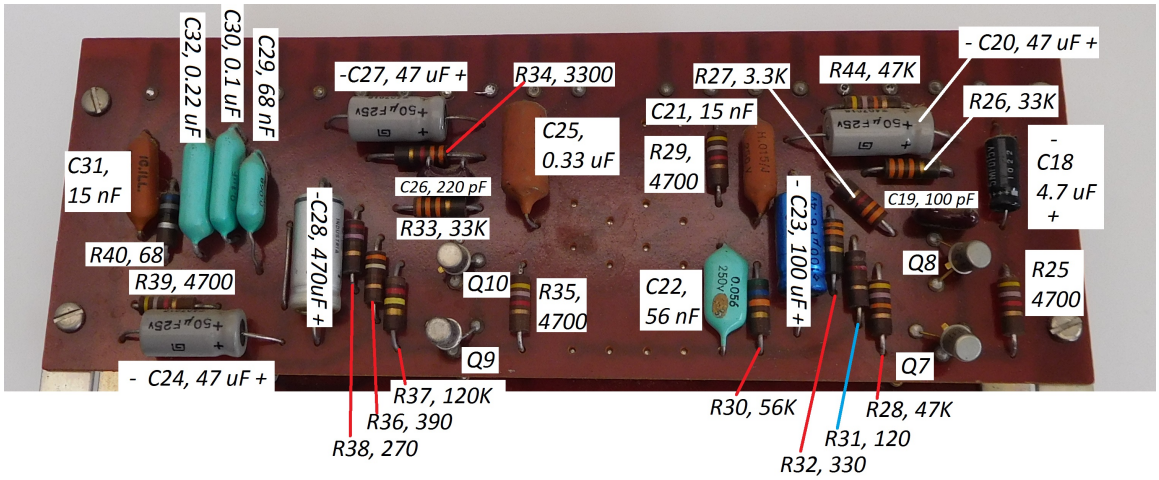
SCA-80(Q) PREAMP BOARDS RESTORAL MANUAL



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Section 1: About This Manual

This manual gives the information you need to restore the preamp PC boards of a Dynaco SCA80 or SCA80Q integrated amp. When you install this kit, you'll get better sound as you:

- Replace 10% carbon composition resistors with 1% metal film resistors
- Replace 40+ year old electrolytic capacitors with fresh, new capacitors
- Replace original film capacitors with new film or COG capacitors

To be successful with this kit:

- You'll need serious de-soldering equipment and a fair amount of patience, or
- Non-serious de-soldering equipment and the patience of a saint.

Please see Appendix 1 and 2 for more information about de-soldering equipment.

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 the Appendix 1 and Appendix 2)
6. Magnifying glass, if you're over 42!
7. A multi-meter for measuring Ohms and DC volts is handy, but not strictly necessary

Recommended Solder

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

Project Overview

Broadly, the project consists of the following steps:

1. Unplugging the SCA80(Q) and removing the cover.
2. Labeling, then de-soldering all the wires from each preamp circuit board.
3. Removing and replacing the components on each circuit board.
4. Re-installing the restored printed circuit boards.
5. Re-attaching the wires to the circuit boards.
6. Reassembling the SCA80(Q).

Important Tips for Success

This is a big job. Removing all the components and replacing them takes quite a while. Take frequent breaks. Mark your position in the manual. Use good de-soldering equipment. If you have only things like a sold-a-pult and solder braid, this kit will take a really long time, and try your patience. Be especially careful to take breaks. See Appendix 1 and Appendix 2 for details.

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.

Section 2: About the Preamp Section Upgrade

Removing the Cover

1. Disconnect the SCA80(Q) from your music system.
2. Unplug the power cord and allow the SCA80(Q) 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 4 screws that hold the cover in place, 2 on the left side and 2 on the right side. There may be one more screw in the center of the back.
4. Lift the cover straight up and set it aside in a safe place.

Initial Sanity Check

Before you begin the re-build we'll check the power supply voltages so we can at least be aware of the possible existence of multiple problems.

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.

Be careful! These steps are performed with the power connected and turned on!	Done ✓	Done ✓
The voltage on eyelet 4 of both preamp PCB's should measure between 17.5 volts DC (+/-20%) (with respect to ground).	☐	☐
The voltage on eyelet 12 of both preamp PCB's should measure 24 volts DC (+/- 20%) (with respect to ground).	☐	☐

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 either R41 or R42, or C11, the 3-section silver capacitor. You may have to replace these components (The C11 kit is a good way to do this: http://updatemydynaco.com/storeindex.html#SCA80C11
    b. The problem could be with components on the preamp circuit boards. Best thought is to continue on to the next section to continue replacing the components.
3. The voltages are too high:
    a. Typically (but not exclusively) this would be caused by component problems on the PCB. Continue on to replacement the components.

Preparing to Remove the Circuit Boards

1. Unplug the power cord and allow the SCA80(Q) 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. The kit is supplied with two sets of number labels, one for the right channel, and one for the left channel.
3. Mark all the wires that connect to the left channel (it's the one closer to the back of the chassis) PCB using the supplied labels. These labels have an eyelet number, and the letter B, for back. Make sure that the label numbers match the eyelet numbers etched in the copper traces on the solder side of the PCB. This will help you get the preamp back together after the modifications.
4. Desolder all the wires from the left channel PCB after they are labeled. Be careful not to put too much stress on the selector switch.
5. Mark all the wires that connect to the right channel (it's the one closer to the front of the chassis) PCB using the supplied labels. These labels have an eyelet number, and the letter F, for Front. Make sure that the label numbers match the eyelet numbers etched in the copper traces on the solder side of the PCB. This will help you get the preamp back together after the modifications.
6. De-solder all the wires from the right channel PCB after they are labeled. Don't put too much stress on the selector switch as you remove these wires.
7. Prepare to remove the two PCB's and the bracket that holds them in place by carefully dressing the wires out of the way,
8. Remove the two 6-32 nuts, lock washers, and screws that hold the U-shaped brackets that retain the circuit boards to the bottom of the chassis.
9. Remove the assembly of the brackets and the two PCB's from the chassis.
10. 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.
11. Once both boards are removed, clear the solder from the numbered eyelet holes. If you have official de-soldering equipment, use it. If you don't, you may want to use the Toothpick Trick (see Appendix 1 and 2) to clear the solder from these eyelets. Doing so will make reassembly much easier. Check for daylight visible through all the holes, and/or that they will pass a piece of bare hook-up wire.

PC Board Component Replacement

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

- Remove the indicated component
- Clear the solder from the associated PCB mounting holes
- Install the new component, carefully following the directions.
- Make a check-mark the left or the right channel board as you complete the step.

You'll want to print out and refer to Figure 3 as it will make it much easier to locate each component.

If you like to use a lead-bender for the resistors, 0.55” works well for all the resistors with the exception of R34, where a 0.80” span works better.

Remove this			Install this	Done ✓	Done ✓
R40	68	Blue, gray, black, silver	Blue, gray, black, gold, brown		
R31	120	Brown, Red, Brown, gold	Brown, red, black, black, brown		
R38	270	Red, Violet, Brown, gold	Red, violet, black, black, brown		
R32	330	Orange, Orange, Brown, gold	Orange, orange, black, black, brown		
R36	390	Orange, white, brown, gold	Orange, white, black, black, brown		
R27	3K3	Orange, orange, red, gold	Orange, orange, black, brown, brown		
R34	3K3	Orange, orange, red, gold	Orange, orange, black, brown, brown		
R25	4K7	Yellow, violet, red, gold	Yellow, violet, black, brown, brown		
R29	4K7	Yellow, violet, red, gold	Yellow, violet, black, brown, brown		
R35	4K7	Yellow, violet, red, gold	Yellow, violet, black, brown, brown		
R39	4K7	Yellow, violet, red, gold	Yellow, violet, black, brown, brown		
R26	33K	Orange, orange, orange, gold	Orange, orange, black, red, brown		
R33	33K	Orange, orange, orange, gold	Orange, orange, black, red, brown		
R28	47K	Yellow, violet, orange, gold	Yellow, violet, black, red, brown		
R44	47K	Yellow, violet, orange, gold	Yellow, violet, black, red, brown		
R30	56K	Green, blue, orange, gold	Green, blue, black, red, brown		
R37	120K	Brown, red, yellow, gold	Brown, red, black, orange, brown		

These capacitors are non-polar. Either orientation works fine. Note:

1. For the red capacitors, leave a little space between the first bend of the lead and the body to avoid cracking the capacitor coating.
2. For all these capacitors, it has become virtually impossible to find axial versions of these capacitors, and so radial capacitors have been substituted. Use **Figure 4** as a guide to the way that the leads should be formed to fit well into the original circuit boards.

Remove this		Install this	Marking	Done ✓	Done ✓
C22	56 nf, 5%	56 nf, 5%	563J		
C29	68 nF, 10%	68 nF, 10%	68nk100		
C30	0.1 µF, 5%	0.1 µF, 5%	µ1J100		
C32	0.22 µF, 10%	0.22 µF, 10%	µ22K63		
C25	0.33 µF, 10%	0.33 µF, 10%	334K		
C19	100 pF, 5%	100 pF, 5%	101		
C21	15 nF, 5%	15 nF, 5%	153J100		
C31	15 nF, 5%	15 nF, 5%	153J100		
C26	220 pF, 10%	220 pF, 10%	221		

The following capacitors are polarized. Watch carefully to assure the new capacitors are installed with the correct polarity.

C14	5 µF, 15V	4.7 µF, 50V		
C18	5 µF, 15V	4.7 µF, 50V		
C24	50 µF, 25	47 µF, 25V		
C27	50 µF, 25	47 µF, 25V		
C20	50 µF, 25V	47 µF, 25V		
C23	100 µF, 2V	100 µF, 25V		
C28	500 µF, 10V	470 µF, 16V		

Install the following transistors. Be careful not to get too much heat on the transistors. Refer to Figure 4 to see the correct orientation of the transistors.

Q7	MPSA18	High beta NPN, low noise		
Q8	MPSA18	High beta NPN, low noise		
Q9	MPSA18	High beta NPN, low noise		
Q10	MPSA18	High beta NPN, low noise		

Figure 1-Both PCBs reassembled onto U brackets, ready for installation

Inspection and Preliminary Reassembly

Inspect your work 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. Verify that the eyelets along the tops of the boards are free of solder and are ready to accept the labeled wires.

Attach the PC boards to the U-shaped bracket. Use the original 4-40 screws and nuts. Don't re-install them into the SCA80 until you have completed the following section.

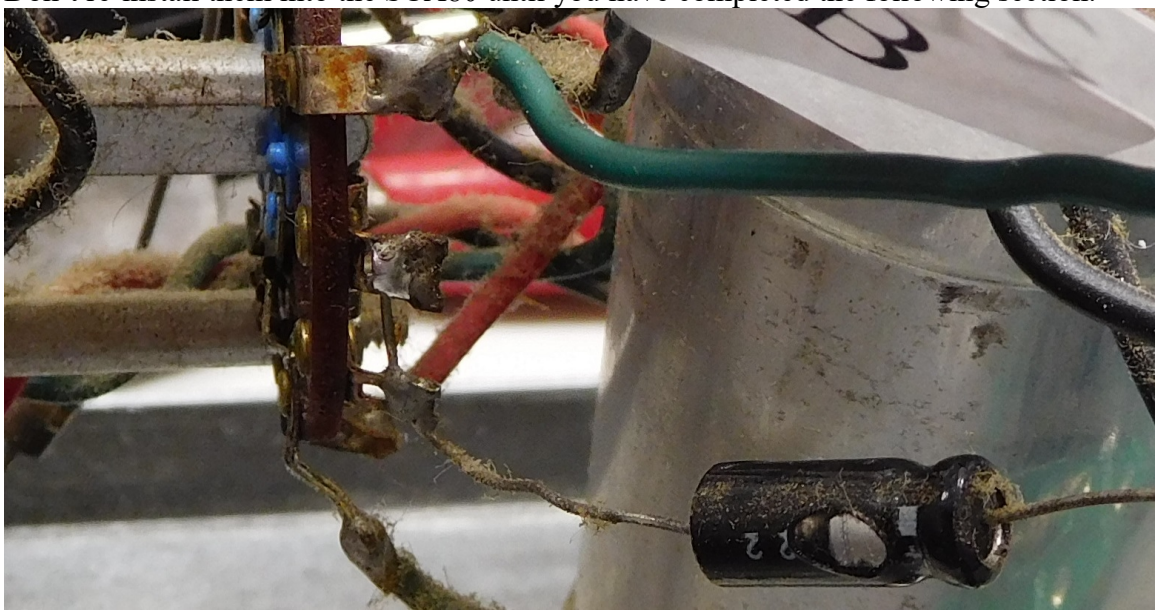

Figure 2-Showing connection of original C14 negative end to terminals 3 and 4 of the selector switch

Change C14

From your earlier disassembly, you'll note two C14 capacitors, 4.7 µF, connected to the front and back decks of the selector switch. Their positive ends will be labeled with 6F and 6B labels. Their negative end connects to pins 3 and 4 of the selector switch.

To change both C14's:

1. Mark the *positive* end of both new C14s (4.7 µF, 50V), one with a "6F new" label, and the other with a "6B new" label.
2. Note carefully the two switch contacts where the original C14 negative leads were connected.
3. De-solder the original C14's from the selector switch, replacing them with a similarly connected new C14. Leave the leads at full length. Remember that the negative lead goes to pin 3 and 4 of the selector switch.

Reinstall the U-bracketed boards

Screw the assembly of PC-boards and U-shaped bracket back into the SCA-80(Q) chassis. Use the original 6-32 screws and nuts. The solder side of both PCBs will be closest to the front panel.

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. Be gentle…don't yank on the wires, but rather form them carefully.
3. Make sure that the bare leads of C14 can't short out to adjacent metal.
4. If you need a reminder about where something goes, please refer to Figure 5.

Final Sanity Checks

Here are a few last tests *before* you reconnect your SCA80(Q) 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.

Be careful! These steps are performed with the power connected and turned on!	Done ✓	Done ✓
The voltage on eyelet 4 of both preamp PCB's should measure between 17.5 volts DC (+/-20%) (with respect to ground).	☐	☐
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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 SCA-80(Q) 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 SCA80(Q) quiets down very nicely (unless of course you have C9 or C11 problems).
- Reinstall the four screws that hold the cover in place.
- Reinstall the SCA80(Q) to your music system.

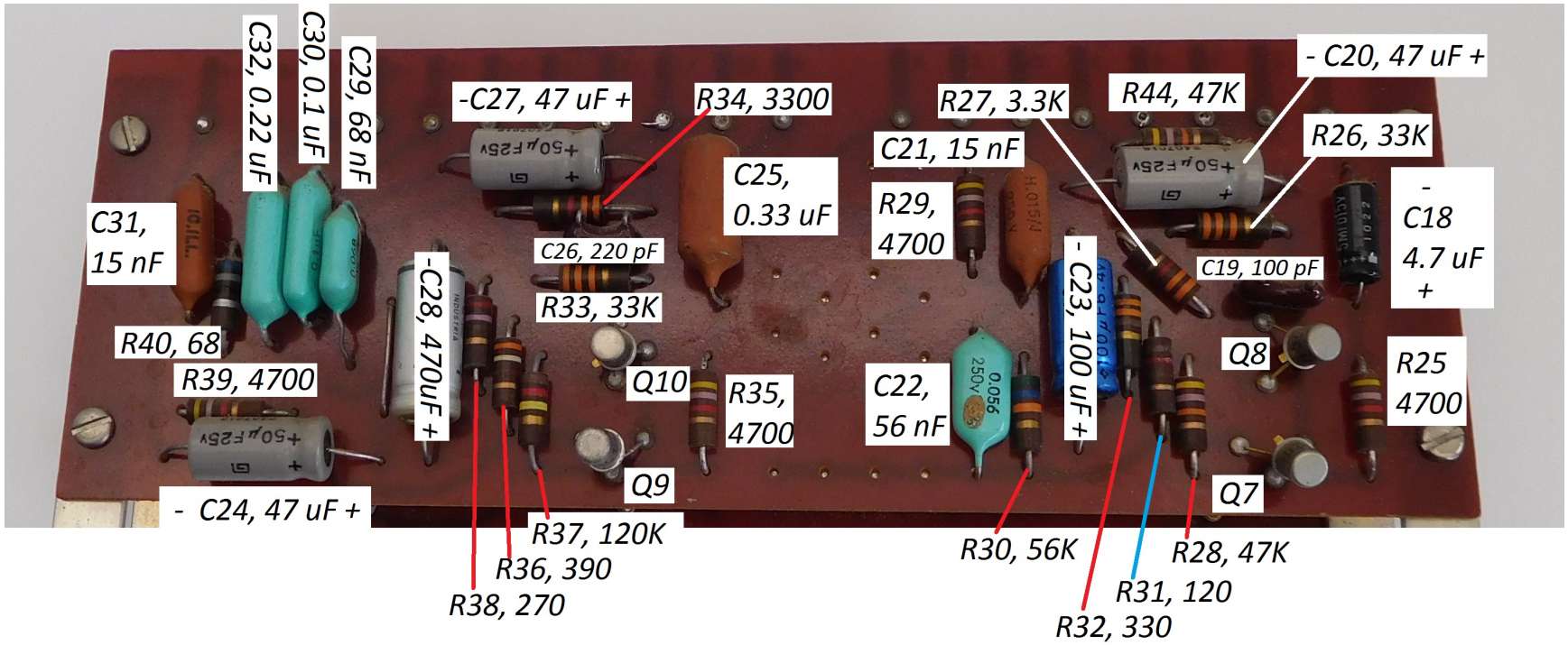

Figure 3-Stock PCB (before upgrade)

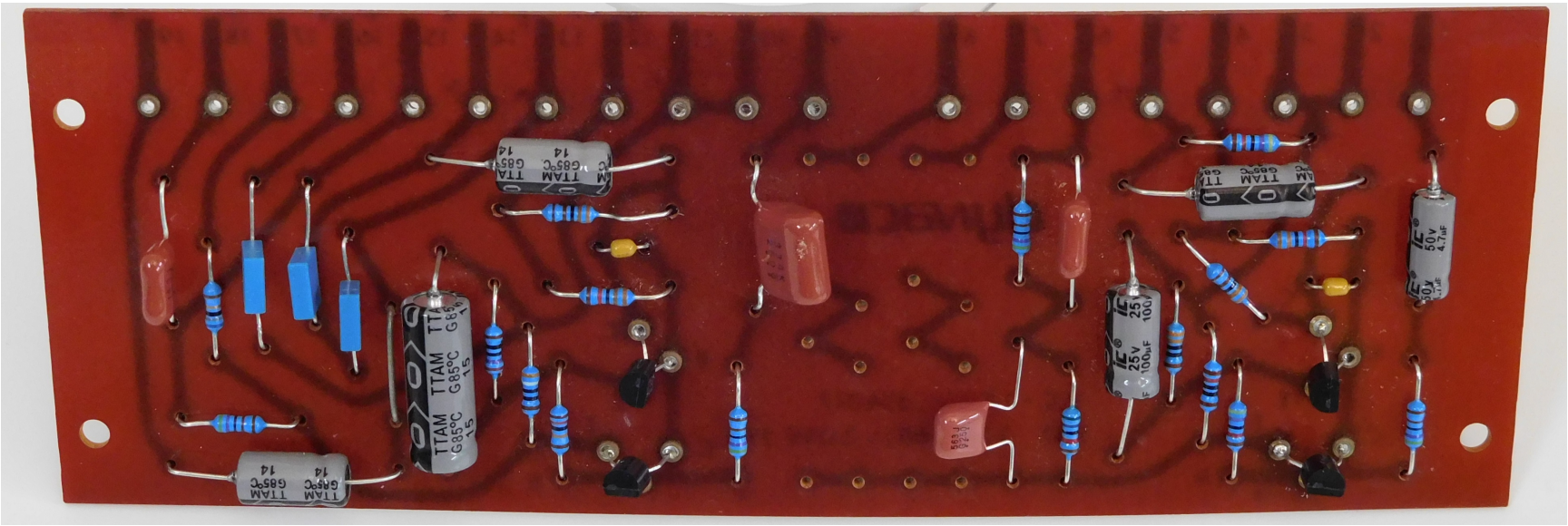

Figure 4-Stock PCB (after upgrade)

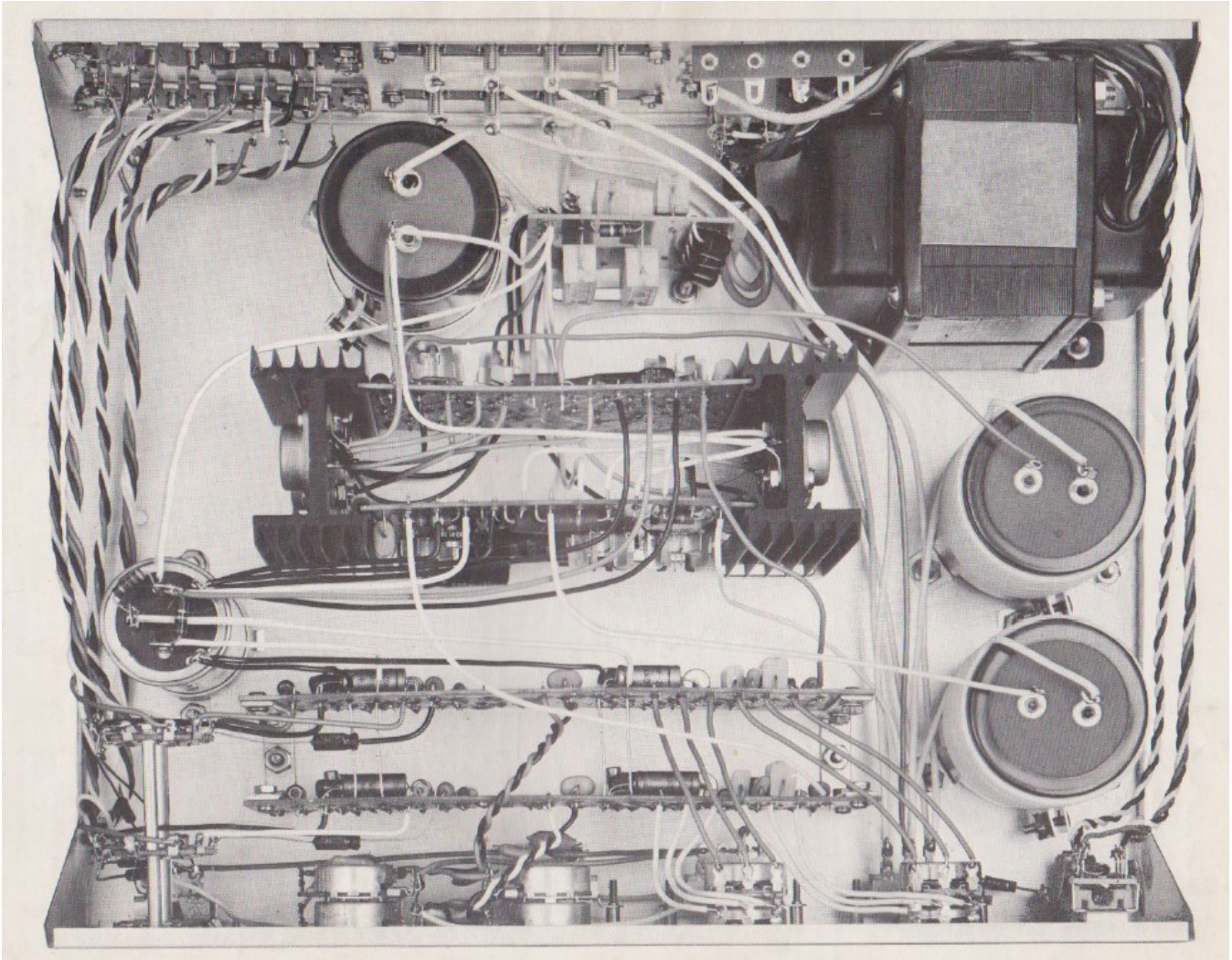

Figure 5-SCA80 Wiring

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.

Appendix 2: First Class De-soldering

De-soldering can be easy if you have the right tools. Through the years, I've used a number of "make-do" methods:

- The toothpick trick – not bad for clearing a hole if the diameter is big enough.
- Sold-a-pult- these spring loaded, one shot solder vacuums are a step in the right direction, but can't supply both heat and vacuum action simultaneously. Some people cut a v-shaped hole in the tip to poke the soldering iron through, but it's still a bit hit or miss, and frustrating.
- Solder wick- this is copper braid that you heat up in connection with the joint. The idea is that the solder wicks into the copper braid, away from the joint. It's still slow and frustrating, and takes so much heat that you worry about the board.

At some point, you'll decide that you deserve a better way to desolder, and you'll buy a heat source with a built in continuous vacuum pump. Big industrial units can cost many hundreds of dollars. Here's the best value I've found so far, the Hakko 808. I bought mine for about $180, and it's worth every penny. Often when I de-solder components, the action is so clean that they just fall out of the board.

Once you've treated yourself to a real de-soldering tool like the Hakko 808, you'll wonder why you waited so long.