KG-854 54-WATT
ALL-TRANSISTOR STEREO AMPLIFIER

CONSTRUCTING YOUR KNIGHT-KIT

The transistor amplifier you will build has been designed to deliver the highest standards of high fidelity performance. The construction information given here has been carefully worked out to guide your every step. **Please follow the instructions carefully, and work slowly.** In the end you will be rewarded with a fine amplifier and personal satisfaction from a job well done.

Choose a workplace that is well lighted, and has an outlet for your soldering iron. Such an area should allow you to work at a leisurely pace without too many interruptions.

When you are instructed to unpack your kit and check your parts, you will find it convenient to keep your parts sorted in egg cartons, muffin tins, or ice cube trays.

Several basic tools are required to build your kit. They are: a medium size screwdriver with a $\frac{3}{16}$" blade; a small size screwdriver with a $\frac{1}{8}$" blade; a pair of long nose pliers; a pair of diagonal wire cutters and a soldering iron rated about 40 watts. Although they are not absolutely necessary, a set of nut drivers is very helpful.

UNPACKING

Check the contents of your kit against the parts list. This will help you become acquainted with the individual parts before you are required to use them. Any unfamiliar parts can be identified by comparing them with the parts identification photographs or wiring illustrations.

NOTE: The front surface of the heavy "U" shaped chassis has a 4-degree slant. This causes the dress panel to slant by an equal amount and contributes to the modern appearance of this amplifier.

Assort the hardware by size. The hardware identification photograph is shown actual size on page 60 to aid you.

Terminal strips are known by "TS" numbers and can be identified by their photographs in the Parts Idendification Chart. It is very important that you choose the right terminal strip during construction. Look for the number of terminals, how many are located left or right of the mounting foot, and whether or not the foot is also a terminal.

Capacitors come in many shapes, sizes and types. Most of the capacitors used in this kit are of the "electrolytic" type. These units have a positive + and a negative – lead. It is **imperative** that you connect these leads to the point indicated in the construction step. These capacitors are all marked with two essential characteristics; capacitance, marked in microfarads (Mfd or μfd) and voltage, (V). Typical markings are:

250 MFD 15V | 10 MF 6V | 10-25 DC

In each unit the first number is the capacitance in microfarads, the second number is the working voltage. Notice in the third example that the abbreviation for microfarad is missing; however you can still tell that this unit is a 10 μf at 25V.

Ceramic disc capacitors have their value (capacitance) marked in either of two units. The first unit is identical to the electrolytic types, the μfd. The second unit is a million times smaller, it is the micromicrofarad ($\mu\mu$fd). Disc capacitors often do not have the unit indicated on them. You can quickly tell what the unit is, however, by the numbers given. If the number starts with a decimal point, such as .0033, read it as .0033 μfd. If a part is marked in whole numbers, such as 6800, read it as 6800 $\mu\mu$fd.

The resistors for your kit are supplied on plainly marked cards. Do not remove the resistors from the cards before you need them. Two types of resistors are used: Cylindrical carbon composition and wire-wound resistors. Two sizes of resistors are supplied in this kit. In order of increasing sizes these are: ½, and 2-watt units.

The value (resistance) is indicated by the first three color bands. The fourth band indicates the amount the resistance can vary from the stated value, with silver representing 10%, and gold, 5% tolerance. If the tolerance is important in a particular step, this will be specified.

Variable resistors (controls) have their value and part number stamped on the case.

The step-by-step instructions must be followed exactly. DO NOT attempt to wire this kit from the pictorials or schematic diagram alone because a definite wiring sequence must be followed. Occasionally several parts are mounted or wired in a single step. Be sure to read the entire step before starting. A box is provided next to each step to check off the step after you have completed it.

THIS KIT MUST BE PROPERLY SOLDERED!

USE ENOUGH HEAT

This is the main idea of good soldering. Apply enough heat to the metal surfaces you are joining to make the solder spread freely, until the contour (shape) of the connection shows under the solder.

AN ELECTRONIC UNIT WILL NOT WORK . . . unless it is properly soldered. Read these instructions carefully to understand the basic ideas of good soldering.

Enough heat must be used so the solder can actually penetrate the metal surfaces, making an unbroken path over which electricity can travel. You are not using enough heat if the solder barely melts and forms a rounded ball of rough, flaky solder.

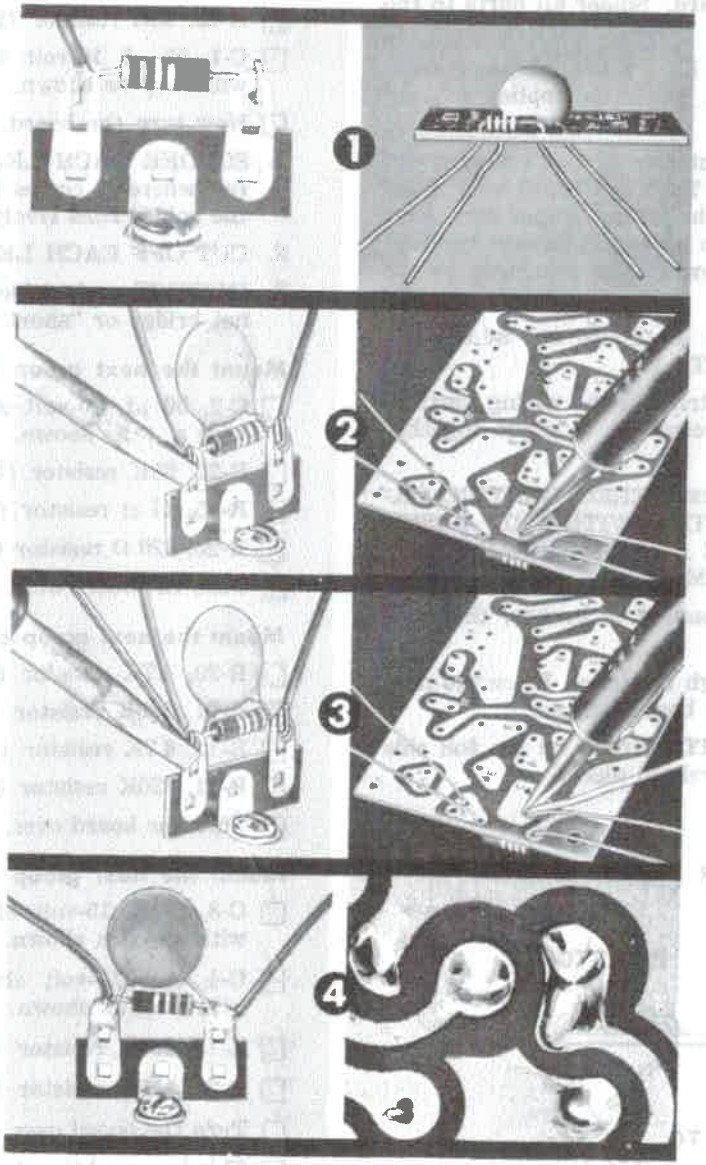
Use the Right Soldering Tool

A soldering iron in the 27-40 watt range is recommended. Any iron in this range with a clean, chisel-shaped tip will supply the correct amount of heat to make a good solder connection.

Keep the iron or gun tip brightly coated with solder. When necessary, wipe the hot tip clean with a cloth. If you are using an old tip, clean it before you start soldering. Use a fine file or steel wool to expose the bright metal. Heat the iron and immediately coat the tip with solder.

Use Only Rosin Core Solder

We supply the right kind of solder (*rosin core solder*). Do not use any other kind of solder! **Use of Acid Core Solder, Paste, or Irons Cleaned on a Sal Ammoniac Block will ruin any Electronic Unit and will Void the Guarantee.**



HERE'S HOW TO DO IT . . .

1. Join bare metal to bare metal; insulation must be removed. Make good mechanical connections and keep resistor and capacitor leads as short as possible, unless otherwise specified.

2. Coat the tip of a hot iron with solder. Then **Firmly Press the Flat Side of the Tip** against the parts to be soldered together. Keep the iron there while you . . .

3. Apply the solder between the metal to be soldered and the iron tip. Use only enough solder to flow over all surfaces of the connection, and all wires in the connection. Remove the iron.

Do Not Move Parts Until the Solder Hardens. If you accidentally move the wires as the solder is hardening, apply your iron and reheat.

4. Compare your soldering with the pictures on this page. You have a good connection if your solder has flowed over all surfaces to be connected, following the shape of the surfaces. It should appear smooth and bright and all wires in the connection should be well-soldered.

You Have Not Used Enough Heat: If your connection is rough and flaky-looking, or if the solder has formed a round ball instead of spreading.

The difference between good soldering (enough heat) and poor soldering (not enough heat) is just a few extra seconds with a hot iron **firmly** applied. REMEMBER, LARGER METAL SURFACES TAKE A LONGER TIME TO HEAT.

MOUNTING PARTS ON THE PRINTED CIRCUIT BOARD

SEE FIGURE 1.

☐ Examine the large circuit board. Notice that it has two different sides: a component side, on which are printed outlines of the parts; and a copper foil side, on which is etched the wiring pattern. Mount all parts on the component side of the board. Solder all parts to the foil side of the board.

NOTE: The foil side of the circuit board will have a blue or green coating. This is a solder resistant coating that has been applied to help avoid solder "shorts".

☐ Small transistor socket. On the component side of the board, insert the socket leads into the holes for TR-1. Turn the board over, resting it on the socket to hold the socket in place. Solder the three leads carefully. Use only enough solder to cover the base of the lead and the hole. Do not allow solder to flow to the next hole in the "island".

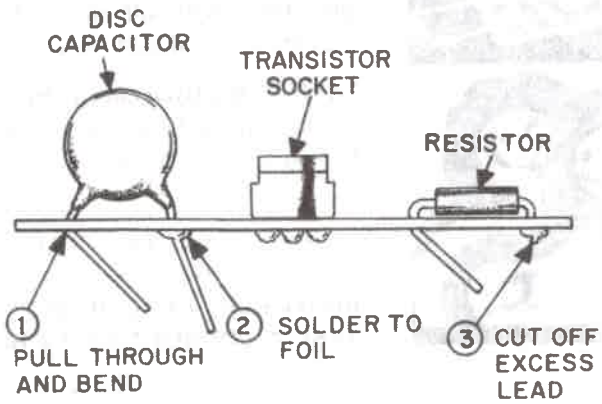
☐ Seven small transistor sockets. Insert in the board one at a time; then solder each in the same manner as TR-1.

CAUTION: There are many closely spaced strips in the wiring pattern. When you solder parts to the board, be careful not to short together separate strips of foil.

Resistors and capacitors will be mounted next. ELECTROLYTIC CAPACITORS MUST BE MOUNTED CORRECTLY, WITH THE + END POSITIONED AS ILLUSTRATED OR THE AMPLIFIER WILL NOT WORK AND COSTLY PARTS MAY BE DAMAGED.

For convenience, the following parts are mounted in groups, then soldered. Use this method for mounting:

1. **INSERT THE LEADS** of the parts through the holes. Place the part over its outline on the board, close to the board surface.
2. **THEN BEND THE LEADS AT A SLIGHT ANGLE** on the foil side of the board, so that the part is held securely in place.



Mount the following group of parts:

☐ R-19, 220 Ω resistor (red, red, brown). Notice that the resistors are easy to mount if the leads are bent close to the body first.

☐ R-14, 47 Ω resistor (yellow, violet, black).

☐ R-13, 68K resistor (blue, gray, orange).

☐ C-1, 50 μf, 10-volt electrolytic capacitor. Position the end marked with a + as shown.

☐ Now turn the board over and solder each component as follows:

1. SOLDER EACH LEAD of each part, only at the hole in the metal foil where it comes through. Be sure to heat the connection until the solder runs freely and spreads around the lead and hole.
2. CUT OFF EACH LEAD as close as possible to the board.
3. INSPECT each soldered connection to be sure that the solder does not bridge or "short" to an adjacent foil strip.

Mount the next group of parts:

☐ C-2, 50 μf, 10-volt electrolytic capacitor. Position the end marked with a + as shown.

☐ R-22, 68K resistor (blue, gray, orange).

☐ R-25, 47 Ω resistor (yellow, violet, black).

☐ R-26, 220 Ω resistor (red, red, brown).

☐ Turn the board over. Solder each connection, and cut off excess wire.

Mount the next group of parts:

☐ R-20, 4.7K resistor (yellow, violet, red).

☐ R-21, 330K resistor (orange, orange, yellow).

☐ R-12, 4.7K resistor (yellow, violet, red).

☐ R-11, 330K resistor (orange, orange, yellow).

☐ Turn the board over. Solder each connection, and cut off excess wire.

Mount the next group of parts:

☐ C-3, 5 μf, 15-volt electrolytic capacitor. Position the end marked with a + as shown.

☐ C-4, 5μf, 15-volt electrolytic capacitor. Position the end marked with a + as shown.

☐ R-15, 150K resistor (brown, green, yellow).

☐ R-23, 150K resistor (brown, green, yellow).

☐ Turn the board over. Solder each connection, and cut off excess wire.

☐ This is a good time to stop and check your work.

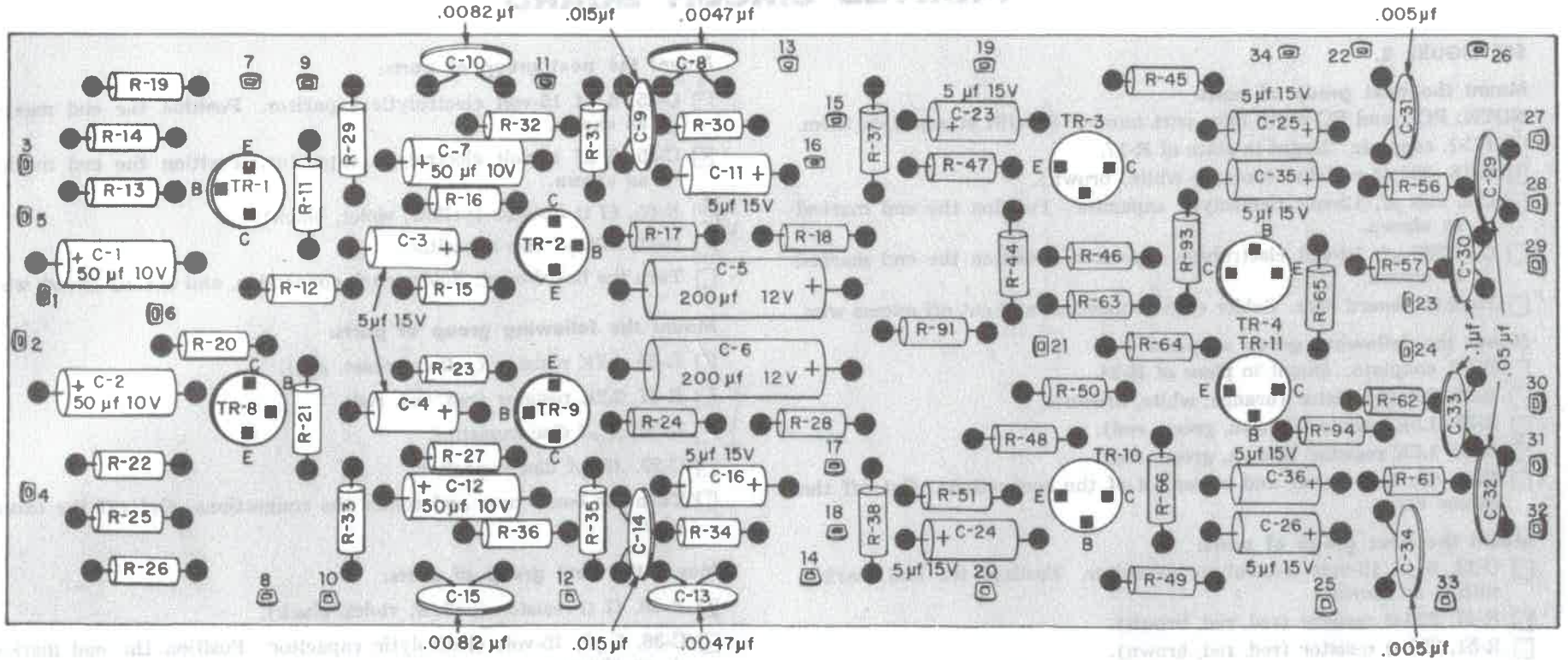


FIGURE 1. MOUNTING PARTS ON THE PRINTED CIRCUIT BOARD

Mount the next group of parts:

- [ ] R-29, 3.3K resistor (orange, orange, red).
- [ ] R-32, 5.6K resistor (green, blue, red).
- [ ] R-16, 8.2K resistor (gray, red, red).
- [ ] C-7, 50 µf, 10-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] C-10, .0082 µf disc capacitor (may be marked 8200 µµf).
- [ ] Turn the board over. Solder each connection, and cut off excess wire.

Mount the following group of parts:

- [ ] R-31, 330K resistor (orange, orange, yellow).
- [ ] C-9, .015 µf disc capacitor (may be marked 15,000 µµf).
- [ ] C-11, 5 µf, 15-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] R-30, 15K resistor (brown, green, orange).
- [ ] C-8, .0047 µf disc capacitor (may be marked 4700 µµf).
- [ ] Turn the board over. Solder each connection, and cut off excess wire.

Mount the next group of parts:

- [ ] R-27, 8.2K resistor (gray, red, red).
- [ ] R-33, 3.3K resistor (orange, orange, red).
- [ ] R-36, 5.6K resistor (green, blue, red).
- [ ] C-12, 50 µf, 10-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] C-15, .0082 µf disc capacitor (may be marked 8200 µµf).
- [ ] Turn the board over. Solder each connection, and cut off excess wire.

Mount the following group of parts:

- [ ] R-35, 330K resistor (orange, orange, yellow).
- [ ] C-14, .015 µf disc capacitor (may be marked 15,000 µµf).
- [ ] C-13, .0047 µf disc capacitor (may be marked 4700 µµf).
- [ ] R-34, 15K resistor (brown, green, orange).
- [ ] C-16, 5 µf, 15-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] Turn the board over. Solder each connection, and cut off excess wire.

PRINTED CIRCUIT BOARD

SEE FIGURE 2.

Mount the next group of parts:

NOTE: PC-1 and PC-2 will have part number 820-197 stamped on them.

- [ ] PC-1, couplate. Mount in place of R-17.
- [ ] R-18, 390 Ω resistor (orange, white, brown).
- [ ] C-5, 200 μf, 12-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] C-6, 200 μf, 12-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] Turn the board over. Solder each connection, and cut off excess wire.

Mount the following group of parts:

- [ ] PC-2, couplate. Mount in place of R-24.
- [ ] R-28, 390 Ω resistor (orange, white, brown).
- [ ] R-37, 1.5K resistor (brown, green, red).
- [ ] R-38, 1.5K resistor (brown, green, red).
- [ ] Turn the board over and solder all of the connections. Cut off the excess wire.

Mount the next group of parts:

- [ ] C-23, 5 μf 15-volt electrolytic capacitor. Position the end marked with + as shown.
- [ ] R-47, 220 Ω resistor (red, red, brown).
- [ ] R-51, 220 Ω resistor (red, red, brown).
- [ ] C-24, 5 μf 15-volt electrolytic capacitor. Position the end marked with + as shown.
- [ ] R-45, 18K resistor (brown, gray, orange).
- [ ] R-49, 18K resistor (brown, gray, orange).
- [ ] Turn the board over and solder all of the connections. Cut off the excess wire.

Mount the next group of parts:

- [ ] R-91, 1.2K resistor (brown, red, red).
- [ ] R-48, 470K resistor (yellow, violet, yellow).
- [ ] R-50, 4.7K resistor (yellow, violet, red).
- [ ] R-64, 3.9K resistor (orange, white, red).
- [ ] Turn the board over. Solder each connection, and cut off excess wire.

Mount the following group of parts:

- [ ] R-63, 3.9K resistor (orange, white, red).
- [ ] R-46, 4.7K resistor (yellow, violet, red)
- [ ] R-44, 470K resistor (yellow, violet, yellow).
- [ ] R-93, 100K resistor (brown, black, yellow).
- [ ] Turn the board over and solder the connections. Cut off the excess wire.

Mount the next group of parts:

- [ ] C-25, 5 μf 15-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] C-35, 5 μf 15-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] R-65, 47 Ω resistor (yellow, violet, black).
- [ ] C-31, .005 μf disc capacitor.
- [ ] Turn the board over. Solder each connection, and cut off excess wire.

Mount the following group of parts:

- [ ] R-56, 4.7K resistor (yellow, violet, red).
- [ ] R-57, 2.2K resistor (red, red, red).
- [ ] C-30, .1 μf disc capacitor.
- [ ] C-29, .05 μf disc capacitor.
- [ ] Turn the board over and solder the connections. Cut off the excess wire.

Mount the next group of parts:

- [ ] R-66, 47 Ω resistor (yellow, violet, black).
- [ ] C-36, 5 μf, 15-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] C-26, 5 μf, 15-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] R-94, 100K resistor (brown, black, yellow).
- [ ] Turn the board over. Solder each connection, and cut off excess wire.

Mount the following group of parts:

- [ ] R-62, 2.2K resistor (red, red, red).
- [ ] R-61, 4.7K resistor (yellow, violet, red).
- [ ] C-34, .005 μf disc capacitor.
- [ ] C-33, .1 μf disc capacitor.
- [ ] C-32, .05 μf disc capacitor.
- [ ] Turn the board over and solder the connections. Cut off the excess wire.

Go back and carefully check the foil side of the circuit board. Be sure that there are no solder "shorts", or parts left unsoldered.

The wiring of the circuit board is now completed, set the board aside, it will be used later.

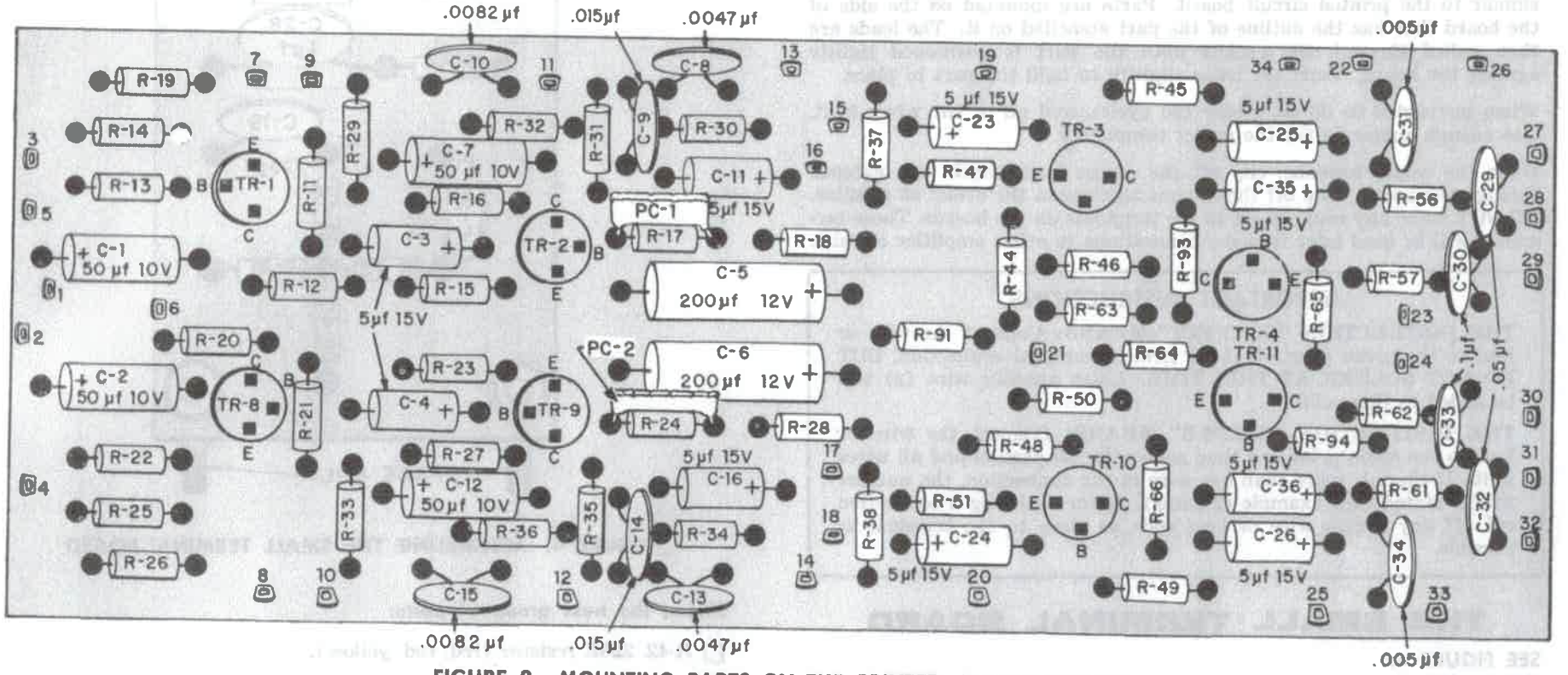


FIGURE 2. MOUNTING PARTS ON THE PRINTED CIRCUIT BOARD

INSPECT YOUR SOLDERING. Solder must not bridge across from one foil strip to another foil strip. Figure 3 shows a correctly soldered foil strip and a "WRONG" picture with 2 solder bridges or short circuits to other foil strips.

To correct a solder "bridge" or shorted foil strips, hold the board foil side down. Place the hot tip of your iron against the connection and allow the solder to run back onto the tip. Use your cutters to remove any excess wire that may be shorting across the two strips.

FIGURE 3

ASSEMBLING THE TERMINAL BOARDS

The terminal boards supplied with your kit are assembled in a manner similar to the printed circuit board. Parts are mounted on the side of the board that has the outline of the part stenciled on it. The leads are then pulled through the eyelets until the part is positioned tightly against the board. Bend the leads slightly to hold the part in place.

When instructed to do so, solder the eyelet, and all of the wires in it. Use enough solder to fill the eyelet completely.

When the solder hardens, clip off the excess lead length that extends through the board. Clip off these wires as close to the eyelet as possible. DO NOT make any connections to the terminals on the boards. These terminals will be used later to make connections to other amplifier circuits.

IMPORTANT INSTRUCTIONS

THE INSTRUCTION "CONNECT" MEANS: Connect the wire or lead to the given point. Make a firm mechanical connection, BUT DO NOT SOLDER AT THIS TIME. Later another wire (s) will be added to this point.

THE INSTRUCTION "SOLDER" MEANS: Connect the wire or lead to the given point and then solder the connection and all wires in it. If there is more than one wire in the connection, the number will be stated—for example (2 wires). After soldering a connection cut off any excess wire or lead ends as close to the terminal as possible.

THE SMALL TERMINAL BOARD

SEE FIGURE 4.

- [ ] Mount two #6 spade bolts on the terminal side of the board, with the shoulders under the board. Fasten with two 6-32x$\frac{5}{16}$" screws, lockwashers and nuts.

Mount the following group of parts:

- [ ] R-53, 100 Ω resistor (brown, black, brown).
- [ ] C-27, 1 μf 3-volt disc capacitor. Disregard the + marking on the board.
- [ ] Turn the board over and solder all three of the eyelets. The center eyelet will have 2 wires extending from it. Cut off the excess wire.

Mount the next group of parts:

- [ ] R-54, 100 Ω resistor (brown, black, brown).
- [ ] C-28, 1 μf 3-volt disc capacitor. Disregard the + marking on the board.
- [ ] Turn the board over and solder all three of the eyelets. The center eyelet will have 2 wires extending from it. Cut off the excess wire.

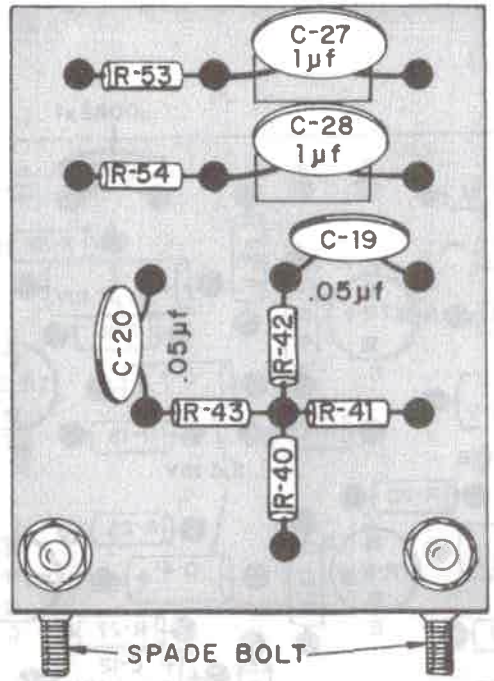


FIGURE 4. ASSEMBLING THE SMALL TERMINAL BOARD

Mount the next group of parts:

- [ ] R-42, 220K resistor (red, red, yellow).
- [ ] R-43, 220K resistor (red, red, yellow).
- [ ] R-40, 820 Ω resistor (gray, red, brown).
- [ ] R-41, 820 Ω resistor (gray, red, brown).
- [ ] Solder only the eyelet at the center point of these four resistors. This eyelet will have four wires extending from it. Cut off all excess wire.

Mount the remaining parts:

- [ ] C-20, .05 μf disc capacitor.
- [ ] C-19, .05 μf disc capacitor.
- [ ] Solder all of the remaining eyelets in the small board. Cut off the excess wire.

Set the small terminal board aside. It will be used later.

ASSEMBLING THE LARGE TERMINAL BOARD

This terminal board is assembled in the same manner as the small board. This board has parts mounted on both sides. Some of the eyelets will have leads inserted through them from both sides. Be sure that wires inserted from one side of the board are not pushed out of the eyelet when other wires are added from the other side. Solder the eyelets only when told to do so. DO NOT solder the terminals, or connect any component leads to them. These terminals will be used later in the wiring sequence.

- [ ] Mount two #6 spade bolts on the side of the terminal board with C-37 stenciled on it. Place the shoulders of the spade bolts under the board and fasten with two 6-32 x $\frac{5}{16}$" screws, lockwashers and nuts.

SEE FIGURE 5.

- [ ] Turn the board over so that it is positioned as shown. Mount the first group of parts.
- [ ] C-38, 200 μf, 12-volt electrolytic capacitor. **Position the end marked** + as shown.
- [ ] R-72, 220 Ω resistor (red, red, brown.)
- [ ] R-71, 13K, 5% resistor (brown, orange, orange, gold).
- [ ] C-46, .02 μf disc capacitor.
- [ ] Solder eyelet 1. Solder eyelet 2 (4 wires). Cut off all excess wire

Mount the next group of parts:

- [ ] R-86, 150 Ω, 2-watt resistor (brown, green, brown).
- [ ] R-74, 4.7 Ω, 2-watt resistor (yellow, violet, gold).
- [ ] Solder eyelet 5. Solder eyelet 6 (2 wires). Cut off all excess wire.

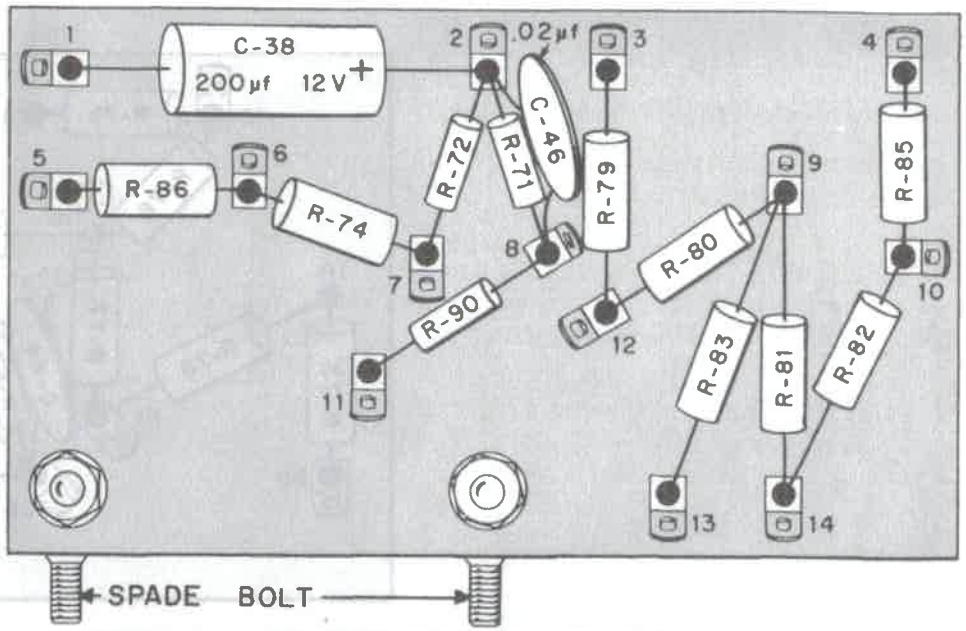


FIGURE 5. ASSEMBLING THE LARGE TERMINAL BOARD

Mount the following group of parts:

- [ ] R-90, 270 Ω resistor (red, violet, brown).
- [ ] R-79, 470 Ω, 2-watt resistor (yellow, violet, brown).
- [ ] R-80, 4.7 Ω, 2-watt resistor (yellow, violet, gold).
- [ ] Solder eyelet 11. Solder eyelet 12 (2 wires). Cut off all excess wire.

Mount the following group of parts:

- [ ] R-83, .51 Ω, 2-watt resistor (green, brown, silver).
- [ ] R-81, 470 Ω, 2-watt resistor (yellow, violet, brown).
- [ ] R-85, .51 Ω, 2-watt resistor (green, brown, silver).
- [ ] Solder eyelet 13 and eyelet 4. Solder eyelet 9 (3 wires). Cut off all excess wire.
- [ ] R-82, 4.7 Ω, 2-watt resistor (yellow, violet, gold).
- [ ] Solder eyelet 14 (2 wires). Cut off all excess wire.

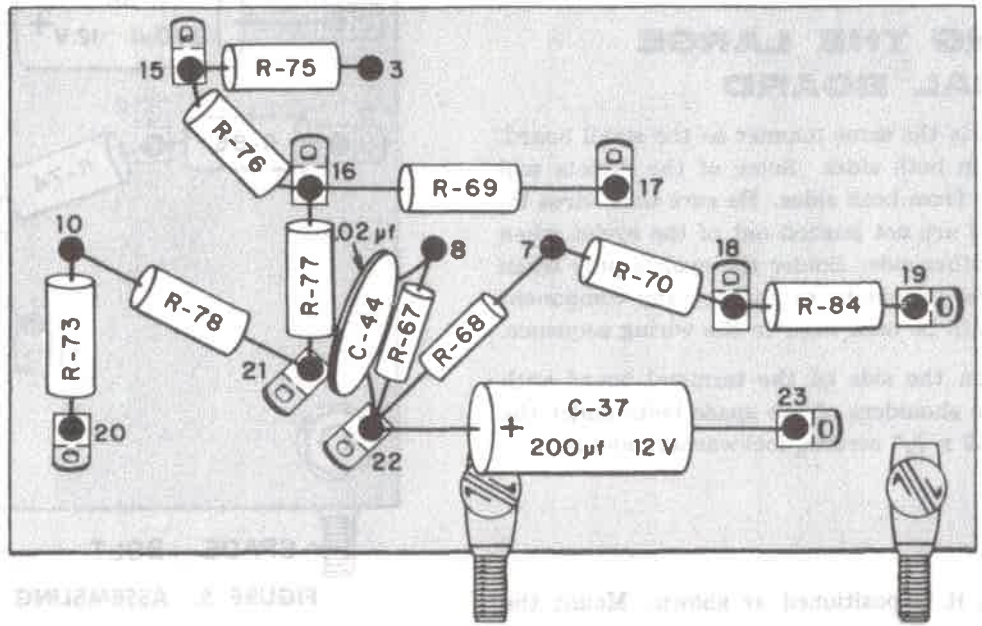


FIGURE 6. ASSEMBLING THE LARGE TERMINAL BOARD (OTHER SIDE)

LARGE TERMINAL BOARD

SEE FIGURE 6.

Turn the board over and mount the following group of parts:

- [ ] C-37, 200 µf, 12-volt electrolytic capacitor. Position the end marked + as shown.
- [ ] R-68, 220 Ω resistor (red, red, brown).
- [ ] R-67, 13K, 5% resistor (brown, orange, orange, gold).
- [ ] C-44, .02 µf disc capacitor.
- [ ] Solder eyelet 22 (4 wires), eyelet 8 (5 wires), and eyelet 23. Cut off all excess wire.

Mount the next group of parts:

- [ ] R-70, 4.7 Ω, 2-watt resistor (yellow, violet, gold).
- [ ] R-84, 150 Ω, 2-watt resistor (brown, green, brown).
- [ ] Solder eyelet 7 (4 wires), eyelet 18 (2 wires) and eyelet 19. Cut off the excess wires.

Mount the next group of parts:

- [ ] R-69, .51 Ω, 2-watt resistor (green, brown, silver).
- [ ] R-77, 470 Ω, 2-watt resistor (yellow, violet, brown).
- [ ] R-76, 4.7 Ω, 2-watt resistor (yellow, violet, gold).
- [ ] R-75, 470 Ω, 2-watt resistor (yellow, violet, brown).
- [ ] Solder eyelet 16 (3 wires), eyelet 15 (2 wires), eyelet 3 (2 wires) and eyelet 17. Cut off all excess wire.

Mount the last group of parts:

- [ ] R-78, 4.7 Ω, 2-watt resistor (yellow, violet, gold).
- [ ] R-73, .51 Ω, 2-watt resistor (green, brown, silver).
- [ ] Solder eyelet 21 (2 wires), eyelet 10 (4 wires) and eyelet 20. Cut off any excess wire.

This completes the wiring of your large terminal board. Go back and check your wiring and soldering. All of the wires in each eyelet should be soldered, and no leads should extend from the board.

PRE-WIRING THE SELECTOR SWITCH

The selector switch terminals are numbered by position. The positions are numbered clockwise, and there are 12 positions. To acquaint yourself with the switch, position it as shown in the figure. Count the terminals on wafer A. Note that there is not a terminal at position 3 and 4.

CAUTION: The Switch will be permanently damaged if solder is allowed to flow beyond the switch terminal rivet.

A convenient ruler has been included on the separate sheet to help you measure the bare wire.

SEE FIGURE 7.

- ☐ ¾" bare wire. Cut from the length supplied. Solder one end to terminal 1 of S-1A. Connect the other end to terminal 2 of S-1A.
- ☐ Short white/red wire. Solder one end to terminal 2 of S-1A (2 wires). The other end will be connected later.
- ☐ White/green wire. Solder to terminal 5 of S-1A.
- ☐ Yellow wire. Solder to terminal 6 of S-1A.
- ☐ 4 shielded cables. Prepare each as shown in the next column. At one end unwrap the spiral shield and twist the strands tightly. At the other end, cut off the shield. Lightly coat the stranded tips with solder.
- ☐ Short gray shielded cable. At the end without shield, slip ½" of yellow tubing over the inner conductor; then solder to terminal 2 of S-1B.
- ☐ 1¼" bare wire. Solder to terminal 3 of S-1C.
- ☐ Red wire. Solder to terminal 4 of S-1C.

SEE FIGURE 8.

Turn the switch over so that it is positioned as shown.

- ☐ Green wire. Solder to terminal 7 of S-1A.
- ☐ ¾" bare wire. Connect one end to terminal 8 of S-1A. Solder the other end to terminal 9 of S-1A.
- ☐ White/black wire. Solder to terminal 8 of S-1A (2 wires).
- ☐ Short white/yellow wire. Solder to terminal 10 of S-1A.
- ☐ Black wire. Solder to terminal 11 of S-1A.
- ☐ Blue wire. Solder to terminal 12 of S-1A.
- ☐ Short, red shielded cable. Connect the shield to terminal 7 of S-1C. Solder this end of the inner conductor to terminal 8 of S-1B.
- ☐ Orange wire. Connect to terminal 7 of S-1C.
- ☐ Set the switch aside, it will be used later.

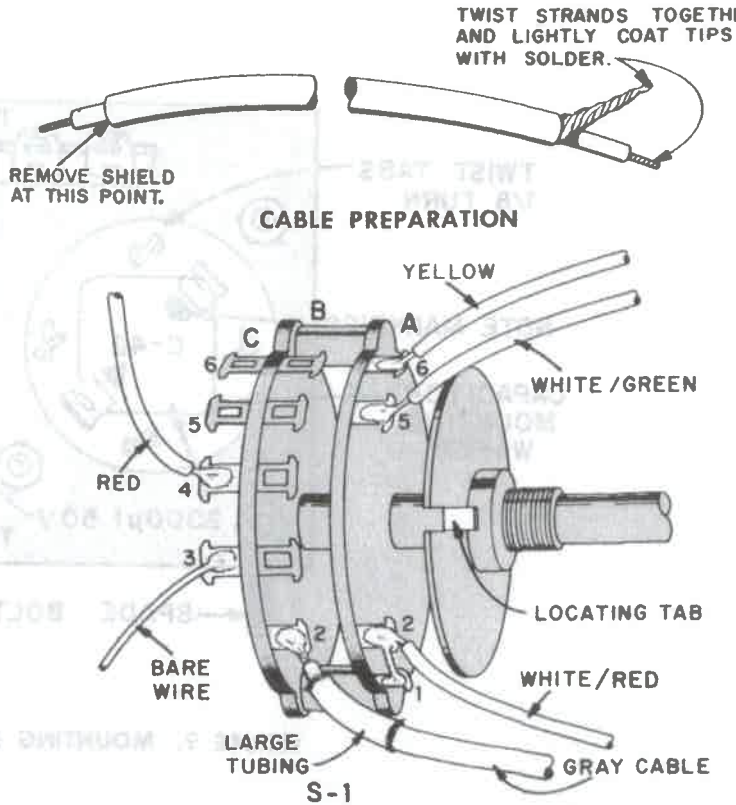


FIGURE 7. PRE-WIRING THE SELECTOR SWITCH

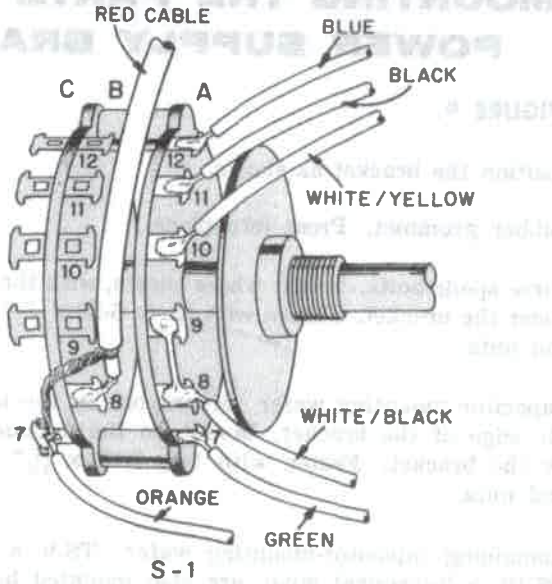


FIGURE 8. PRE-WIRING THE SELECTOR SWITCH (OTHER SIDE)

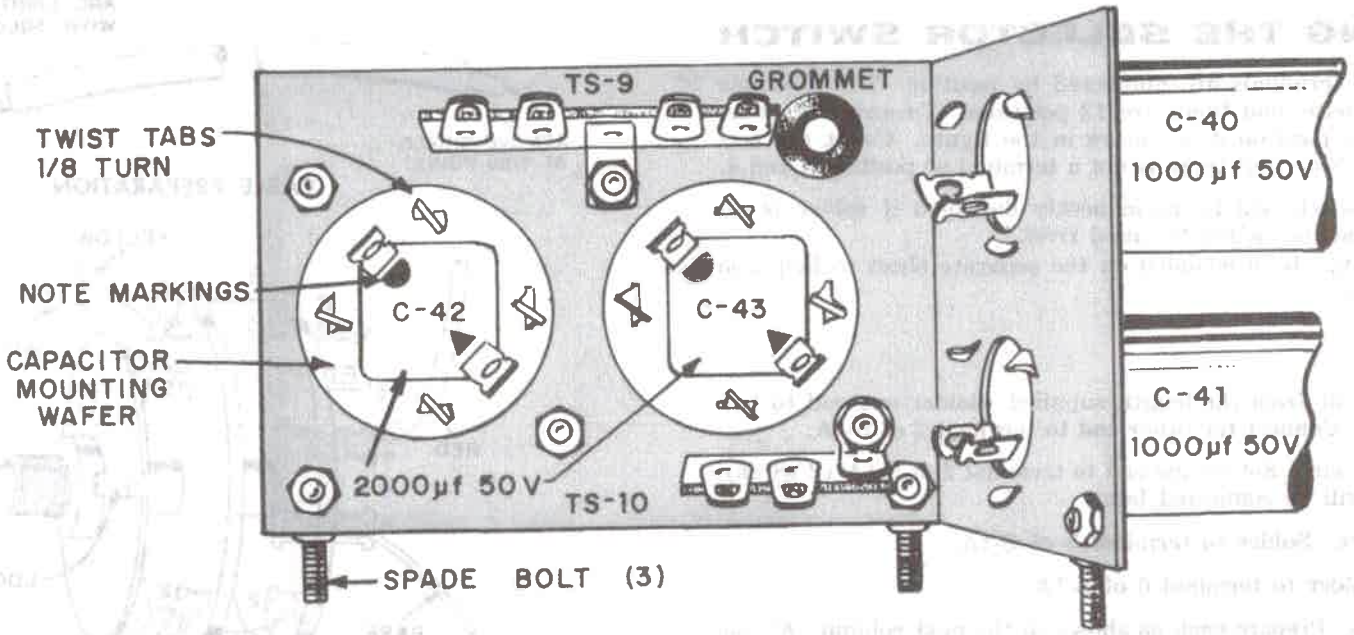


FIGURE 9. MOUNTING PARTS ON THE POWER SUPPLY BRACKET

MOUNTING THE PARTS ON THE POWER SUPPLY BRACKET

SEE FIGURE 9.

☐ Position the bracket as shown.

☐ Rubber grommet. Press into place.

☐ Three spade bolts. Mount where shown, with the shoulders positioned under the bracket. Fasten with three 6-32 x $\frac{5}{16}$" screws, lockwashers, and nuts.

☐ Capacitor mounting wafer. Mount one in the large opening nearest the edge of the bracket. Mount on the outside of the "L" formed by the bracket. Fasten with two 6-32 x $\frac{5}{16}$" screws, lockwashers, and nuts.

☐ Remaining capacitor-mounting wafer. TS-9, a 4-terminal strip and TS-10, a 2-terminal strip, are also mounted in this step. Use two 6-32 x $\frac{5}{16}$" screws to mount the wafer on the outside of the "L" formed by the bracket.

On the other side of the bracket, place TS-10 on the screw nearest the spade bolt; place TS-9 on the other screw. Fasten with two lockwashers and nuts.

☐ C-41, 1000 µf, 50-volt electrolytic capacitor. Position the terminals exactly as shown in the figure. Mount in the small opening nearest the spade bolt. Fasten by twisting the mounting tabs about ⅛ turn.

☐ C-40, remaining 1000 µf, 50-volt electrolytic capacitor. Position the two terminals exactly as shown, and mount in the remaining small opening. Fasten by twisting the mounting tabs about ⅛ turn.

☐ C-43, 2000 µf, 50-volt, electrolytic capacitor. Position as shown in the figure and mount on the capacitor mounting wafer nearest the bend in the bracket. Fasten by twisting the mounting tabs about ⅛ turn.

☐ C-42, remaining 2000 µf, 50-volt, electrolytic capacitor. Position the two terminals exactly as shown, and mount on the remaining capacitor mounting wafer. Fasten by twisting the mounting tabs about ⅛ turn.

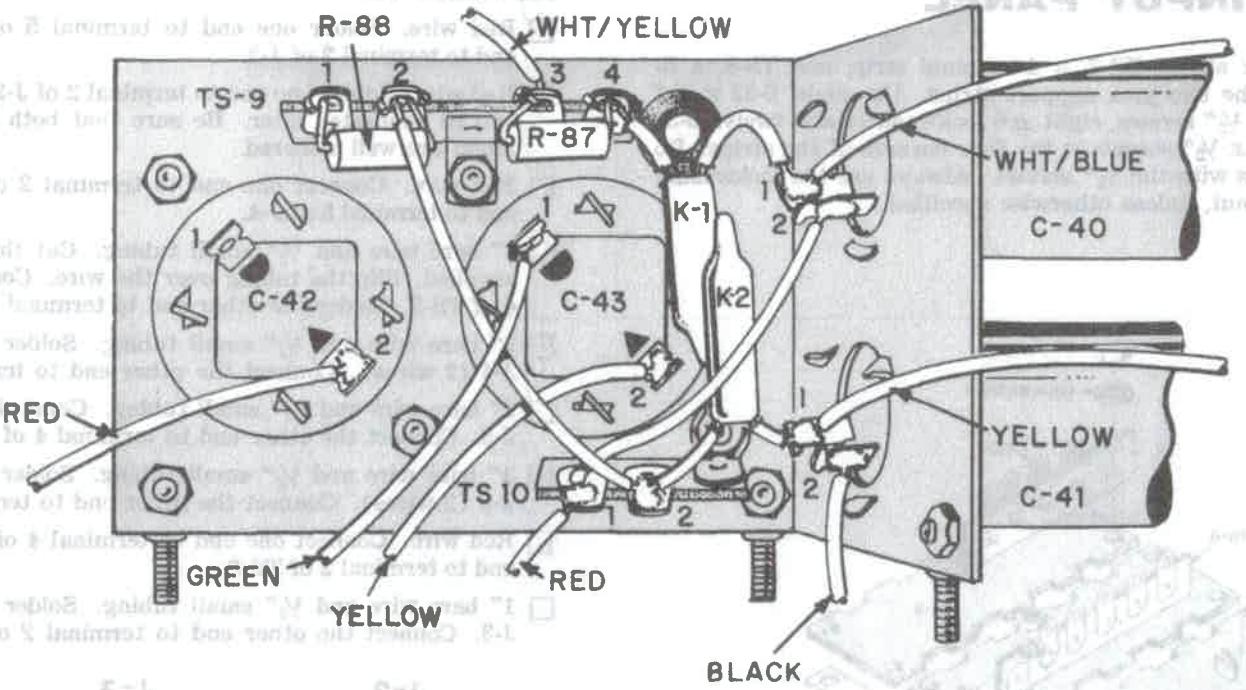


FIGURE 10. PRE-WIRING THE POWER SUPPLY BRACKET

PRE-WIRING THE POWER SUPPLY BRACKET

SEE FIGURE 10.

- Orange wire. Connect one end to terminal 2 of TS-9. Connect the other end to terminal 2 of TS-10.
- White/green wire. Connect one end to terminal 1 of TS-10. Solder the other end to terminal 2 (□) of C-40.
- Red wire. Solder one end to terminal 1 of TS-10 (2 wires). The other end will be connected later.
- Black wire. Solder one end to terminal 2 (□) of C-41. The other end will be connected later.
- Yellow wire. Solder one end to terminal 2 (△) of C-43. The other end will be connected later.
- Green wire. Connect one end to terminal 1 (⏚) of C-43. The other end will be connected later.
- Red wire. Solder one end to terminal 2 (△) of C-42. The other end will be connected later.
- Yellow wire. Connect one end to terminal 1 (△) of C-41. The other end will be connected later.
- K-2, circuit breaker. Slip ½" of tubing over each of the leads. Solder one lead to terminal 1 (△) of C-41 (2 wires). Solder the other lead to terminal 2 of TS-10. (2 wires).
- K-1, circuit breaker. Slip ½" of tubing over each lead. Connect one lead to terminal 1 (△) of C-40. Connect the other lead to terminal 4 of TS-9.
- White/blue wire. Solder one end to terminal 1 (△) of C-40. (2 wires). The other end will be connected later.
- R-87, 220 Ω resistor, (red, red, brown). Connect one lead to terminal 3 of TS-9. Connect the other lead to terminal 4 of TS-9.
- Short white/yellow wire. Connect one end to terminal 3 of TS-9. The other end will be connected later.
- R-88, 220 Ω resistor (red, red, brown). Connect one lead to terminal 1 of TS-9. Connect the other lead to terminal 2 of TS-9.
- Set the completed bracket aside, it will be used later.

ASSEMBLING AND WIRING THE INPUT PANEL

SEE FIGURE 11.

☐ Mount three 4-jack strips, TS-7, a 4-terminal strip, and TS-8, a 5-terminal strip on the two jack support strips. Use eight 6-32 x $\frac{5}{16}$" screws, four 6-32 x ½" screws, eight #6 lockwashers and twelve 6-32 nuts. Use the 6-32 x ½" screws at the four corners of the strips. Do not use lockwashers with the ½" screws. Always use the lockwasher directly under the nut, unless otherwise specified.

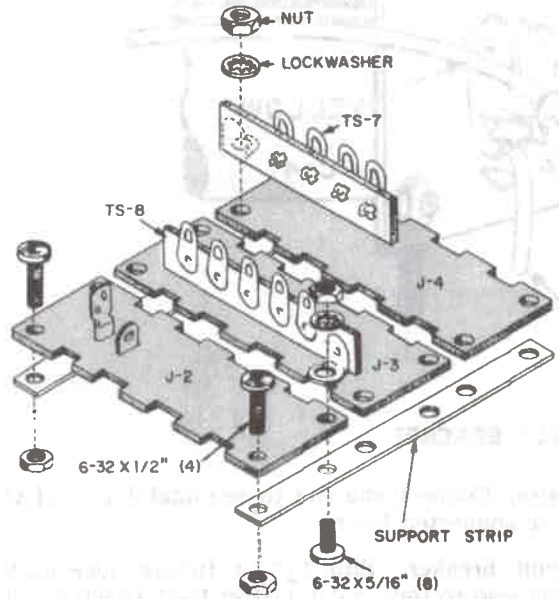


FIGURE 11. ASSEMBLING THE INPUT PANEL

IMPORTANT INSTRUCTIONS

THE INSTRUCTION "CONNECT" MEANS: Connect the wire or lead to the given point. Make a firm mechanical connection, BUT DO NOT SOLDER AT THIS TIME. Later another wire (s) will be added to this point.

THE INSTRUCTION "SOLDER" MEANS: Connect the wire or lead to the given point and then solder the connection and all wires in it. If there is more than one wire in the connection, the number will be stated—for example (2 wires). After soldering a connection cut off any excess wire or lead ends as close to the terminal as possible.

FIRST WIRING

SEE FIGURE 12.

☐ Red wire. Solder one end to terminal 5 of J-2. Connect the other end to terminal 2 of J-2.

☐ Red wire. Solder one end to terminal 2 of J-2 (2 wires). The other end will be connected later. Be sure that both leaves of this double terminal are well soldered.

☐ Red wire. Connect one end to terminal 2 of J-4. Connect the other end to terminal 5 of J-4.

☐ 1" bare wire and ½" small tubing. Cut the tubing from the length supplied. Slip the tubing over the wire. Connect one end to terminal 4 of TS-7. Solder the other end to terminal 5 of J-4 (2 wires).

☐ 1" bare wire and ½" small tubing. Solder one end to terminal 2 of J-4 (2 wires). Connect the other end to terminal 2 of TS-7.

☐ 1" bare wire and ½" small tubing. Connect one end to terminal 5 of J-3. Connect the other end to terminal 4 of TS-7.

☐ 1" bare wire and ½" small tubing. Solder one end to terminal 5 of J-3 (2 wires). Connect the other end to terminal 4 of TS-8.

☐ Red wire. Connect one end to terminal 4 of TS-8. Connect the other end to terminal 2 of TS-8.

☐ 1" bare wire and ½" small tubing. Solder one end to terminal 2 of J-3. Connect the other end to terminal 2 of TS-8.

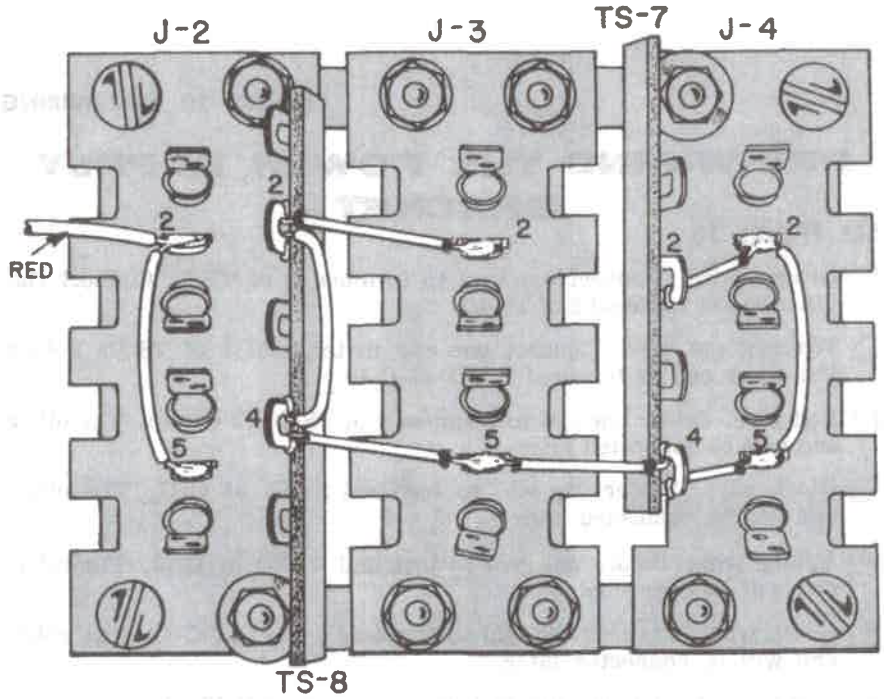


FIGURE 12. FIRST WIRING

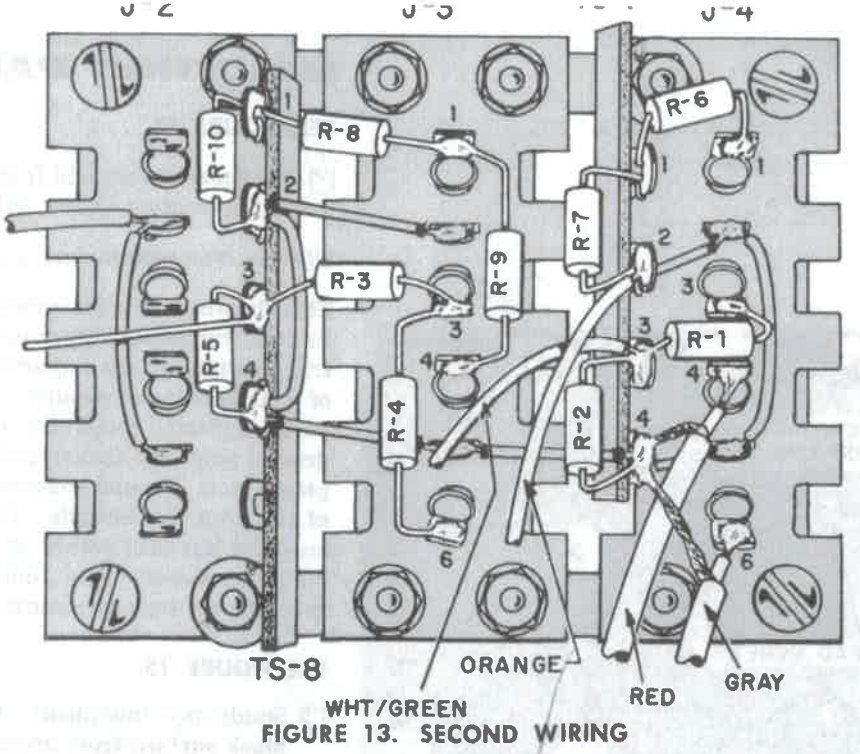


FIGURE 13. SECOND WIRING

SECOND WIRING

SEE FIGURE 13.

IMPORTANT: For proper fit of the input panel the resistor leads must be kept as short as possible. Be sure to position the resistors NO HIGHER than the terminals on TS-7 and 8.

- [ ] R-6, 390K resistor (orange, white, yellow). Solder one lead to terminal 1 of J-4. Connect the other lead to terminal 1 of TS-7.
- [ ] R-7, 15K resistor (brown, green, orange). Connect one lead to terminal 1 of TS-7. Connect the other lead to terminal 2 of TS-7.
- [ ] R-1, 390K resistor (orange, white, yellow). Solder one lead to terminal 3 of J-4. Connect the other lead to terminal 3 of TS-7.
- [ ] R-2, 15K resistor (brown, green, orange). Connect one lead to terminal 3 of TS-7. Connect the other lead to terminal 4 of TS-7.
- [ ] R-9, 560K resistor (green, blue, yellow). Solder one lead to terminal 4 of J-3. Connect the other lead to terminal 1 of J-3.
- [ ] R-4, 560K resistor (green, blue, yellow). Solder one lead to terminal 6 of J-3. Connect the other lead to terminal 3 of J-3.
- [ ] R-3, 220K resistor (red, red, yellow). Solder one lead to terminal 3 of J-3 (2 wires). Connect the other lead to terminal 3 of TS-8.
- [ ] R-8, 220K resistor (red, red, yellow). Solder one lead to terminal 1 of J-3 (2 wires). Connect the other lead to terminal 1 of TS-8.
- [ ] R-10, 15K resistor (brown, green, orange). Connect one lead to terminal 1 of TS-8. Solder the other lead to terminal 2 of TS-8 (3 wires).
- [ ] Orange wire. Solder one end to terminal 2 of TS-7 (3-wires). The other end will be connected later.
- [ ] White/green wire. Solder one end to terminal 3 of TS-7 (3 wires). The other end will be connected later.
- [ ] 1½" bare wire. Connect to terminal 3 of TS-8. The other end will be connected later.
- [ ] R-5, 15K resistor (brown, green, orange). Solder one lead to terminal 4 of TS-8 (3 wires). Solder the other lead to terminal 3 of TS-8 (3 wires).
- [ ] Long gray shielded cable. Connect the shield to terminal 4 of TS-7. Solder this end of the inner conductor to terminal 6 of J-4.
- [ ] Long red shielded cable. Solder the shield to terminal 4 of TS-7 (5 wires). Solder this end of the inner conductor to terminal 4 of J-4.

Set the input panel aside; it will be used later.

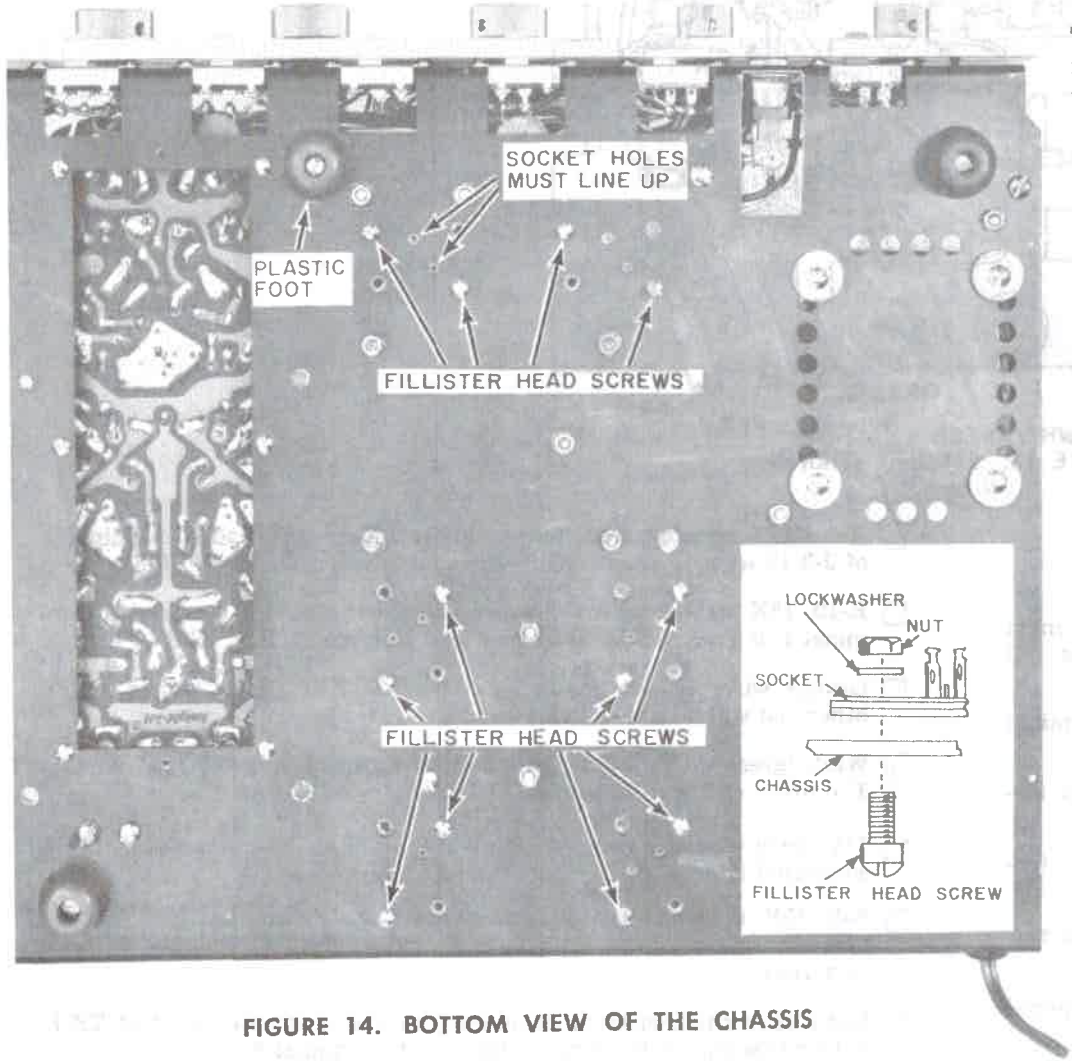


FIGURE 14. BOTTOM VIEW OF THE CHASSIS

MOUNTING PARTS ON THE CHASSIS

SEE FIGURE 14.

☑ Four plastic feet and four #6 thread-cutting screws. Mount each foot in the location shown with a thread-cutting screw.

NOTE: The plastic feet are mounted on the OUTSIDE of the chassis.

The chassis has been anodized to enhance its appearance and increase its heat radiating properties. This black finish is also a very good electrical insulator. An important design detail of this amplifier is the use of a common-point ground system. This type of ground system eliminates possible ground loops that could cause hum or instability. The common ground point for this amplifier is a solder lug mounted behind the headphone jack. Ground connections will be distributed from this point to all of the amplifier circuits. To be sure of a good electrical connection, the anodized surface, where the solder lug will be mounted, must be completely removed. The finish must also be removed from around the ground post hole to assure a good external ground.

SEE FIGURE 15.

☐ Sandpaper (supplied). On the INSIDE of the chassis, remove the black surface from around the solder lug mounting hole. The surface must be removed for about $\frac{1}{8}$" around the hole. Use short circular motions when sanding.

☑ Solder lug. Mount with a 6-32 x $\frac{5}{16}$" screw and nut. Tighten securely.

☑ Remove the black surface from around the ground post hole on the inside of the chassis. Place a lockwasher on the #8 screw. Insert the screw through the hole. Fasten with a #8 nut. Place the small knurled nut on the screw, finger tight.

☑ Large transistor socket for TR-5. Position the E and B terminals as shown in the figure and mount on the inside of the chassis with two #6 FILLISTER-HEAD screws. Fasten with two #6 lockwashers and nuts. Place the lockwashers **directly under the nuts.**

NOTE: Use only fillister-head screws for mounting transistor sockets. Any other type will be too large, and will "short" the transistor, resulting in permanent damage. Refer to the parts identification photo to be sure that you are using the proper screws, and Figure 14 for proper location.

☐ Five remaining transistor sockets. Position the E and B terminals **as shown.** Mount on the inside of the chassis with FILLISTER-HEAD screws, #6 lockwashers and nuts. Place the lockwashers **directly under the nuts.**

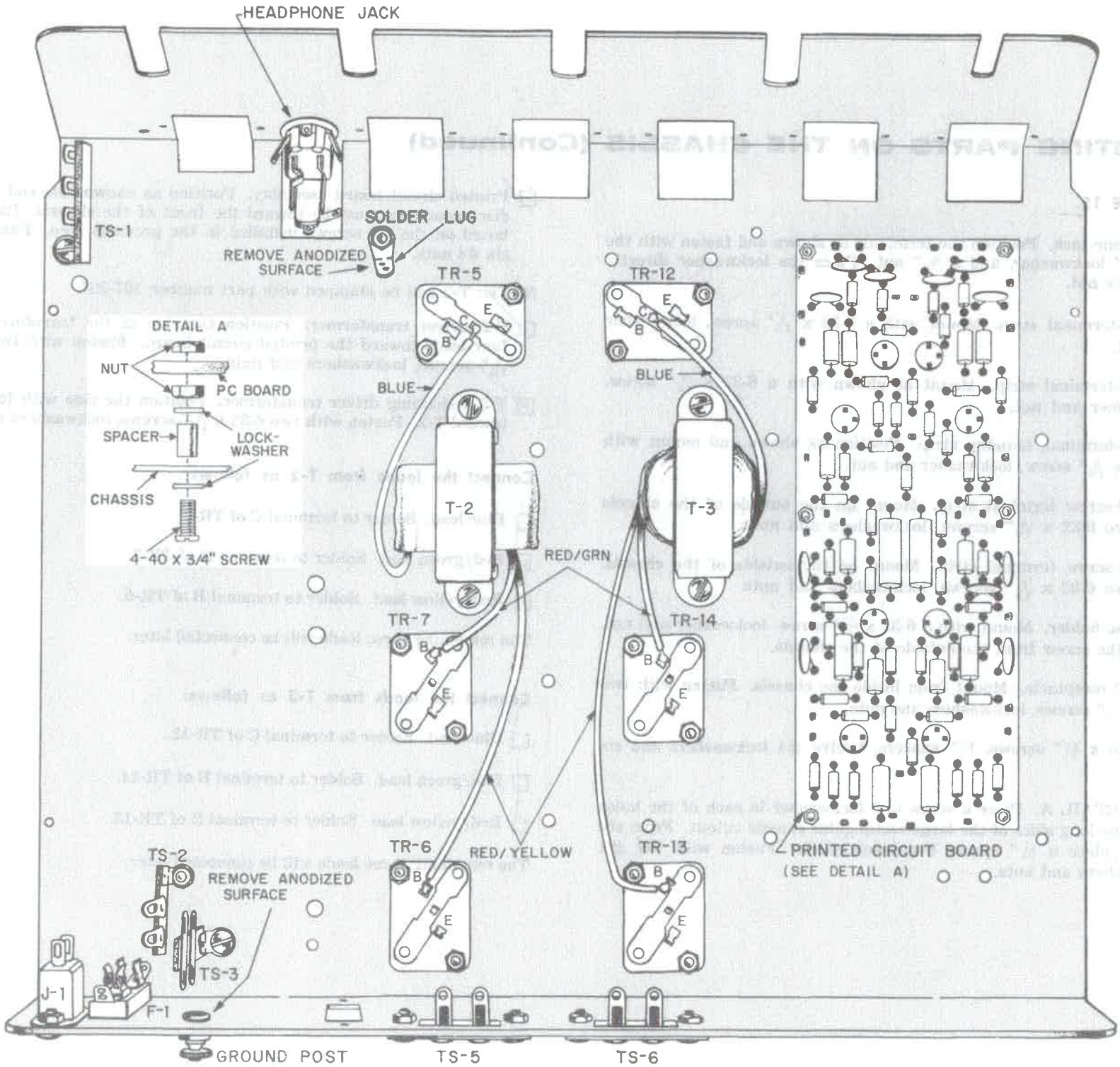


FIGURE 15.
MOUNTING PARTS
ON THE CHASSIS

MOUNTING PARTS ON THE CHASSIS (Continued)

SEE FIGURE 15.

- [ ] Headphone jack. Position the terminals as shown and fasten with the thin 3/8" lockwasher, and a 3/8" nut. Place the lockwasher directly under the nut.
- [ ] TS-1, 3-terminal strip. Mount with a 6-32 x $\frac{5}{16}$" screw, lockwasher and nut.
- [ ] TS-2, 2-terminal strip. Mount as shown with a 6-32 x $\frac{5}{16}$" screw, lockwasher and nut.
- [ ] TS-3, 2-terminal, standup strip. Position as shown and mount with a 6-32 x $\frac{5}{16}$" screw, lockwasher and nut.
- [ ] TS-5, 2-screw terminal strip. Mount on the **outside** of the chassis with two 6-32 x $\frac{5}{16}$" screws, lockwashers and nuts.
- [ ] TS-6, 2-screw terminal strip. Mount on the **outside** of the chassis. with two 6-32 x $\frac{5}{16}$" screws, lockwashers and nuts.
- [ ] F-1, fuse holder. Mount with a 6-32 x 3/8" screw, lockwasher and nut. Insert the screw from the outside of the chassis.
- [ ] J-1, AC receptacle. Mount from inside the chassis. Fasten with two 6-32 x 3/8" screws, lockwashers and nuts.
- [ ] Six 4-40 x 3/1" screws, 1/4" spacers, twelve #4 lockwashers and six nuts.

  SEE DETAIL A. Place a screw and lockwasher in each of the holes along the long sides of the large rectangular chassis cutout. From the bottom, place a 1/1" spacer over each screw. Fasten with the #4 lockwashers and nuts.

- [ ] Printed circuit board assembly. Position as shown, the end with six disc capacitors must be toward the front of the chassis. Install the board on the six screws installed in the previous step. Fasten with six #4 nuts.

NOTE: T-2 will be stamped with part number 107-297.

- [ ] T-2, driver transformer. Position the side of the transformer with four leads toward the printed circuit board. Fasten with two 6-32 x $\frac{5}{16}$" screws, lockwashers and nuts.
- [ ] T-3, remaining driver transformer. Position the side with four leads toward T-2. Fasten with two 6-32 x $\frac{5}{16}$" screws, lockwashers and nuts.

Connect the leads from T-2 as follows:

- [ ] Blue lead. Solder to terminal C of TR-5.
- [ ] Red/green lead. Solder to terminal B of TR-7.
- [ ] Red/yellow lead. Solder to terminal B of TR-6.

The remaining three leads will be connected later.

Connect the leads from T-3 as follows:

- [ ] Blue lead. Solder to terminal C of TR-12.
- [ ] Red/green lead. Solder to terminal B of TR-14.
- [ ] Red/yellow lead. Solder to terminal B of TR-13.

The remaining three leads will be connected later.

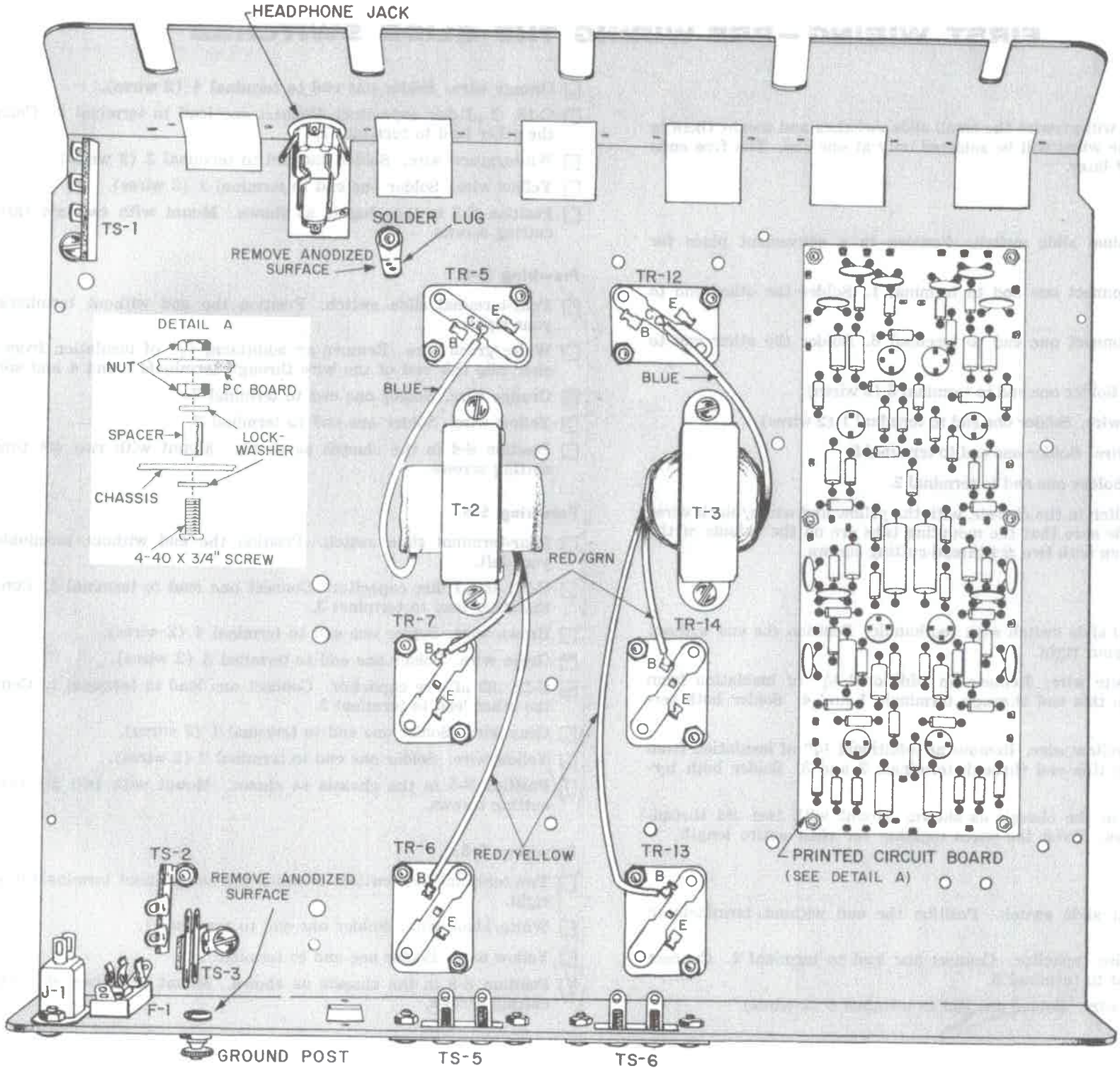


FIGURE 15. MOUNTING PARTS ON THE CHASSIS

FIRST WIRING — PRE-WIRING THE SLIDE SWITCHES

SEE FIGURE 16.

This first wiring will prewire the small slide switches and mount them in the chassis. Some wires will be soldered only at one end. The free ends will be connected later.

Prewiring S-2.

- [ ] S-2, six-terminal slide switch. Position in a convenient place for wiring.
- [ ] Red wire. Connect one end to terminal 1. Solder the other end to terminal 4.
- [ ] Red wire. Connect one end to terminal 6. Solder the other end to terminal 3.
- [ ] Yellow wire. Solder one end to terminal 6 (2 wires).
- [ ] White/black wire. Solder one end to terminal 1 (2 wires).
- [ ] White/blue wire. Solder one end to terminal 5.
- [ ] Violet wire. Solder one end to terminal 2.
- [ ] Insert the switch in the chassis, with the yellow and white/black wires to the left. Be sure that the mounting tabs are on the outside of the chassis. Fasten with two #4 thread-cutting screws.

Prewiring S-7.

- [ ] Four-terminal slide switch with red handle. Position the end without terminals to your right.
- [ ] Long red/white wire. Remove an additional ¼" of insulation from one end. Slip this end through terminals 1 and 4. Solder both terminals.
- [ ] Long white/yellow wire. Remove an additional ¼" of insulation from one end. Slip this end through terminals 2 and 3. Solder both terminals.
- [ ] Position S-7 in the chassis as shown. Mount with two #4 thread-cutting screws. Twist the wires together for their entire length.

Prewiring S-3.

- [ ] Four-terminal slide switch. Position the end without terminals to your left.
- [ ] C-17, .2 μf disc capacitor. Connect one lead to terminal 4. Connect the other lead to terminal 3.
- [ ] White/black wire. Solder one end to terminal 3 (2 wires).
- [ ] Orange wire. Solder one end to terminal 4 (2 wires).
- [ ] C-18, .2 μf disc capacitor. Connect one lead to terminal 2. Connect the other lead to terminal 1.
- [ ] White/green wire. Solder one end to terminal 2 (2 wires).
- [ ] Yellow wire. Solder one end to terminal 1 (2 wires).
- [ ] Position S-3 in the chassis as shown. Mount with two #4 thread-cutting screws.

Prewiring S-4.

- [ ] Four-terminal slide switch. Position the end without terminals to your right.
- [ ] White/green wire. Remove an additional ¼" of insulation from one end. Slip this end of the wire through terminals 1 and 4 and solder.
- [ ] Orange wire. Solder one end to terminal 3.
- [ ] Yellow wire. Solder one end to terminal 2.
- [ ] Position S-4 in the chassis as shown. Mount with two #4 thread-cutting screws.

Prewiring S-5.

- [ ] Four-terminal slide switch. Position the end without terminals to your left.
- [ ] C-21, .05 μf disc capacitor. Connect one lead to terminal 4. Connect the other lead to terminal 3.
- [ ] Brown wire. Solder one end to terminal 4 (2 wires).
- [ ] Green wire. Solder one end to terminal 3 (2 wires).
- [ ] C-22, .05 μf disc capacitor. Connect one lead to terminal 1. Connect the other lead to terminal 2.
- [ ] Gray wire. Solder one end to terminal 1 (2 wires).
- [ ] Yellow wire. Solder one end to terminal 2 (2 wires).
- [ ] Position S-5 in the chassis as shown. Mount with two #4 thread-cutting screws.

Prewiring S-8.

- [ ] Two terminal slide switch. Position the end without terminals to your right.
- [ ] White/black wire. Solder one end to terminal 1.
- [ ] Yellow wire. Solder one end to terminal 2.
- [ ] Position S-8 in the chassis as shown. Mount with two #4 thread-cutting screws.

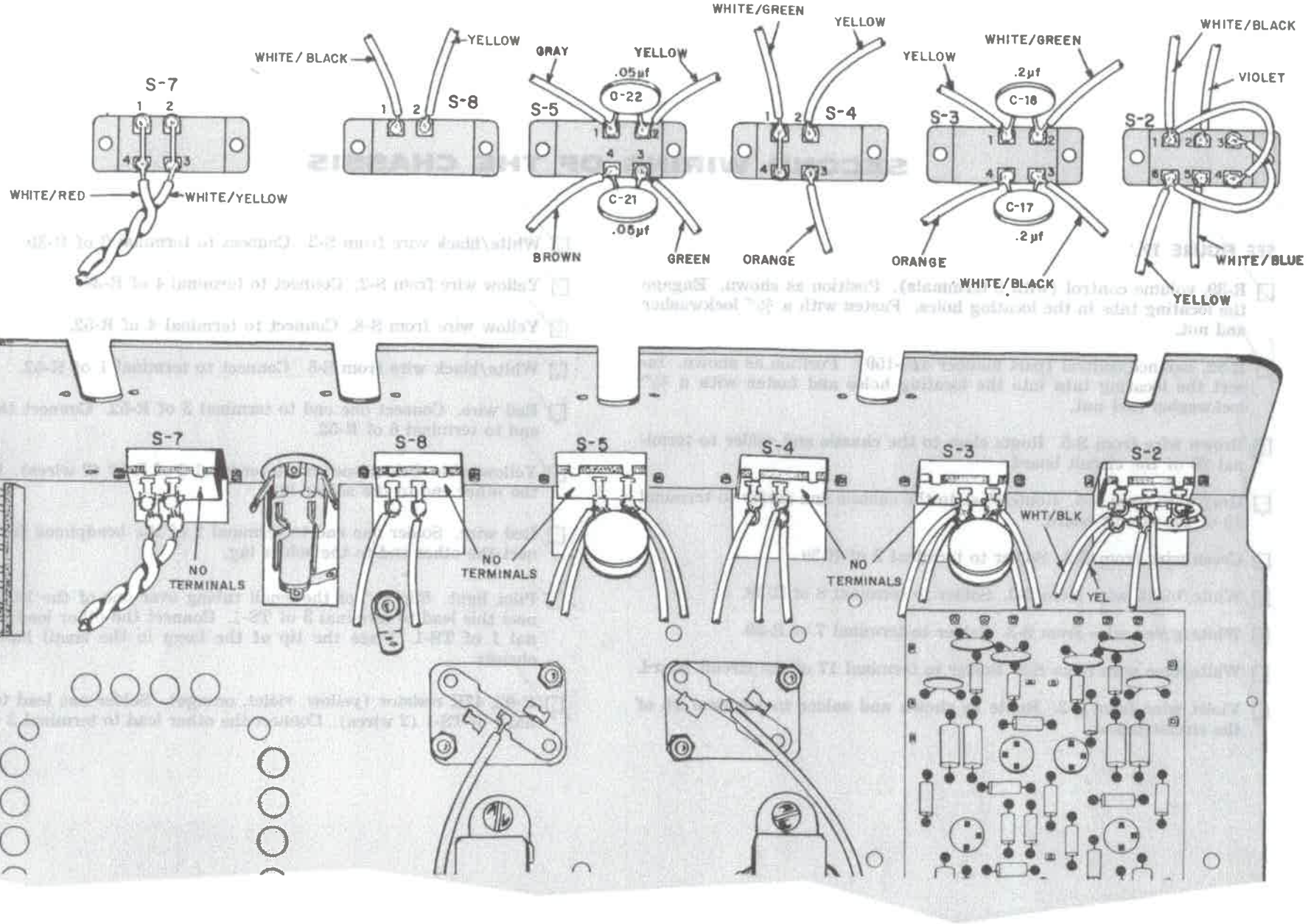


FIGURE 16. FIRST WIRING OF THE CHASSIS

SECOND WIRING OF THE CHASSIS

SEE FIGURE 17.

- [ ] R-39, volume control (with 8 terminals). Position as shown. Engage the locating tabs in the locating holes. Fasten with a ⅜" lockwasher and nut.
- [ ] R-52, balance control (part number 420-159). Position as shown. Insert the locating tabs into the locating holes and fasten with a ⅜" lockwasher and nut.
- [ ] Brown wire from S-5. Route close to the chassis and solder to terminal 20 of the circuit board.
- [ ] Gray wire from S-5. Route close to the chassis and solder to terminal 19 of the circuit board.
- [ ] Green wire from S-5. Solder to terminal 2 of R-39.
- [ ] White/black wire from S-3. Solder to terminal 8 of R-39.
- [ ] White/green wire from S-3. Solder to terminal 7 of R-39.
- [ ] White/blue wire from S-2. Solder to terminal 17 of the circuit board.
- [ ] Violet wire from S-2. Route as shown and solder to terminal 16 of the circuit board.
- [ ] White/black wire from S-2. Connect to terminal 3 of R-39.
- [ ] Yellow wire from S-2. Connect to terminal 4 of R-39.
- [ ] Yellow wire from S-8. Connect to terminal 4 of R-52.
- [ ] White/black wire from S-8. Connect to terminal 1 of R-52.
- [ ] Red wire. Connect one end to terminal 3 of R-52. Connect the other end to terminal 6 of R-52.
- [ ] Yellow wire. Solder one end to terminal 6 of R-52 (2 wires). Connect the other end to the solder lug.
- [ ] Red wire. Solder one end to terminal 2 of the headphone jack. Connect the other end to the solder lug.
- [ ] Pilot light. Slip ¾" of the small tubing over one of the leads. Connect this lead to terminal 3 of TS-1. Connect the other lead to terminal 1 of TS-1. Place the tip of the lamp in the small hole in the chassis.
- [ ] R-92, 47K resistor (yellow, violet, orange). Solder one lead to terminal 1 of TS-1 (2 wires). Connect the other lead to terminal 2 of TS-1.

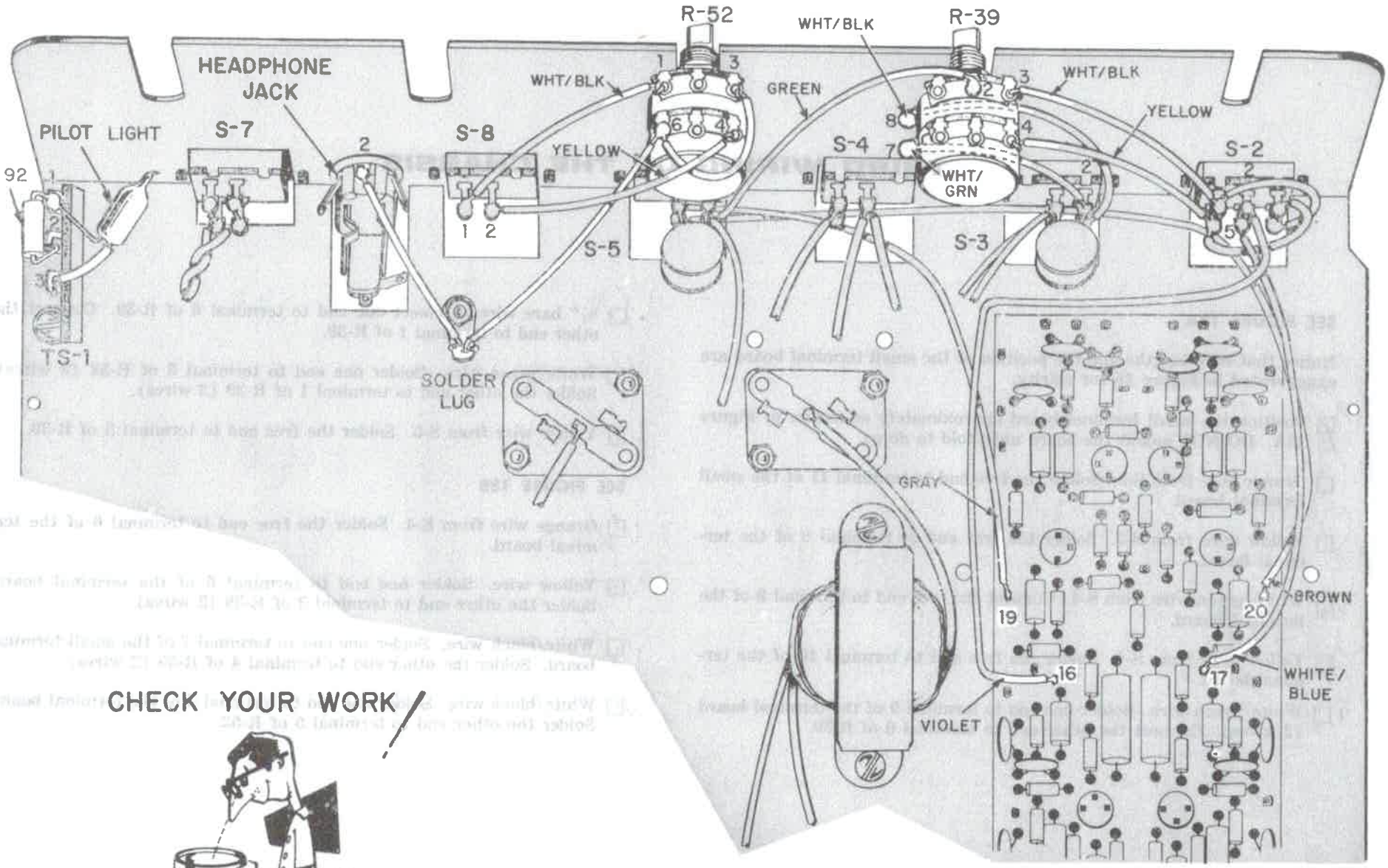


FIGURE 17. SECOND WIRING OF THE CHASSIS

THIRD WIRING OF THE CHASSIS

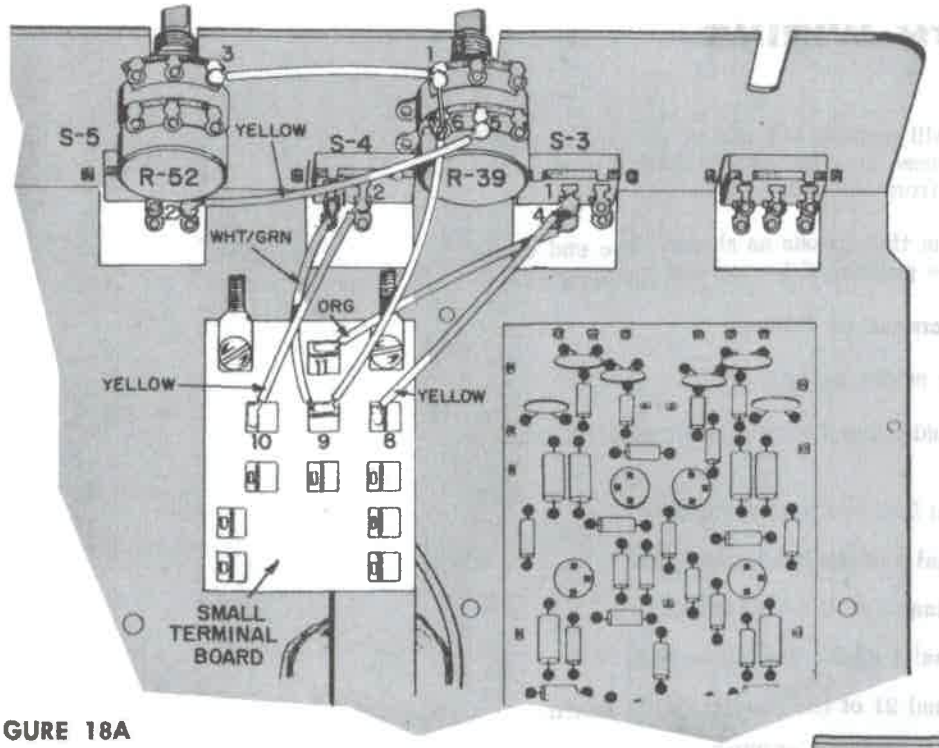
SEE FIGURE 18A

Notice that wire lengths and the position of the small terminal board are exaggerated in Figure 18 for clarity.

- [ ] Position the small terminal board approximately as shown in Figure 18A. DO NOT mount the board until told to do so.
- [ ] Orange wire from S-3. Solder the free end to terminal 11 of the small terminal board.
- [ ] Yellow wire from S-3. Solder the free end to terminal 8 of the terminal board.
- [ ] White/green wire from S-4. Connect the free end to terminal 9 of the terminal board.
- [ ] Yellow wire from S-4. Solder the free end to terminal 10 of the terminal board.
- [ ] White/green wire. Solder one end to terminal 9 of the terminal board (2 wires). Connect the other end to terminal 6 of R-39.
- [ ] ¾" bare wire. Connect one end to terminal 6 of R-39. Connect the other end to terminal 1 of R-39.
- [ ] White/green wire. Solder one end to terminal 3 of R-52 (2 wires). Solder the other end to terminal 1 of R-39 (2 wires).
- [ ] Yellow wire from S-5. Solder the free end to terminal 5 of R-39.

SEE FIGURE 18B

- [ ] Orange wire from S-4. Solder the free end to terminal 6 of the terminal board.
- [ ] Yellow wire. Solder one end to terminal 5 of the terminal board. Solder the other end to terminal 3 of R-39 (2 wires).
- [ ] White/black wire. Solder one end to terminal 7 of the small terminal board. Solder the other end to terminal 4 of R-39 (2 wires).
- [ ] White/black wire. Solder one end to terminal 3 of the terminal board. Solder the other end to terminal 5 of R-52.



GURE 18A

Now is a good time to stop and take a break. You are more than half-way through.

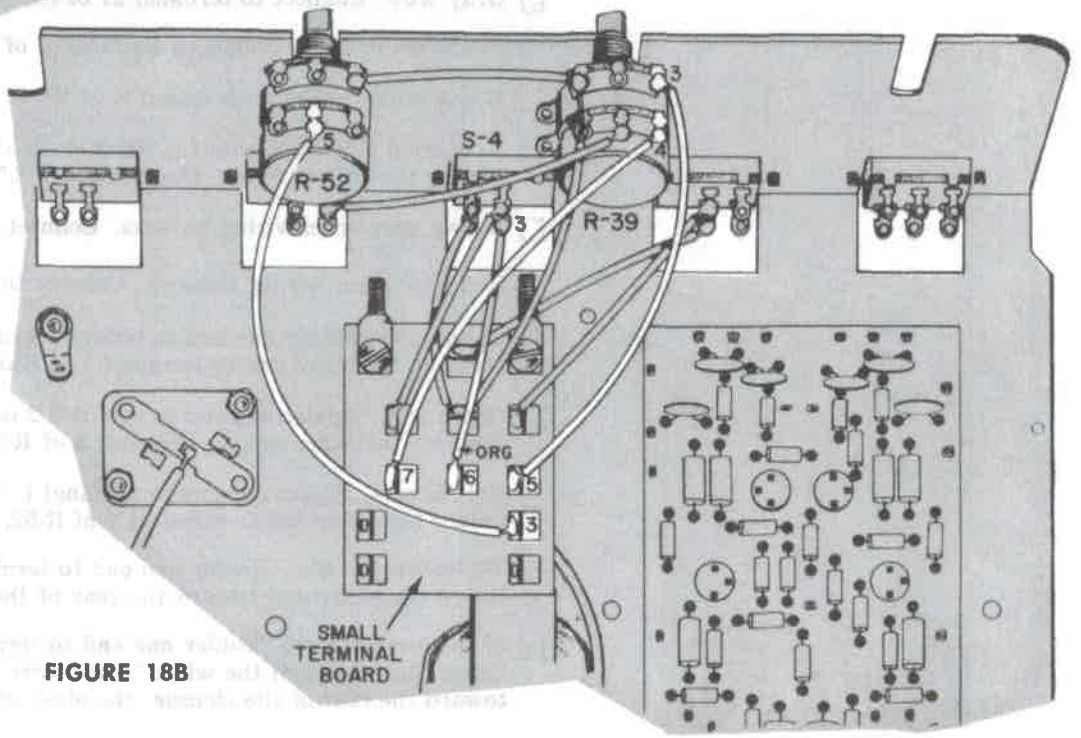


FIGURE 18B

FOURTH WIRING

SEE FIGURE 19.

The following wiring sequence will connect one end of the output circuit wiring harness. The wiring harness may be identified by the long gray (about 6" long) wire extending from the side.

- ☑ Position the wiring harness in the chassis as shown. The end of the harness with 8 wires must be positioned toward the headphone jack.

Connect the wires from the harness as follows:

- ☑ Orange wire. Connect to the solder lug.
- ☑ Black wire. Solder to the solder lug (4 wires). Be sure all 4 wires are well soldered.
- ☑ Blue wire. Solder to terminal 3 of the headphone jack.
- ☑ Green wire. Solder to terminal 4 of the headphone jack.
- ☑ Yellow wire. Solder to terminal 5 of the headphone jack.
- ☑ Violet wire. Solder to terminal 1 of the headphone jack.
- ☑ Gray wire. Connect to terminal 21 of the printed circuit board.
- ☑ Black/white wire. Solder to terminal E of TR-5.
- ☑ White wire. Solder to terminal B of TR-5.
- ☑ R-59, dual 50K treble control (Part # 392-165). Position the locating tabs in the chassis holes. Fasten with a 3/8" lockwasher and nut.
- ☑ Brown wire from wiring harness. Connect to terminal 1 of R-59.
- ☑ Red wire from wiring harness. Connect to terminal 6 of R-59.
- ☑ Green wire. Solder one end to terminal 4 of the small terminal board. Connect the other end to terminal 4 of R-59.
- ☑ Green wire. Solder one end to terminal 2 of the small terminal board. Connect the other end to terminal 3 of R-59.
- ☑ Yellow wire. Solder one end to terminal 1 of the small terminal board. Solder the other end to terminal 2 of R-52.
- ☑ White/brown wire. Solder one end to terminal 2 of TS-1 (2 wires). Route the other end toward the rear of the chassis.
- ☑ White/orange wire. Solder one end to terminal 3 of TS-1 (2 wires). Twist this wire, and the white/brown wire together. Route the wires toward the rear of the chassis; the other ends will be connected later.

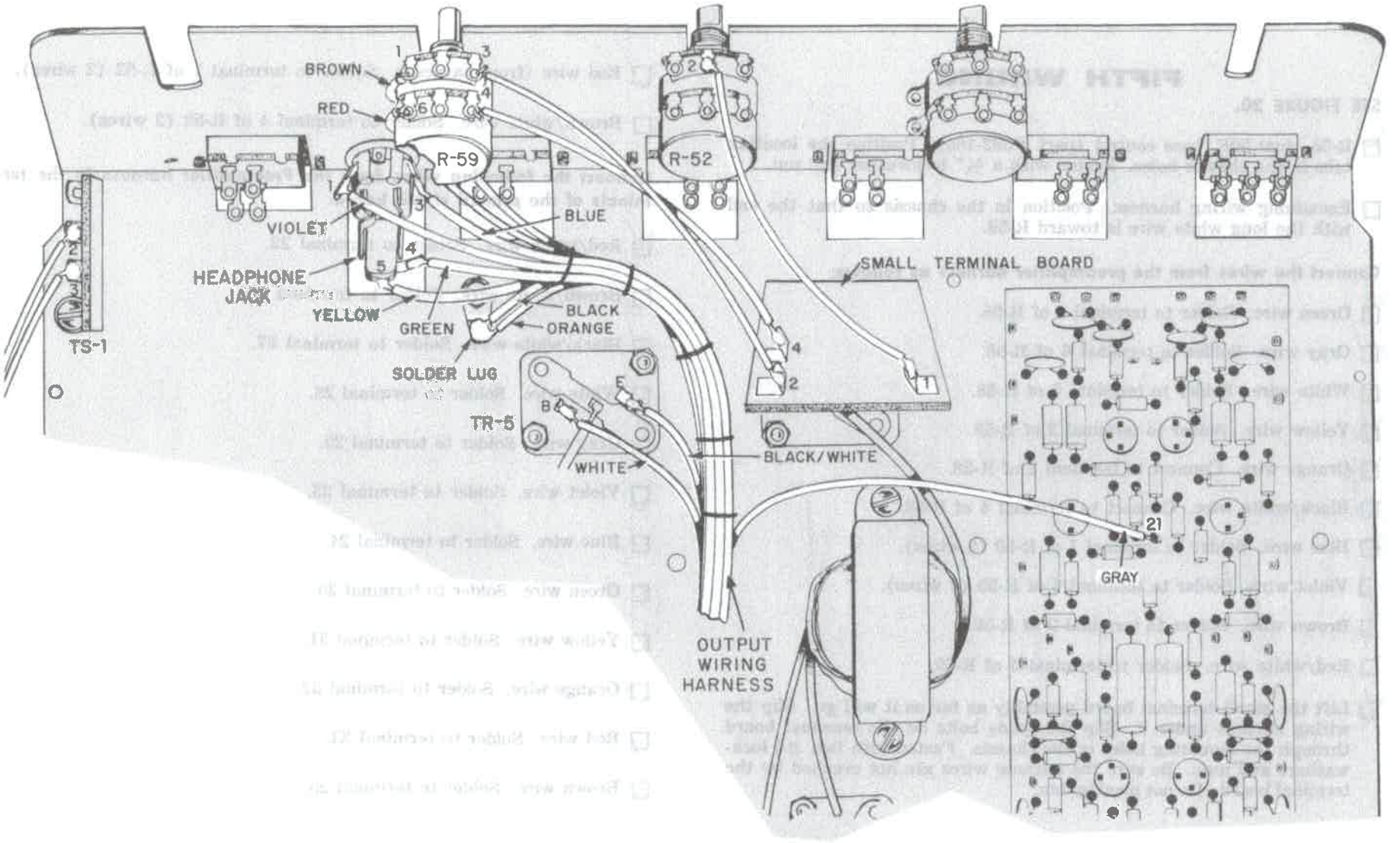


FIGURE 19. FOURTH WIRING OF THE CHASSIS

FIFTH WIRING

SEE FIGURE 20.

- [ ] R-58, dual 50K, bass control (part #392-165). Position the locating tabs in the chassis holes. Fasten with a 3/8" lockwasher and nut.
- [ ] Remaining wiring harness. Position in the chassis so that the end with the long white wire is toward R-58.

Connect the wires from the preamplifier harness as follows:

- [ ] Green wire. Solder to terminal 1 of R-58.
- [ ] Gray wire. Solder to terminal 6 of R-58.
- [ ] White wire. Solder to terminal 5 of R-58.
- [ ] Yellow wire. Solder to terminal 2 of R-58.
- [ ] Orange wire. Connect to terminal 3 of R-58.
- [ ] Black/white wire. Connect to terminal 4 of R-58.
- [ ] Blue wire. Solder to terminal 1 of R-59 (2 wires).
- [ ] Violet wire. Solder to terminal 6 of R-59 (2 wires).
- [ ] Brown wire. Solder to terminal 2 of R-59.
- [ ] Red/white wire. Solder to terminal 5 of R-59.
- [ ] **Lift the small terminal board assembly as far as it will go. Slip the wiring harness under it. Slip the spade bolts on the terminal board through the mounting holes in the chassis. Fasten with two #6 lockwashers and nuts. Be sure the harness wires are not crushed by the terminal board. Do not overtighten.**
- [ ] Red wire (from harness). Solder to terminal 1 of R-52 (2 wires).
- [ ] Brown/white wire. Solder to terminal 4 of R-52 (2 wires).

Connect the following wires from the Preamplifier harness to the terminals of the printed circuit board:

- [ ] Red/white wire. Solder to terminal 22.
- [ ] Brown/white wire. Solder to terminal 26.
- [ ] Black/white wire. Solder to terminal 27.
- [ ] White wire. Solder to terminal 28.
- [ ] Gray wire. Solder to terminal 29.
- [ ] Violet wire. Solder to terminal 23.
- [ ] Blue wire. Solder to terminal 24.
- [ ] Green wire. Solder to terminal 30.
- [ ] Yellow wire. Solder to terminal 31.
- [ ] Orange wire. Solder to terminal 32.
- [ ] Red wire. Solder to terminal 33.
- [ ] Brown wire. Solder to terminal 25.

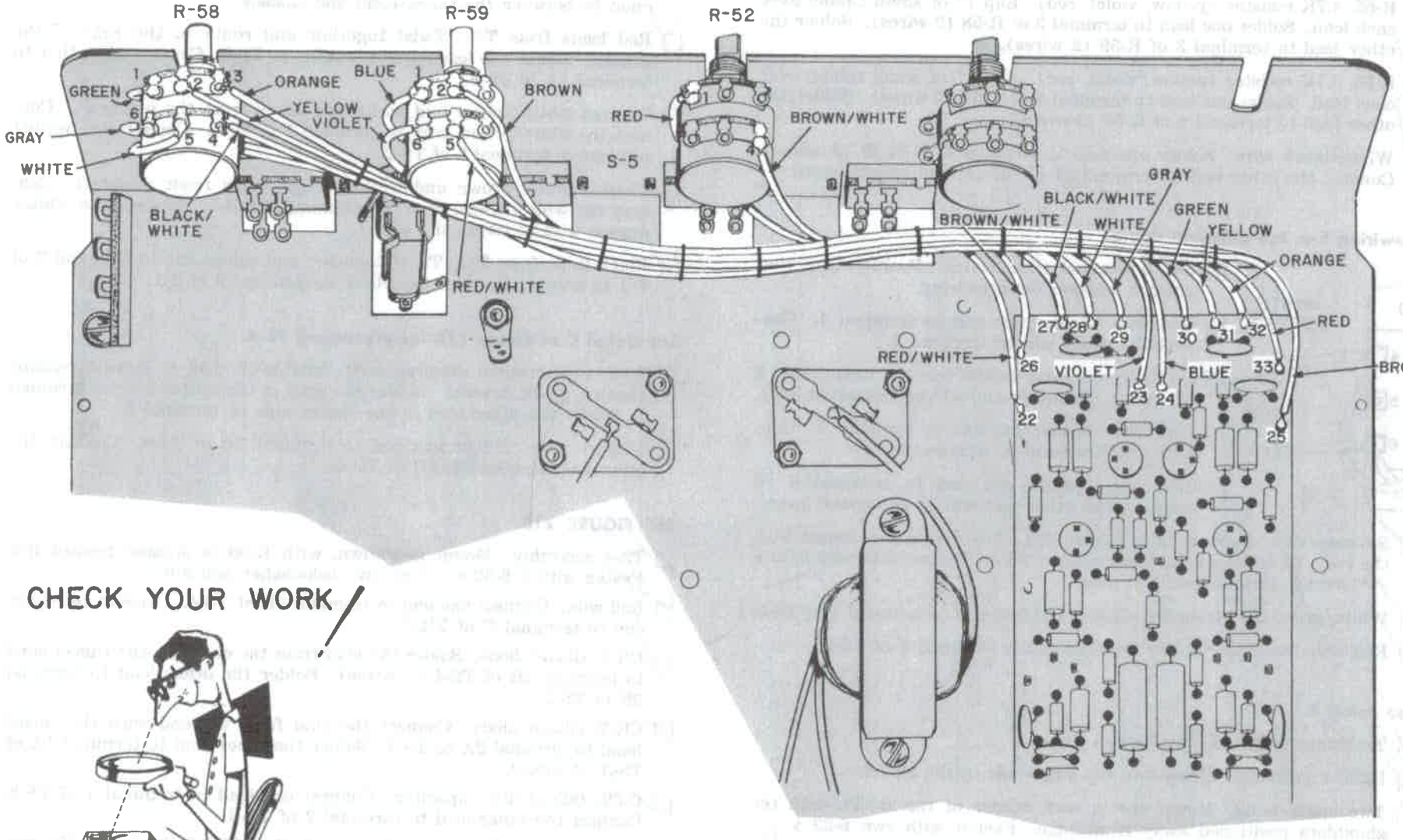


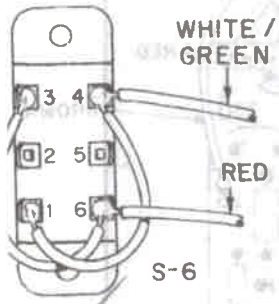
FIGURE 20. FIFTH WIRING OF THE CHASSIS

SIXTH WIRING

SEE FIGURE 21A.

- [ ] R-55, 4.7K resistor (yellow, violet, red). Slip 1″ of small tubing over each lead. Solder one lead to terminal 3 of R-58 (2 wires). Solder the other lead to terminal 3 of R-59 (2 wires).
- [ ] R-60, 4.7K resistor (yellow, violet, red). Slip 1″ of small tubing over each lead. Solder one lead to terminal 4 of R-58 (2 wires). Solder the other lead to terminal 4 of R-59 (2 wires).
- [ ] White/black wire. Solder one end to terminal 6 of R-39 (3 wires). Connect the other end to terminal 34 of the printed circuit board.

Prewiring S-6, see adjacent figure.



- [ ] S-6, 6-terminal slide switch. Position in a convenient location for prewiring.
- [ ] Red wire. Solder one end to terminal 1. Connect the other end to terminal 4.
- [ ] White/green wire. Solder one end to terminal 4 (2 wires). The other end will be connected later.
- [ ] Red wire. Solder one end to terminal 3. Connect the other end to terminal 6.
- [ ] Red wire. Solder one end to terminal 6 (2 wires). The other end will be connected later.
- [ ] S-6 assembly. Refer back to Figure 21A. Position in the chassis with the red and white/green wires toward TS-5. Fasten with two 6-32 x $\frac{5}{16}$″ screws, lockwashers and nuts.
- [ ] White/green wire from S-6. Solder the free end to terminal 1 of TS-5.
- [ ] Red wire from S-6. Solder the free end to terminal 2 of TS-5.

See detail A.

- [ ] Transformer shield. Position as shown.
- [ ] Rubber grommet. Press into the large hole in the shield.
- [ ] Two spade bolts. Mount one in each corner of the shield, with the shoulders positioned away from edge. Fasten with two 6-32 x $\frac{5}{16}$″ screws, lockwashers and nuts.
- [ ] Transformer shield assembly. Pass the twisted wires from TS-1 and S-7 through the grommet and route toward the rear of the chassis. Mount the shield and fasten with two #6 lockwashers and nuts.
- [ ] T-1, power transformer. Place a clip nut on each of the mounting feet, with the raised side toward the transformer, as shown in detail B.
- [ ] Mount T-1 with four 6-32 x $\frac{3}{8}$″ screws and thick flatwashers. Place the washers on the screws before installing the screws. The washers must be between the screw-head and chassis.
- [ ] Red leads from T-1. Twist together and route to the rear of the chassis. Solder one lead to terminal 2A of TS-3. Connect the other to terminal 1A of TS-3.
- [ ] Twisted white/yellow and white/red wires from the grommet. Connect the white/yellow wire to terminal 1 of TS-2. Connect the white/red lead to terminal 2 of TS-2.
- [ ] Twisted white/brown and white/orange wires from grommet. Connect the white/brown wire to terminal 2 of F-1. Connect the white/orange wire to terminal 2 of J-1.
- [ ] Black leads from T-1. Twist together and solder one to terminal 2 of F-1 (2 wires). Connect the other to terminal 2 of J-1.

See Detail C of Figure 21B for pre-wiring TS-4.

- [ ] TS-4, a 3-terminal standup strip, and R-89, 150 Ω, 2-watt resistor (brown, green, brown). Solder one lead in the center hole of terminal 1. Solder the other lead in the center hole of terminal 3.
- [ ] 1″ bare wire. Solder one end to terminal 2B of TS-4. Connect the other lead to terminal 3B of TS-4.

SEE FIGURE 21B.

- [ ] TS-4 assembly. Mount as shown, with R-89 positioned toward S-6. Fasten with a 6-32 x $\frac{5}{16}$″ screw, lockwasher and nut.
- [ ] Red wire. Connect one end to terminal 3B of TS-4. Connect the other end to terminal C of TR-6.
- [ ] CR-1, silicon diode. Solder the lead from the end with the raised band to terminal 3B of TS-4 (3 wires). Solder the other lead to terminal 2B of TS-3.
- [ ] CR-2, silicon diode. Connect the lead from the end with the raised band to terminal 2A of TS-4. Solder the other lead to terminal 1A of TS-3 (2 wires).
- [ ] C-39, .005 μf disc capacitor. Connect one lead to terminal 1 of TS-2. Connect the other lead to terminal 2 of TS-2.
- [ ] Orange wire. Solder one end to terminal 1 of TS-2 (3 wires). Connect the other end to terminal 1 of J-1.
- [ ] Red wire. Solder one end to terminal 1 of J-1 (2 wires). Solder the other end to terminal 1 of F-1.
- [ ] Bend the terminals of F-1 so they point toward the front of the chassis.

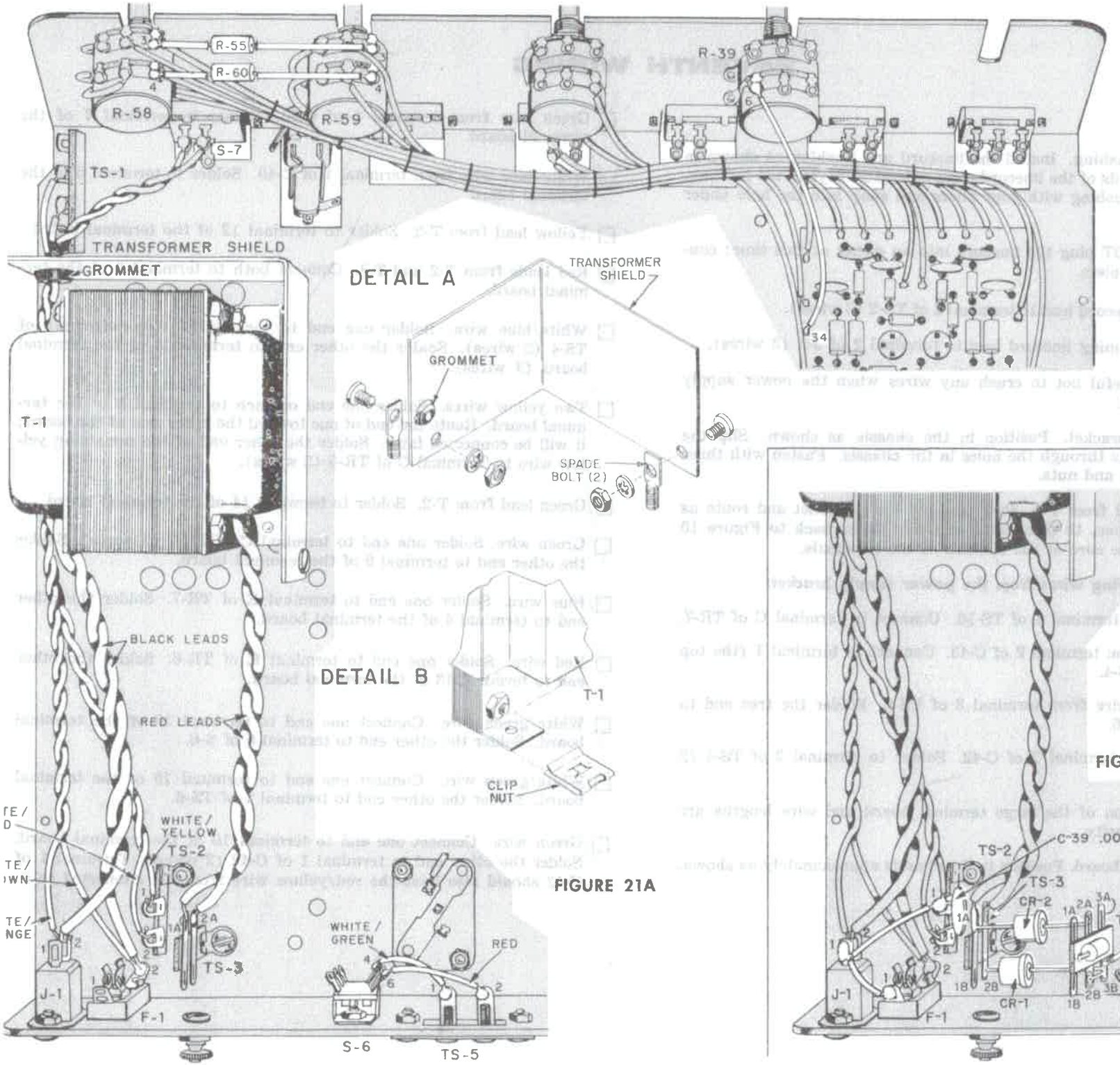


FIGURE 21A

FIGURE 21B

SIXTH WIRING

SEVENTH WIRING

SEE FIGURE 22.

☐ Linecord and bushing. Install the linecord and bushing as shown in detail A. The ends of the linecord must extend 2" beyond the bushing. Compress the bushing with your pliers and snap into the hole under J-1.

CAUTION: DO NOT plug the linecord into an outlet at this time; construction is not complete.

☐ Solder either linecord lead to terminal 2 of TS-2 (3 wires).

☐ Solder the remaining linecord lead to terminal 2 of J-1 (3 wires).

CAUTION: Be careful not to crush any wires when the power supply bracket is mounted.

☐ Power supply bracket. Position in the chassis as shown. Slip the three spade bolts through the holes in the chassis. Fasten with three #6 lockwashers and nuts.

☐ Red/yellow lead from T-1. Pass through the grommet and route as shown and connect to terminal 1 of C-42. Refer back to Figure 10 on Page 13 to be sure of the location of the terminals.

Connect the following wires from the power supply bracket:

☐ Red wire from terminal 1 of TS-10. Connect to terminal C of TR-7.

☐ Yellow wire from terminal 2 of C-43. Connect to terminal 1 (the top terminal) of TS-4.

☐ White/yellow wire from terminal 3 of TS-9. Solder the free end to terminal 2 of S-6.

☐ Red wire from terminal 2 of C-42. Solder to terminal 2 of TS-4 (2 wires).

NOTE: The position of the large terminal board and wire lengths are exaggerated for clarity.

☐ Large terminal board. Position in the chassis approximately as shown. Do not fasten.

☐ Green wire from terminal 1 of C-43. Solder to terminal 7 of the terminal board.

☐ White/blue wire from terminal 1 of C-40. Solder to terminal 5 of the terminal board.

☐ Yellow lead from T-2. Solder to terminal 12 of the terminal board.

☐ Red leads from T-2 and T-3. Connect both to terminal 8 of the terminal board.

☐ White/blue wire. Solder one end to terminal 1 (top terminal) of TS-4 (2 wires). Solder the other end to terminal 8 of the terminal board (3 wires).

☐ Two yellow wires. Solder one end of each to terminal 3 of the terminal board. Route the end of one toward the other side of the board; it will be connected later. Solder the other end of the remaining yellow wire to Terminal C of TR-6 (2 wires).

☐ Green lead from T-2. Solder to terminal 14 of the terminal board.

☐ Green wire. Solder one end to terminal C of TR-7 (2 wires). Solder the other end to terminal 9 of the terminal board.

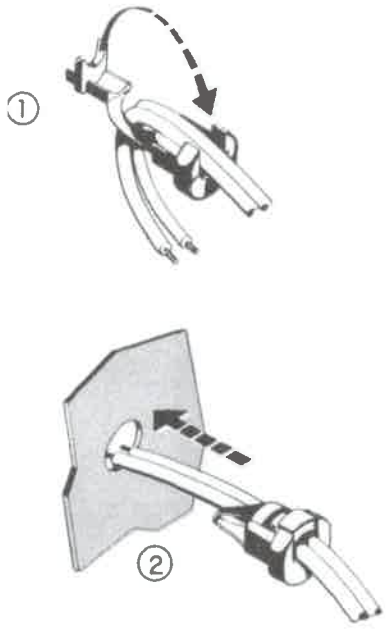
☐ Blue wire. Solder one end to terminal E of TR-7. Solder the other end to terminal 4 of the terminal board.

☐ Red wire. Solder one end to terminal E of TR-6. Solder the other end to terminal 13 of the terminal board.

☐ White/green wire. Connect one end to terminal 10 of the terminal board. Solder the other end to terminal 5 of S-6.

☐ White/green wire. Connect one end to terminal 10 of the terminal board. Solder the other end to terminal 1 of TS-6.

☐ Green wire. Connect one end to terminal 10 of the terminal board. Solder the other end to terminal 1 of C-42 (2 wires). Terminal 1 of C-42 should also have the red/yellow wire from T-1 connected to it.



DETAIL A

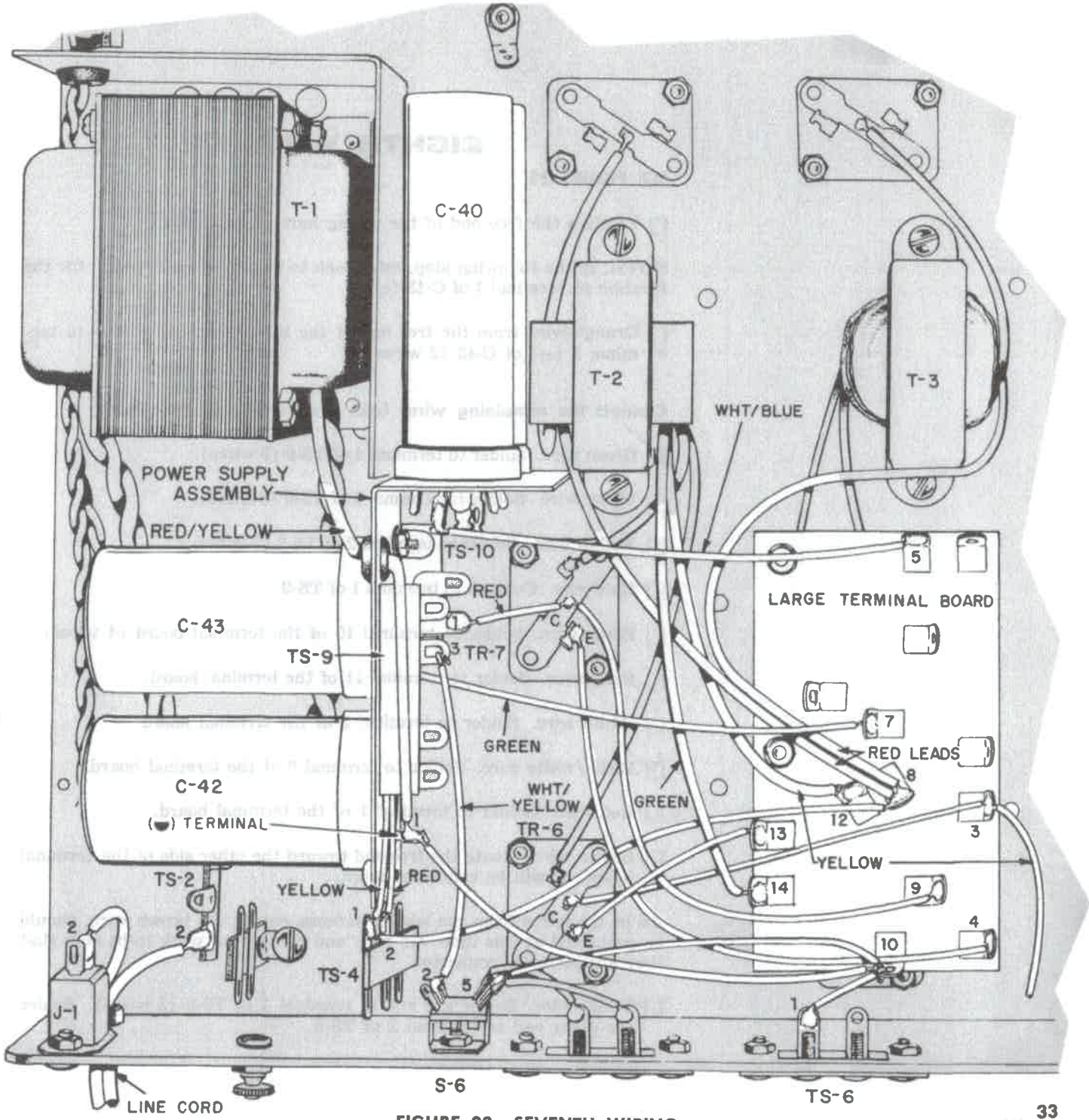


FIGURE 22. SEVENTH WIRING

EIGHTH WIRING

SEE FIGURE 23.

- [ ] Position the free end of the wiring harness as shown.

NOTE: In the following step, refer back to Figure 10 on Page 13, for the location of terminal 1 of C-43 (⏛).

- [ ] Orange wire from the free end of the wiring harness. Solder to terminal 1 (⏛) of C-43 (2 wires).

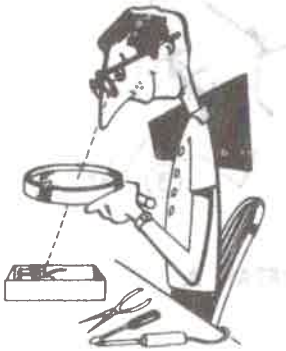
Connect the remaining wires from the harness as follows:

- [ ] Green wire. Solder to terminal 4 of TS-9 (3 wires).
- [ ] Violet wire. Solder to terminal 3 of TS-9 (3 wires).
- [ ] Yellow wire. Solder to terminal 2 of TS-9 (3 wires).
- [ ] Blue wire. Connect to terminal 1 of TS-9.
- [ ] Black wire. Solder to terminal 10 of the terminal board (4 wires).
- [ ] Gray wire. Solder to terminal 11 of the terminal board.
- [ ] White wire. Solder to terminal 2 of the terminal board.
- [ ] Black/white wire. Solder to terminal 6 of the terminal board.
- [ ] Red wire. Solder to terminal 1 of the terminal board.
- [ ] Brown wire. Route the free end toward the other side of the terminal board; it will be connected later.

All of the wires from the wiring harness, except the brown wire, should be connected at this time. Go back and check your work to be sure that they are correctly connected.

- [ ] Violet wire. Solder one end to terminal 1 of TS-9 (3 wires). Solder the other end to terminal 2 of TS-6.

CHECK YOUR WORK



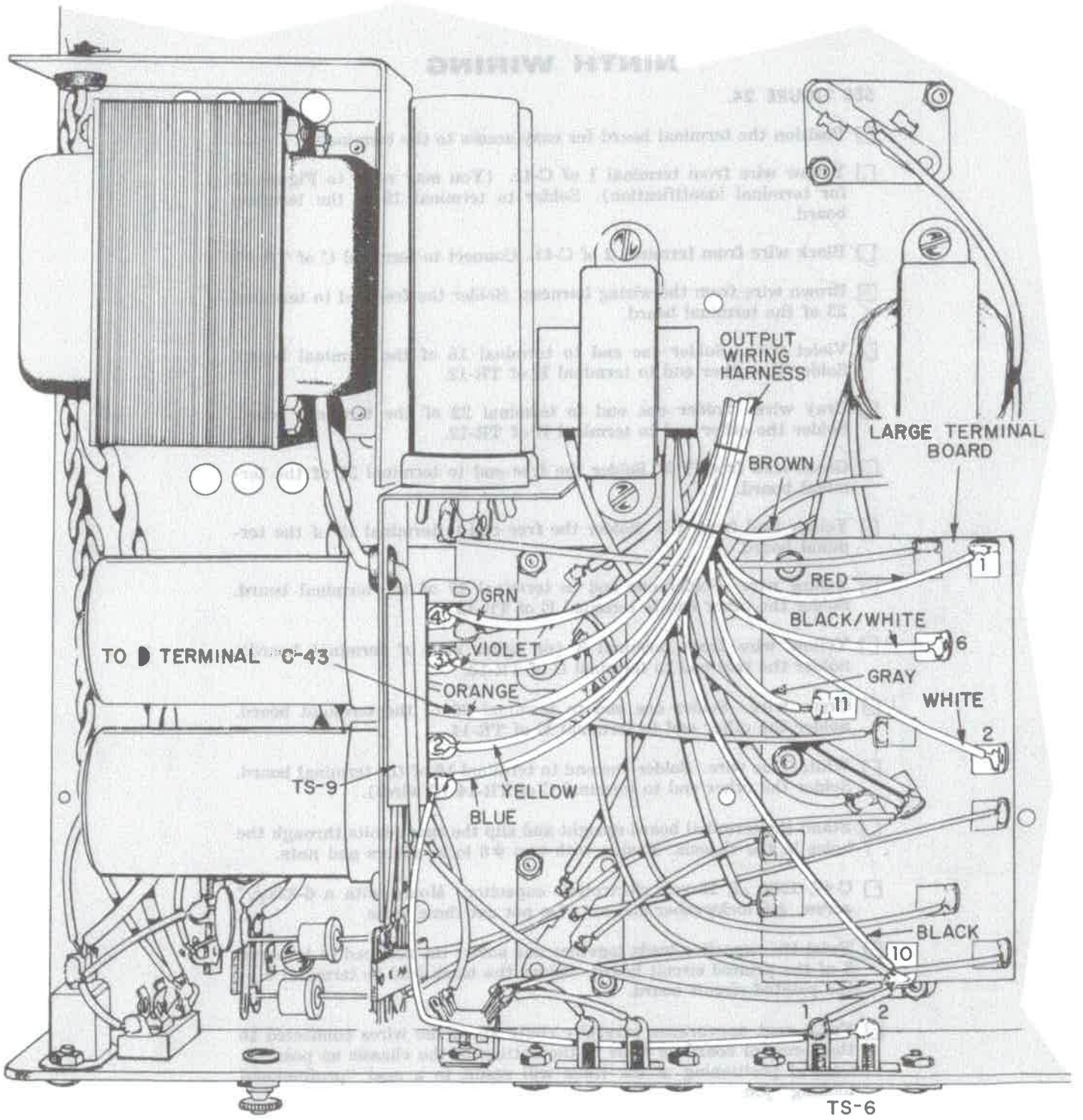


FIGURE 23.
EIGHTH WIRING

NINTH WIRING

SEE FIGURE 24.

- [ ] Position the terminal board for easy access to the terminals.
- [ ] Yellow wire from terminal 1 of C-41. (You may refer to Figure 10 for terminal identification). Solder to terminal 19 of the terminal board.
- [ ] Black wire from terminal 2 of C-41. Connect to terminal C of TR-14.
- [ ] Brown wire from the wiring harness. Solder the free end to terminal 23 of the terminal board.
- [ ] Violet wire. Solder one end to terminal 18 of the terminal board. Solder the other end to terminal E of TR-12.
- [ ] Gray wire. Solder one end to terminal 22 of the terminal board. Solder the other end to terminal B of TR-12.
- [ ] Green lead from T-3. Solder the free end to terminal 21 of the terminal board.
- [ ] Yellow lead from T-3. Solder the free end to terminal 15 of the terminal board.
- [ ] Yellow wire. Solder one end to terminal 17 of the terminal board. Solder the other end to terminal E of TR-13.
- [ ] Yellow wire from terminal 3 (on other side of terminal board). Solder the free end to terminal C of TR-13.
- [ ] Green wire. Solder one end to terminal 20 of the terminal board. Solder the other end to terminal E of TR-14.
- [ ] White/blue wire. Solder one end to terminal 16 of the terminal board. Solder the other end to terminal C of TR-14 (2 wires).
- [ ] Stand the terminal board upright and slip the spade bolts through the holes in the chassis. Fasten with two #6 lockwashers and nuts.
- [ ] C-47, 1000 μf, 15-volt electrolytic capacitor. Mount with a 6-32x$\frac{5}{16}$" screw, #6 lockwasher and nut. Do not cut these leads.
- [ ] Twist the capacitor leads together and solder the red lead to terminal 3 of the printed circuit board. Solder the black lead to terminal 6 of the printed circuit board.
- [ ] For a neat appearance carefully route all of the wires connected to the terminal board as close to the bottom of the chassis as possible. Careful positioning of the leads will result in a neat "professional looking" job.

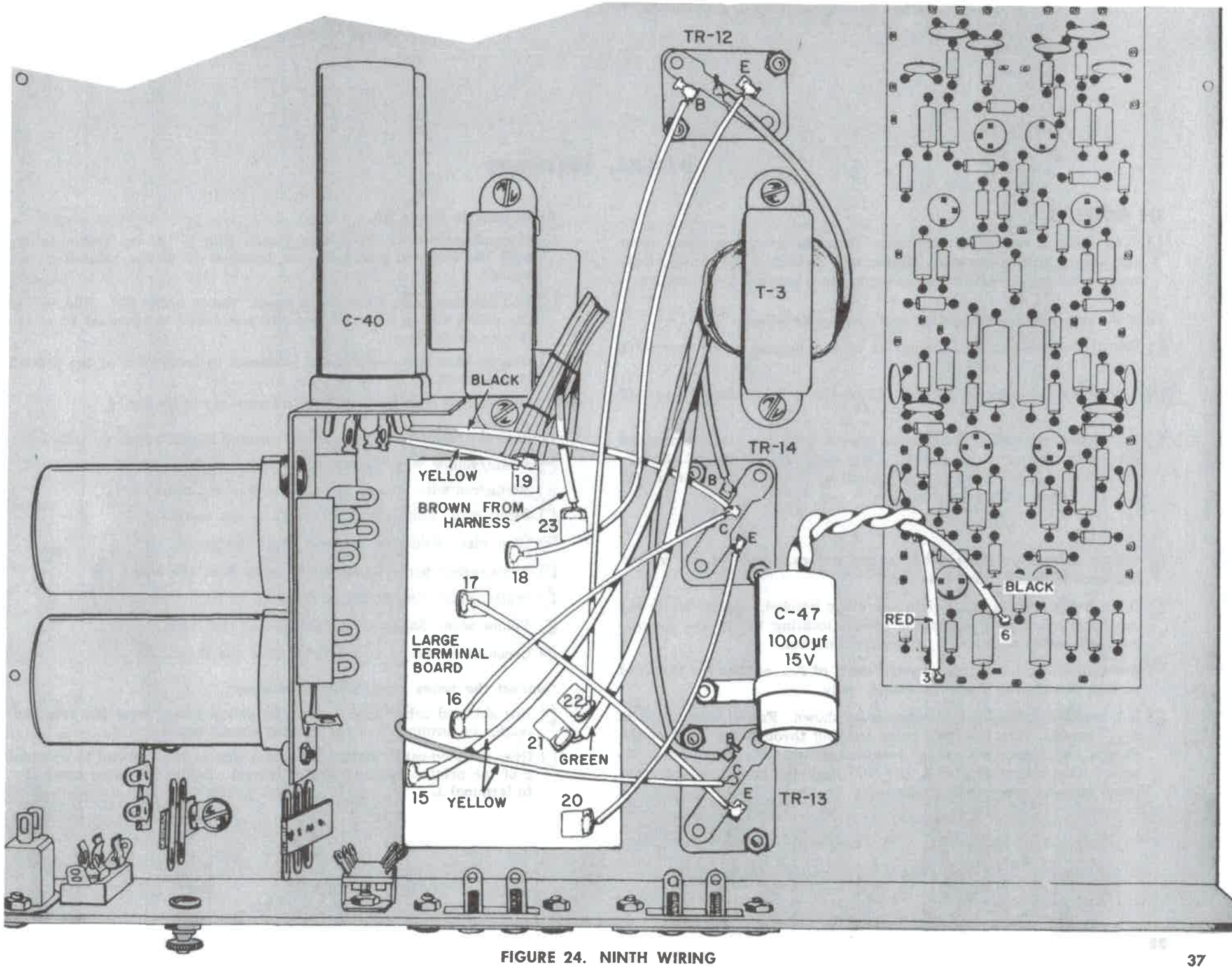


FIGURE 24. NINTH WIRING

FINAL WIRING

SEE FIGURE 25.

- [ ] C-45, 2000 μf electrolytic capacitor. Slip the mounting strap under the output wiring harness. Mount with a 6-32 x $\frac{5}{16}$" screw, lockwasher and nut. Position the wiring harness between C-45 and T-2.

Twist the capacitor leads together and connect as follows:

- [ ] Brown lead. Solder to terminal 34 of the printed circuit board (2 wires).
- [ ] Yellow lead. Solder to terminal 21 of the printed circuit board (2 wires).
- [ ] Input panel assembly. Position as shown, with the 2 shielded cables toward the center of the chassis. Slip the 4 long screws at the corners of the panel through the mounting holes in the rear of the chassis. Fasten with 4 acorn nuts.

See detail A.

- [ ] Switch mounting bracket. Slip a clip nut over each of the mounting holes with the raised side up.
- [ ] S-1, selector switch and switch mounting bracket. Mount S-1 in the mounting bracket. Position the switch locating lug in the locating hole and fasten with a ⅜" lockwasher and nut.
- [ ] Front panel bushing. Slip over the shaft of S-1, so that the threaded portion faces away from the switch body.
- [ ] S-1, assembly. Mount in the chassis as shown. Fasten with two 6-32 x $\frac{5}{16}$" screws. Slip the front panel bushing through the front of the chassis and fasten with a ⅜" lockwasher and nut, finger-tight. To assure easy operation of S-1, DO NOT tighten the nut on the front panel bushing more than finger-tight

Refer back to Figure 25.

- [ ] Gray shielded cable from input panel. Slip ½" of the yellow tubing over the free end and solder to terminal 15 of the printed circuit board.
- [ ] Red shielded cable from input panel. Route under S-1. Slip ½" of the yellow tubing over the free end and solder to terminal 18 of the printed circuit board.
- [ ] Orange wire from input panel. Connect to terminal 5 of the printed circuit board.
- [ ] Orange wire from S-1C. Solder to terminal 4 of the board.

Connect the wires from S-1A to the printed circuit board as follows:

- [ ] White/yellow wire. Solder to terminal 7 of the board.
- [ ] White/red wire. Solder to terminal 9 of the board.
- [ ] Black wire. Solder to terminal 11 of the board.
- [ ] Blue wire. Solder to terminal 13 of the board.
- [ ] White/green wire. Solder to terminal 8 of the board.
- [ ] White/black wire. Solder to terminal 10 of the board.
- [ ] Yellow wire. Solder to terminal 12 of the board.
- [ ] Green wire. Solder to terminal 14 of the board.

Connect the wires from S-1B as follows:

- [ ] Red shielded cable. Slip ½" of the yellow tubing over the free end. Solder to terminal 2 of the printed circuit board.
- [ ] Gray shielded cable. Solder the shield wire at the free end to terminal 5 of the printed circuit board (2 wires). Solder the inner conductor to terminal 1.

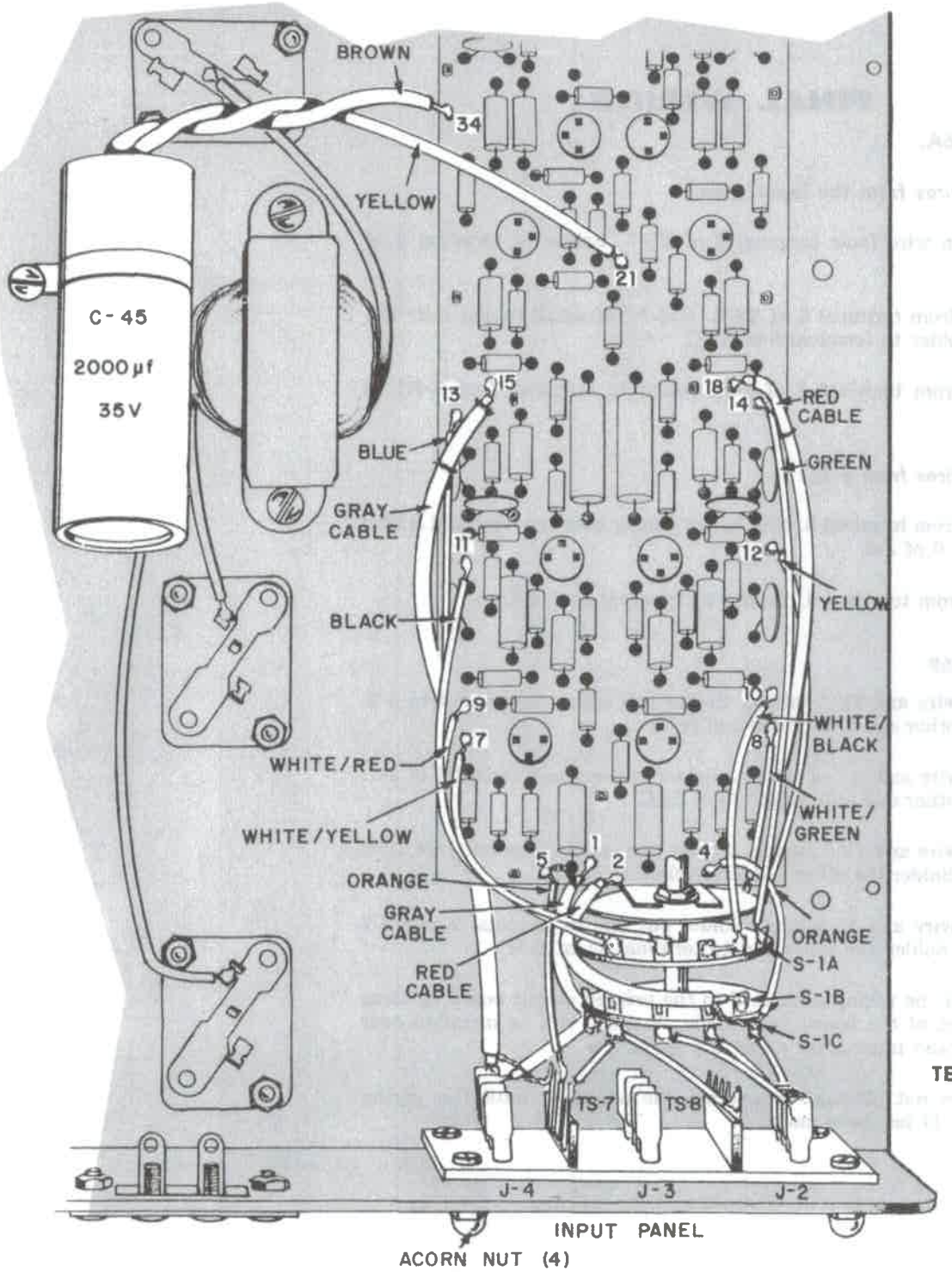
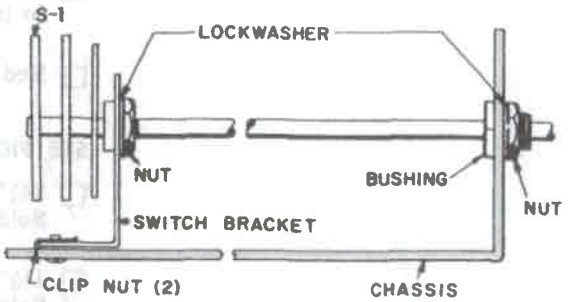


FIGURE 25.
TENTH WIRING



DETAIL A

FINAL WIRING

SEE FIGURE 26A.

Connect the wires from the input panel:

☑ White/green wire from terminal 3 of TS-7. Solder to terminal 5 of S-1C.

☐ Bare wire from terminal 3 of TS-8. Slip 1" of small tubing over the wire and solder to terminal 6 of S-1C.

☐ Red wire from terminal 2 of J-2. Solder to terminal 7 of S-1C (3 wires).

Connect the wires from S-1C:

☑ **Bare wire from terminal 3. Slip ⅝" of tubing over the wire and solder to terminal 6 of J-2.**

☐ Red wire from terminal 4. Solder to terminal 3 of J-2.

SEE FIGURE 26B.

☐ 1¾" bare wire and 1¼" tubing. Solder one end to terminal 4 of J-2. Solder the other end to terminal 9 of S-1C.

☐ 1¼" bare wire and ¾" of tubing. Solder one end to terminal 1 of J-2. Solder the other end to terminal 10 of S-1C.

☐ 1¾" bare wire and 1¼" tubing. Solder one end to terminal 1 of TS-8 (3 wires). Solder the other end to terminal 12 of S-1C.

☐ 1½" bare wire and 1" tubing. Solder one end to terminal 1 of TS-7 (3 wires). Solder the other end to terminal 11 of S-1C.

☐ Route all of the wiring connected to the printed circuit board as close to the edges of the board as possible. A shield will be installed over the board, and must clear all of the wires.

CAUTION: Do not attempt to operate the amplifier until the wiring check on page 44 has been made.

FINAL WIRING

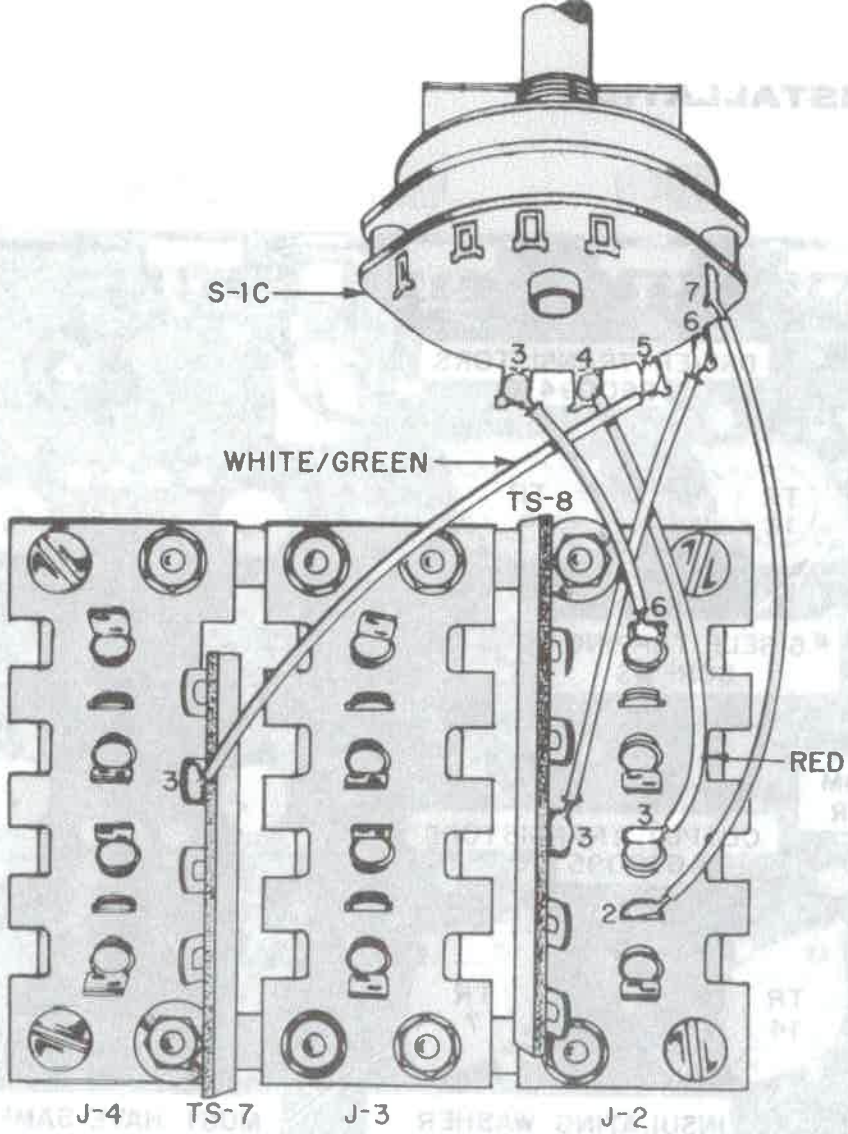


FIGURE 26A

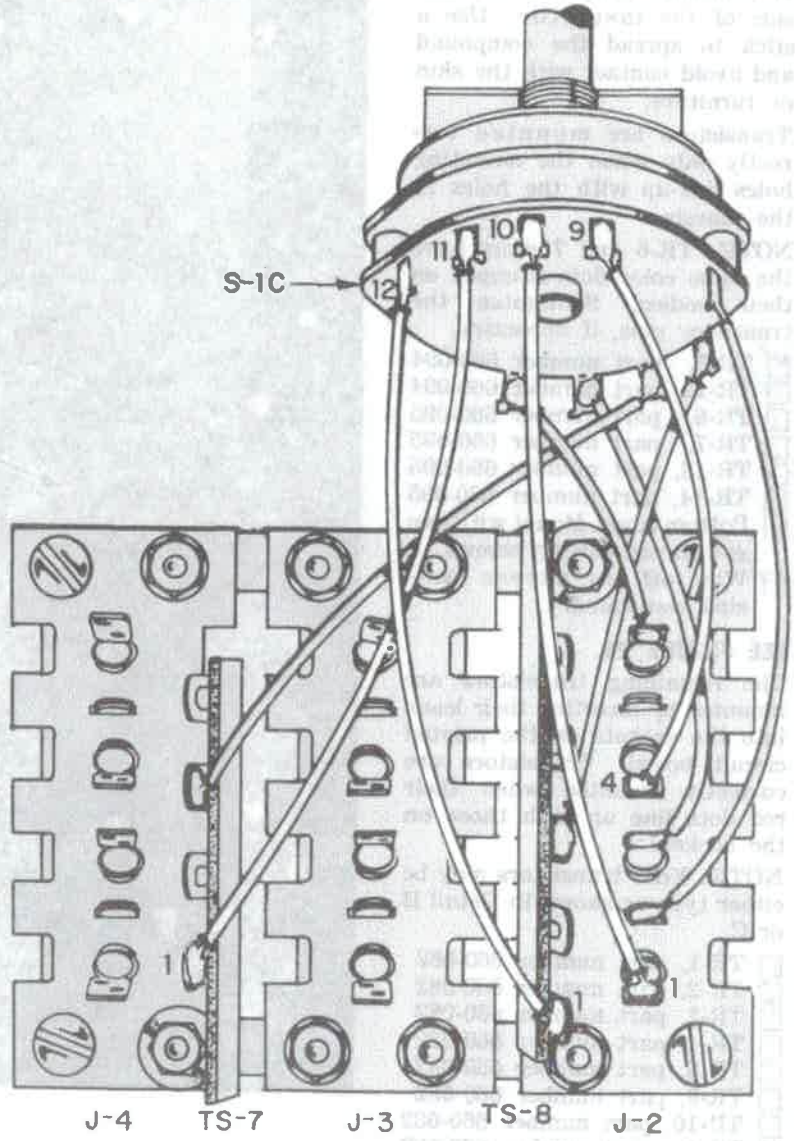


FIGURE 26B

POWER TRANSISTORS

SEE FIGURE 27.

CAUTION. Be sure the self-tapping screws do not cut wires inside the chassis.

Mount each power transistor with an insulator and two #6 x ½" self-tapping screws, as shown in Detail A. Apply a small amount of heat-sink compound to each side of the insulator. Use a stick to spread the compound and avoid contact with the skin or furniture.

Transistors are mounted correctly only when the mounting holes line-up with the holes in the chassis.

NOTE: TR-6 and 7 must have the same color dots stamped on their bodies. Straighten the transistor pins, if necessary.

- [ ] TR-5, part number 660-094
- [ ] TR-12, part number 660-094
- [ ] TR-6, part number 660-095
- [ ] TR-7, part number 660-095
- [ ] TR-13, part number 660-095
- [ ] TR-14, part number 660-095
- [ ] Bottom cover. Mount with two #4 thread-cutting screws.
- [ ] Wipe off any excess heat-sink compound.

SEE FIGURE 28.

The remaining transistors are mounted by inserting their leads into the sockets on the printed circuit board. Transistors are correctly mounted when their red dots line up with those on the sockets.

NOTE: Your transistors may be either type as shown in Detail B or C.

- [ ] TR-1, part number 660-082
- [ ] TR-2, part number 660-082
- [ ] TR-3, part number 660-082
- [ ] TR-4, part number 660-082
- [ ] TR-8, part number 660-082
- [ ] TR-9, part number 660-082
- [ ] TR-10, part number 660-082
- [ ] TR-11, part number 660-082

TRANSISTOR INSTALLATION

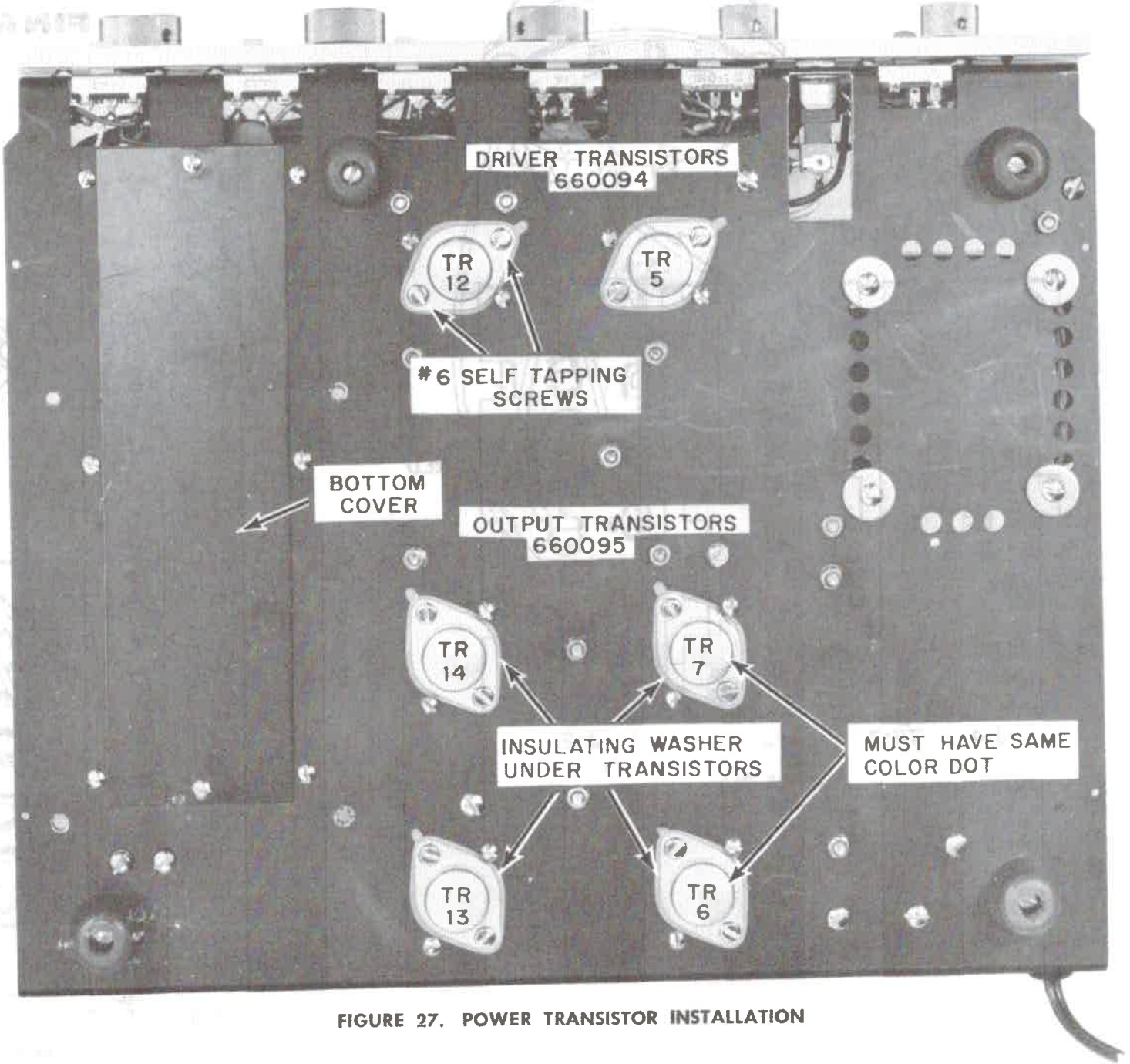
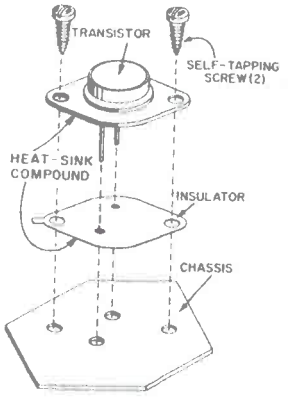
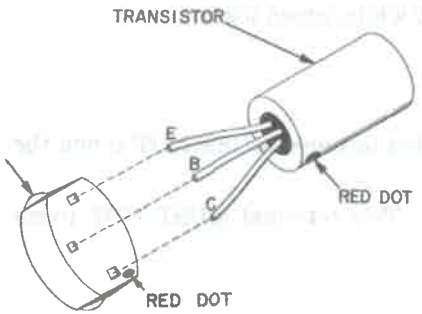


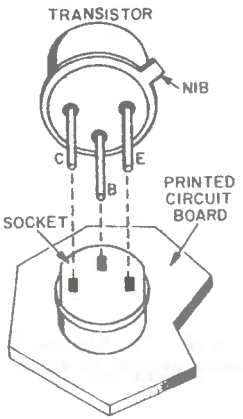
FIGURE 27. POWER TRANSISTOR INSTALLATION



DETAIL A



DETAIL B



DETAIL C

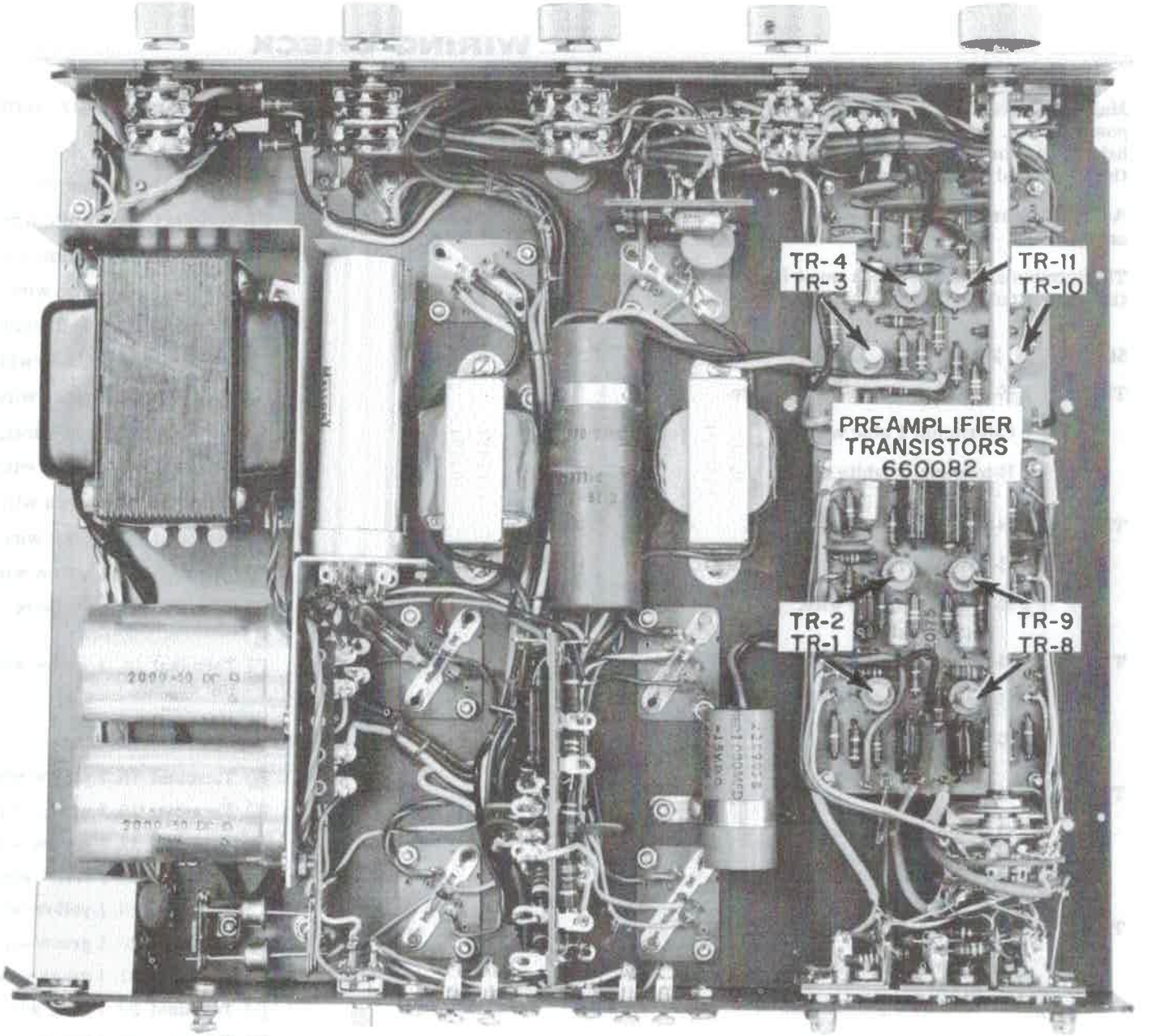


FIGURE 28. PREAMPLIFIER TRANSISTOR INSTALLATION

WIRING CHECK

Make the following wiring check before plugging the amplifier into a power outlet, or connecting any associated equipment. This check will help locate any serious wiring error that might damage components in the driver and output stages.

Any discrepancies must be corrected BEFORE applying power to the amplifier.

The terminals you will check must have the proper number of wires and the correct colors. Also check to be sure the terminals are well soldered.

SEE FIGURE 29.

TR-5
- ☐ E-terminal 1 black/white wire.
- ☐ C-terminal 1 blue wire.
- ☐ B-terminal 1 white wire.

TR-7
- ☐ B-terminal 1 red/green wire.
- ☐ C-terminal 1 red and 1 green wire.
- ☐ E-terminal 1 blue wire.

TR-6
- ☐ B-terminal 1 red/yellow wire.
- ☐ C-terminal 1 red and 1 yellow wire.
- ☐ E-terminal 1 red wire.

TR-12
- ☐ E-terminal 1 violet wire.
- ☐ C-terminal 1 blue wire.
- ☐ B-terminal 1 gray wire.

TR-14
- ☐ B-terminal 1 red/green wire.
- ☐ C-terminal 1 white/blue wire, and 1 black wire.
- ☐ E-terminal 1 green wire.

TR-13
- ☐ B-terminal 1 red/yellow wire.
- ☐ C-terminal 1 yellow wire (from terminal 3 of the large terminal board).
- ☐ E-Terminal 1 yellow wire.

LARGE TERMINAL BOARD (terminals only)

SEE FIGURE 30A.

- ☐ Terminal 1, 1 red wire.
- ☐ Terminal 2, 1 white wire.
- ☐ Terminal 3, 2 yellow wires.
- ☐ Terminal 4, 1 blue wire.
- ☐ Terminal 5, 1 white/blue wire.
- ☐ Terminal 6, 1 black/white wire.
- ☐ Terminal 7, 1 green wire.
- ☐ Terminal 8, 2 red wires, 1 white/blue wire.
- ☐ Terminal 9, 1 green wire.
- ☐ Terminal 10, 1 black wire, 2 white/green wires.
- ☐ Terminal 11, 1 gray wire.
- ☐ Terminal 12, 1 yellow wire.
- ☐ Terminal 13, 1 red wire. This terminal MUST NOT touch the chassis.
- ☐ Terminal 14, 1 green wire. This terminal MUST NOT touch the chassis.

SEE FIGURE 30B.

- ☐ Terminal 15, 1 yellow wire.
- ☐ Terminal 16, 1 white/blue wire.
- ☐ Terminal 17, 1 yellow wire.
- ☐ Terminal 18, 1 violet wire.
- ☐ Terminal 19, 1 yellow wire.
- ☐ Terminal 20, 1 green wire.
- ☐ Terminal 21, 1 green wire.
- ☐ Terminal 22, 1 gray wire.
- ☐ Terminal 23, 1 brown wire.

☐ Carefully check the wiring in the rest of the amplifier. Resolder any connections that look doubtful. Remove any wire clippings that may have dropped into the chassis.

☐ F-1, fuse. Snap into the fuse holder, F-1.

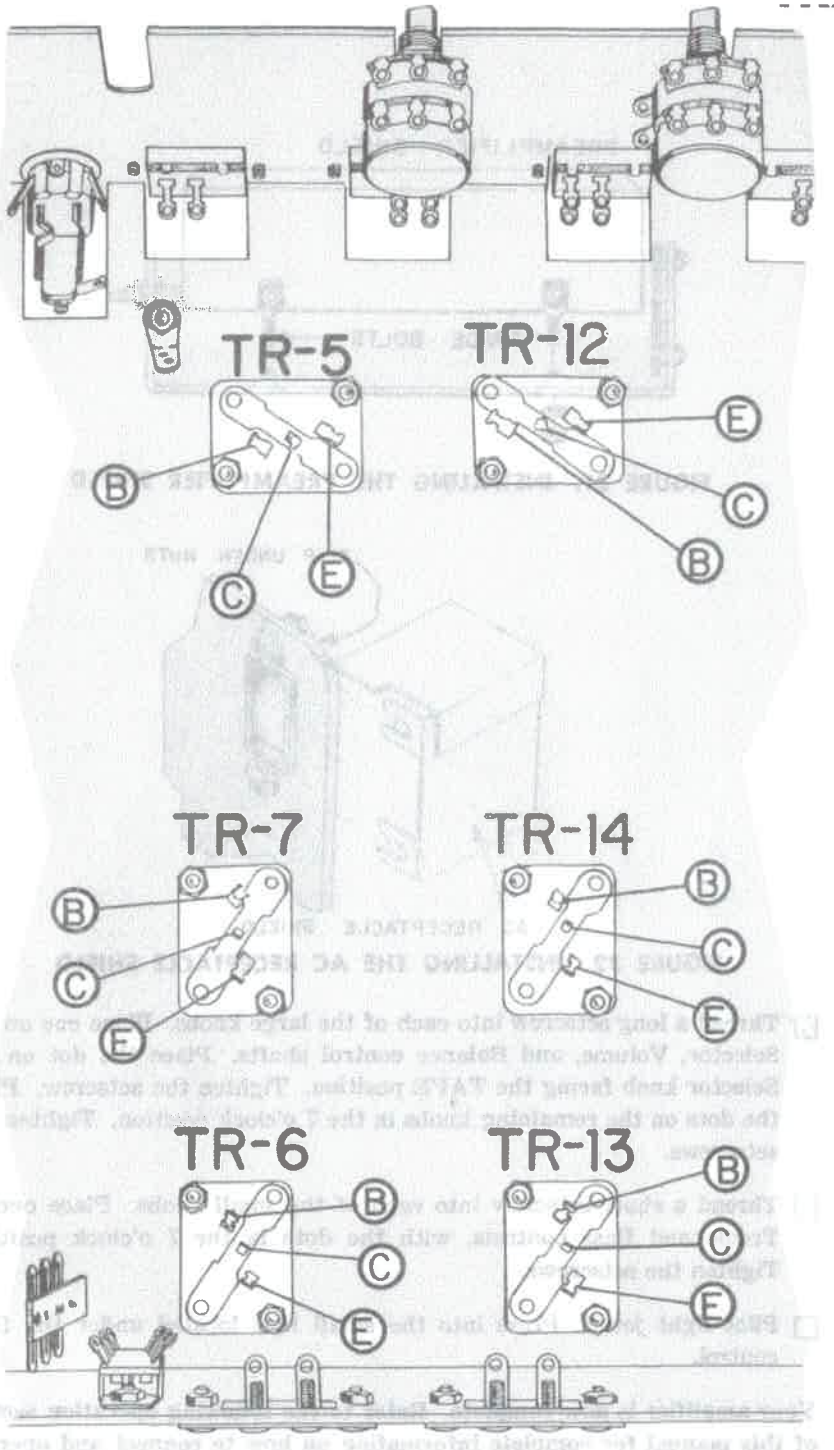


FIGURE 29

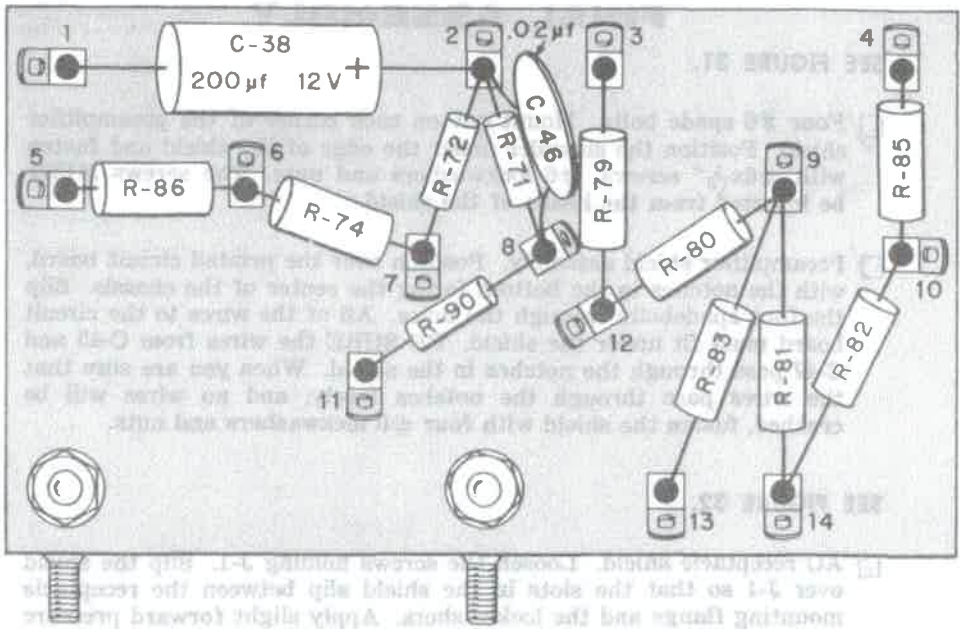


FIGURE 30A

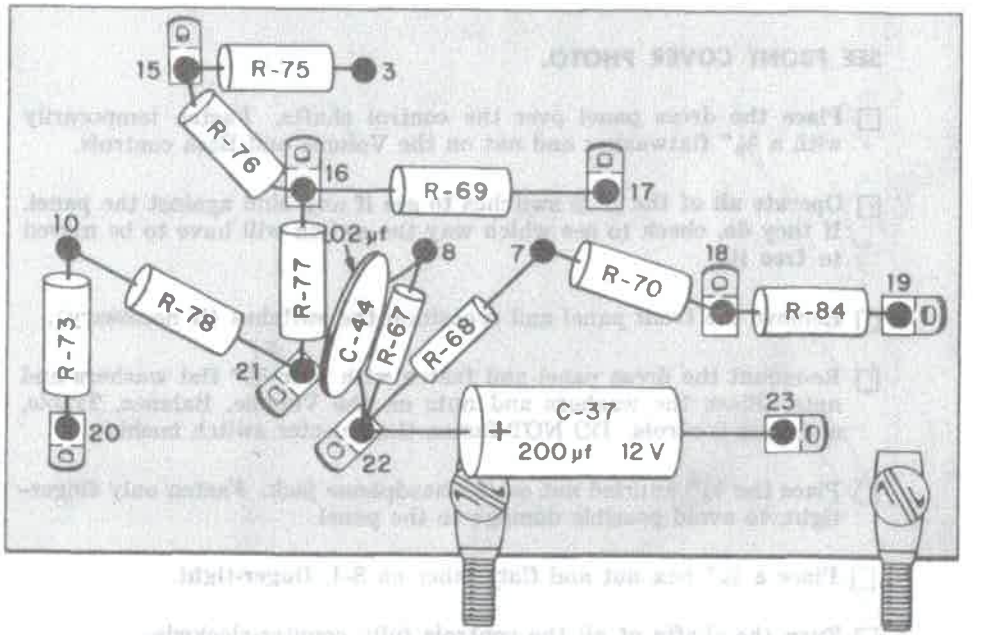


FIGURE 30B

FINAL ASSEMBLY

SEE FIGURE 31.

☐ Four #6 spade bolts. Mount one on each corner of the preamplifier shield. Position the shoulder under the edge of the shield and fasten with #6x$\frac{5}{16}$" screws, #6 lockwashers and nuts. **The screws MUST be inserted from the inside of the shield.**

☐ Preamplifier shield assembly. Position over the printed circuit board, with the notches in the bottom facing the center of the chassis. Slip the four spadebolts through the holes. All of the wires to the circuit board must fit under the shield. BE SURE the wires from C-45 and C-47 pass through the notches in the shield. When you are sure that the wires pass through the notches freely, and no wires will be crushed, fasten the shield with four #6 lockwashers and nuts.

SEE FIGURE 32.

☐ AC receptacle shield. Loosen the screws holding J-1. Slip the shield over J-1 so that the slots in the shield slip between the receptacle mounting flange and the lockwashers. Apply slight forward pressure on the shield. While maintaining this pressure, tighten the screws.

CAUTION: The AC shield must not touch any of the terminals or wiring on the receptacle, or fuse holder.

SEE FRONT COVER PHOTO.

☐ Place the dress panel over the control shafts. Fasten temporarily with a ⅜" flatwasher and nut on the Volume and Bass controls.

☐ Operate all of the slide switches to see if any bind against the panel. If they do, check to see which way the switch will have to be moved to free it.

☐ Remove the front panel and reposition the switches (if necessary).

☐ Re-mount the dress panel and fasten with four ⅜" flat washers and nuts. Place the washers and nuts on the Volume, Balance, Treble, and Bass controls. DO NOT fasten the Selector switch bushing.

☐ Place the ⅜" knurled nut on the headphone jack. Fasten only finger-tight, to avoid possible damage to the panel.

☐ Place a ⅜" hex nut and flatwasher on S-1, finger-tight.

☐ Turn the shafts of all the controls fully counter-clockwise.

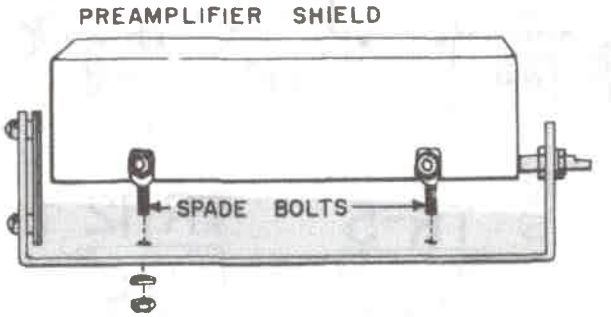


FIGURE 31. INSTALLING THE PREAMPLIFIER SHIELD

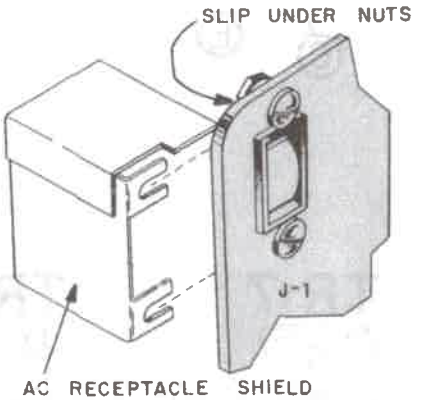


FIGURE 32. INSTALLING THE AC RECEPTACLE SHIELD

☐ Thread a long setscrew into each of the large knobs. Place one on the Selector, Volume, and Balance control shafts. Place the dot on the Selector knob facing the TAPE position. Tighten the setscrew. Place the dots on the remaining knobs in the 7 o'clock position. Tighten the setscrews.

☐ Thread a short setscrew into each of the small knobs. Place one on Treble and Bass controls, with the dots in the 7 o'clock position. Tighten the setscrews.

☐ Pilot light jewel. Press into the small hole located under the Bass control.

Your amplifier is now complete. Refer to the following operation section of this manual for complete information on how to connect and operate.

SPECIFICATIONS

Power Output

8 Ohms	54 watts total IHF music power. 27 watts per channel. 108 watts peak power. 17 watts continuous sinewave power per channel.
Frequency Response	± 1db, 20 to 25,000 cps at rated power output.
Harmonic Distortion	Less than 1% at rated power output.
Intermodulation Distortion	Less than 1.5% at rated power output 60 cps and 7kc mixed 4:1.

Hum and Noise

Tape Head	Better than 60 db below rated power
Mag Phono	Better than 60 db below rated power
Tuner	75 db below rated power
Aux.	75 db below rated power

Input Sensitivity and Impedance (for rated output)

Input	*Sensitivity*	*Impedance*
Tape Head	2.5 millivolts	200K ohms
Mag Phono	3 millivolts	200K ohms
Tuner	.5 volt	500K ohms
Aux. #1	.25 volt	150K ohms
Aux. #2	1 volt	620K ohms

Separation	Better than 40 db.
Tape Output	.5 volts 10K source impedance
Output Impedance	May be used with 8 or 16 ohm speakers.
Damping Factor	10 when used with 8 ohm speaker. 17 when used with 16 ohm speaker.

Equalization

Tape Head	NARTB
Mag Phono	RIAA
Bass Cut or Boost	10 db at 100 cps
Treble Cut or Boost	5 db at 15 kc.
Controls	SELECTOR (tape-phono-tuner-aux.), VOLUME. BASS, TREBLE and BALANCE.
Function Switches	RUMBLE FILTER, SCRATCH FILTER, STEREO-REVERSE, LOUDNESS, STEREO-MONO, POWER on-off, SPEAKER PHASE (on rear of chassis).
Semiconductors	8 signal transistors, 6 power transistors, 2 silicon diodes.
Line Voltage Required	110 volts to 130 volts, 60 cps AC only.
Power Consumption	25 watts (no signal)
Power Receptacle	1 switched
Size (HWD)	2¾" x 13" x 11".

CONNECTING EQUIPMENT

General Rules:

1. **Always use shielded cable** to connect program-source equipment to the amplifier input jacks.
2. **Always turn the amplifier off before connecting or disconnecting equipment.** If pin plugs are inserted or withdrawn from inputs while power is applied, strong hum voltages can be developed which may overdrive your speakers.
3. **Adequate ventilation must be provided** to insure proper operation and component life. The feet provided with the amplifier and the optional cabinets will provide proper air flow under the chassis. **While the amplifier is very efficient** in its use of power, it does dissipate some power in the form of heat. *Do not place the amplifier on top of a vacuum-tube tuner or similar heat producing piece of equipment.*
4. Place low-level program source equipment, such as a magnetic phono pickup or tape player, as close to the amplifier as possible.

   Excessive length of connecting cable can cause hum pickup and loss of high frequencies.

SEE FIGURE 33.

Record Changer or Turntable

Determine what phono cartridge type you have: low-level magnetic, low-level ceramic, or high-level ceramic. Magnetic cartridges and some of the low-level ceramics may be connected directly to the PHONO inputs.

Many of the high quality ceramics that have been introduced require some type of equalization network in order to connect to the PHONO inputs. These networks are usually supplied by the cartridge manufacturer. If in doubt about your cartridge consult the manufacturer or dealer from whom it was purchased.

The less expensive, high-level, ceramic cartridges have outputs of 1 volt or more. Connect this type of cartridge to the AUX 1 inputs.

Tuners

FM and FM-AM tuners with multiplex. Connect the tuner outputs to the TUN inputs. The TUN input sensitivity is .5 volt. If your tuner has an output level control, set it so that the volume level is about the same as your record player.

FM tuners with separate multiplex adaptors. Connect the adapter outputs to the TUN input jacks. Note: if your adapter does not have a "feed-through" arrangement the FM output of your tuner can be connected to one of the AUX input jacks, allowing you to bypass the adapter.

Separate AM tuner. Connect the output of this unit to one of the AUX input jacks. Choose a jack that gives a level closest to your record player.

Tape Equipment

Tape Transport (basic playback unit with no preamplifier). Any tape player with high-impedance heads (these are commonly used in this type of unit) can be connected to the TAPE inputs. These inputs are equalized for 7½" per second tape recordings.

Tape Recorder with preamplifier. Connect the "line" input jacks of the recorder to the REC output jacks on the rear of the amplifier. Connect the recorder output jacks to the AUX input jacks of the amplifier. Determine which AUX input pair gives the most desirable level.

AC Power Receptacle

This receptacle is provided for connecting associated equipment, such as: tuners, turntables or tape recorders. The receptacle is switched with the amplifier OFF-POWER switch. The receptacle is not fused. *Do not connect units drawing more than 100 watts.* Check the manufacturer's specifications for power consumption.

Speakers

Connect the wires from the left speaker system to the LEFT SPKR terminals.

Connect the wires from the right speaker system to the RIGHT SPKR terminals of the amplifier.

If you have two or more speaker systems for each channel, see Figure . . for correct connection.

Ground Post

Use this terminal as a common point ground for all of the components in your stereo system. Run a #14 wire from each of the components to this terminal. This will eliminate any possible hum loop that might be present in your system. If hum persists, connect this terminal to a good earth ground, such as a cold water pipe or a radiator. A copper ground-rod, driven into moist earth, is an excellent ground, and should be used if there is no other ground point available, or if hum is persistent.

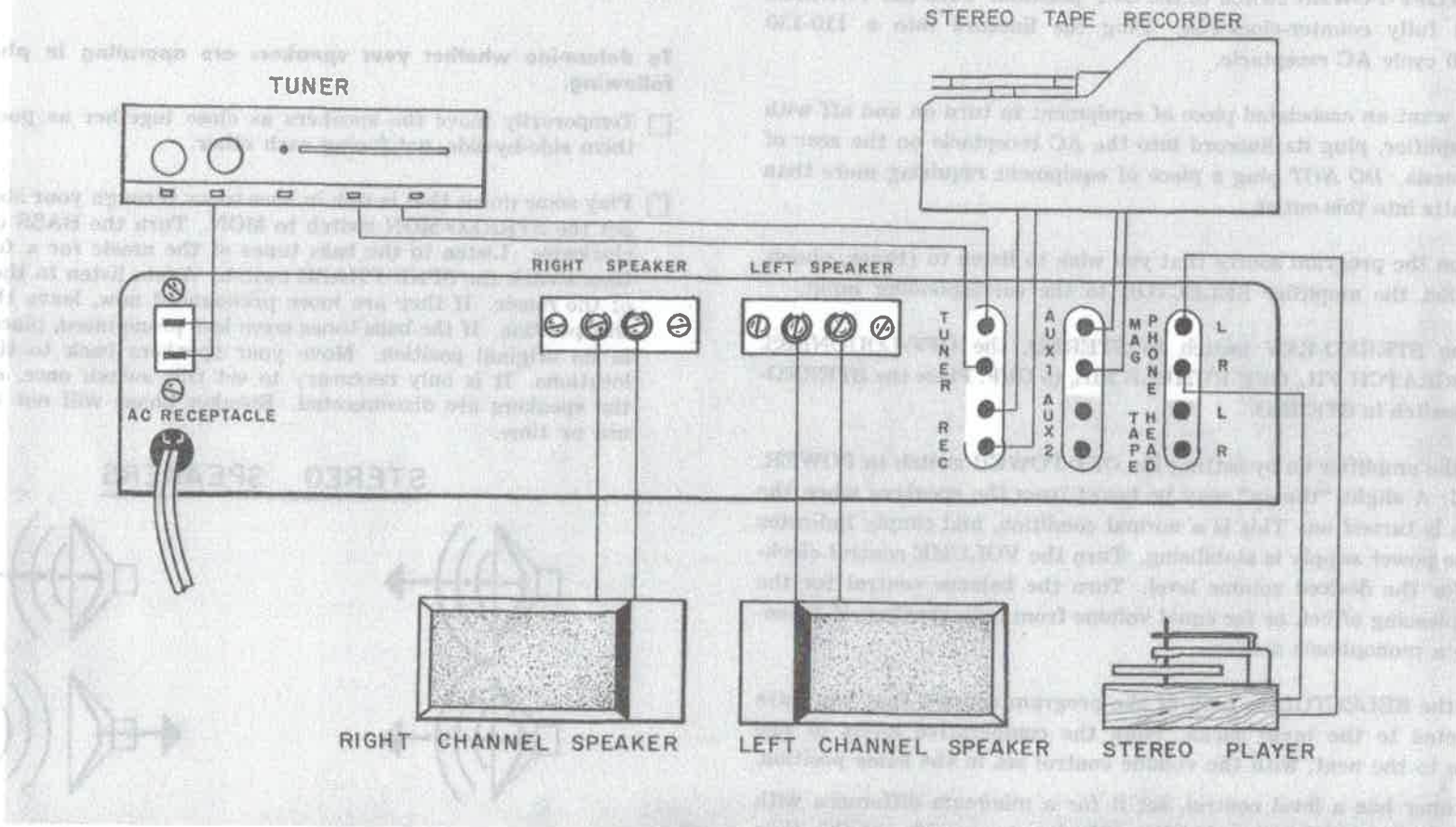

STEREO TAPE RECORDER
TUNER
RIGHT SPEAKER
LEFT SPEAKER
AC RECEPTACLE
TUNER REC
AUX1
AUX2
MAG PHONE
TAPE HEAD
L
R
L
R
RIGHT CHANNEL SPEAKER
LEFT CHANNEL SPEAKER
STEREO PLAYER

FIGURE 33

OPERATING THE AMPLIFIER

☐ **Connect all equipment to the amplifier.** Connect your speakers to the left and right SPKR. terminals on the rear of the chassis.

CAUTION: NEVER TOUCH ANY PART OF THE WIRING WHILE THE AMPLIFIER IS PLUGGED INTO THE POWER OUTLET.

☐ Set the OFF-POWER switch to the OFF position. Turn the VOLUME control fully counter-clockwise. Plug the linecord into a 110-130 volt, 60 cycle AC receptacle.

☐ If you want an associated piece of equipment to turn on and off with the amplifier, plug its linecord into the AC receptacle on the rear of the chassis. *DO NOT* plug a piece of equipment requiring more than 100 watts into this outlet.

☐ Turn on the program source that you wish to listen to (tuner, phono, etc.) Set the amplifier SELECTOR to the corresponding input.

☐ Set the STEREO-REV switch to STEREO, the OFF-LOUDNESS, OFF-SCRATCH FIL, OFF-RUMBLE FIL, to OFF. Place the STEREO-MON switch in STEREO.

☐ Turn the amplifier on by setting the OFF-POWER switch to POWER. NOTE: A slight "thump" may be heard from the speakers when the switch is turned on. This is a normal condition, and simply indicates the the power supply is stabilizing. Turn the VOLUME control clockwise for the desired volume level. Turn the balance control for the most pleasing effect, or for equal volume from both speakers if listening to a monophonic source.

☐ Turn the SELECTOR to each of the program sources that you have connected to the input jacks. Note the comparative levels of one source to the next, with the volume control set in the same position.

If your tuner has a level control, set it for a minimum difference with the phono input. If you are using the AUX inputs, consider at this time whether to use #1 or 2. Choose the one that gives a level that is about the same as PHONO.

PHASING THE LEFT AND RIGHT SPEAKERS

For the best bass reproduction the left and right speakers must be phased. That is, the cones of the left and right speakers must move in and out at the same time. When the speakers operate out of phase, the bass tones will be cancelled. The amount of cancellation will depend upon how far apart the speakers are spaced. The farther apart, the less effect phasing will have.

To determine whether your speakers are operating in phase do the following:

☐ Temporarily move the speakers as close together as possible. Keep them side-by-side, not facing each other.

☐ Play some music that is rich in bass tones through your stereo system. Set the STEREO-MON switch to MON. Turn the BASS control fully clockwise. Listen to the bass tones of the music for a few minutes; then switch the SPKR PHASE switch. Again listen to the bass tones of the music. If they are more pronounced now, leave the switch in this position. If the bass tones seem less pronounced, place the switch in its original position. Move your speakers back to their original locations. It is only necessary to set this switch once, or whenever the speakers are disconnected. Speaker phase will not change with use or time.

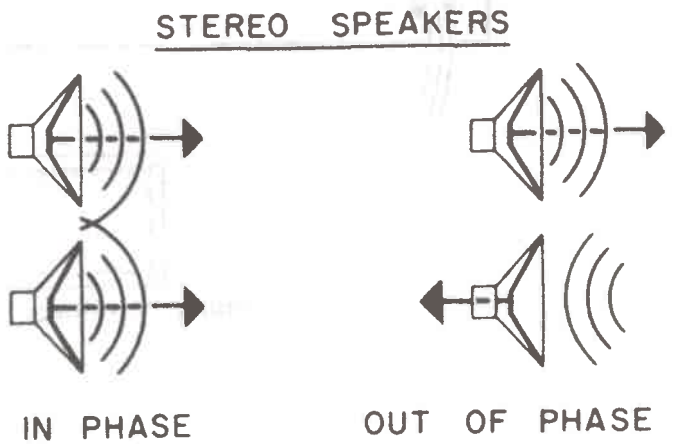
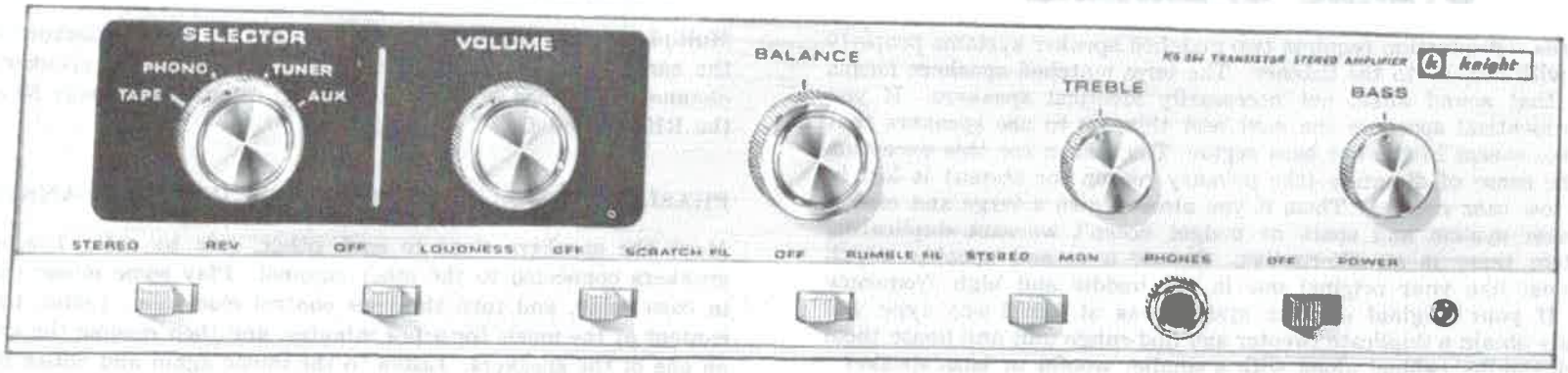


FIGURE 34. PHASING STEREO SPEAKERS

CONTROL FUNCTIONS



SELECTOR should be placed in the position corresponding to the program source that you wish to hear (PHONO, TUNER etc.). The selector's function is to select a pair of inputs to be conected to the amplifier circuits.

VOLUME is used as its name implies, to control the volume. This control is a simple volume control, unless the OFF-LOUDNESS control on the bottom row is set in the LOUDNESS position. The OFF-LOUDNESS control is explained in the CONTROL FUNCTIONS—BOTTOM ROW section of this manual.

BALANCE controls the relative volume of the left and right speakers. Use this control to set the stereo balance for the most pleasing effect. When this control is in the center position, the volume of both speakers is the same (if they are identical). As you turn the control clockwise, the volume of the left speaker will decrease. Turning the control counterclockwise decreases the volume of the right speaker. This control also functions when the amplifier is used for monophonic listening, allowing you to adjust the balance for the best monaural sound. Turn this control through its full range to acquaint yourself with its effect.

BASS and TREBLE controls adjust the tonal balance of both channels at the same time. The TREBLE control will cut or boost the treble tones of the music. The BASS control cuts or boosts the bass tones.

STEREO-REV is used to reverse the two stereo channels. Setting this switch in the reverse position will cause the left input signals to be reproduced by the right speaker and vice-versa.

OFF-LOUDNESS. Placing this control in the loudness position changes the action of the volume control to a loudness control. In this operation the "FLETCHER MUNSON" hearing characteristics are applied to the circuit. The "FLETCHER MUNSON" characteristics compensate for the deficiency of the human ear to hear very low bass and very high treble tones at low volume levels. When this switch is placed in the LOUDNESS position, the volume will seem to drop slightly and the bass and treble tones will become more pronounced. Increasing the volume control with the LOUDNESS on decreases the loudness compensation.

OFF-SCRATCH FIL introduces the scratch filter when placed in the SCRATCH FIL. position. The scratch filter provides a sharp cutoff of the high frequencies, reducing scratch from old or worn records, or tape hiss.

OFF-RUMBLE FIL introduces a sharp cutoff of the response below 25 CPS. This eliminates the low frequency rumble caused by some record playing equipment. **The rumble and scratch filters can be used together.**

STEREO-MON is used to connect the two amplifier channels in parallel. Use the STEREO position for all stereo reproduction. Use the MON position to listen to a monophonic source that has been connected to only one jack of an input pair. This allows listening to a monaural source from both speakers. Use the MON position to listen to monophonic records played with your stereo cartridge.

HEADPHONES. This jack is intended for use with any low-impedance set of headphones. When you insert the plug into the jack, the headphones are placed directly in parallel with the speakers. Because phones have a much greater sensitivity than speakers, the output level of the amplifier has been designed to drop by a comparable amount. Thus, if you are listening to the speakers at a given level, then plug in the headphones, you will hear about the same level from the phones. Note however that the speakers will become almost inaudible. This feature allows listening at considerable volume without disturbing anyone.

OFF-POWER controls the AC power to the amplifier and accessory receptacle on the rear of the chassis. Place this switch in the POWER position, and the amplifier is turned on, and the receptacle on the rear of the chassis is energized.

PILOT LIGHT. The pilot light is an indication of whether the amplifier is turned on or off. When the light glows, the amplifier is on.

STEREO SPEAKERS

Good stereo reproduction requires two matched speaker systems properly oriented with respect to the listener. The term matched speakers means speakers that sound alike, not necessarily identical speakers. If you can't use identical speakers the next best thing is to use speakers that sound alike **except** in the low bass region. The reason for this exception is that the sense of direction (the primary reason for stereo) is lost in the very low bass regions. Thus, if you already own a large and expensive speaker system and space or budget doesn't warrant duplicating this system there is an alternative. Choose a second speaker which sounds most like your original one in the middle and high frequency regions. If your original speaker system was of the 3-way type you can usually obtain a duplicate tweeter and mid-range unit and house them in a much smaller cabinet along with a smaller woofer or bass speaker.

SPEAKER PLACEMENT

Figure 35 indicates the optimum relationship between the listener and the speakers. The recommended 40 degree angle is not critical. Just try to keep the speakers separated by about ½ to ¾ the distance from them to the listener.

Experiment with the placement of your speakers because every room has its own acoustical properties and decorating problems.

MULTIPLE SPEAKER INSTALLATION

Additional speakers may be added to your amplifier, if desired. These speakers are usually used to provide music to other parts of the home. The additional speakers may be installed if the following requirements are met.

The two channels of the KG-854 must not be connected to each other in any case.

The total load of the additional speakers must represent an impedance of from 8 to 16 ohms to the SPKR terminals of the amplifier. If the speakers are not properly connected, considerable power will be lost.

Figure 36 shows the proper connection of multiple speakers to one channel of the amplifier. Any combination of speakers that will represent a proper load to the amplifier may be connected to the other channel. These loads do not necessarily have to be the same, as the balance control will compensate for any difference in volume that might occur.

NOTE: A commercially manufactured two- or three-way speaker system utilizing a proper crossover network should be considered one speaker of the impedance stated in the manufacturer's specifications.

PHASING MULTIPLE SPEAKERS

Multiple speaker installations require that all of the speakers located in the same room operate IN-PHASE. First phase the speakers in each channel as outlined in this section; then refer back to page 50 and phase the RIGHT and LEFT channel.

PHASING TWO OR MORE SPEAKERS IN ONE CHANNEL

Move the speakers close to each other, side by side. Disconnect the speakers connected to the other channel. Play some music that is rich in bass tones, and turn the bass control clockwise. Listen to the bass content of the music for a few minutes, and then reverse the connections on one of the speakers. Listen to the music again and notice if the bass tones seem to increase.

If the bass tones seem to increase, leave the wires connected in this manner. If the bass tones do not increase, or seem to decrease, re-connect the wires in their original position. Repeat this operation for each additional speaker in this channel. When all speakers in the same room are phased, mark the terminals and wires connected to them. This will help to re-connect the speakers properly if they ever need to be disconnected at any time in the future.

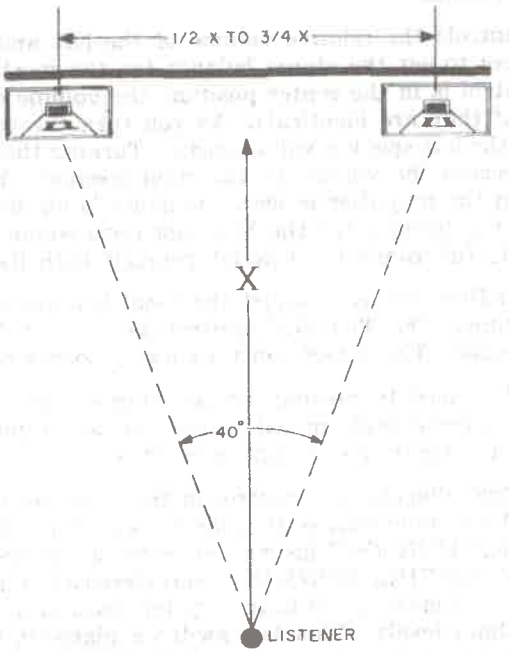
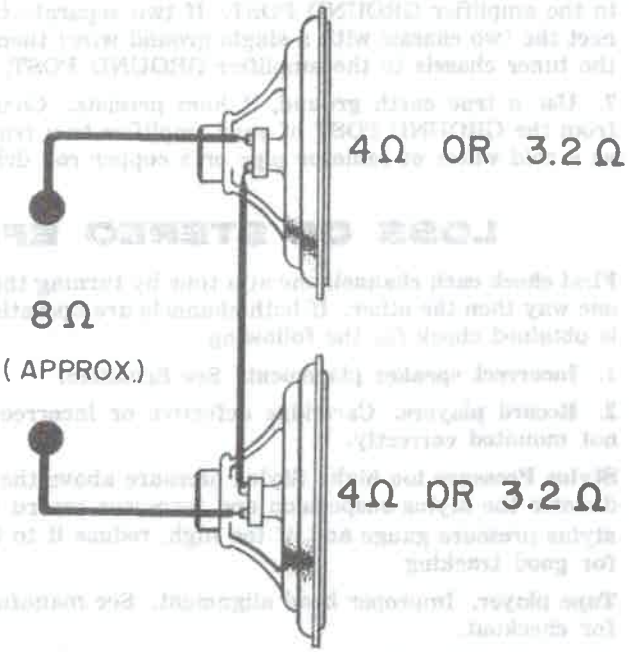
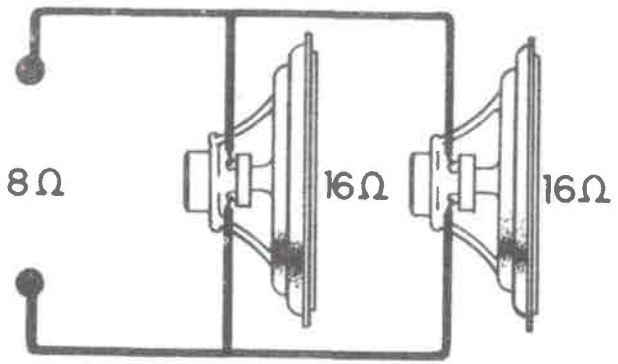
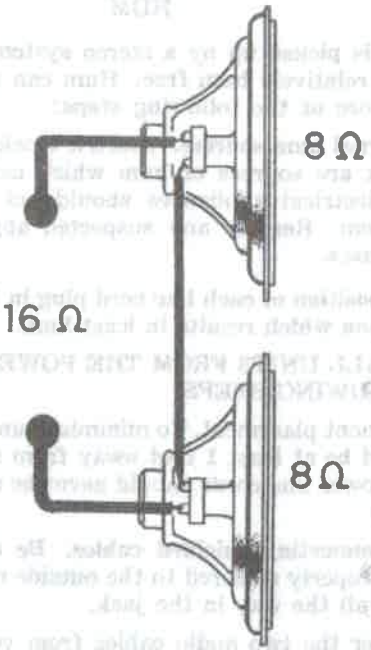


FIGURE 35. PROPER SPEAKER PLACEMENT

CONNECTING MULTIPLE SPEAKERS







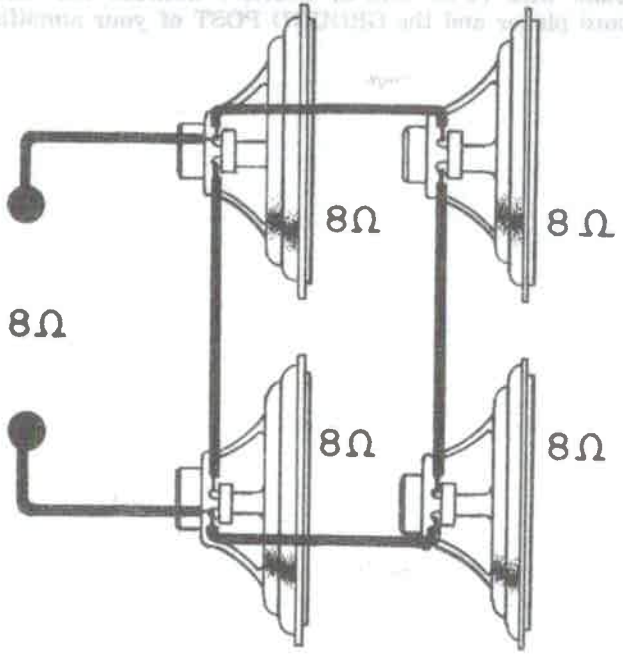


FIGURE 36

SERVICE INFORMATION

HUM

Sometimes hum is picked up by a stereo system even though each unit in the system is relatively hum free. Hum can usually be eliminated by taking one or more of the following steps:

1. **Remove external hum sources.** Electric clocks, fluorescent lamps and power equipment are sources of hum which can be picked up by your system. Such electrical appliances should not be placed too close to your music system. Remove any suspected appliances and note if the hum level decreases.

2. **Reverse the position** of each line cord plug in the socket, one at a time, to find the position which results in least hum.

DISCONNECT ALL UNITS FROM THE POWER LINE BEFORE TRYING THE FOLLOWING STEPS:

3. Check component placement. To minimize hum, magnetic record player cartridges should be at least 1 foot away from amplifier or tuner power transformers. Power line cords should never be close to the interconnecting audio cables.

4. **Check interconnecting shielded cables.** Be sure the shield braid or spiral shield is properly soldered to the outside of the plug and that each is firmly seated all the way in the jack.

5. Twist together the two audio cables from your record player before you connect them to your amplifier.

6. **Connect a ground wire** (#18 wire or heavier) between the motor frame of your record player and the GROUND POST of your amplifier. Many record players have ground or "earth" terminals provided for this purpose. In the same way, connect the motor frame of your tape recorder to the amplifier GROUND POST. If two separate tuners are used, connect the two chassis with a single ground wire; then connect just one of the tuner chassis to the amplifier GROUND POST.

7. Use a true earth ground, if hum persists. Connect a ground cable from the GROUND POST of your amplifier to a true earth ground such as a cold water or radiator pipe or a copper rod driven into the earth.

LOSS OF STEREO EFFECT

First check each channel, one at a time by turning the BALANCE control one way then the other. If both channels are operating but no separation is obtained check for the following:

1. **Incorrect speaker placement.** See Speakers.

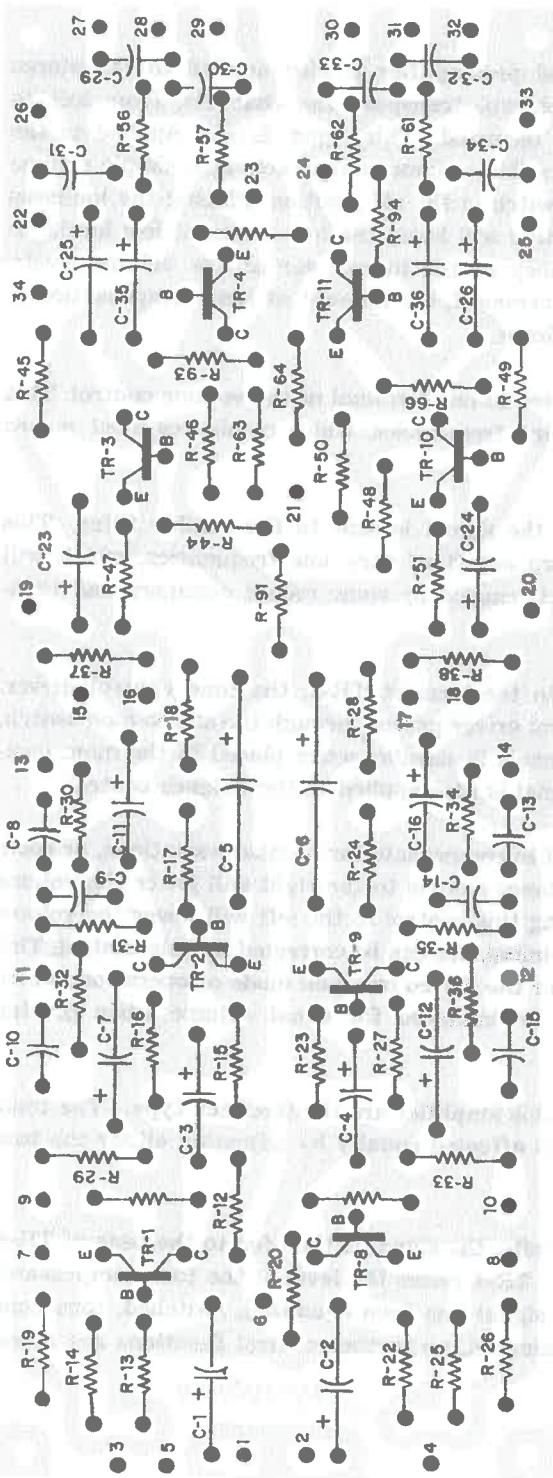
2. **Record players.** Cartridge defective or incorrectly wired. Cartridge not mounted correctly.

Stylus Pressure too high. Stylus pressure above the recommended value distorts the stylus suspension and increases record wear. Check with a stylus pressure gauge and, if too high, reduce it to the minimum needed for good tracking.

Tape player. Improper head alignment. See manufacturer's instructions for checkout.

Stereo Multiplex FM. Be sure station is broadcasting stereo. Try other stations if possible. Be sure tuner is accurately tuned in, since separation can be lost by only a slight mistuning in most tuners. Poor antenna systems will also cause loss of separation.

SCHEMATIC DIAGRAM



TROUBLESHOOTING CHART

TROUBLE	POSSIBLE CAUSE	SERVICE PROCEDURE
UNIT DEAD		
Pilot lamp not lit, F-1, not blown.	Open switch, linecord, or transformer primary.	Check switch and linecord wiring. Check transformer T-1.
F-1 blown, pilot lamp not lit.	Shorted diode, electrolytic capacitor, or transformer.	Check CR-1 and CR-2. Check C-42 and C-43. Check T-1.
No fuses blown, pilot lamp lit.	Mis-wired large or small circuit board.	Check wiring of both boards.
RIGHT CHANNEL DEAD		
Right channel dead.	T-2 primary winding shorted.	Replace T-2.
R-83 or R-85 smoking.	Shorted TR-6 or TR-19.	Replace TR-6 or 7. Check soldering of sockets and board.
LEFT CHANNEL DEAD		
R-69 or 73 smoking.	Shorted TR-13 or 14.	Check sockets for solder shorts. Check TR-13 and 14 and replace if necessary.
Left channel dead.	Shorted primary T-3.	Check wiring and transformer. Replace T-3 if necessary.
Oscillation on one or both channels.	Poor ground connection (s).	Reheat solder lug connections. Tighten solder lug mounting screw. Be sure that solder lug is mounted directly to bright chassis.
Amplifier plays normally, one channel only.	Wiring error or defective transistor.	Determine which channel is at fault. Check wiring in this channel. Interchange like transistors from channel to channel until defective one is found. NOTE: Power must be off whenever transistors are interchanged.
DISTORTION		
Distortion in phono position.	High output ceramic phono cartridge plugged into phono input.	Change input cables to AUX-1 or AUX-2 input jacks.

CIRCUIT DESCRIPTION

This transistor amplifier performs the following functions:

1. Provides a control point where program input sources are selected in pairs, TAPE, PHONO, AUX, AND TUNER.

2. Provided frequency equalization for magnetic phono and tape head inputs.

3. Provides bass, treble and switched loudness controls.

4. Provides proper outputs for tape recording.

5. Provides the power amplification needed for operating loudspeakers.

6. Provides miscellaneous switching functions: Channel reversing, stereo-mono mode selection, rumble and scratch filtering, and speaker phasing.

The block diagram shows the individual functional blocks (transistor and associated parts) and how the signals flow from block to block. Notice that the amplifier has two identical channels, so the blocks are duplicated for each channel, only the right channel will be explained.

The selector switch determines which pair of inputs is connected to the preamplifier circuits. The selected pair is connected to the first pre-amplifier, TR-1. All other input pairs are connected directly to ground to eliminate any possible noise pickup. Any input selected, whether high or low level, is connectly directly to the first preamplifier.

Output from the first preamplifier is applied to the second preamplifier, TR-2. Output from TR-2 is then applied to the proper feedback type, equalization network. The proper equalization network is selected by the selector switch. NARTB equalization for the tape head input, RIAA equalization for the mag phono input, and flat response for the aux. and tuner inputs is provided by these networks.

Output from the second preamplifier is applied to the tape recorder output jacks. These jacks provide a suitable signal voltage to apply to the high level input jacks of a tape recorder. A tape recorder connected to these jacks receives an equalized, constant-level signal that is unaffected by the volume or tone controls.

The signal from the second preamplifier is also applied to the stereo reverse switch. This switch will transpose the channels, from left to right and vice-versa, when operated. This signal is also applied to the volume and loudness circuits. The volume control acts as a simple volume control with the loudness switch in the off position. Placing the loudness switch in the loudness position will boost the bass tones at low levels, to compensate for the deficiency of the human ear at low volume levels. When the volume level is increased, the amount of tone compensation is reduced until it is insignificant.

The scratch filter is connected to one terminal of the volume control. This filter sharply attenuates high frequencies, which eliminates most record scratch.

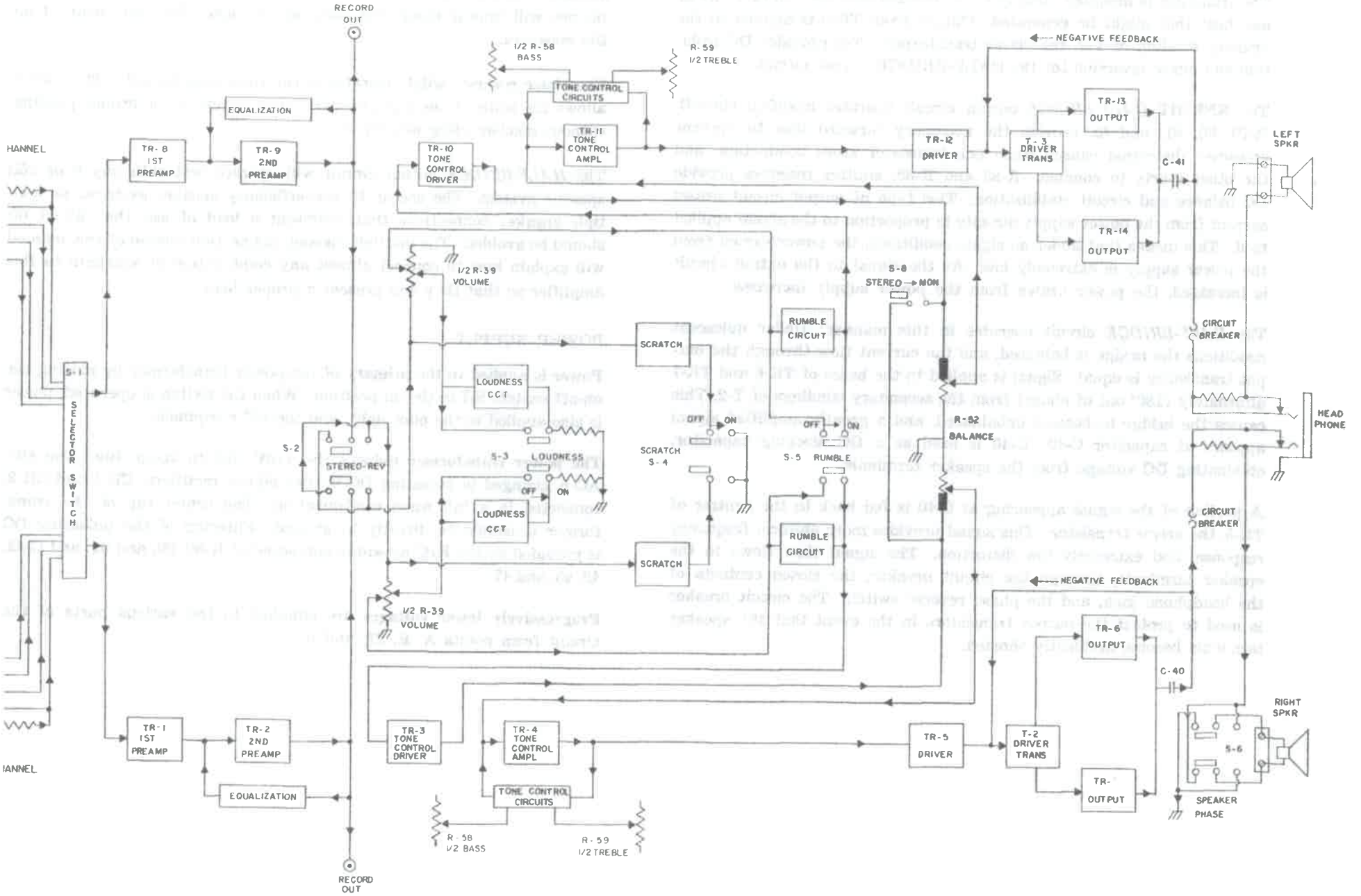
After the volume control, the signal is sent to the rumble filter. This filter provides a very sharp cutoff of very low frequencies, which will eliminate the rumble that is caused by some record changers and turn-tables.

The signal continues on to the base of TR-3, the tone control driver. Output from the tone control driver passes through the stereo-mon switch, which will place both channels in parallel when placed in the mon. position. At this point the signal is also applied to the balance control.

The balance control is used to compensate for speaker variations, or room acoustics. Turning the balance control to the right will lower the volume of the left channel. Turning this control to the left will lower the volume of the right channel. Any imbalance can be corrected by this control. This control is effective in either the stereo or mono mode of operation, which will allow the system to be balanced for equal volume when playing mono material.

The tone controls used in this amplifier are the feedback type. The tonal balance of both channels is affected equally by adjusting either the bass or treble controls.

From the tone control circuits, the signal is then fed to the base of TR-4, the tone control amplifier. TR-4 raises the level of the tone compensated signal. At this point the signal has been equalized, switched, tone compensated, level set, and balanced, no further control functions are necessary.


RECORD OUT
1/2 R-58 BASS
R-59 1/2 TREBLE
TONE CONTROL CIRCUITS
NEGATIVE FEEDBACK
EQUALIZATION
TR-8 1ST PREAMP
TR-9 2ND PREAMP
TR-10 TONE CONTROL DRIVER
TR-11 TONE CONTROL AMPL
TR-12 DRIVER
T-3 DRIVER TRANS
TR-13 OUTPUT
TR-14 OUTPUT
C-41
LEFT SPKR
1/2 R-39 VOLUME
S-8 STEREO → MON
CIRCUIT BREAKER
RUMBLE CIRCUIT
SCRATCH
LOUDNESS CCT
S-1 SELECTOR SWITCH
S-2 STEREO-REV
S-3 LOUDNESS
OFF ON
SCRATCH S-4
S-5 RUMBLE
R-52 BALANCE
HEAD PHONE
TR-1 1ST PREAMP
TR-2 2ND PREAMP
TR-3 TONE CONTROL DRIVER
TR-4 TONE CONTROL AMPL
TR-5 DRIVER
T-2 DRIVER TRANS
TR-6 OUTPUT
TR- OUTPUT
C-40
RIGHT SPKR
S-6
SPEAKER PHASE
R-58 1/2 BASS
R-59 1/2 TREBLE
RECORD OUT

Signal from TR-4 is passed to the driver transistor, TR-5. This unit is a power type transistor, operated as a class-A, ground-emitter amplifier. The transistor is mounted directly to the chassis heat sink, to carry away any heat that might be generated. Output from TR-5 is applied to the primary winding of T-2, the driver transformer. T-2 provides DC isolation and phase inversion for the HALF-BRIDGE output circuit.

The **KNIGHT** *HALF-BRIDGE* output circuit operates modified class-B. R-79, 80, 81, and 82 provide the necessary forward bias to prevent crossover distortion caused when one transistor stops conducting, and the other starts to conduct. R-83 and R-85, emitter resistors provide DC balance and circuit stabilization. This type of output circuit draws current from the power supply directly in proportion to the signal applied to it. This means that under no-signal conditions, the power drawn from the power supply is extremely low. As the signal to the output circuit is increased, the power drawn from the power supply increases.

The *HALF-BRIDGE* circuit operates in this manner: Under quiescent conditions the bridge is balanced, and the current flow through the output transistors is equal. Signal is applied to the bases of TR-6 and TR-7 alternately (180′ out of phase) from the secondary windings of T-2. This causes the bridge to become unbalanced, and a greatly amplified signal appears at capacitor C-40. C-40 is used as a DC blocking capacitor, eliminating DC voltage from the speaker terminals.

A portion of the signal appearing at C-40 is fed back to the emitter of TR-5, the driver transistor. This signal provides more uniform frequency response, and extremely low distortion. The signal then flows to the speaker terminals, through the circuit breaker, the closed contacts of the headphone jack, and the phase reverse switch. The circuit breaker is used to protect the output transistors in the event that the speaker terminals become accidently shorted.

The three circuit phone jack is intended for use with any set of low impedance headphones. When the phones are plugged into the jack, the speaker volume will become almost inaudible, and the level from the phones will appear about the same as the level that was heard from the speakers.

The phase reverse switch operates in the right channel only. This switch allows the leads of the right speaker to be reversed for proper phasing, without disconnecting any leads.

The *HALF-BRIDGE* output circuit will operate best with any 8 or 16Ω speaker system. The use of 4Ω low-efficiency speaker systems, or multiple speaker connections that represent a load of less than about 6Ω should be avoided. The multiple speaker connection section of this manual will explain how to connect almost any combination of speakers to this amplifier so that they will present a proper load.

POWER SUPPLY

Power is applied to the primary of the power transformer by placing the on-off switch, S-7 in the on position. When the switch is operated, power is also applied to the pilot light, and the AC receptacle.

The power transformer reduces the 110V. AC to about 40v. The 40v. AC is changed to pulsating DC by two silicon rectifiers, CR-1 and CR-2, connected in a full wave configuration. The center tap of the transformer is connected directly to ground. Filtering of the pulsating DC is provided by the R/C networks composed of R-89, 90, and 91, and C-42, 43, 45, and 47.

Progressively lower voltages are supplied to the various parts of the circuit from points A, B, 21, and 6.