each step in the following table, checking it off as it is completed. The wire lengths specified are a bit long, but that is infinitely preferable to a bit short.

Action	Balance control pin	Volume control pin	Done
Cut a 3" length of black 22 AWG wire. Strip ¼" of insulation from both ends. Install as shown above. Leave room in the eyelet as another wire will be added later.	1	G5	
Cut a 3" length of black 22 AWG wire. Strip ¼" of insulation from both ends. Install as shown above. Leave room in the eyelet as another wire will be added later.	6	G3	
Cut a 3" length of red 22 AWG wire. Strip ¼" of insulation from both ends. Install as shown above.	3	AW	
Cut a 3" length of green 22 AWG wire. Strip ¼" of insulation from both ends. Install as shown above.	4	BW	

Add twisted pairs to the volume control:

Action	Done(✓)
Cut a piece of red/black twisted pair to a length of 3.5". Strip ¼" of insulation from all 4 ends. <ul style="list-style-type: none"> <li>• Connect red wire to balance control pin 2.</li> <li>• Connect the black wire to balance control pin 1.</li> </ul>	
Cut a piece of green/black twisted pair to a length of 5". Strip ¼" of insulation from all 4 ends. <ul style="list-style-type: none"> <li>• Connect green wire to balance control pin 5.</li> <li>• Connect the black wire to balance control pin 6.</li> </ul>	

Add a ground wire to the volume control.

Action	Done(✓)
Cut a 3" length of black wire. Remove ¼" of insulation from both ends. Solder it to G1 on the volume control.	

Figure 7 shows the completed assembly. Form the wires as shown to make reassembly easier.

### Install the volume/balance assembly

Place the volume/balance assembly along the top edge of the chassis, near the positions where they will be installed. Connect the following wires to and from the assembly.

Wire labeled:	To Volume PCB terminal:	Done (✓)
ALT	ALT	
BLT	BLT	
AIN	AIN	
BIN	BIN	
G2	G2	

#### Reconnect the 18K resistors

1. Twist together the free ends of the 18K resistors.
2. Slide a 1.5" piece of black 1/8" heat-shrink tubing over the end of the black 22 AWG wire that connects to G1.
3. Twist or form a hook in the free end of the G1 wire to the now-twisted ends of the 18K resistors.
4. Push the heat-shrink tubing back toward the volume control PCB.
5. Solder the G1 wire to the 18K resistors.
6. Slide the heat-shrink over the connection between the G1 wire and the 18K resistors.
7. Use the barrel or end of the iron to shrink the heat-shrink tubing.



**Figure 7-completed balance-volume assembly ready for installation**

Reconnect the input jack ground wire

Solder the input jack ground wire into G2 of the volume control PCB. If it's too short to do this with the balance-volume assembly along the top of the chassis, you can defer this connection until after installing the assembly into the chassis.

Install the balance-volume assembly

1. The shaft of the new volume control is a bit longer than we'd like it to be. Before May of 2024, we would cut the shaft. However, around that time we came to feel that the vibration from cutting the shaft reduced the reliability of the volume control. Thus we advise the following revised procedure:
  - a. Thread one nut onto the volume control to a depth of about 0.1" from the end of the threaded portion of the bushing.
  - b. Insert the volume control and nut into the front panel.

- c. Insert the second nut to retain the volume control on the front panel. The outside surface of the nut should be flush with the end of the pot's mounting bushing. This minimizes the projection of the shaft beyond the front panel. If the volume control included a washer, set it aside as it won't be used.
2. Insert the balance control into its mounting hole.
3. Install and tighten the balance control nut. Note that the balance and volume control nuts are not interchangeable.

Reconnect the twisted pair outputs from the balance control

1. The red/black twisted pair connects to eyelets 9 and 10 of the front PCB.
  - a. Connect the red wire to eyelet 9.
  - b. Connect the black wire to eyelet 10.
2. The green/black twisted pair connects to eyelets 9 and 10 of the rear PCB.
  - a. Connect the green wire to eyelet 9.
  - b. Connect the black wire to eyelet 10.

You have now completed installation of the new volume control.

**Re-install the front panel**

Reinstall the front panel. Affix it in place using the same nuts that previously held it in place. We've provided a second nut for the new volume control. If enough threads are showing, install the nut. If not, just re-install the rest of the original collection of nuts to retain the front panel.

Turn the volume control shaft fully counterclockwise. Fit the small brass tube over the end of the knurled shaft. Fit the large volume control knob over the knurled shaft and brass tube adapter. Point the indicator at 7 o'clock and tighten the set-screw.

Re-install the bass and treble knobs using the B and F marks on the masking tape. Reinstall the rest of the knobs. Replace the cover and install the 4 (perhaps 5) screws that hold the cover in place. Reinstall your upgraded PAT4 into your sound system.

## **Section 5: Replacing the SCA80(Q) Volume Control**

This section covers the SCA-80(Q).

### ***Removing the Cover***

1. Disconnect your SCA80(Q) from your system.
2. Pull your SCA80(Q) power cord out of the AC wall socket.
3. Pull any power cords that are plugged into your SCA80(Q)'s convenience outlets.
4. Remove the 4 screws (two on each side) that hold the cover in place. Note that most SCA80(Q)'s have a 5<sup>th</sup> screw in the center of the back-panel cover.
5. Remove the cover and set it aside in a safe place.
6. Set up a bowl to receive the parts that you remove.

### ***Gaining Access to the Old Volume Control***

Here's the procedure:

7. Start with the bass control knob. Turn it fully clockwise. Put a piece of masking tape on the front panel. Use a pen to mark the fully clockwise position on the masking tape. Remove the bass control knob by loosening its set-screw.
8. Move on to the treble control knob. Turn the knob fully clockwise. Put a piece of masking tape on the front panel. Use a pen to mark the fully clockwise position on the masking tape. Remove the treble control knob by loosening its set-screw.
9. Remove the 3 remaining front panel knobs by loosening the set-screws in the knobs. Store the knobs in a safe place. There is no need to mark their positions as it will be evident when they are re-installed.
10. Note the locations of the nuts that hold the cosmetic front panel in place. Remove those nuts and save them into your bowl.
11. Remove the front panel and store it in a safe place.

The nuts that hold the controls into the structural front panel are now visible. Remove the nut that holds the volume control in place. Back the volume control out of the front panel. Hopefully there is enough slack to allow you access to the wires. Depending upon the wire lengths, it might be helpful to also remove the nut that holds the balance control so the balance control and volume control could be removed as a pair.

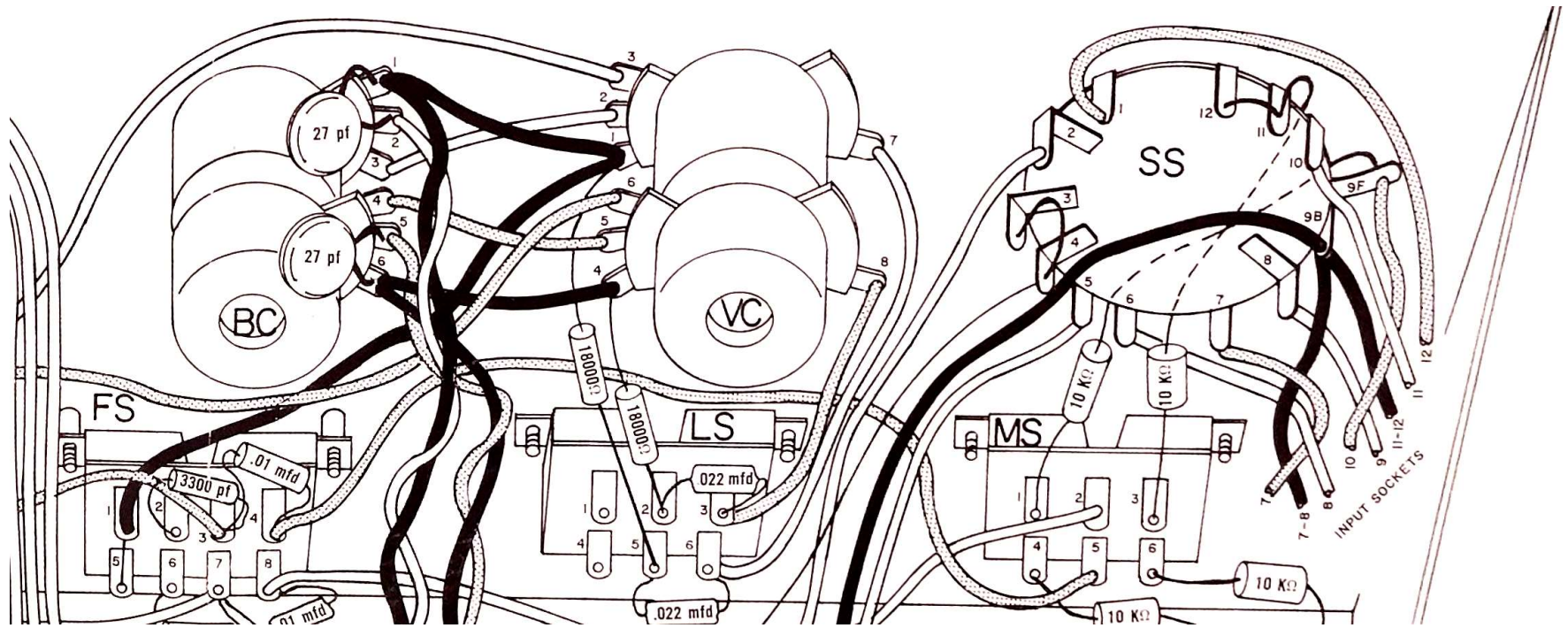


Figure 8-Closeup of original volume control wiring

## Rebuilding the SCA80(Q) Volume-Balance Control Assembly

### Label and remove the following wires

Label and remove the following wires. Refer to Figure 8. Clip them as close as possible to the volume and balance controls to preserve the maximum possible length.

Old connection	New Label	Done (✓)
Volume pin 7	ALT	
Volume pin 8	BLT	
Volume pin 3	AIN	
Volume pin 6	BIN	
18K resistor to pin 4, clip close to pin 4	No label necessary, the resistor itself uniquely identifies the point.	
18K resistor to pin 1, clip close to pin 1	No label necessary, the resistor itself uniquely identifies the point.	
Front PCB pin 9, desolder and remove	No label needed	
Front PCB pin 10, desolder and remove	No label needed	
Rear PCB pin 9, desolder and remove	No label needed	
Rear PCB pin 10, desolder and remove	No label needed	
Volume Pin 1, desolder at volume control end	G4 (this is the wire that goes to pins 1 and 5 of the filter switch)	

Remove the nuts that hold the volume and balance controls to the front panel. Remove the volume and balance controls with their remaining wires as a complete unit.

### Clean up the Balance Control

We will re-use the balance control and the 27 pF capacitors. Clip and/or desolder the balance control wires. With a little care, you can get the balance control to the point where all of the eyelets are clear. We've given this step its own heading because it may take some time and care to perform this step without harming the balance control. Set the old volume control aside. It will not be used.

### Re-wire the volume/balance assembly

You will now wire the old balance control to the new volume control.

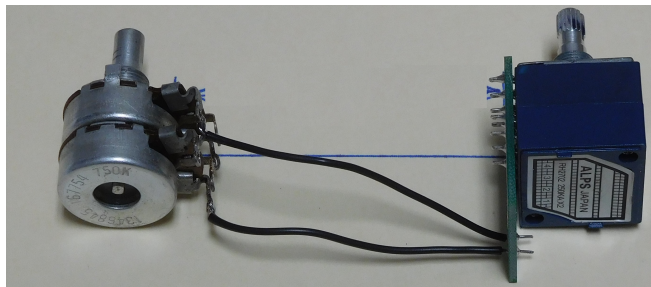


Figure 9-Balance control connects to new volume control

Position the balance and volume control as shown in Figure 6. Now perform each step in the following table, checking it off as it is completed. The wire lengths specified are a bit long, but that is infinitely preferable to a bit short.

Action	Balance control pin	Volume control pin	Done
Cut a 3" length of black 22 AWG wire. Strip ¼" of insulation from both ends. Install as shown above. Leave room in the eyelet as another wire will be added later.	1	G5	
Cut a 3" length of black 22 AWG wire. Strip ¼" of insulation from both ends. Install as shown above. Leave room in the eyelet as another wire will be added later.	6	G3	
Cut a 3" length of red 22 AWG wire. Strip ¼" of insulation from both ends. Install as shown above.	3	AW	
Cut a 3" length of green 22 AWG wire. Strip ¼" of insulation from both ends. Install as shown above.	4	BW	

Add twisted pairs to the volume control:

Action	Done(✓)
Cut a piece of red/black twisted pair to a length of 3.5". Strip ¼" of insulation from all 4 ends. <ul style="list-style-type: none"> <li>• Connect red wire to balance control pin 2.</li> <li>• Connect the black wire to balance control pin 1.</li> <li>• Insert the recovered 27 pF cap between pins 1 and 2.</li> <li>• Solder the connections on pin 1 and the connections on pin 2.</li> </ul>	
Cut a piece of green/black twisted pair to a length of 5". Strip ¼" of insulation from all 4 ends. <ul style="list-style-type: none"> <li>• Connect green wire to balance control pin 5.</li> <li>• Connect the black wire to balance control pin 6.</li> <li>• Insert the recovered 27 pF cap between pins 5 and 6.</li> <li>• Solder the connections on pin 5 and the connections on pin 6.</li> </ul>	

Add a ground wire to the volume control.

Action	Done(✓)
Cut a 3" length of black wire. Remove ¼" of insulation from both ends. Solder it to G1 on the volume control.	

Figure 7 shows the completed assembly. Form the wires as shown to make reassembly easier.



## Install the volume/balance assembly

Place the volume/balance assembly along the top edge of the chassis, near the positions where they will be installed. Connect the following wires to and from the assembly.

Wire labeled:	To Volume PCB terminal:	Done (✓)
ALT	ALT	
BLT	BLT	
AIN	AIN	
BIN	BIN	
G4	G4 (restores ground to terminals 1 and 5 of the filter switch)	

### Reconnect the 18K resistors

8. Twist together the free ends of the 18K resistors.
9. Slide a 1.5" piece of black 1/8" heat-shrink tubing over the end of the black 22 AWG wire that connects to G1.
10. Twist or form a hook in the free end of the G1 wire to the now-twisted ends of the 18K resistors.
11. Push the heat-shrink tubing back toward the volume control PCB.
12. Solder the G1 wire to the 18K resistors.
13. Slide the heat-shrink over the connection between the G1 wire and the 18K resistors.
14. Use the barrel or end of the iron to shrink the heat-shrink tubing.

### Install the balance-volume assembly

1. The shaft of the new volume control is a bit longer than we'd like it to be. Before May of 2024, we would cut the shaft. However, around that time we came to feel that the vibration from cutting the shaft reduced the reliability of the volume control. Thus we advise the following revised procedure:
  - a. Thread one nut onto the volume control to a depth of about 0.1" from the end of the threaded portion of the bushing.
  - b. Insert the volume control and nut into the front panel.
  - c. Insert the second nut to retain the volume control on the front panel. The outside surface of the nut should be flush with the end of the pot's mounting bushing. This minimizes the projection of the shaft beyond the front panel. If the volume control included a washer, set it aside as it won't be used.
2. Insert the balance control into its mounting hole.
3. Install and tighten the balance control nut. Note that the balance and volume control nuts are not interchangeable.

### Reconnect the twisted pair outputs from the balance control

1. The red/black twisted pair connects to eyelets 9 and 10 of the front PCB.
  - a. Connect the red wire to eyelet 9.
  - b. Connect the black wire to eyelet 10.
2. The green/black twisted pair connects to eyelets 9 and 10 of the rear PCB.
  - a. Connect the green wire to eyelet 9.

- b. Connect the black wire to eyelet 10.

You have now completed installation of the new volume control.

### **Re-install the front panel**

Reinstall the front panel. Affix it in place using the same nuts that previously held it in place. We've provided a second nut for the new volume control. If enough threads are showing, install the nut. If not, just re-install the rest of the original collection of nuts to retain the front panel.

Turn the volume control shaft fully counterclockwise. Fit the small brass tube over the end of the knurled shaft. Fit the large volume control knob over the knurled shaft and brass tube adapter. Point the indicator at 7 o'clock and tighten the set-screw.



**Figure 10-completed balance-volume assembly ready for installation**

Re-install the bass and treble knobs using the marks on the masking tape. Reinstall the rest of the knobs. Replace the cover and install the 5 screws that hold the cover in place. Reinstall your upgraded SCA80 into your sound system.

## Appendix 1 – Step sizes in the Alps Pot

These are step pots. That means that there's actually a 23 position switch that controls the tap point on a resistor string. The upside is that the gain tracking between the left and right channels is practically perfect. The downside is that you might consider some of the steps to be a bit larger than you'd like. In practice, I haven't found this to be a problem, but forewarned is forearmed.

Step size (dB)	Gain setting
0.81	max gain
1.08	
1.39	
1.79	
1.94	
2.41	
2.72	
4.1	
4.86	
5.5	
3.4	
2.46	
2.63	
3.21	
3.7	
3.63	
3.77	
4.65	
5.55	
8.1	
25.3	min gain