dynaco TIP MODIFICATION FOR STEREO 120 AMPLIFIER

INTRODUCTION

Since its introduction several years ago the DYNACO Stereo 120 has earned a reputation for superlative sound quality which has established it as the most popular of all power amplifiers in its class. As a result of continuing development leading to the Stereo 400, a modification has been incorporated in all newly manufactured Stereo 120 amplifiers. DYNACO has also made it possible with this kit to alter older units. This TIP modification greatly improves its reliability under adverse load conditions and strengthens its resistance to internal parts failure with improved circuit protective action, but without changing the amplifier's superb specifications or sonic character.

ASSEMBLY INSTRUCTIONS

To wire this kit, you will need a pencil type soldering iron of 30-60 watts, 60/40 rosin core solder, a small wet sponge to clean the tip of the iron, a medium screwdriver, side cutting and needle nose pliers (available as combination pliers), an inexpensive wire stripper (a single edge razor blade is adequate), a soft pencil or china marker, several wood toothpicks, and paper tissue. If you built your Stereo 120 some time ago, please reread the general soldering information given in its manual on pages 7 and 8 under ASSEMBLY INSTRUCTIONS. In addition, all references in these instructions will coincide with the component descriptions, lug and eyelet numbers as in the original manual. Therefore, if you no longer have the Stereo 120 kit manual, a replacement may be obtained from DYNACO. Its cost is $1.50 postpaid. When ordering, please attach your check in prepayment.

INITIAL DISASSEMBLY (Refer to the Pictorial Diagram on the back, page 8)

1 ( ) Unsolder the wires connected to the following eyelets on the right *and* left PC-14 amplifier boards: eyelet #13, #12, #11, #10, #9 and #8. Bend the wires out of the way of the boards, but do *not* unsolder the other ends of these wires.

2 ( ) Unsolder the long red wire at the red (+) lug on C12 from Q5C on the *right* heat sink. Similarly, unsolder the red wire at the red (+) lug on C12 from Q5C on the *left* heat sink.

3 ( ) Mark the amplifier-heat sink assemblies with a soft pencil or china marker so that they are identified LEFT or RIGHT once they have been removed from the chassis.

4 ( ) Remove the nuts, bolts and lockwashers which hold the amplifier-heat sink assemblies to the *chassis* and lift off both assemblies. Reserve the hardware.

5 ( ) Set the chassis aside and select the two amplifier-heat sink assemblies. While taking care not to crush or twist the leads to transistors Q1 and Q2, remove the long bolts, 1" spacers, nuts and lockwashers holding the PC-14 boards to the heat sinks.

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Separate each board from its heat sink as far as the interconnecting wires will permit without undue strain. Reserve the hardware.

6 ( ) Unsolder and discard the following components on both PC-14 boards: transistors Q3 and Q4; capacitors C1, C6 and C13 (old boards will not contain capacitor C13). To remove transistors Q3 and Q4, first pull off their finned heat sinks. A white thermal compound has been applied to aid in heat transfer and the heat sink. This compound should be wiped off the transistor with some disposable paper tissue or you will get it on your hands and possibly on your clothes. Although the compound is not harmful, it can be messy.

Each transistor has three leads. While holding a lead with long nose pliers on the components side of the board, touch a hot iron to the same lead on the circuit side of the board. When the solder has melted, pull the lead out the components side until it is clear of the board. Repeat on the remaining leads and discard the part.

Once all the parts are removed, clean out the holes made in the boards by their removal with a hot iron and a wood toothpick. Apply the iron to the circuit side next to a hole or eyelet and push the toothpick through the hole from the *circuit* side. See that a hole through the board clear of solder is obtained. This technique is used to aid in mounting new components through these holes.

RE-WIRING EACH BOARD

1 ( ) Select one of the 0.47 mfd capacitors supplied with this kit. *If* the part is tubular shaped with axial leads, bend its leads 90° to the body of the capacitor. If the part is rectangular, bend its leads to fit. Mount the part in position C6 on one of the PC-14 boards by pushing the leads through the board from the components side. While holding the capacitor as close to the board as it will go, solder both leads on the circuit side and then trim off the excess leads.

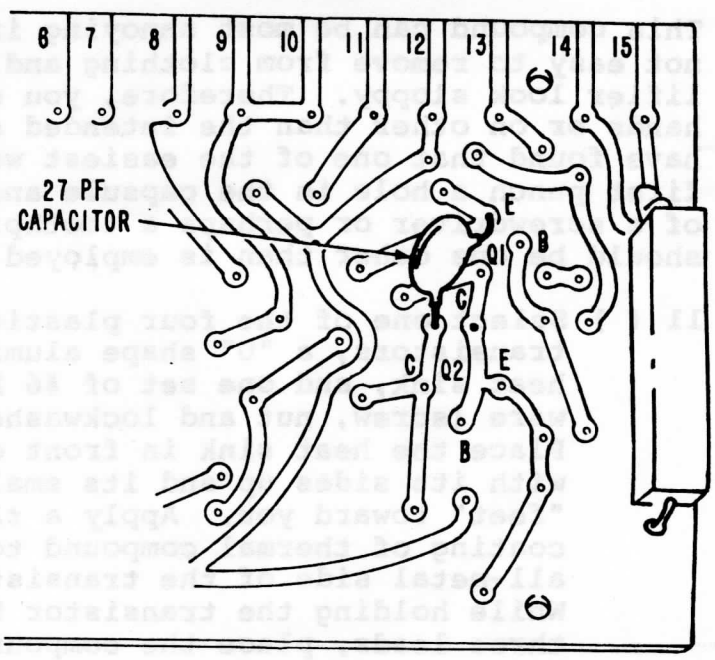
2 ( ) Select the remaining 0.47 mfd capacitor. As before, bend its leads and mount the part in position C6 on the other PC-14 board. Hold the capacitor, solder both leads and trim the leads.

If your PC-14 boards do *NOT* contain capacitor C13, skip the following four steps (steps 3, 4, 5 and 6) and these should be followed now by steps 3a, 4a, 5a and 6a at the end of these assembly instructions on page 6.

3 ( ) Select one of the 68 pf small disc capacitors. Mount it in position C13 on one of the PC-14 boards, using care not to disturb the leads to transistor Q2 (the one with the heat sink). Hold the capacitor as close to the board as permissible on the components side, solder both leads on the circuit side and trim the leads short.

4 ( ) Select the remaining 68 pf capacitor. Mount it in position C13 on the other PC-14 board as above. Watch those leads to Q2!

5 ( ) Select one of the 27 pf capacitors. Bend its leads about 45° out from the body. This capacitor will be mounted on the *circuit* side of one of the boards between the emitter of Q1 (the transistor without the heat sink) and the collector of Q2. See the pictorial to the right. Solder one lead to the nearest circuit path of solder at the open end of the E. Solder the other lead to the lead pushing through the board equidistant from the two C markings. Make certain that the leads do not touch anything other than the intended connections and also see that in soldering you have not disturbed any already installed components.



PC 14 AMPLIFIER BOARD

6 ( ) Repeat the above step with the remaining 27 pf capacitor and the second PC-14 board.

7 ( ) Select a 4.7 (or 5) mfd tantalum capacitor. A color dot or tiny "+" adjacent to one lead indicates the positive lead. CORRECT POLARITY OF THESE CAPACITORS IS ESSENTIAL. Spread the leads and mount it as close to the board as possible on the components side in position C1 on one of the PC-14 boards. Solder the leads on the circuit side and trim them.

8 ( ) Select the remaining 4.7 (or 5) mfd tantalum and, as before, mount it close to the board in position C1 on the other PC-14 board. Make certain that the polarity is correct, solder and trim the leads.

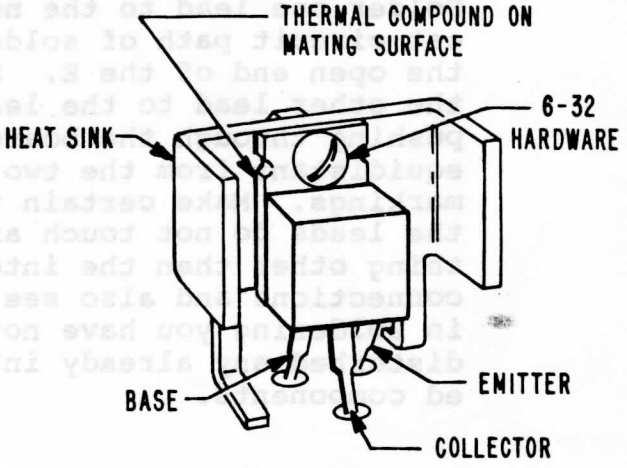
9 ( ) Set aside the PC-14 boards, select the chassis assembly and one of the 1000 ohm resistors (color coded brown, black, red). Shorten the leads to the resistor appropriately and connect one resistor lead to one of the black binding post lugs at the output of the amplifier. Connect the other resistor lead to the red binding post lug above the black post. Solder both connections securely. Observe that there are now four wires connected to the black post lug and three wires connected to the red post lug.

10 ( ) Select the remaining 1000 ohm resistor. Shorten its leads and connect one end to the other black binding post lug and the remaining end to the corresponding red binding post lug. Solder both connections securely.

Steps 11, 12, 18 and 19 following describe the installation of some components which require the application of the white silicon thermal compound supplied in a capsule. This compound is necessary to assure good heat transfer. The amount provided is *well in excess* of what you need.

This compound can be most annoying if not carefully handled. It is not easy to remove from clothing and it can make your finished amplifier look sloppy. Therefore, you should wipe off any excess on your hands or on other than the intended surfaces with paper tissues. We have found that one of the easiest ways to handle this compound is to first punch a hole in the capsule and apply it with either the blade of a screwdriver or perhaps a toothpick. If a screwdriver is used, it should be one other than is employed to mount the hardware.

11 ( ) Select one of the four plastic body transistors, a "U" shape aluminum heat sink, and one set of #6 hardware (screw, nut and lockwasher). Place the heat sink in front of you with its sides up and its small "feet" toward you. Apply a *thin* coating of thermal compound to the all-metal side of the transistor. While holding the transistor by its three leads, place the compound side against the heat sink so that the holes in both parts line up and the leads point squarely from the "feet" end of the heat sink. Mount the transistor to the heat sink with a screw passed through from the transistor side and fastened in place on the back of the heat sink with first a lockwasher and then a nut. Use a very slight twisting motion to aid in squeezing out any trapped air between transistor and heat sink, but final tightening must leave the transistor square on the heat sink. Tighten until you see compound squeezing out the sides of the transistor and the transistor cannot easily move. Wipe off excess compound, particularly from transistor leads.



TRANSISTOR LEAD POSITIONS

12 ( ) Repeat the above procedure with the remaining three transistors, compound, heat sinks and hardware.

13 ( ) Select one of the transistor and heat sink combinations just completed marked #577031 (or TIP 31C). With the open part of the "U" facing up, bend the center (collector) lead of the transistor up about 1/4". Mount this transistor assembly from the components side on one of the PC-14 boards in position Q3 with the open part of the "U" facing at an angle toward the top row of eyelets on PC-14. Keep the two outside leads of the transistor as vertical as possible so that the heat sink will be above them. Firmly and gently push the assembly in place until both feet of the heat sink touch the board, but do not come in contact with any leads to resistors in the area. While holding the assembly from the top, solder the three transistor leads on the circuit side of the board. Trim the leads short on the circuit side and then double check to see that no leads or parts of the heat sink touch other leads.

14 ( ) Select one of the transistor-heat sink combinations marked #567032 (or TIP 32C). As before, bend the center (collector) lead up and mount the assembly from the components side in position Q4 on the same board with the open part of the "U" *away from* the top row of eyelets on PC-14. While keeping the two outside leads vertical, push the assembly in place until both feet touch the

the board but do not come in contact with nearby resistor and diode leads. Hold the assembly from the top and solder on the circuit side. Double check the placement of the assembly with respect to other leads and then trim the transistor leads short.

15 ( ) Repeat step 13 with the remaining #577031 assembly and the other PC-14 board at position Q3. Watch to see that the feet do not touch any resistor leads.

16 ( ) Repeat step 14 with the remaining #567032 at position Q4. Watch those feet!

This completes the soldering for the TIP modification. Now it is a good idea to observe the solder connections you have made to see that each one is shiny and flows smoothly from a lead to the circuit or a terminal. A solder ball is surely a rosin or dry soldered connection and should be re-wet with a very small amount of additional solder as required. Also check that there are no solder splashes on the boards and that all of the leads have been cut short. Double check the soldering of the 27 pf capacitor on the circuit side.

17 ( ) Reassemble both PC-14 boards to its associated heat sink with the four long bolts, 1" spacers, nuts and lockwashers. A bolt is first passed through the heat sink, then a spacer is added, followed by the board, a lockwasher and finally a nut.

18 ( ) Apply a relatively thin even coat of thermal compound to the base of the heat sink (the part that bolts to the amplifier chassis) and then remount the correct assemblies on each side of the chassis. As the assemblies are tightened to the chassis, the compound will squeeze out and any excess may be removed with tissue.

19 ( ) Remove the nuts, bolts and lockwashers which mount the heat sink associated with the PC-15 power supply to the chassis. As above, apply a relatively thin even coat of compound to the base of this heat sink. Remount the assembly with the same hardware and wipe off excess compound.

20 ( ) Reconnect the long red wire from Q5C on the *right* heat sink to the red (+) lug on C12. Reconnect the red wire from Q5C on the *left* heat sink to the same lug. Make certain that all three wires are securely soldered at this lug.

21 ( ) Solder the wires going to eyelets #8, #9, #10, #11, #12 and #13 on both PC-14 boards. See the pictorial diagram on the back page of these instructions for their locations.

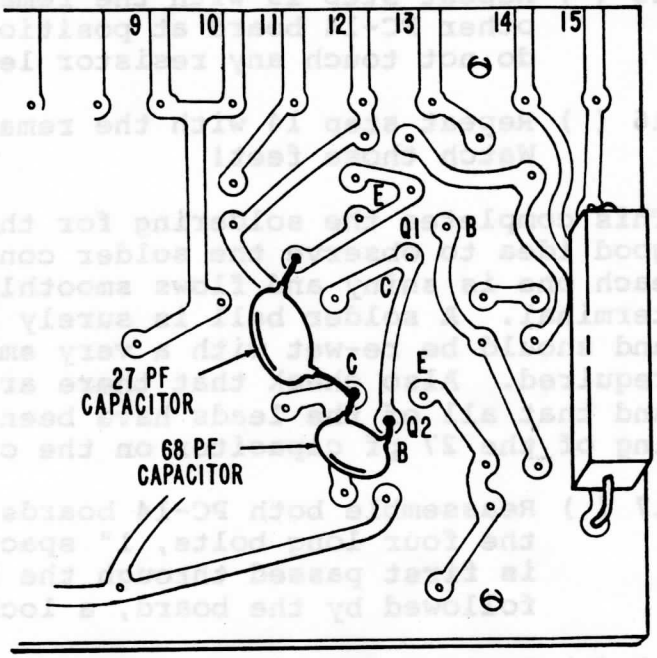
FINAL ASSEMBLY

After the wiring is completed, inspect to see that there are no insecure connections and for any possibility of bare wires touching other than the intended terminal. Carefully inspect the new Q3 and Q4 transistor and heat sink assemblies to see that they do not touch any resistor, capacitor or diode leads. Also check to see that Q1 and Q2 transistors have remained in their original positions, that their leads have not been twisted or broken and that the finned heat sink on Q2 is securely in place and undisturbed. Turn the amplifier upside down to shake out any bits of solder or wire. Reinstall the cover.

The following four steps are to be used in place of steps 3, 4, 5 and 6 on pages 2 and 3 under *RE-WIRING EACH BOARD* if your PC-14 boards do *not* contain position C13. When following these steps, refer to the pictorial diagram below on the right.

3a ( ) Select one of the 27 pf small disc capacitors. Bend its leads almost 90° out from its body and mount it as shown on the *circuit* side of one of the PC-14 boards. The leads are quite short, but they will reach. If you first "tin" the leads by applying a little solder to them no further solder should be required. Make certain that neither lead touches other than the intended connection.

4a ( ) Select the remaining 27 pf capacitor and, as before, mount it on the circuit side of the other PC-14 board. Make sure the leads do not touch other connections.



PC 14 AMPLIFIER BOARD
(OLDER TYPE)

5a ( ) Select one of the 68 pf small disc capacitors and cut its leads to not more than 1/4". Mount it on the circuit side of one of the PC-14 boards as shown from the C (collector) to B (base) of Q2 (the transistor with the heat sink). This will now make three leads at C of Q2 and therefore observe that in soldering you have not disturbed any already installed parts.

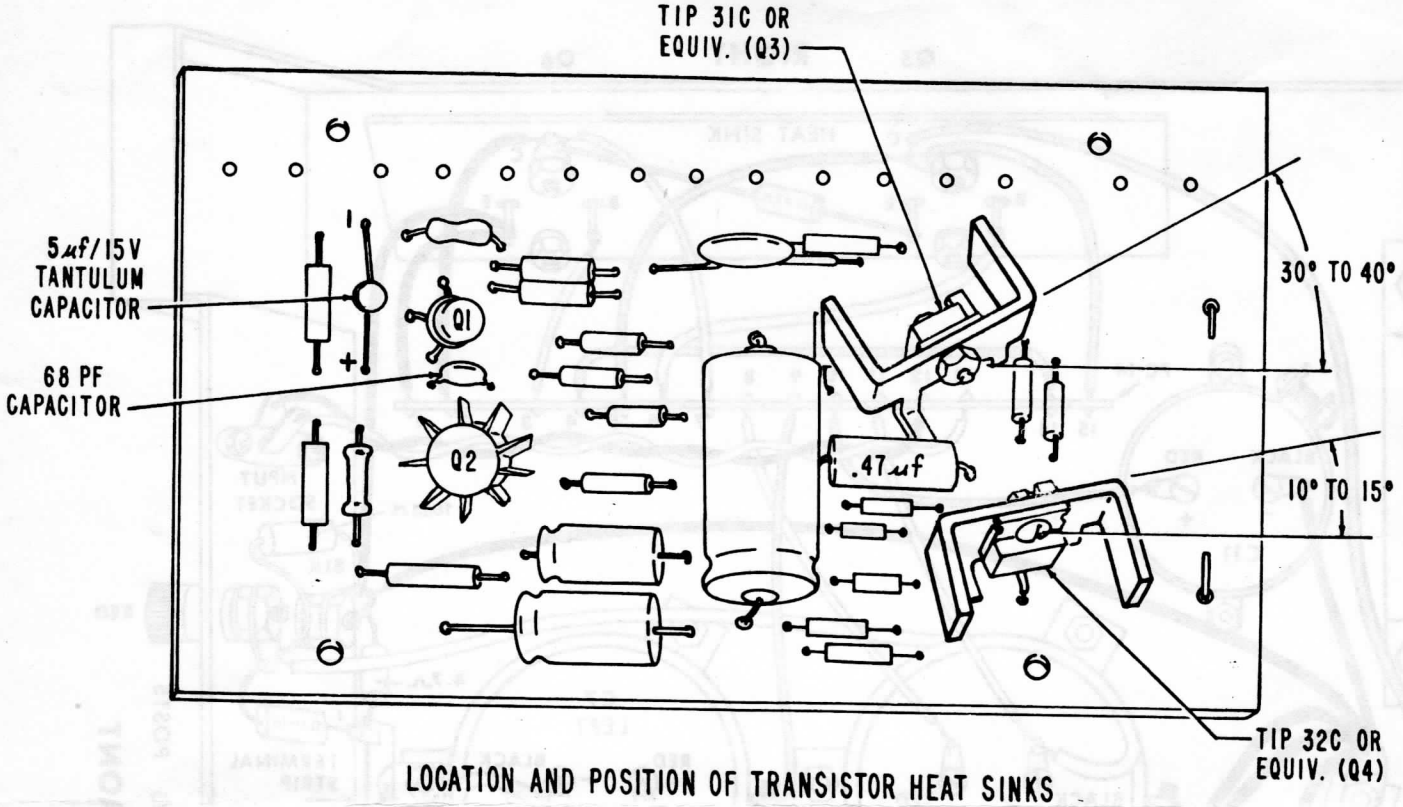
6a ( ) Select the remaining 68 pf capacitor and, as above, mount it on the other PC-14 board. Do not disturb other components when soldering.

Now continue the wiring with step 7 on page 3.

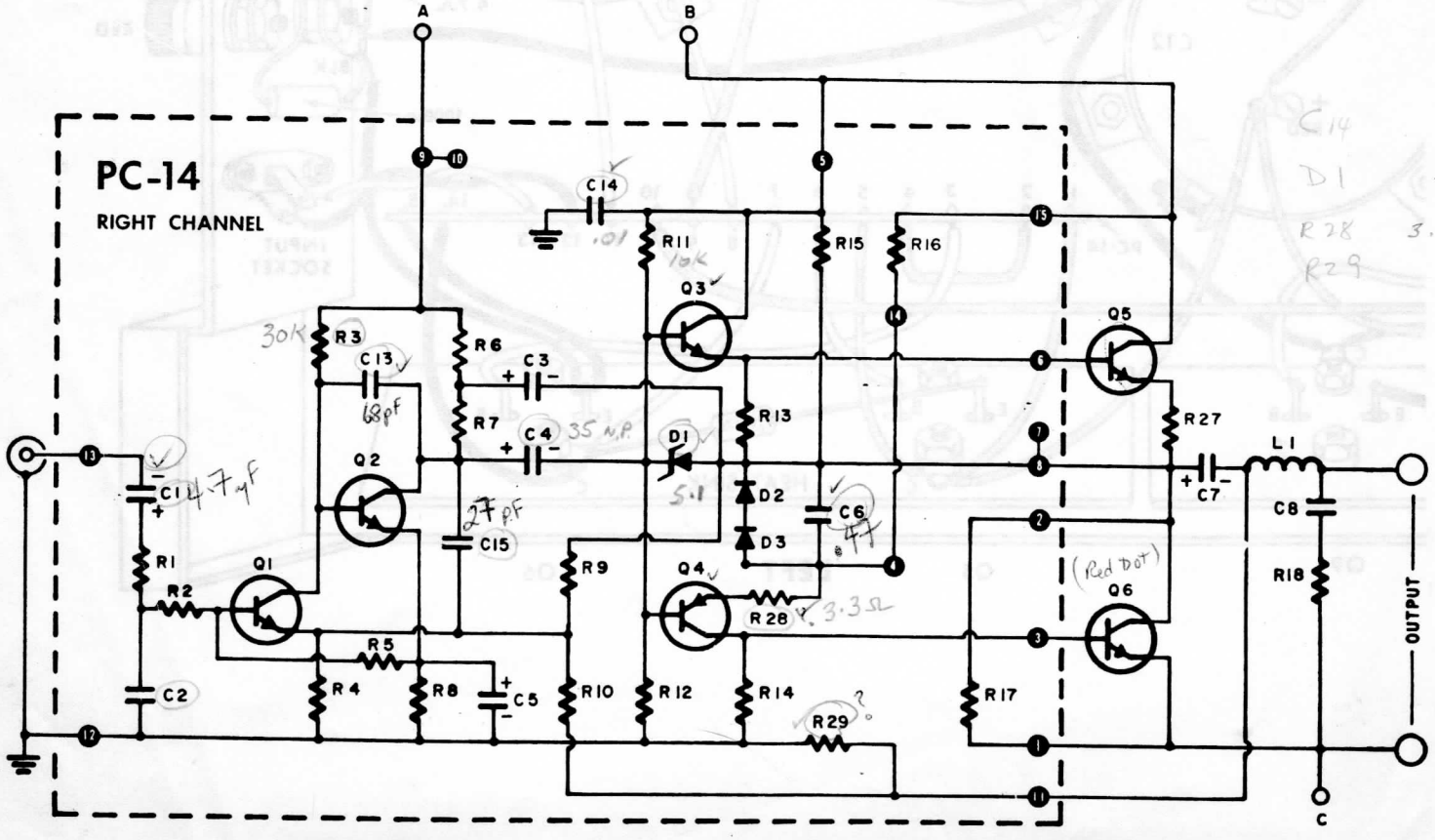
PARTS LIST

DESCRIPTION	PART #
2- 1000 ohm, 1/2 watt resistor	113102
2- 68 pf disc capacitor	237680
2- 27 pf disc capacitor	244271
2- .47 mfd tubular capacitor	264474
2- 5 mfd tantalum capacitor	282505
2- TIP 32C PNP transistor	567032
2- TIP 31C NPN transistor	577031
4- 6-32 x 1/4" screw	612342
4- 6-32 hex nut	614355
4- 6-32 lockwasher	617305
4- Heat sink	767001
1- Instruction sheet	919017
1- White silicon thermal compound	945004

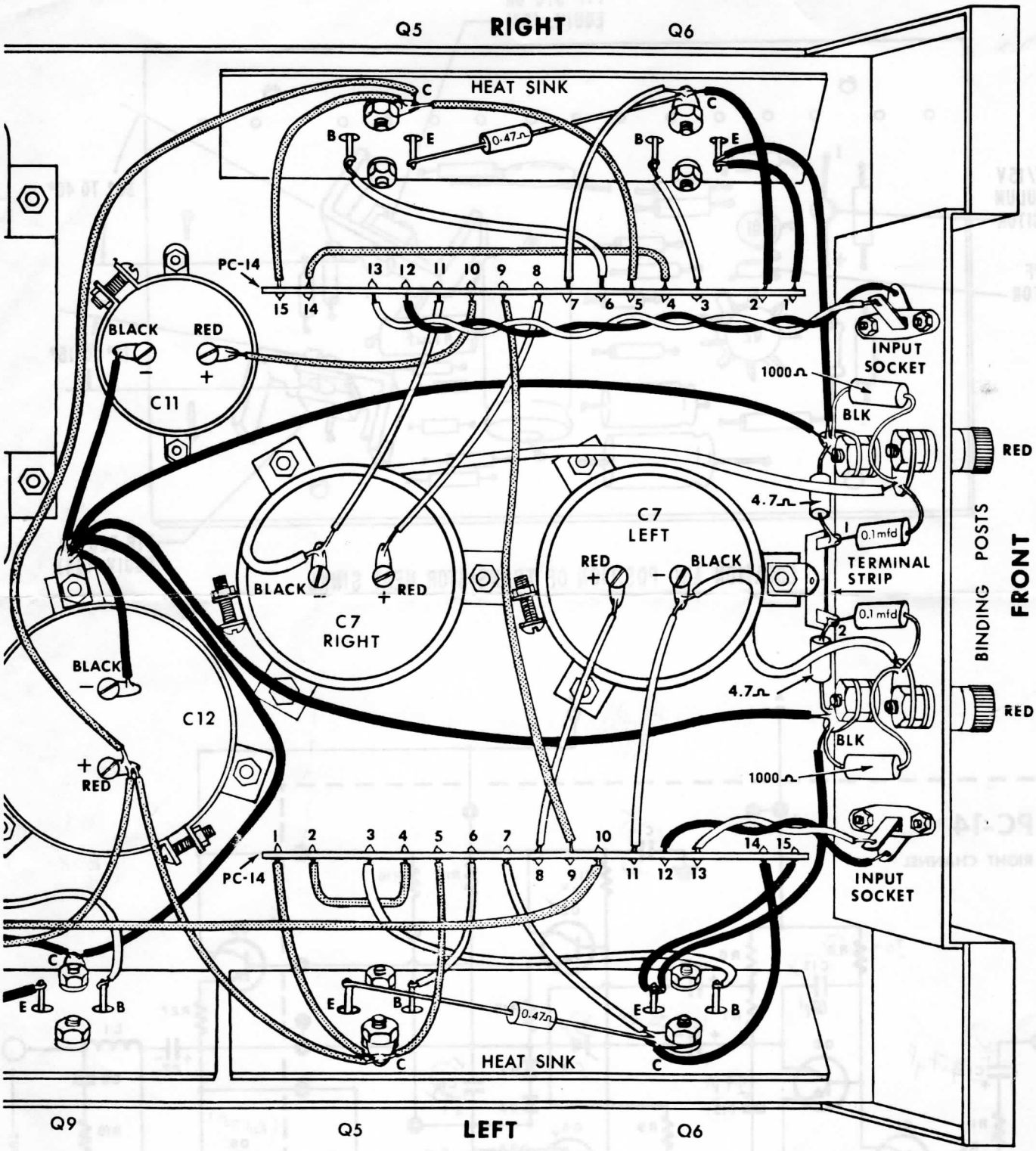
SUPER TIP MOD: (4) #571104 (2N5630) plus above items.



LOCATION AND POSITION OF TRANSISTOR HEAT SINKS



2N5630


Q5
RIGHT
Q6
HEAT SINK
C
B
E
0.47Ω
PC-14
13 12 11 10 9 8
15 14
7 6 5 4 3 2 1
BLACK
RED
C11
INPUT SOCKET
1000Ω
BLK
RED
4.7Ω
C7 LEFT
RED
BLACK
0.1mfd
TERMINAL STRIP
BLACK
RED
C7 RIGHT
BINDING POSTS
FRONT
BLACK
C12
RED
1 2 3 4 5 6 7 10
14 15
8 9 11 12 13
PC-14
INPUT SOCKET
HEAT SINK
Q9
Q5
LEFT
Q6