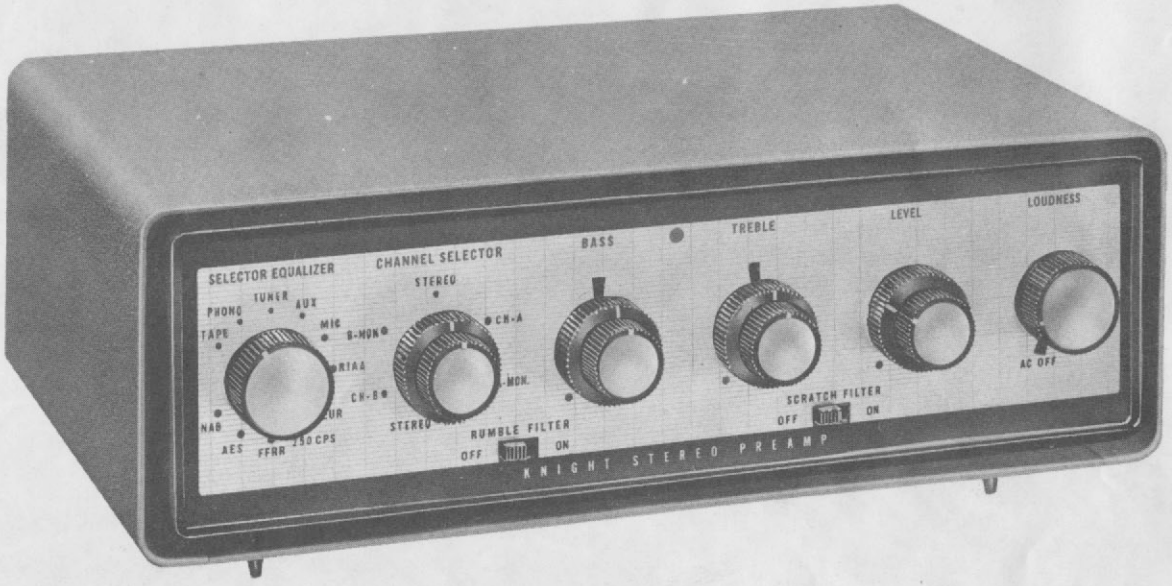
knight-kits

Allied knight-kit®

STEREO PREAMPLIFIER

83 YX 776



ALLIED RADIO
CORPORATION
100 N. WESTERN AVE. • CHICAGO 80, ILL. HAYMARKET 1-6800

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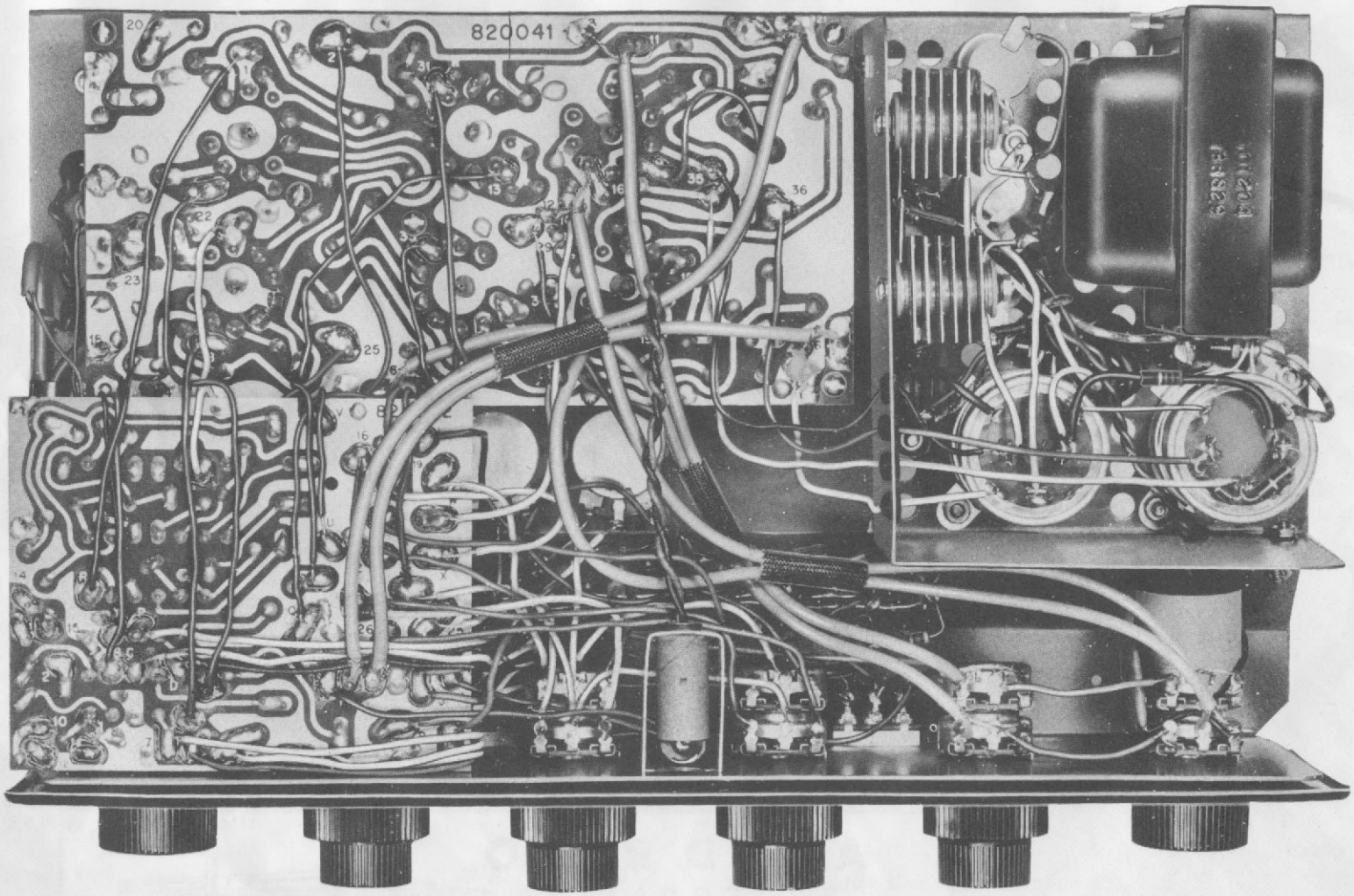
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FEATURES

- Channel-Selector switch allows your choice of straight stereo, stereo reverse, either channel using both outputs while the other channel remains inoperative.
- Each channel has 2 parallel outputs to permit headphone or monitor use.
- Single control function switch controls both binaural and monaural inputs
- 5 pairs of stereo inputs.
- 4 monaural inputs.
- 6 accurate record equalization settings.
- Concentric clutch-type controls for fast operation.
- High output (in excess of 3 volts).
- Extremely low hum and noise.
- 2 low noise, low microphonic, premium type 12AY7 tubes.
- All tube filaments, including pilot light, are DC operated.
- 2 sharp cut off RC type rumble filters.
- 2 sharp cut off LC type scratch filters.
- Printed circuitry throughout, including printed circuit switches.
- 2 low impedance cathode follower outputs permit unrestricted location of amplifiers.
- 2 AC accessory outlets: 1 switched and 1 unswitched.
- All tubes, inputs, outputs, the fuse, and AC accessory outlets accessible from bottom of chassis.

SPECIFICATIONS

STEREO INPUTS:

TAPE HEAD (NARTB EQUALIZATION) — Sensitivity for 1 volt output: 2.5 MV
Hum and noise: 60 db below 1 volt (10 MV ref)

MAGNETIC PHONO (RIAA EQUALIZATION) — Sensitivity for 1 volt output: 2.5 MV
Hum and noise: 60 db below 1 volt (10 MV ref)
Cartridge termination: adjustable 5K to 105K calibrated

CERAMIC PHONO (RIAA EQUALIZATION) — Sensitivity for 1 volt output: 70 MV
Hum and noise: 60 db below 1 volt (0.5 volt ref)

AUXILIARY (FLAT) — Sensitivity for 1 volt output: 500 MV
Hum and noise: 75 db below 1 volt (1 volt ref)
Frequency response: ± ½ db from 7 cps to 75,000 cps

TUNER (FLAT) — Sensitivity for 1 volt output: 150 MV
Hum and noise: 80 db below 1 volt (1 volt ref)
Frequency response: ± ½ db from 7 cps to 120,000 cps
Individual level set controls for each channel

MONAURAL INPUTS:

G.E. PHONO (CHOICE OF EQUALIZATION) — Sensitivity for 1 volt output (FFRR Eq.): 2.2 MV
Hum and noise: 60 db below 1 volt (10 MV ref)

PICKERING PHONO — Sensitivity for 1 volt output: 6 MV
Hum and noise: 60 db below 1 volt (10 MV ref)

CERAMIC PHONO (CHOICE OF EQUALIZATION) — Sensitivity for 1 volt ouptut: 200 MV
Hum and noise: 60 db below 1 volt (10 MV ref)

MICROPHONE — Sensitivity for 1 volt output: 25 MV
Frequency response ± ½ db from 10 cps to 80,000 cps

CROSSTALK BETWEEN CHANNELS — −45 db or better

MONAURAL EQUALIZATION — RIAA, FFRR, Eur, 250 CPS, AES

STEREO EQUALIZATION — NARTB equalization on Tape Head input
RIAA equalization on Phono input

HARMONIC DISTORTION — Less than 0.15% from 20 cps to 20,000 cps at 1 volt output

OUTPUT IMPEDANCE — Nominal 600 ohms at 1,000 cps

TONE CONTROLS — Separate Bass and Treble Controls providing 15 db of bass boost or cut at 20 cps, and 15 db of treble boost or cut at 20,000 cps

RUMBLE FILTER — RC type providing 5 db per octave attenuation below 100 cps (both channels)

SCRATCH FILTER — LC type providing 10 db per octave attenuation above 3,000 cps (both channels)

TUBE COMPLEMENT — 2 low noise, low microphonic, premium type
12 AY7 tubes and 4 ECC82/12AU7 tubes

POWER CONSUMPTION — 25 watts

SIZE — 4¼" (plus ¾" legs) x 13¼" x 8"

NET WEIGHT — 16 lbs.

INTRODUCTION

This precision engineered instrument, with its unique flexibility, is the ultimate in a Stereo Preamplifier.

Compare the foregoing specifications and features with any other Stereo Preamplifier, regardless of price. Your Stereo Preamplifier has simplified and completely centralized control. A single switch controls 5 pairs of stereophonic inputs (including tapehead) and 4 monophonic inputs. A second single switch selects straight stereo, stereo reverse, either channel separately, or either channel into both monaural outputs. DC filaments assure quietest operation. Two low impedance cathode follower outputs permit location of your amplifiers where best suited to the space and decor of the listening room. These are among the exclusive features which make your Preamplifier today's outstanding unit.

CHECKING YOUR KIT

Before starting to build your Preamplifier, check each part against the parts list on page 22. This will familiarize you with each part. If you cannot identify some parts by sight, locate their pictures in the illustrations.

CONSTRUCTION

The only tools needed to build your Preamplifier are a pair of long-nose, side-cutting pliers; a screwdriver; a pair of diagonal cutters; and a soldering iron.

Look carefully at each illustration. Note how parts are mounted. These pictorial diagrams show the actual location of all parts and wires.

The step-by-step instructions have been carefully worked out and should be followed exactly. DO NOT WIRE this Preamplifier from the pictorials or schematic alone. It should be ASSEMBLED and WIRED in a DEFINITE SEQUENCE to give the best performance.

Occasionally more than one component is mounted with the same hardware. BE SURE TO READ EACH STEP ALL THE WAY THROUGH before starting it. For your convenience, space blocks are provided so each step can be checked off as completed.

Resistors of the same resistance but with different tolerances are used in this kit. The first three color bands give the resistance in ohms; the fourth band is silver or gold. If silver, the tolerance is 10%; if GOLD, 5%. IT IS EXTREMELY IMPORTANT TO USE RESISTORS of the SPECIFIED TOLERANCE. The Greek letter "Ω" means "ohm"; "K" means "1,000."

WIRING

When connecting a wire to a terminal, bend the end of the wire around the terminal and clamp it tightly with your long-nose pliers. Figure 1 shows the best way to connect a part. As illustrated, the end leads should be pulled through the terminals so that the part is tightly mounted. After pulling the lead through the terminal, bend it around the terminal and cut off the excess wire.

The term "spaghetti" is applied to the 5-inch length of soft, small diameter tubing supplied. This spaghetti is used to cover bare leads where there is a chance that they will touch other leads or metal parts.

The color of a wire indicates its length. Be sure to use the color called for in each of the wiring steps.

When you are told to "solder", you should connect the wire or lead to the terminal specified and then solder it and all other wires (if any) connected to that terminal. "Connect, but DO NOT solder" means that you are NOT TO SOLDER at that step because more wires or parts are to be connected to that terminal in future steps.

HOW TO CARE FOR YOUR SOLDERING IRON

Your soldering iron is the essential for good soldering since it supplies the most important factor — HEAT. To make soldering easier and to give the greatest transfer of heat from the iron to your work, the tip of the iron should be clean and properly tinned. Before starting to solder, clean the tip of your iron with a fine file, or piece of steel wool, until its bright copper surface is exposed. Now let the iron heat so that you can coat the tip with a thin layer of ROSIN CORE SOLDER. This is called "tinning" the iron. While the iron is hot, wipe the tip with a soft rag to remove excess solder. The tip now should have a bright, silvery appearance.

When the tip of the iron gets covered with dirty looking scale, clean the tip by wiping with a clean dry rag. Then re-tin the iron.

To get the most heat out of the iron, press the iron firmly to the connection. Do not use the iron like a brush—soldering is not a paste spreading operation.

USE ONLY ROSIN CORE SOLDER

USE THE ROSIN CORE SOLDER SUPPLIED WITH THE KIT. KITS WIRED WITH ACID CORE SOLDER OR ACID FLUX WILL SOON CORRODE AND NOT OPERATE PROPERLY. SUCH KITS ARE NOT ELIGIBLE FOR REPAIR OR SERVICE.

THIS KIT MUST BE *PROPERLY* SOLDERED!

WITHOUT GOOD SOLDERING, AN ELECTRONIC UNIT WILL NOT WORK . . . just as a suit of clothing will fall apart if the stitches are loose . . . no matter how excellent the material.

USE ENOUGH HEAT

This is the main idea of good soldering. The purpose of soldering is to join metal parts, making an UNBROKEN metal path over which electricity can travel. To do this you must apply enough heat to the metal surfaces to make the solder spread freely on them, until the contour (shape) of the connection shows under the solder. If the solder barely melts and forms a rounded ball, *you are not using enough heat.* If you do not use enough heat, there may be no electrical connection, although it appears soldered.

HERE'S HOW TO DO IT . . .

1. Join bare metal to bare metal. Insulation must be removed.

2. Coat the tip of a hot iron with solder.

3. FIRMLY PRESS THE FLAT SIDE OF THE TIP OF A HOT IRON FLAT against the parts to be soldered together. Keep it there while you apply the solder BETWEEN THE IRON TIP AND THE METAL TO BE SOLDERED. Use only enough solder for it to flow over ALL the surfaces of the connection. Remove the iron.

4. DO NOT MOVE PARTS UNTIL THE SOLDER HARDENS. If you accidentally move the wires as the solder is hardening, apply your iron and reheat.

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.

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.

USE A 100-WATT IRON

A 100-watt soldering iron with a clean, chisel-shaped tip will supply the right amount of heat when used correctly. Notice how the iron is held in the picture. Heat the iron for 10 minutes before you start soldering. Keep the tip brightly coated with solder. When necessary, wipe the hot tip clean with a cloth. (If you use a soldering gun, be sure the tip reaches full heat before you 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.

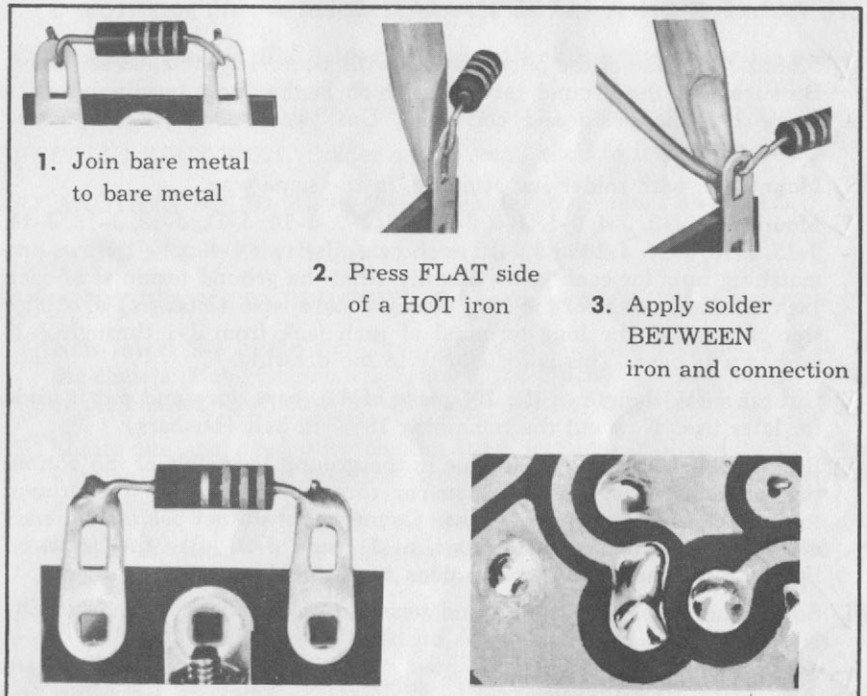


FIGURE 1. THE ONE-TWO-THREE OF GOOD SOLDERING.

FIRST PARTS MOUNTING ON CHASSIS

Seven sizes of screws are supplied. These screws must be used EXACTLY as specified. For convenience during assembly, separate the screws into groups by size and length before you begin mounting parts.

The quantity and size of screws are:

Quantity	Size
4	3-48 x ¼"
3	4-40 x 3/16"
40	4-40 x ¼"
7	4-40 x 1⅝"
15	6-32 x ¼"
6	6-32 x 7/16"
2	6-32 x 1¼"
4	#6 self tapping

SEE FIGURE 2 ON A LARGE SEPARATE SHEET

- ☑ Mount J-20 (one of the phono jacks) with solder lug attached as shown. Be sure that the ground terminal, which is the short terminal with a single hole, is positioned correctly. Use two 4-40 x ¼" screws and matching nuts.
- ☑ Mount J-1, with solder lug attached, in the same way.
- ☑ Mount J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11, J-12, J-13, J-14, J-15, J-16, J-17, J-18 and J-19 as shown. Use two 4-40 x ¼" screws and matching nuts for each jack. Slightly twist the ground terminal of each jack to ease passage of the long pieces of bare wire (busbars) in a later step. Note that the long terminal of each jack from J-1 through J-10 is shown as bent. This is for clarity in the drawing.
- ☑ Cut off a 1½" length of the 20" piece of #18 bare wire and put it aside for later use. Now cut the remaining 18½" in half (busbars).
- ☑ Run one busbar through the hole in the ground terminals of the bottom row of jacks. Run the other busbar through the hole in the ground terminals of the top row of jacks. Connect, but do not solder, the ends of the busbars to the solder lugs on J-1 and J-20. See the detail on Figure 2 for the busbar connections at J-20.
- ☑ Solder the busbars to the ground terminal of each jack as shown. DO NOT solder the free ends of the busbars to the solder lugs.
- ☑ Position the largest grommet (⅜") and the two medium ones (5/16") where shown.
- ☑ Mount R-2, the 100K dual potentiometer. Insert the shaft of R-2 down through the hole in the chassis and secure it with a ⅜" nut.
- ☑ Mount R-7 and R-15, the 100K, single potentiometers, in the same way.
- ☑ Mount J-21, an AC receptacle, as shown. From the bottom of the chassis, insert two 6-32 x 7/16" screws through the holes, put lockwashers over the screws, and tighten with matching nuts.
- ☑ Mount J-22, the other AC receptacle, as you did J-21.
- ☑ Mount R-100, a 260 ohm, ceramic stand-up resistor as shown. Use a 6-32 x ¼" screw with matching lockwasher and nut. Mount R-101, the other 260 ohm stand-up resistor, the same way.
- ☑ Fuseholder and its mounting hardware are packaged together. Put the rubber washer over the fuseholder. Insert and position fuseholder where shown. Tighten with lockwasher and nut BEFORE bending terminal 1 away from body.

BEFORE PROCEEDING TO THE NEXT STEP, BE SURE THAT ALL PARTS ARE TIGHTLY SECURED. LOOSE ASSEMBLY CAN CAUSE NOISE WHEN SET IS OPERATING.

FIRST WIRING VIEW

Two types of wire, solid and stranded, and two types of cable, shielded single-conductor and 3-conductor, are furnished. Stranded wires have greater flexibility and consist of several strands of fine wire twisted together.

Take each of the stranded wires, twist the fine wires tightly at each end and coat lightly with solder. Treating the stranded wires in this way will make it easier to solder them in later operations.

SEE FIGURE 3 ON LARGE SEPARATE SHEET

- ☑ See DETAIL A. Twist leads of C-2, a small disc-like 15 μμfd, 5% capacitor, around the leads of R-6, a 390 KΩ resistor, marked with color bands orange, white, yellow. Solder the union of the leads lightly. TO PREVENT HEAT DAMAGE to the resistor as you solder, hold each lead with a pair of long-nose pliers between the body of the resistor and the union of the leads.
- ☑ Solder one lead of R-6 to terminal 1 of R-7; the other to the long terminal of J-5.
- ☑ Study DETAIL "B." Prepare the two 3-conductor cables, as shown. Cable "A" has a BROWN, a GRAY, and a TAN wire. Cable "B" has a RED, a GREEN, and a BLACK wire.
- ☑ Thread the cables under the capacitor-resistor combination (C-2 and R-6) and under the bottom busbar, as shown. Next pull these cable ends through the slot-like opening at the left of the chassis front for about 3".
- ☑ SEE DETAIL C. With S-2, one of the slide switches, held on the outside of the chassis, solder the brown wire of Cable "A" to terminal 4; the gray wire to terminal 5; and the tan wire to terminal 6.
- ☑ Cable "B". Solder the black wire to terminal 1 of S-2; the red wire to terminal 2, and the green wire to terminal 3. Recheck Detail B to be sure that these various wires have been connected to the right terminals.
- ☑ Insert S-2 in the chassis with terminals 1, 2, and 3, the top row, toward the open side of the chassis. Tighten with two 3-48 x ¼" screws and nuts.
- ☑ Now carefully pull back the free ends of the cables to take up any slack.

- [ ] Bend down the long terminals of J-1 and J-2, as shown. Take care that they do not touch the ground terminals, since contact with other parts to be mounted later must be avoided.
- [ ] From the 4" piece of #20 bare wire, cut a ¾" length. Solder one end to terminal 5 of R-2. Connect, but do not solder, the other end to terminal 4 of R-2.
- [ ] STRANDED BLUE WIRE. Solder to terminal 4 of R-2. Make sure the ends of both the bare and the blue wire are soldered.
- [ ] Cut another ¾" length of #20 bare wire. Solder one end to terminal 2 of R-2. Connect, but do not solder, the other end to terminal 1 of R-2.
- [ ] STRANDED VIOLET WIRE. Solder to terminal 1 of R-2. Make sure the end of the violet wire and bare wire are soldered.
- [ ] SHORT SOLID ORANGE WIRE. Solder to terminal 6 of R-2. Connect, but do not solder the other end to long terminal of J-2.
- [ ] ANOTHER SHORT SOLID ORANGE WIRE. Solder to solder lug attached to J-1, as shown. Be sure that the two busbars and the orange wire are soldered.
- [ ] STRANDED ORANGE WIRE. Solder to long terminal of J-11.
- [ ] STRANDED RED WIRE. Solder to long terminal of J-1.
- [ ] STRANDED YELLOW WIRE. Solder to long terminal of J-2. Be sure both wires are soldered.
- [ ] STRANDED GREEN WIRE. Connect, but do not solder, to long terminal of J-12.
- [ ] STRANDED WHITE WIRE. Solder one end to long terminal of J-13.
- [ ] STRANDED GRAY WIRE. Solder to long terminal of J-3.
- [ ] STRANDED BROWN-WHITE WIRE. Solder to long terminal of J-14.
- [ ] STRANDED BLACK-WHITE WIRE. Solder to long terminal of J-4.
- [ ] STRANDED GREEN-WHITE WIRE. Solder to long terminal of J-16.
- [ ] STRANDED YELLOW-WHITE WIRE. Solder to long terminal of J-6.
- [ ] SOLID RED WIRE. Connect, but do not solder, one end to terminal 3 of R-7. Connect, but do not solder, the other end to terminal 3 of R-15.
- [ ] ANOTHER SOLID RED WIRE. Solder to top busbar between J-7 and J-8, as shown. Connect, but do not solder, the other end to terminal 3 of R-15.
- [ ] Prepare two pieces of 8" shielded cable as shown in Figure 13 on page 16.
- [ ] Solder the shield wire of one shielded cable to terminal 3 of R-7. Solder the inner conductor on the same end to terminal 2 of R-7.
- [ ] Solder the shield wire of the other shielded cable to terminal 3 of R-15. Solder the inner conductor on the same end to terminal 2 of R-15.
- [ ] STRANDED BROWN WIRE. Solder one end to long terminal of J-17.
- [ ] STRANDED BLACK WIRE. Solder to long terminal of J-7.
- [ ] SOLID RED WIRE. Connect, but do not solder, one end to long terminal of J-19. Connect, but do not solder, the other end to long terminal of J-20.
- [ ] SOLID RED WIRE. Connect, but do not solder, one end to long terminal of J-9. Connect, but do not solder, the other end to long terminal of J-10.
- [ ] Connect, but do not solder, one lead of R-91, a 47KΩ 5%, resistor (yellow, violet, orange, GOLD) to the long terminal of J-20. Connect, but do not solder, the other lead to the solder lug attached to J-20.
- [ ] Connect, but do not solder, one lead of R-90, another 47KΩ 5%, resistor (yellow, violet, orange, GOLD) to the long terminal of J-10. Solder the other lead to solder lug attached to J-20. Have a well-soldered connection covering the two resistor leads and the two busbar ends.
- [ ] SOLID GRAY WIRE. Solder to terminal 4 of S-4, the other slide switch.
- [ ] ANOTHER SOLID GRAY WIRE. Solder to terminal 6 of S-4.
- [ ] SOLID BLUE WIRE. Solder only a small hook to terminal 1 of S-4.
- [ ] ANOTHER SOLID BLUE WIRE. Solder to terminal 3 of S-4.
- [ ] SOLID RED WIRE. Solder to terminal 5 of S-4.
- [ ] ANOTHER SOLID RED WIRE. Solder to terminal 2 of S-4.
- [ ] Now insert S-4 in the slot-like opening to the right end of the front of the chassis. Have terminals 1, 2, and 3, the top row, toward the open side of the chassis. Tighten S-4 with two 3-48 x ¼" screws and nuts.
- [ ] Solder the short red wire coming from terminal 5 of S-4 to the long terminal of J-10. Be sure the two red wire ends and the resistor lead are soldered.
- [ ] Solder the red wire coming from terminal 2 of S-4 to long terminal of J-20. Have all connections well soldered.
- [ ] SOLID RED WIRE. Connect, but do not solder, one end to terminal 2 of J-22. Connect, but do not solder, the other end to terminal 1 of J-21.
- [ ] Prepare C-57 and C-53, two .01 μfd disc capacitors, as shown in Detail D of Figure 3. Then solder the short lead of C-57 to terminal 1 of J-21. Position the spaghetti-covered lead as shown; it will be connected later. Connect, but do not solder, the short lead of C-53 to terminal 2 of J-21.
- [ ] From the bottom side of the chassis insert the line cord up through the large grommet. Tie a knot in the cord about 3" from the free ends. Connect, but do not solder, one of the line cord ends to terminal 1 of J-22. Connect, but do not solder, the other line cord end to terminal 2 of J-22.

☐ SOLID RED WIRE. Solder one end to terminal 2 of J-22. Solder the other end of this wire to terminal 1 of the fuseholder.

☐ ANOTHER SOLID RED WIRE. Solder one end to terminal 1 of R-101. Connect, but do not solder, the other end to terminal 1 of R-100.

☐ Mount the capacitor brackets as shown. Use two 6-32 x ¼" screws with matching lockwashers and nuts. Hold the ends of the brackets together with a 6-32 x 7/16" screw, lockwasher and nut. If necessary, slip one mounting foot under the large grommet.

☐ Mount R-57, a 1 MegΩ control where shown. Tighten with ⅜" nut.

☐ Mount R-64, the other 1 MegΩ control. Tighten with ⅜" nut.

☐ Mount R-72, a 50KΩ control, where shown. Tighten with ⅜" nut.

SECOND WIRING VIEW

SEE FIGURE 4 ON LARGE SEPARATE SHEET.

☐ SOLID YELLOW WIRE. Solder one end to terminal 3 of R-2, the other to long terminal of J-12. Have both connections at J-12 well soldered.

☐ Refer to Detail A in the First Wiring View. Twist the leads of C-5, a small disc-like 15 μμfd, 5% capacitor, around the leads of R-14, a 390 KΩ resistor (orange, white, yellow). Solder the union of the leads lightly.

☐ Cut a 1" length from the 5" piece of small spaghetti, the soft insulating covering supplied, and slip it over one of the leads of R-14. Solder this lead to long terminal of J-15, and the uncovered lead to terminal 1 of R-15.

☐ Solder one end of a solid blue wire to long terminal of J-18. Solder one end of a solid green wire to long terminal of J-8. Twist these two wires together, ends to be connected later.

☐ From the bottom side of the chassis, insert a 4-40 x 1⅝" spacer screw as shown in DETAIL A of Fig. 4. Put a spacer over the screw body and crimp with a pair of wire cutters or pliers. Add the fiber washer and nut. Do not be concerned if the assembly is a bit unsteady.

☐ STUDY DETAIL B before proceeding to the next five steps.

☐ CHOKE BOX ASSEMBLY. Mount spade bolts in choke box, using 6-32 x ¼" screws, lockwashers and nuts. Be sure lockwashers are used as shown.

☐ Mount chokes inside the box, as shown. Fasten with the three 4-40 x 3/16" screws, lockwashers and nuts. The inner mounting lugs of the chokes overlap and are secured with the same screw, lockwasher and nut.

☐ Thread the twisted leads of one choke through one of the grommets at the left end of the chassis and the leads of the other choke through the other grommet.

☐ Position choke box on the bottom side of the chassis so that the threaded ends of the spade bolts come up through the two holes near the grommets. Note that the head of the spacer-covered screw is now inside the choke box, and no longer visible on the bottom side of the chassis.

☐ Tighten down spade bolt nearest the rear of the chassis with lockwasher and nut.

☐ Position Cables "A" and "B" as shown. Hold in place by a cable clamp attached to front spade bolt of the choke box. Tighten clamp over cables with a lockwasher and nut.

☐ **Position choke leads as shown.**

☐ Trim just enough from the red lead of back choke to connect to long terminal of J-19. Strip ¼" of the insulation from the end of this lead, then solder it to long terminal of J-19. Be sure both connections are soldered.

☐ Trim just enough from the BLACK LEAD OF THE FRONT CHOKE to connect to long terminal of J-9. Strip ¼" of the insulation from the end of the lead, then solder it to long terminal of J-9. Be sure both connections are soldered.

☐ SEE DETAIL C. Take two blue wires and solder one to each of the terminals of R-78, the dual loudness control. Twist these blue wires together and thread through the control shield as shown. Then set the shield firmly in place.

☐ Mount R-78 where shown and secure with a ⅜" nut.

☐ Insert the 4 small grommets and the one remaining medium sized grommet in the power assembly shield plate.

☐ Now run the twisted blue wires from R-78 through the medium grommet in the front of the power assembly shield. Rotate the shield to the right to get it out of the way during most of the following wiring steps.

☐ SOLID RED WIRE. Solder one end to terminal 5 of R-72, and the other end to terminal 4 of R-78.

☐ ANOTHER SOLID RED WIRE. Solder one end to terminal 2 of R-72, and the other to terminal 1 of R-78.

☐ Connect, but do not solder, one blue wire from R-78 to terminal 2 of J-21.

☐ Solder the other blue wire from R-78 to terminal 1 of J-22. Be sure all connections are soldered.

☐ SOLID YELLOW WIRE. Solder one end to terminal 2 of R-101.

☐ SOLID YELLOW WIRE. Solder one end to terminal 1 of R-100.

☑ A THIRD SOLID YELLOW WIRE. Connect, but do not solder, one end to terminal 2 of R-100.

☑ SOLID RED WIRE. Solder one end to terminal 2 of R-100. Be sure both connections are soldered.

☑ Mount T-1, the power transformer, where shown. Fasten it with straight lug in the chassis slot with a 6-32 x ¼" screw, lockwasher and nut for each lug.

☑ Twist together the black and the black-white transformer leads. Solder the black-white lead to terminal 2 of J-21. Be sure all connections are soldered.

☑ Now solder the black lead to terminal 2 of the fuseholder.

☑ Rotate the power assembly shield plate counter-clockwise to its normal position, as shown.

☑ SEE DETAIL D. Attach a spade bolt to the rear end of the power shield with a 6-32 x ¼" screw, lockwasher and nut.

☑ Push the threaded end of the spade bolt down through the small hole in the chassis and secure it on the bottom side with a matching lockwasher and nut.

☑ From the bottom side of the chassis, insert a 6-32 x ¼" screw and slip over it the small shield bracket, as shown. Secure with matching lockwasher and nut.

☑ Insert a 6-32 x ¼" screw through the top hole of this shield bracket and on through the matching hole in the front of the power assembly shield. Tighten with matching lockwasher and nut.

THIRD WIRING VIEW

SEE FIGURE 5 ON A LARGE SEPARATE SHEET.

Study the DETAIL before mounting CR-1 and CR-2.

Note that each of the rectifiers, CR-1 and CR-2, has one slotted, positive terminal, marked plus (+), and one negative terminal which is unmarked. Bend each of the unmarked terminals as shown.

☑ Mount CR-2 using a 6-32 x 1¼" screw, thick fiber washer, lockwasher and nut, as shown in the detail.

☑ Mount CR-1 in the same way. Note that the positive terminals point toward each other and overlap.

☑ Hook the free end of the short red wire from terminal 2 of R-100 through the overlapping slotted terminals and solder. Be sure the two terminals and the wire end are well soldered, but be careful that no solder touches the shield.

☑ Twist together the red leads from T-1. Solder one lead to terminal 2 of CR-2, and the other to terminal 2 of CR-1, as shown.

☑ Mount C-50, the 120-120-40 μfd electrolytic capacitor where shown. Note the triangle, half-moon, and square markings at the base of three terminals. Position the terminals of C-50 EXACTLY as shown. Push C-50 down about 1", and adjust the bracket to hold the capacitor securely in place by tightening the screw.

☑ Mount C-49 as shown, and secure in the same way.

☑ Solder the spaghetti-covered lead from C-57 and C-53, to terminal 7 of C-50.

☑ Connect, but do not solder, one lead of R-96, a 1500Ω resistor, (brown, green, red), to terminal 6 of C-49. Connect, but do not solder the other lead to terminal 4 of C-49.

☑ Connect, but do not solder, the yellow wire from terminal 2 of R-101 to terminal 6 of C-50.

☑ Solder the yellow wire from terminal 1 of R-100 to terminal 4 of C-50.

☑ Connect, but do not solder, the yellow wire from terminal 2 of R-100 to terminal 2 of C-50.

☑ Solder one end of the remaining 1½" piece of #18 bare wire to terminal 1 of C-50, and the other end to terminal 7 of C-49.

☑ Divide in half the remaining length of small spaghetti and cover each lead of R-98, a 2200 ohm resistor (red, red, red). Now solder one lead of R-98 to terminal 2 of C-50. Be sure both connections are soldered. Connect, but do not solder, the other lead of R-98 to terminal 2 of C-49.

☑ Connect, but do not solder, one lead of R-97, a 1500 ohm resistor (brown, green, red) to terminal 4 of C-49. Solder the other lead to terminal 2 of C-49. Be sure both connections are soldered.

☑ Solder the red-yellow lead from T-1 to terminal 1 of C-49.

☑ Now pull to the left the blue and the violet wires from R-2; the short orange wire from the solder lug attached to J-1; the yellow wire from J-2; the red wire from J-1; the orange wire from J-11; the green wire from J-12; the gray wire from J-3; and the white wire from J-13.

☑ Pull to the right, the choke leads; the shielded cable from R-7; the yellow-white wire from J-6; and the green-white wire from J-16; the black from J-7, and the brown from J-17. Pull to the front and to the right, the black-white wire from J-4; and the brown-white wire from J-14.

Put Figure 5 aside temporarily.

YOU ARE NOW READY TO MOUNT PARTS ON THE LARGE PRINTED CIRCUIT BOARD

PRINTED CIRCUITS and PRINTED CIRCUIT WIRING. Printed circuits greatly simplify wiring. A thin layer of copper foil is bonded to a sheet of laminated plastic. To form the wiring pattern, some of the copper foil is then removed by an etching process. Holes are punched in the board and are so placed that they will accept the leads of the various components to be mounted on the board. These parts are soldered directly to the wiring pattern and this results in a circuit with uniform, error-free wiring.

Soldering parts to a printed circuit is not difficult if a few rules are carefully followed. Use enough heat at the point to be soldered so that the solder flows over the surface to be covered and around the connection. Component leads should be trimmed after soldering.

Special care should be taken in soldering tube socket pins so that the solder flows around the entire terminal and makes good contact with the foil. Stand the board on its side when soldering these terminals to be sure solder does not run down the socket thus causing a short when the tube shields are installed.

Some wires will be connected in holes in the printed circuit boards. They also are soldered to the foil wiring pattern. Look back at the lower right illustration in Figure 1 on page 5 for correct solder connections.

The holes in the board are spaced to accept the leads on the parts when the leads are bent down sharply, close to the body of the part. Insert leads through the holes in the board and bend them on the other side. When you have checked and are satisfied that parts are mounted correctly, solder each lead to the wiring pattern at the point where it comes through the board. Cut off excess lead length, close to the board after soldering.

PARTS MOUNTING ON THE LARGE PRINTED CIRCUIT BOARD

SEE FIGURE 6

☑ Pick up the large circuit board and note that one side of the board has its parts outlined and numbered. Parts are to be mounted on this side of the board.

☑ There are six printed circuit tube sockets. Mount them in the positions indicated: V-1, V-2, V-3, V-4, V-5, and V-6. They will snap in the holes.

CAUTION: There are many closely-spaced conducting paths on the printed circuit boards. When you solder a part to a board, BE CAREFUL NOT TO SHORT TOGETHER DIFFERENT PATHS.

☑ Now turn the board over, tilt it on its side and solder these socket pins to the metal foil. The center pin of each socket must be soldered to the wiring pattern.

The next steps give the symbol numbers and descriptions of the resistors and capacitors to be mounted on this board. Insert the wire leads of each part in the holes, as shown in Figure 6, and outlined on the board. Bend the wire leads on the foil side of the board to hold the parts in place. Colors in parentheses are those of the first three bands on each resistor.

☑ R-40, 1.5 MegΩ (brown, green, green)
☑ R-27, 2.2 KΩ (red, red, red)
☑ R-44, 60KΩ, deposited carbon, 5%, (blue, black, orange, GOLD)
☑ C-10, 90 μfd ceramic tubular. Position with plus (+) marked end as shown.
☑ R-21, 1 MegΩ (brown, black, green)
☑ R-23, 47 KΩ (yellow, violet, orange)
☑ R-25, 60 KΩ, deposited carbon, 5%, (blue, black, orange, GOLD)
☑ R-65, 47 KΩ (yellow, violet, orange)
☑ R-29, 10 MegΩ (brown, black, blue)
☑ C-13, 90 μfd ceramic tubular. Position with plus (+) marked end as shown.
☑ R-41, 1.5 MegΩ (brown, green, green)
☑ R-43, 10 MegΩ (brown, black, blue)
☑ R-22, 1 MegΩ (brown, black, green)
☑ R-28, 2.2 KΩ (red, red, red)
☑ R-35, 1.5 MegΩ (brown, green, green)
☑ R-36, 1.5 MegΩ (brown, green, green)
☑ R-38, 10 MegΩ (brown, black, blue)
☑ C-8, 90 μfd tubular capacitor. Position with plus (+) marked end as shown.
☑ R-33, 1 MegΩ (brown, black, green)
☑ R-42, 2.2 KΩ (red, red, red)
☑ R-24, 47 KΩ (yellow, violet, orange)
☑ R-37, 2.2 KΩ (red, red, red)
☑ R-34, 1 MegΩ (brown, black, green)
☑ R-30, 10 MegΩ (brown, black, blue)
☑ R-39, 60 KΩ, deposited carbon, 5%, (blue, black, orange, GOLD)
☑ C-9, .1 μfd paper tubular. Position with banded end as shown.
☑ C-19, 90 μfd ceramic tubular. Position with plus (+) marked end as shown.
☑ R-68, 47 KΩ (yellow, violet, orange)
☑ R-26, 60 KΩ, deposited carbon, 5%, (blue, black, orange, GOLD)
☑ R-52, 470Ω (yellow, violet, brown)
☑ C-40, .5μfd molded tubular. Position with banded end as shown.
☑ R-69, 470Ω (yellow, violet, brown)
☑ R-55, 47 KΩ (yellow, violet, orange)
☑ C-44, 5μfd ceramic tubular. Position with plus (+) marked end as shown.
☑ C-29, .5μfd molded tubular. Position with banded end as shown.
☑ R-66, 470Ω (yellow, violet, brown)
☑ R-53, 470Ω (yellow, violet, brown)
☑ R-71, 10 MegΩ (brown, black, blue)
☑ R-70, 10 MegΩ (brown, black, blue)
☑ R-84, 2.7 KΩ (red, violet, red)
☑ R-54, 47 KΩ (yellow, violet, orange)
☑ C-42, 5 μfd ceramic tubular. Position with plus marked end as shown.
☑ R-83, 2.7 KΩ (red, violet, red)
☑ R-99, 150Ω (brown, green, brown)

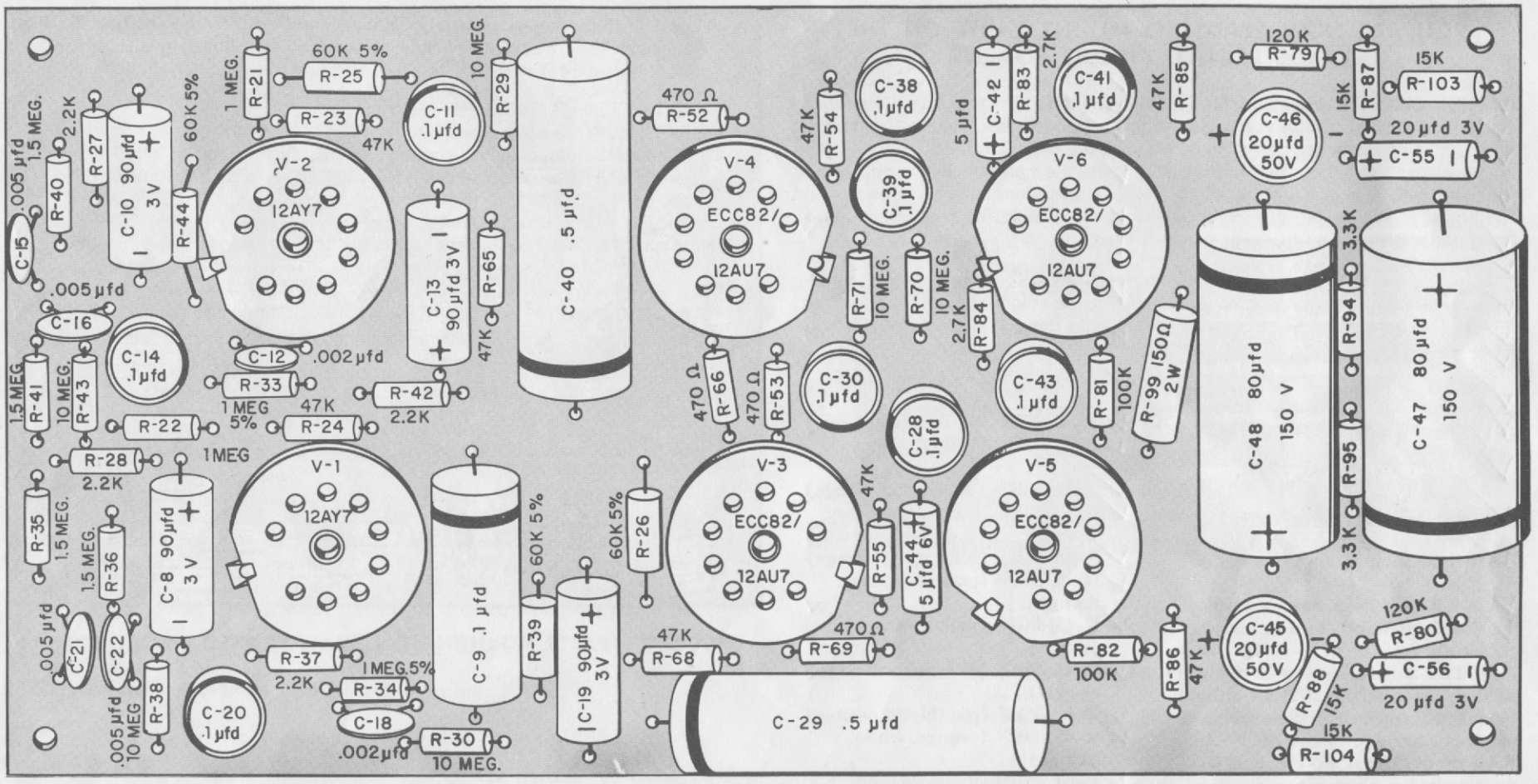


FIGURE 6. MOUNTING PARTS ON LARGE PRINTED CIRCUIT BOARD

- ☑ R-81, 100KΩ (brown, black, yellow)
- ☑ R-82, 100KΩ (brown, black, yellow)
- ☑ R-86, 47KΩ (yellow, violet, orange)
- ☑ R-88, 15KΩ (brown, green, orange)
- ☑ R-104, 15KΩ (brown, green, orange)
- ☑ R-80, 120KΩ (brown, red, yellow)
- ☑ C-56, 20 µfd, 3V, ceramic tubular. Position with plus marked end as shown.
- ☑ R-94, 3.3KΩ (orange, orange, red)
- ☑ R-95, 3.3KΩ (orange, orange, red)
- ☑ R-85, 47KΩ (yellow, violet, orange)
- ☑ R-79, 120KΩ (brown, red, yellow)
- ☑ R-87, 15KΩ (brown, green, orange)
- ☑ R-103, 15KΩ (brown, green, orange)
- ☑ C-55, 20 µfd, 3V, ceramic tubular. Position with plus marked end as shown.
- ☑ C-47, 80 µfd cardboard tubular. Position with heavy banded end as shown.
- ☑ C-48, 80 µfd cardboard tubular. Position with heavy banded end as shown.

At the other end of the board, mount these six ceramic disc capacitors:

- ☑ C-15, .005 µfd, 10%
- ☑ C-16, .005 µfd, 10%
- ☑ C-12, .002 µfd, 10%
- ☑ C-21, .005 µfd, 10%
- ☑ C-22, .005 µfd, 10%
- ☑ C-18, .002 µfd, 10%

Now mount the nine ceramic tubular standup capacitors. Be sure that the banded ends are positioned as shown.

- ☑ C-14, .1 µfd
- ☑ C-20, .1 µfd
- ☑ C-11, .1 µfd
- ☑ C-38, .1 µfd
- ☑ C-39, .1 µfd
- ☑ C-30, .1 µfd
- ☑ C-28, .1 µfd
- ☑ C-43, .1 µfd
- ☑ C-41, .1 µfd

Finally, mount the two 20 µfd, 50V, electrolytic capacitors: C-45 and C-46

SEE FIGURE 7

From the top of the small circuit board (the side showing the outline of the parts) mount:

- R-59 220KΩ (red, red, yellow)
- R-56, 220KΩ (red, red, yellow)
- R-93, 18KΩ (brown, gray, orange)
- R-92, 18KΩ (brown, gray, orange)
- R-60, 22KΩ (red, red, orange)
- R-32, 330KΩ (orange, orange, yellow)
- R-47, 7.5 KΩ (violet, green, red)
- R-58, 22KΩ (red, red, orange)
- R-16, 3.3 MegΩ (orange, orange, green)
- R-17, 220KΩ (red, red, yellow)
- R-31, 330KΩ (orange, orange, yellow)
- R-51, 2.7 MegΩ (red, violet, green)
- R-50, 2.7 MegΩ (red, violet, green)
- R-8, 3.3 MegΩ (orange, orange, green)
- R-9, 220KΩ (red, red, yellow)
- R-102, 10 MegΩ (brown, black, blue)

NOTE: If you have a cartridge of the G.E. SERIES, VR II, either monaural or stereo, and intend using this cartridge in the MONAURAL input, *Mount R-106*, a 47 KΩ resistor in the place marked on the board for R-18, which is a 27 KΩ resistor; and *Mount R-105*, a 56 KΩ resistor, in the place marked on the board for R-19, which is a 22 KΩ resistor. DO NOT OVERLOOK THESE SUBSTITUTIONS.

IF, HOWEVER, YOU HAVE A MONAURAL CARTRIDGE OF THE OLD G.E. RPX SERIES, mount R-18 and R-19, as marked on the board.

IT IS IMPORTANT TO MOUNT THE RIGHT RESISTORS FOR WHICHEVER CARTRIDGE YOU INTEND TO USE, because a mistake made at this point would be time consuming to correct.

- R-18, 27KΩ (red, violet, orange)
- R-19, 22KΩ (red, red, orange)
- R-4, 4.7KΩ (yellow, violet, red)
- R-1, 68KΩ (blue, gray, orange)
- R-3, 47KΩ (yellow, violet, orange)
- R-5, 10 MegΩ (brown, black, blue)
- R-10, 68KΩ (blue, gray, orange)
- R-20, 10 MegΩ (brown, black, blue)
- R-12, 4.7KΩ (yellow, violet, red)
- R-11, 47KΩ (yellow, violet, orange)
- R-13, 10 MegΩ (brown, black, blue)
- R-75, 7.5KΩ (violet, green, red)
- R-73, 43KΩ (yellow, orange, orange)
- R-74, 68KΩ (blue, gray, orange)
- R-46, 75KΩ (violet, green, orange)
- R-48, 68KΩ (blue, gray, orange)
- R-45, 33KΩ (orange, orange, orange)
- R-49, 43KΩ (yellow, orange, orange)
- R-61, 24KΩ (red, yellow, orange)
- R-62, 20KΩ (red, black, orange)
- R-63, 39KΩ (orange, white, orange)
- R-67, 75KΩ (violet, green, orange)
- R-77, 33KΩ (orange, orange, orange)
- R-76, 6.8KΩ (blue, gray, red)
- R-89, 39KΩ (orange, white, orange)

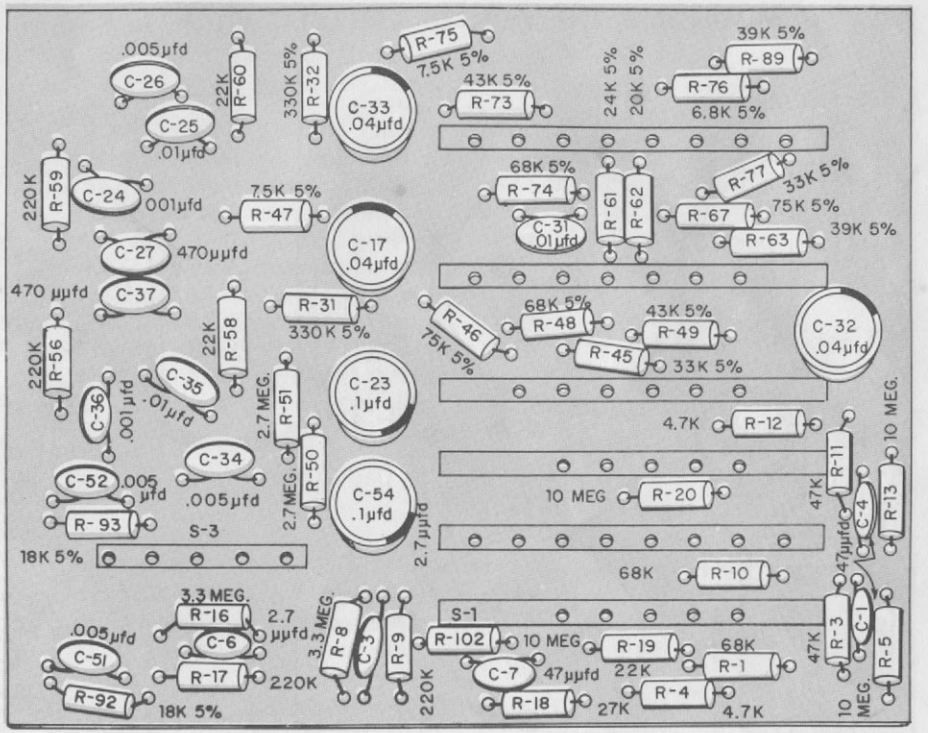


FIGURE 7. PARTS MOUNTING ON SMALL PRINTED CIRCUIT BOARD

Now mount these sixteen ceramic disc capacitors:

- C-52, .005 µfd, 10%
- C-51, .005 µfd, 10%
- C-6, 2.7 µµfd, 10%
- C-3, 2.7 µµfd, 10%
- C-31, .01 µfd, 10%
- C-26, .005 µfd
- C-25, .01 µfd
- C-24, .001 µfd
- C-27, 470 µµfd
- C-37, 470 µµfd
- C-36, .001 µfd
- C-35, .01 µfd
- C-34, .005 µfd
- C-7, 47 µµfd
- C-4, 47 µµfd
- C-1, 47 µµfd

Five ceramic tubular standup capacitors are mounted next. Be sure the banded ends are positioned as shown.

- C-33, .04 µfd, 10%
- C-17, .04 µfd, 10%
- C-23, .1 µfd
- C-54, .1 µfd
- C-32, .04 µfd, 10%

SHORT

MOUNTING THE PRINTED CIRCUIT SWITCHES

SEE FIGURE 8

☑ S-1 is a six-wafer printed circuit switch. Insert the pins on the bottom of S-1 into the matching holes on the small printed circuit board. Turn the board over and solder each of the pins on the switch to the wiring pattern on the board. Be careful that solder does not flow onto another pin, or to nearby parts of the wiring pattern. Be sure, however, that the solder makes a good connection between the foil and the switch pins.

☑ S-3 is the one-wafer printed circuit switch. Install S-3 on the printed circuit board in the same way as you mounted S-1. Solder each of the pins at the base of the wafer to the wiring pattern.

YOU ARE NOW READY TO INSTALL THE SMALL PRINTED CIRCUIT BOARD

Refer to Figure 5 again.

☑ Hold the board foil side up and insert the shafts of S-1 and S-3 through the two holes at the left front of the chassis. Secure each shaft with a 3/8" nut.

☑ Solder the inner conductor of the shielded cable from R-7 in hole C.

☑ Solder the yellow-white wire from J-6 in hole 7.

☑ Solder the green-white wire from J-16 in hole 5.

☑ Solder the inner conductor of the shielded cable from R-15 in hole P.

☑ Solder the free black choke lead in hole G and the free red choke lead in hole H.

YOU ARE NOW READY TO MOUNT THE LARGE PRINTED CIRCUIT BOARD

This circuit board is mounted to the chassis and supported by 7 4-40 x 1 5/8" screws with spacers, fiber washers and nuts, but only 6 lockwashers.

☑ Put a fiber washer over one of these screws and then, from the foil side of the board, put the screw down through the large hole in the corner near the number 20. Slip a spacer over the screw and crimp it to the screw body with diagonal cutters, or pliers. In the same way attach screws with fiber washers and spacers through the large holes in the corners near the numbers 21 and 37. Put the remaining three screws with washers and spacers through the large holes along the center of the board. You have already mounted the 7th screw in a previous step.

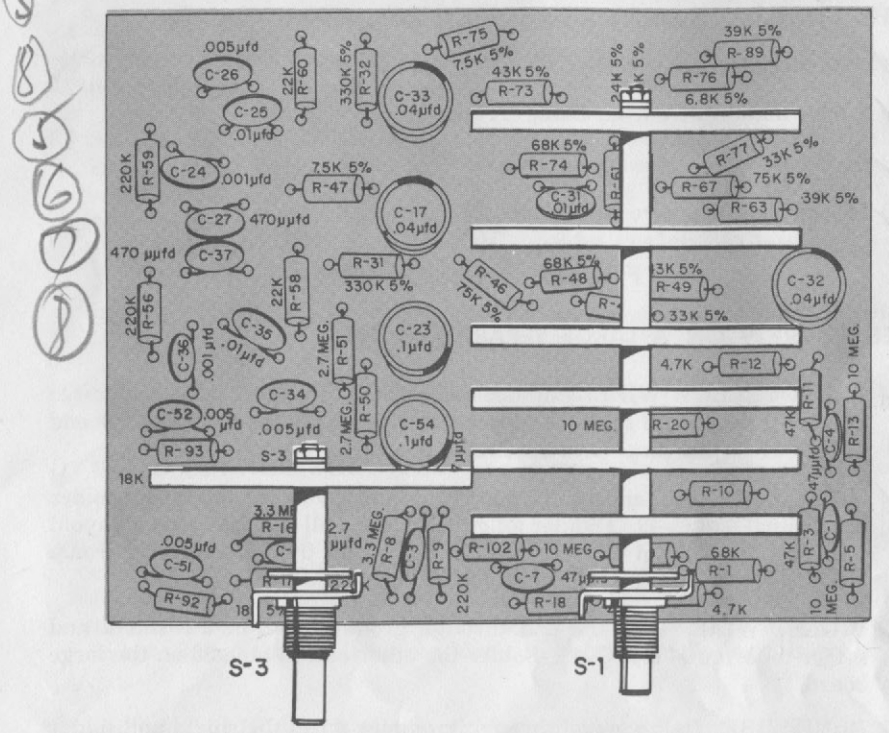


FIGURE 8. MOUNTING THE PRINTED CIRCUIT SWITCHES

☐ Remove the nut and fiber washer from the screw and spacer already mounted during the 2nd Wiring and Parts Mounting. Using this screw as a guide by bringing its end up through the large empty hole in the corner of the board below the number 18, position the board as shown and the other six screw ends will fit in the six small holes in the chassis.

☑ Replace the fiber washer and nut over the screw end showing on TOP of the board in the lower left-hand corner. Be sure the fiber washer is between the board and the nut.

☑ Now tighten the remaining six screws with matching lockwashers and nuts on the bottom side of the chassis.

☑ Solder the long gray wire from Cable "A" in hole Y on the small circuit board.

☑ Solder the long red wire from Cable "B" in hole B on the small circuit board.

IN THE NEXT FOUR STEPS, THE WIRES ARE PUSHED UP FROM THE UNDERSIDE OF THE LARGE CIRCUIT BOARD.

- [ ] Solder the brown wire from Cable "A" in hole 20.
- [ ] Solder the tan wire from Cable "A" in hole 5.
- [ ] Solder the black wire from Cable "B" in hole 23.
- [ ] Solder the green wire from Cable "B" in hole 18.

FOURTH WIRING VIEW

SEE FIGURE 9 ON A LARGE SEPARATE SHEET.

- [ ] SOLID YELLOW WIRE. Pull one end through grommet #4 in the power assembly shield and solder it to terminal 5 of C-50. Solder the other end in hole 37 on the large printed circuit board.
- [ ] GRAY WIRE. Pull one end through grommet #3 in the shield and solder to terminal 4 of C-49. (Solder all connections well but take care to avoid touching the body of either of the resistors with the hot soldering iron.) Solder the other end of the wire in hole 34 on the large board.
- [ ] VIOLET WIRE. Pull one end through grommet #2 in the shield and solder to terminal 6 of C-49. Solder the other end in hole 36 on the large board.
- [ ] BLUE WIRE. Pull one end through grommet #1 in the shield and solder to terminal 6 of C-50. Be sure both connections are soldered. Solder the other end in hole 35 on the large board.
- [ ] Prepare four pieces of the 10" shielded cable as shown in Figure 10. Each cable is made of an insulated **inner conductor** of stranded wire covered by a black, plastic-like **shielding.** Under the shielding runs a solid **shield wire** the length of the cable. The shielding is covered by an **outer insulation.**
- [ ] Select one of these cables and at one end, solder its inner conductor to terminal 2 of R-78. Solder the shield wire to terminal 3 of R-78.
- [ ] Cut the 3" length of the large diameter tubing into 1" lengths. Slide one of these pieces over this cable.
- [ ] Now solder the inner conductor at the free end of the cable in hole 19 on the large board, and the shield wire in hole 2 on the same board.
- [ ] In a previous step, you twisted together the blue wire from J-18 and the green wire from J-8. Now solder the green wire in hole 30 on the large board and the blue wire in hole 29 on the same board. Be sure these wires are soldered in the correct holes.
- [ ] Take another piece of 10" cable and at one end, solder its inner conductor to terminal 1 of R-72, and its shield wire to terminal 3 of R-72.

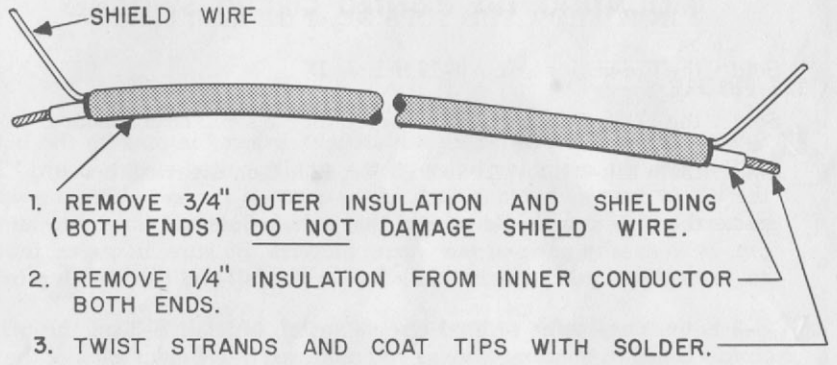


FIGURE 10. PREPARATION OF FIRST GROUP OF SHIELDED CABLE

- [ ] Put another 1" piece of the large diameter tubing over this cable. Now solder the inner conductor at the free end in hole 26 on the large board and the shield wire in hole 27 on the same board.
- [ ] RED WIRE. From the underside of the small board, push one end up through hole 4 and solder. ON THE TOP SIDE of the large board, solder the other end in hole 24.

THE WIRES IN THE NEXT NINE STEPS ARE ALL MOUNTED TO THE SMALL CIRCUIT BOARD FROM ITS UNDERSIDE

- [ ] Solder the orange wire from the solder lug attached to J-1 in hole 3.
- [ ] Solder the green wire from J-12 in hole 14.
- [ ] Solder the white wire from J-13 in hole 11.
- [ ] Solder the violet wire from terminal 1 of R-2 in hole 15.
- [ ] Solder the orange wire from J-11 in hole 2.
- [ ] Solder the red wire from J-1 in hole 1.
- [ ] Solder the gray wire from J-3 in hole 10.
- [ ] Solder the blue wire from terminal 4 of R-2 in hole 13.
- [ ] Solder the yellow wire from J-2 in hole 12.

NOW FROM THE TOPSIDE of the small board:

- [ ] Solder the brown wire from J-17 in hole D.
- [ ] Solder the black wire from J-7 in hole 6 on the small circuit board.
- [ ] Solder the black-white wire from J-4 in hole 8 on the small board.
- [ ] Solder the brown-white wire from J-14 in hole 9 on the same board.
- [ ] Solder the gray wire from terminal 4 of S-4 in hole J on the small board.
- [ ] Solder the blue wire from terminal 3 of S-4 in hole L.
- [ ] SOLID GREEN WIRE. Solder one end in hole 33 on the LARGE circuit board and the other in hole 23 on the small board.

FIFTH WIRING VIEW

SEE FIGURE 11 ON A LARGE SEPARATE SHEET.

- [ ] Solder one end of a solid yellow wire in hole S on the small board and the other end in hole 7 on the large board.
- [ ] Solder one end of a solid green wire in hole A on the small board and the other end in hole 8 on the large board.
- [ ] From the UNDERSIDE of the small board, push up one end of a red wire and solder to hole V on the small board. Solder the other end in hole 25 on top of the large board.
- [ ] Solder the free end of the blue wire from terminal 1 of S-4 in hole F on the small board.
- [ ] Solder the free end of the gray wire from terminal 6 of S-4 in hole K on the small board.
- [ ] SOLID GREEN WIRE. Solder one end to terminal 6 of R-57 and the other in hole 16 on the small board.
- [ ] SOLID ORANGE WIRE. Solder one end to terminal 1 of R-57 and the other in hole 25 on the small board.
- [ ] SOLID ORANGE WIRE. Connect, but do not solder, one end to terminal 2 of R-57. Solder the other end in hole 24 on the small board.
- [ ] SOLID ORANGE WIRE. Solder one end to terminal 2 of R-57. Be sure all connections are soldered. Solder the other end to terminal 2 of R-64.
- [ ] SOLID BLUE WIRE. Solder one end to terminal 6 of R-64 and the other end in hole 17 on the small board.
- [ ] SOLID ORANGE WIRE. Solder one end to terminal 4 of R-57 and the other in hole 20 on the small printed circuit board.
- [ ] SOLID ORANGE WIRE. Solder one end to terminal 5 of R-64. Connect, but do not solder the other end to terminal 5 of R-57.
- [ ] SOLID YELLOW WIRE. Solder one end to terminal 5 of R-57. Make sure all connections are soldered. Solder the other end in hole 18 on the small board.
- [ ] ANOTHER SOLID YELLOW WIRE. Solder one end to terminal 3 of R-57 and the other end in hole Z on the small board.
- [ ] SOLID GREEN WIRE. Solder one end to terminal 4 of R-64 and the other end in hole 21 on the small board.
- [ ] SOLID YELLOW WIRE. Solder one end in hole W on the small board and the other in hole 10 on the large board.
- [ ] SOLID ORANGE WIRE. Solder one end in hole X on the small board and the other in hole 14 on the large board.
- [ ] Pull a 10" length of cable through the large diameter tubing covering the cable previously soldered to terminals 1 and 3 of R-72. Now solder the insulated conductor at one end to terminal 4 of R-72 and the shield wire to terminal 6 of R-72. At the free end of this cable, solder the shield wire in hole 3, and the insulated conductor in hole 11 on the large board.
- [ ] Pull another 10" length of cable through the large diameter tubing covering the cable already soldered to terminals 2 and 3 of R-78. Solder the insulated conductor at one end to terminal 5 of R-78 and the shield wire to terminal 6 of R-78. At the free end of this cable, solder the shield wire in hole 12 and the insulated conductor in hole 16 on the large board.

SIXTH WIRING VIEW

SEE FIGURE 12 ON A LARGE SEPARATE SHEET.

- ☑ SOLID BLUE WIRE. Solder one end in hole E on the small board and the other end in hole 22 on the large board.
- ☑ ANOTHER SOLID BLUE WIRE. Solder one end in hole R on the small board and the other in hole 1 on the large board.
- ☑ SOLID GREEN WIRE. Solder one end in hole Q on the small board and the other in hole 32 on the large.
- ☑ SOLID BLUE WIRE. Solder one end in hole T on the small board and the other in hole 13 on the large.
- ☑ ANOTHER SOLID BLUE WIRE. Solder one end in hole U on the small board and the other in hole 28 on the large.
- ☑ SOLID GREEN WIRE. Solder one end in hole 19 on the small board and the other in hole 31 on the large.
- ☑ ANOTHER SOLID GREEN WIRE. Solder one end to terminal 1 of R-64 and the other in hole 22 on the small circuit board.
- ☑ A THIRD SOLID GREEN WIRE. Solder one end to terminal 3 of R-64 and the other in hole 26 on the small board.
- ☑ Prepare the remaining 10" and the single 8" length of shielded cable as shown in Figure 13.
- ☑ Solder the inner conductor of the 10" length at the end from which the shield wire has been removed in hole M on the small board. Slip the remaining 1" piece of large diameter tubing over this cable.
- ☑ Now solder the inner conductor at the free end of this cable in hole 21 on the large board. Solder the shield wire directly to the foil side of the board as shown.
- ☑ Solder the inner conductor at the end of the 8" cable from which the shield wire has been removed, in hole N on the small board.
- ☑ Slip the cable through the tubing covering the 10" cable and solder the inner conductor in hole 6 on the large board. Solder the shield wire directly to the foil side of the large board where shown.
- ☑ **Push each pair of cables down as close to the chassis as possible.**
- ☑ Insert the pilot light bulb into its socket and mount this assembly at the front of the chassis where shown.
- ☑ Twist together the red and black leads from the pilot light assembly, and solder the black lead in hole 15 on the large board.
- ☑ Trim off just enough of the red lead to connect it in hole 9 on the large board. Strip ¼" of the insulation from the end of the lead and then solder it in hole 9.
- ☑ Now turn the chassis over and install the tubes as shown in picture on Page 25. Be sure to line up the tube pins correctly before inserting tubes in the sockets.

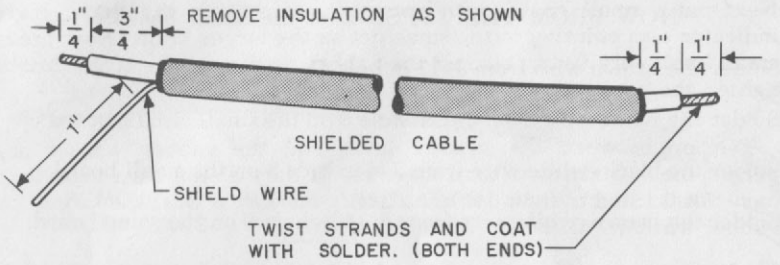


FIGURE 13. PREPARATION OF SECOND GROUP OF SHIELDED CABLES

- ☑ Put a tube shield over each tube.
- ☑ Put the fuse in the fuse holder.
- ☑ Install the small skirted knob on the shaft of R-2 (the Stereo Magnetic Cartridge Load Control). Tuner Lever Controls are screwdriver set, and need no knobs.
- ☑ Return chassis to its normal position and install the front panel, using the six flat washers and six large nuts.
- ☑ Install one of the two larger polished chrome insert knobs on the SELECTOR-EQUALIZER switch. Tighten setscrew against the flat of shaft.
- ☑ Install the concentric large and small knob glued together on the CHANNEL-SELECTOR switch. Tighten setscrew against the flat of the shaft.
- ☑ Turn shafts of the BASS, TREBLE and LEVEL controls all the way counter clockwise. Place one of the larger knobs (with no chromium insert) on each shaft so that its indicator points to the dot on the panel which is in about the "seven o'clock" position. Fit one of the three thick rubber washers in place on each of these knobs.

☑ Next put a small knob (with chromium insert) on the shaft. Have its indicator also pointing to the same dot as the larger knob. Now press the small knob very firmly against the rubber washer in the larger knob and tighten the setscrew.

Tension between the smaller knob and the rubber washer should permit the two knobs to turn together. If they do not turn together, you have not pressed the smaller knob firmly enough against the larger knob's rubber washer.

☑ Install a small knob in the same way on the shafts of the TREBLE and LEVEL controls.

☑ Turn the LOUDNESS control completely counterclockwise. This control has a switch which will "click" in the extreme counterclockwise position.

Put the remaining large knob (with chromium insert) on the control shaft. Tighten with setscrew.

☐ Plug the line cord into a power outlet supplying 105-125 volts, 50-60 cycles AC.

CAUTION: DO NOT TOUCH ANY PART OF THE WIRING WHILE YOUR PREAMPLIFIER IS PLUGGED INTO A POWER OUTLET. NEVER USE OR TEST THE INSTRUMENT WHEN IT IS ON OR CLOSE TO A RADIATOR, SINK, OR OTHER METAL OBJECT.

☐ Read the OPERATING INSTRUCTIONS and TEST YOUR PREAMPLIFIER BEFORE INSTALLING IT IN THE CABINET.

FINAL ASSEMBLY

☐ Fasten the four feet to the bottom of the cabinet with 6-32 x ¼" screws.

☐ Slide the completed Preamplifier into the cabinet and secure it in place with three self-tapping screws.

HOW TO USE YOUR STEREO PREAMPLIFIER

This Stereo Preamplifier has been designed to give a versatile and flexible equalizer and control unit for your complete HI-FI system. Virtually all units of a High Fidelity system can be connected to the Preamplifier. Units can be switched "ON" or "OFF" and their tone and volume controlled from this central point. Your Preamplifier has eight front panel controls:

SELECTOR-EQUALIZER

CHANNEL SELECTOR

BASS CONTROL

TREBLE CONTROL

LEVEL

LOUDNESS and ON/OFF SWITCH

RUMBLE FILTER

SCRATCH FILTER

SELECTOR-EQUALIZER SWITCH. This switch provides the selection of various units which can be connected to the Preamplifier. The four STEREO (BINAURAL) positions are indicated on the panel in red.

The first STEREO position, TAPE, selects the incoming signal from a Stereo tape deck and equalizes according to the NARTB curve.

The second STEREO position, PHONO, applies to both magnetic and ceramic inputs. It provides RIAA equalization for the low level magnetic inputs which feature a variable terminating impedance (5K to 105K). Any inputs to high level ceramic jacks pass through unequalized.

The third STEREO position, TUNER, selects a pair of Tuner inputs and features two level set controls. These inputs are flat (no equalization).

The fourth STEREO position, AUXILIARY, selects a pair of flat inputs to be used for any stereo inputs from Tuner, TV, or high level cartridges which need no equalization.

If any of these foregoing signal sources have only a single output (Monaural Type), this output may be plugged into either of the Stereo channel inputs A or B.

The other positions, indicated on the panel in black, are MONAURAL.

The fifth position is MICROPHONE, and is an input to Channel A ONLY.

The remaining six positions are MONAURAL phono positions providing an assortment of equalizers for any of the three phono inputs, G.E., PICkering, and CERamic. These also, are inputs to Channel A ONLY.

There are two output jacks, one in each channel, for take-off to RECorder. These are taken off ahead of the volume and tone controls. As a result, you may adjust level and tone controls for best listening without affecting the recording level.

The other four outputs are amplifier outputs consisting of a parallel pair for Channel A, and a parallel pair for Channel B. This arrangement of jacks allows for binaural headphone operation with either one or two sets of headphones. When using only one set of headphones, it is not necessary to disconnect the output cables to the amplifiers, — you may leave the amplifiers ON or OFF. For use with two sets of headphones, the amplifier cables must be disconnected. Any good quality binaural headphones may be used for this type of operation.

CHANNEL SELECTOR SWITCH. The Stereo positions are indicated in red and the Monaural positions in black.

STEREO. This position is the normal setting for stereophonic reproduction. The inputs of A are fed through Channel A to the A outputs, and the B inputs through Channel B to the B outputs.

STEREO REV. The Stereo Reverse position reverses the channels with respect to each other: the inputs of A being fed through Channel A to the B outputs, and the inputs of B being fed through Channel B to the outputs of A.

This setting changes the direction of the sound heard at the speakers so that what was originally heard as coming from the left speaker will come from the right, the sound originally heard from the right speaker will come from the left.

CH-A. This setting is the only position in which the A inputs are fed through Channel A to the A outputs, *with the B channel inoperative.*

CH-B. This setting is the only position in which the B inputs are fed through Channel B to the B outputs, with the A channel inoperative.

These CH-A and CH-B positions allow any desired degree of balance in the tone and level of each individual channel when preparing for stereo reproduction. Once you are satisfied that both channels are balanced, re-set the switch in the STEREO or STEREO REVERSE position.

MONAURAL POSITIONS

A-MON. In this position, any input to Channel A is fed through the A Channel to both A and B outputs.

B-MON. In this position, any input to Channel B is fed through the B Channel to both A and B outputs.

These two positions are used when you wish to send the signal from a single monaural input through both amplifiers and both speakers.

BASS and TREBLE CONTROLS. Separate BASS and TREBLE dual concentric controls are used when additional compensation is desired. They can be adjusted independently for each channel. To adjust Channel A, hold the smaller knob firmly with one hand and, with the other hand, turn the larger knob (Channel A) as desired. To adjust Channel B, hold the larger knob firmly and turn the smaller knob (Channel B) as desired. When you have a satisfactory balance between channels, the clutch-type construction of the controls will hold both inner and outer knobs in the desired relative position. You may then change the bass (or treble) in equal amounts, on both channels at the same time, with one hand. Rotation of the controls to the left of center cuts the response; rotation to the right boosts the response. Figure 15 shows the Tone Control Curves for each channel.

The independent functioning of these dual controls is especially desirable when you are using unlike speakers, amplifiers, or other components, in your system.

LEVEL CONTROL and LOUDNESS CONTROL. The human ear does not hear very low frequencies, or very high frequencies, at low volume, as well as it does at high volume. To compensate for this inequality LOUDNESS control is provided. In addition there is a LEVEL control so that adjustment can be made to hold the point at which compensation becomes satisfactory.

With the LEVEL control at zero (fully counter-clockwise) turn the LOUDNESS control full on (full clockwise). Turn the LEVEL control up to a point where the music being played is quite loud. Leave the LEVEL control at this setting permanently and adjust the volume by turning the LOUDNESS CONTROL down to a comfortable listening level.

At maximum, or nearly maximum settings of the LOUDNESS control the frequency response remains flat (technically speaking). As you turn the LOUDNESS control down to "background music" volume, compensation takes place automatically and the music will sound like it is still full and pleasing.

To use the Preamplifier without loudness compensation, you may turn the LOUDNESS control all the way to the right, fully clockwise, and adjust volume with the LEVEL control ONLY.

RUMBLE FILTER. This switch is used to reduce turntable rumble. The filter has a very sharp cut-off below 100 cycles (both channels). To eliminate very low frequency noises from turntables and acoustic coupling from the loudspeaker to the turntable, this switch should be set to the "ON" position. This control is only effective when used on the TAPE HEAD and PHONO inputs, either Stereo or Monaural.

SCRATCH FILTER. The Scratch Filter provides exceptionally sharp high frequency cut off on both channels at the same time. It can be used to eliminate scratch or high frequency noise from ANY input of your pre-amplifier.

INPUTS. Your Stereo Preamplifier has 5 pairs of Stereo inputs and four Monaural inputs. These inputs and their characteristics are given below:

STEREO INPUTS

INPUT	SENSITIVITY	IMPEDANCE
	(For 1 Volt Output at 1,000 cycles)	
Tape Head (NARTB)	2.5 MV	68KΩ
Magnetic Phono (RIAA)	2.5 MV	5K — 105KΩ, adjustable & calibrated
Ceramic Phono	70.0 MV	2.5 Megohms at 1,000 cycles
Auxiliary	500.0 MV	3.5 Megohms
Tuner	150.0 MV	500KΩ

MONAURAL INPUTS

GE	2.5 MV	22KΩ*
Pickering	5.5 MV	49KΩ**
Ceramic	150.0 MV	2.5 Megohms at 1,000 cycles
(Choice of Equalization)		
Microphone	25.0 MV	10 Megohms

* 47 KΩ } Depending on cartridge
**103 KΩ } See note on Page 12

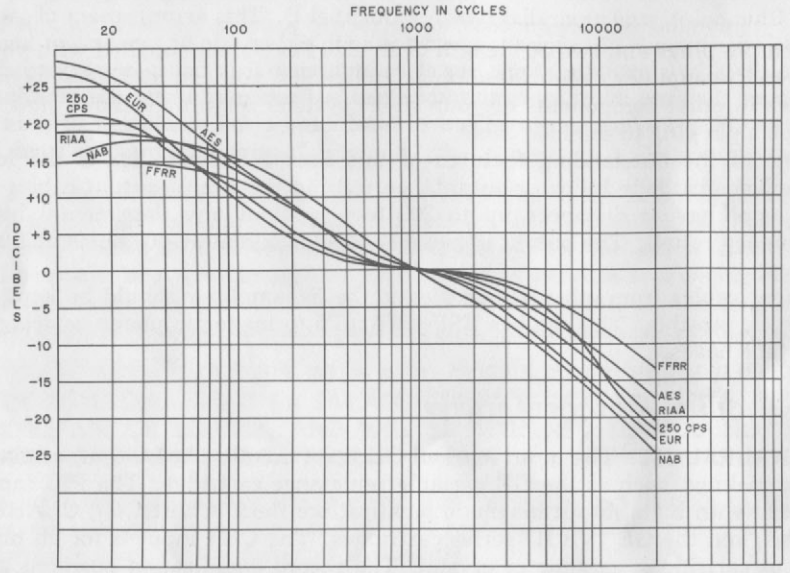


FIGURE 14. EQUALIZATION CURVES

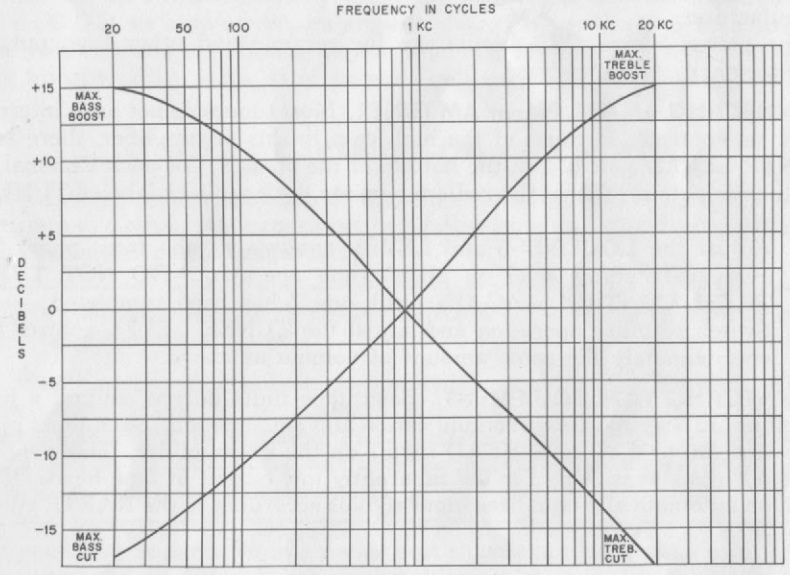


FIGURE 15. TONE CONTROL CURVES FOR EACH CHANNEL

CONNECTING ASSOCIATED HI-FI EQUIPMENT TO THE STEREO PREAMPLIFIER

Ten pin plugs and two 36" length of shielded cable are supplied with your Stereo Preamplifier. With these plugs and cables, you can make connecting cables to other components of your Hi-Fi system. Figure 16 shows how to attach a pin plug to shielded cable.

One of the outstanding features of this Stereo Preamplifier is the low impedance cathode follower outputs, permitting the use of *output* cables to the amplifiers at distances up to 200 feet, without any detrimental high frequency rolloff. The output impedance is approximately 600 ohms at 1,000 cycles.

Input cables from other accessories to the Preamplifier should be kept as short as possible. This applies ESPECIALLY to magnetic phono cartridges and tape heads.

CONNECTING A RECORD PLAYER.

MONAURAL USE. The input marked GE is for connecting low output magnetic pickups, such as the GE variable reluctance cartridge. The PIC input is used with high output magnetic pickups like the PICKERING, CLARKSTAN, and the GE "VR II" series cartridges. The CER input is for all high output cartridges, ceramic or crystal. The record equalization positions are equally effective for all of the phono inputs.

STEREO USE. The paired inputs marked MAG are used for GE and other Stereo Magnetic Phono cartridges. When connecting a cartridge of this type, set the calibrated MAGnetic CARTridge LOAD control (on the bottom of the chassis) to the impedance value recommended by the cartridge manufacturer.

The paired Stereo CER inputs are for ceramic and other high output ceramic or crystal cartridges.

CONNECTING AM/FM, FM, or AM TUNER. Most tuners do not have internal level set controls. Because of the high gain in this preamplifier, there is a TUNER LEVEL control (on the bottom of the chassis) for each Channel.

Plug the output cable of the radio tuner into the input jack labeled TUNER, and then:

1. Adjust the LOUDNESS and LEVEL controls on the front panel for average listening level on phonograph operation. DO NOT TURN THESE CONTROLS AGAIN until step 2 has been completed.
2. Switch to tuner operation and adjust the TUNER LEVEL control for approximately the same amount of volume as above.

CONNECTING TAPE EQUIPMENT. Basic tape units do not contain a preamplifier, so they require preamplification and equalization. Such units must be connected to the TAPE HEAD inputs on the Preamplifier. These inputs have adequate sensitivity for the inherently low output of tape heads. This position automatically equalizes input signals according to the NARTB curve.

A complete tape recorder having an internal preamplifier should be connected to the TUNER or AUX on your Stereo Preamplifier, since these inputs are flat and set for higher input voltages.

CONNECTING A MICROPHONE. Any high impedance microphone, such as a crystal microphone, a high impedance dynamic microphone, or a velocity microphone with matching transformer can be connected to the MIC input jack. Some microphones are supplied with two conductors enclosed in a metal braid. In such cases, solder the common lead and the shield braid to the outer shell of the pin plug. Set the Selector switch to the MIC position.

CONNECTING THE PREAMPLIFIER TO A POWER AMPLIFIER. You may have a stereo amplifier, two separate amplifiers with or without controls, or a single amplifier, with or without controls.

If you have a stereo amplifier, connect a shielded cable from a Channel A MAIN output of the preamplifier to the Channel A input on the amplifier. Connect another shielded cable from a Channel B output to the Channel B input.

If you have two separate amplifiers, connect a Channel A MAIN output from the preamplifier to the input jack on either one of the amplifiers, and connect a Channel B MAIN output to the other amplifier.

If you have only a single amplifier, you may connect either a Channel A or a Channel B MAIN output to the input jack on the amplifier providing the Preamplifier input and Selector-Equalizer switch are in a Stereo position. For equalized Monaural Phono use, connect to Monaural inputs and Channel A MAIN output only.

Amplifiers with controls usually have several inputs, and connection should be made to a high level input (AUX or TUNER). Set the tone controls on the amplifier to their flat position. Your preamplifier will furnish you with a centralized control of tone and volume.

OUTPUT TO A RECORDER from the Preamplifier for recording can be taken from the RECorder output jack on the bottom of the chassis. The signal fed to this receptacle is taken off before the controls on the Preamplifier. This makes it convenient for you to make recordings from any input source and monitor this program at the same time. Independent tone and volume adjustments can be made for each listening channel without affecting the recording signal. Use a shielded cable to connect the RECorder output jack on the preamplifier to the high-level input (sometimes called TUNER) on the recorder.

USING THE AUX INPUT. The AUXiliary input is used for connecting a tuner, TV receiver, or a crystal phono cartridge to your preamplifier. For this operation, set the SELECTOR-EQUALIZER switch to the AUX position.

ACCESSORY POWER RECEPTACLES. Two AC power receptacles are located on the bottom of your Preamplifier. One is controlled by the switch on the front panel; the other is unswitched. An amplifier or a tuner can be connected to the switched receptacle. Then, when the Preamplifier is turned ON or OFF, whatever is connected to the switched receptacle will also be turned ON or OFF. This allows you to take advantage of the automatic turn-off feature on most record changers by plugging it into the unswitched receptacle.

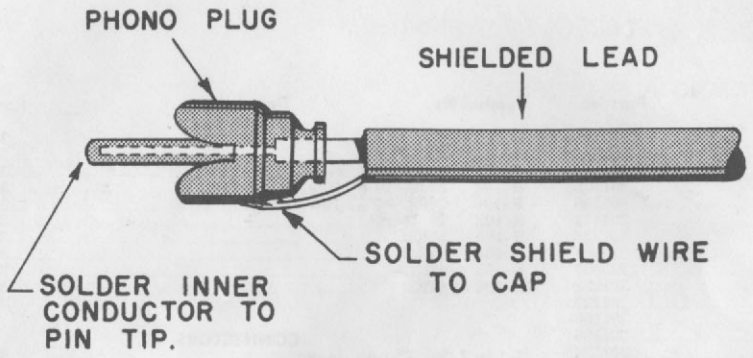


FIGURE 16. HOW TO CONNECT A PIN PLUG

The length of the cable used will depend upon the connection you wish to make. After the length of cable is cut to suit, a phono plug is connected and soldered to each end.

TEST EQUIPMENT USED FOR SPECIFICATION MEASUREMENTS

Hewlett-Packard Model 400D AC VTVM
Hewlett-Packard Model 200CD Audio Generator
Barker-Williamson Model 400 Distortion Analyzer
Tektronix Model 531 Oscilloscope
Simpson Model 390 Wattmeter
Simpson Model 260 VOM
Triplett Model 630A VOM

ALLIED'S SERVICE FACILITIES

If this kit does not operate properly, we recommend the following:

Please write our Kit Department, giving stock number and date you purchased the kit. Also, describe fully what appears to be wrong. We may be able to determine from your letter what is wrong and how to correct the unsatisfactory condition.

This wired KNIGHT-KIT may be returned within one year after purchase for a special service charge of $10.00. Parts within the standard EIA 90-day warranty period will be replaced without charge for the parts. A charge will be made for parts damaged in construction or because of a wiring error. After the one year period, service charges will be based on the length of time required to repair the unit, plus the cost of any parts required.

PLEASE NOTE: KITS BUILT WITH ACID CORE SOLDER, PASTE FLUX, OR WITH IRONS CLEANED ON A SAL AMMONIAC BLOCK, ARE NOT ELIGIBLE FOR REPAIR OR SERVICE, AND WILL BE RETURNED TO YOU NOT REPAIRED, AND AT YOUR EXPENSE.

Allied's service facilities are primarily for inspection and trouble shooting. Kits not completely wired, and which require extensive work will be returned collect with a letter of explanation.

IF YOU RETURN this kit, pack it carefully and well. To prevent damage in shipment, use a large enough carton so that cushioning material can be placed around the instrument. Cushion it tightly. Mark it: FRAGILE — DELICATE ELECTRONIC EQUIPMENT.

Send the kit PREPAID and INSURED. We will return the repaired kit to you C.O.D. as soon as repairs are completed. If you wish to save C.O.D. fees, your advance remittance may be enclosed for standard repair charges plus transportation costs. Any excess remittance will be refunded.

ALLIED'S GUARANTEE ON KNIGHT-KITS

The designs and components selected for KNIGHT-KITS represent over a quarter of a century of experience in kit development. Allied extends these firm guarantees on KNIGHT-KITS:

We guarantee that the circuits on all KNIGHT-KITS have been carefully engineered and tested.

We guarantee that only high-quality components are supplied. All parts are covered by the standard EIA 90-day warranty. Any faulty components will be replaced PREPAID and WITHOUT CHARGE if reported to us within the warranty period. We reserve the right to request the return of defective parts.

If your kit was damaged in a parcel post shipment, please write us at once, describing the condition in which the shipment was received. If your kit was part of a Railway Express shipment that was damaged in transit, please notify the Railway Express agent at once and then write us.

PARTS LIST

CAPACITORS

Symbol No.	Description	Part No.
C-1	Ceramic disc, 47 μμfd, 20%, 500-600 V	276479
C-2	Ceramic disc, 15 μμfd, 5%, 500 V	296028
C-3	Ceramic disc, 2.7 μμfd, 10%, 500 V	296024
C-4	Ceramic disc, 47 μμfd, 20%, 500-600 V	276479
C-5	Ceramic disc, 15 μμfd, 5%, 500 V	296028
C-6	Ceramic disc, 2.7 μμfd, 10%, 500 V	296024
C-7	Ceramic disc, 47 μμfd, 20%, 500 V	276479
C-8	Electrolytic, ceramic case, 90 μfd, 3 V	291004
C-9	Paper tubular, .1 μfd, 200 V	253014
C-10	Electrolytic, ceramic case, 90 μfd, 3 V	291004
C-11	Ceramic tubular, .1 μfd, 200 V	296029
C-12	Ceramic disc, .002 μfd, 10%, 500 V	296025
C-13	Electrolytic, ceramic case, 90 μfd, 3 V	291004
C-14	Ceramic tubular, .1 μfd, 200 V	296029
C-15	Ceramic disc, .005, 10%, 500 V	296026
C-16	Ceramic disc, .005, 10%, 500 V	296026
C-17	Ceramic tubular, .04 μfd, 10%, 200V	296030
C-18	Ceramic disc, .002 μfd, 10%, 500 V	296025
C-19	Electrolytic, ceramic case, 90μfd, 3 V	291004
C-20	Ceramic tubular, .1 μfd, 200 V	296029
C-21	Ceramic disc, .005 μfd, 10%, 500 V	296026
C-22	Ceramic disc, .005 μfd, 10%, 500 V	296026
C-23	Ceramic tubular, .1 μfd, 200 V	296029
C-24	Ceramic disc, .001, 20%, 600 V	276016
C-25	Ceramic disc, .01 μfd, 20%, 600 V	276015
C-26	Ceramic disc, .005, 20%, 500 V	276054
C-27	Ceramic disc, 470 μμfd, 20%, 500-600 V	276478
C-28	Ceramic tubular, .1 μfd, 200 V	296029
C-29	Plastic tubular, .5 μfd, 200 V	253054
C-30	Ceramic tubular, .1 μfd, 200 V	296029
C-31	Ceramic disc, .01 μfd, 10%, 500 V	296027
C-32	Ceramic tubular, .04 μfd, 10%, 200 V	296030
C-33	Ceramic tubular, .04 μfd, 10%, 200 V	296030
C-34	Ceramic disc, .005 μfd, 20%, 500 V	276054
C-35	Ceramic disc, .01 μfd, 20%, 600 V	276015
C-36	Ceramic disc, .001 μfd, 20%, 600 V	276016
C-37	Ceramic disc, 470 μμfd, 20%, 500-600 V	276478
C-38	Ceramic tubular, .1 μfd, 200 V	296029
C-39	Ceramic tubular, .1 μfd, 200 V	296029
C-40	Plastic tubular, .5 μfd, 200 V	253054
C-41	Ceramic tubular, .1 μfd, 200 V	296029
C-42	Electrolytic, ceramic case, 5 μfd, 6 V	291005
C-43	Ceramic tubular, .1 μfd, 200 V	296029
C-44	Electrolytic, ceramic case, 5 μfd, 6 V	291005
C-45	Electrolytic, 20 μfd, 50 V	209003
C-46	Electrolytic, 20 μfd, 50 V	209003
C-47	Electrolytic, cardboard cover, 80 μfd, 150 V	203800
C-48	Electrolytic, cardboard cover, 80 μfd, 150 V	203800
C-49	Electrolytic, 120-120-40 μfd, 150 V	233300
C-50	Electrolytic, 120-120-40 μfd, 150 V	233300
C-51	Ceramic disc, .005 μfd, 10%, 500 V	296026
C-52	Ceramic disc, .005 μfd, 10%, 500 V	296026
C-53	Ceramic disc, .01 μfd, 20%, 600 V	276015
C-54	Ceramic tubular, .1 μfd, 200 V	296029
C-55	Electrolytic, ceramic case, 20 μfd, 3 V	291006
C-56	Electrolytic, ceramic case, 20 μfd, 3 V	291006
C-57	Ceramic disc, .01 μfd, 20%, 600 V	276015

RESISTORS

(All carbon, 10%, ½w, unless otherwise specified)

Symbol No.	Description	Part No.
R-1	68KΩ	301683
R-2	100KΩ, 20%, dual potentiometer	420001
R-3	47KΩ	301473
R-4	4.7KΩ	301472
R-5	10 MegΩ	301106
R-6	390KΩ	301394
R-7	100KΩ, 20%, potentiometer	390136
R-8	3.3 MegΩ	301335
R-9	220KΩ	301224
R-10	68KΩ	301683
R-11	47KΩ	301473
R-12	4.7KΩ	301472
R-13	10 MegΩ	301106
R-14	390KΩ	301394
R-15	100KΩ, 20%, potentiometer	390136
R-16	3.3 MegΩ	301335
R-17	220KΩ	301224
R-18	27KΩ	301273
R-19	22KΩ	301223
R-20	10 MegΩ	301106
R-21	1 MegΩ	301105
R-22	1 MegΩ	301105
R-23	47KΩ	301473
R-24	47KΩ	301473
R-25	60KΩ, deposited carbon, 5%, ½w	330007
R-26	60KΩ, deposited carbon, 5%, ½w	330007
R-27	2.2KΩ	301222
R-28	2.2KΩ	301222
R-29	10 MegΩ	301106
R-30	10 MegΩ	301106
R-31	330KΩ, carbon, 5%	302334
R-32	330KΩ, carbon, 5%	302334
R-33	1 MegΩ, carbon, 5%	302105
R-34	1 MegΩ, carbon, 5%	302105
R-35	1.5 MegΩ	301155
R-36	1.5 MegΩ	301155
R-37	2.2KΩ	301222
R-38	10 MegΩ	301106
R-39	60KΩ, deposited carbon, 5%, ½w	330007
R-40	1.5 MegΩ	301155
R-41	1.5 MegΩ	301155
R-42	2.2KΩ	301222
R-43	10 MegΩ	301106
R-44	60KΩ, deposited carbon, 5%, ½w	330007
R-45	33KΩ, 5%	302333
R-46	75KΩ, 5%	302753
R-47	7.5KΩ, 5%	302752
R-48	68KΩ, 5%	302683
R-49	43KΩ, 5%	302433
R-50	2.7 MegΩ	301275
R-51	2.7 MegΩ	301275
R-52	470Ω	301471
R-53	470Ω	301471
R-54	47KΩ	301473
R-55	47KΩ	301473
R-56	220KΩ	301224
R-57	1 MegΩ, concentric control	420002
R-58	22KΩ	301223
R-59	220KΩ	301224
R-60	22KΩ	301223
R-61	24KΩ, 5%	302243
R-62	20KΩ, 5%	302203
R-63	39KΩ, 5%	302393
R-64	1 MegΩ, concentric control	420002
R-65	47KΩ	301473
R-66	470Ω	301471
R-67	75KΩ, 5%	302753
R-68	47KΩ	301473
R-69	470Ω	301471
R-70	10 MegΩ	301106
R-71	10 MegΩ	301106
R-72	50KΩ, concentric control	420003
R-73	43KΩ, 5%	302433
R-74	68KΩ, 5%	302683
R-75	7.5KΩ, 5%	302752
R-76	6.8KΩ, 5%	302682
R-77	33KΩ, 5%	302333
R-78	500KΩ, loudness control	420004
R-79	120KΩ	301124
R-80	120KΩ	301124
R-81	100KΩ	301104
R-82	100KΩ	301104
R-83	2.7KΩ	301272
R-84	2.7KΩ	301272
R-85	47KΩ	301473
R-86	47KΩ	301473
R-87	15KΩ	301153
R-88	15KΩ	301153
R-89	39KΩ, 5%	302393
R-90	47KΩ, 5%	302473
R-91	47KΩ, 5%	302473
R-92	18KΩ, 5%	302183
R-93	18KΩ, 5%	302183
R-94	3300Ω	301332
R-95	3300Ω	301332
R-96	1500Ω	301152
R-97	1500Ω	301152
R-98	2200Ω	301222
R-99	150Ω, 10%, 2w	307151
R-100	260Ω, 10%, 10w, standup	374011
R-101	260Ω, 10%, 10w, standup	374011
R-102	10 MegΩ	301106
R-103	15KΩ	301153
R-104	15KΩ	301153
R-105	56KΩ	301563
R-106	47KΩ	301473

CONNECTORS

Symbol No.	Description	Part No.
J-1 to J-20	Phono jacks	502220
J-21 & J-22	AC receptacles	502226

FUSE

Symbol No.	Description	Part No.
F-1	1 ampere, slo-blo, type 3AG	491003

RECTIFIERS

Symbol No.	Description	Part No.
CR-1	Selenium, 100 ma	620200
CR-2	Selenium, 100 ma	620200

SWITCHES

Symbol No.	Description	Part No.
S-1	6-wafer, printed circuit rotary	435005
S-2	DPDT slide (Rumble Filter)	431301
S-3	1-wafer, printed circuit rotary	435006
S-4	DPDT slide (Scratch Filter)	431301

TRANSFORMER

Symbol No.	Description	Part No.
T-1	Power Transformer	101204

TUBES

Symbol No.	Description	Part No.
V-1	12 AY7	611018
V-2	12 AY7	611018
V-3	ECC82/12AU7	611019
V-4	ECC82/12AU7	611019
V-5	ECC82/12AU7	611019
V-6	ECC82/12AU7	611019

MISCELLANEOUS

Description	Quantity	Part No.
Bracket, capacitor mtg	2	532018
Bracket, shield	1	470137
Bulb, pilot light #51	1	640007
Cabinet	1	700030
Chassis	1	461332
Choke, 400 MH, filter	2	141000
Clamp, cable	1	532001
Cord, line	1	802007
Foot (for cabinet)	4	470088
Fuse Holder (with hardware)	1	492200
Grommet, ¼"	4	830001
Grommet, ⅜"	1	830200
Grommet, 5/16"	3	830100
Knob, chrome insert	2	763502
Knob, (inner shaft of concentric)	3	763503
Knob, (outer shaft of concentric)	3	763504
Knob, double	1	763505
Knob, ⅞" diam.	1	764501
Manual	1	750170
Panel Escutcheon	1	462805
Phono plug	10	502123
Printed circuit board, large	1	820041
Printed circuit board, small	1	820042
Shield box (for chokes)	1	470138
Shield plate (for power assembly)	1	470136
Shield, tube	6	510004
Socket for pilot light	1	501727
Socket, tube	6	501698
3" Tubing, large diameter	1	812002
5" Tubing, small diameter (spaghetti)	1	812006

HARDWARE

Description	Quantity	Part No.
Lockwasher, #4	9	582200
Lockwasher, #6	26	582300
Nut, hex: 3/8"	15	570840
Nut, hex: 3-48	4	570110
Nut, hex: 4-40	50	570220
Nut, hex: 6-32	24	570340
Screw, machine: 3-48 x 1/4"	4	560112
Screw, machine: 4-40 x 3/16"	3	560221
Screw, machine: 4-40 x 1/4"	40	560222
Screw, machine: 4-40 x 1 3/8"	7	567230
Screw, machine: 6-32 x 1/4"	17	560342
Screw, machine: 6-32 x 7/16"	6	560345
Screw, machine: 6-32 x 1 1/4"	2	564341
Screw, self tapping #6, 5/16"	4	562393
Shield, switch	1	470116
Solder lug #6	2	553005
Spade bolt, #6-32	3	568344
Spacer, 1-5/16"	7	470139
Washer, fiber, thin	7	590200
Washer, fiber, thick	2	590300
Washer, metal	6	580702
Washer, rubber, 3/8" diam.	3	840004

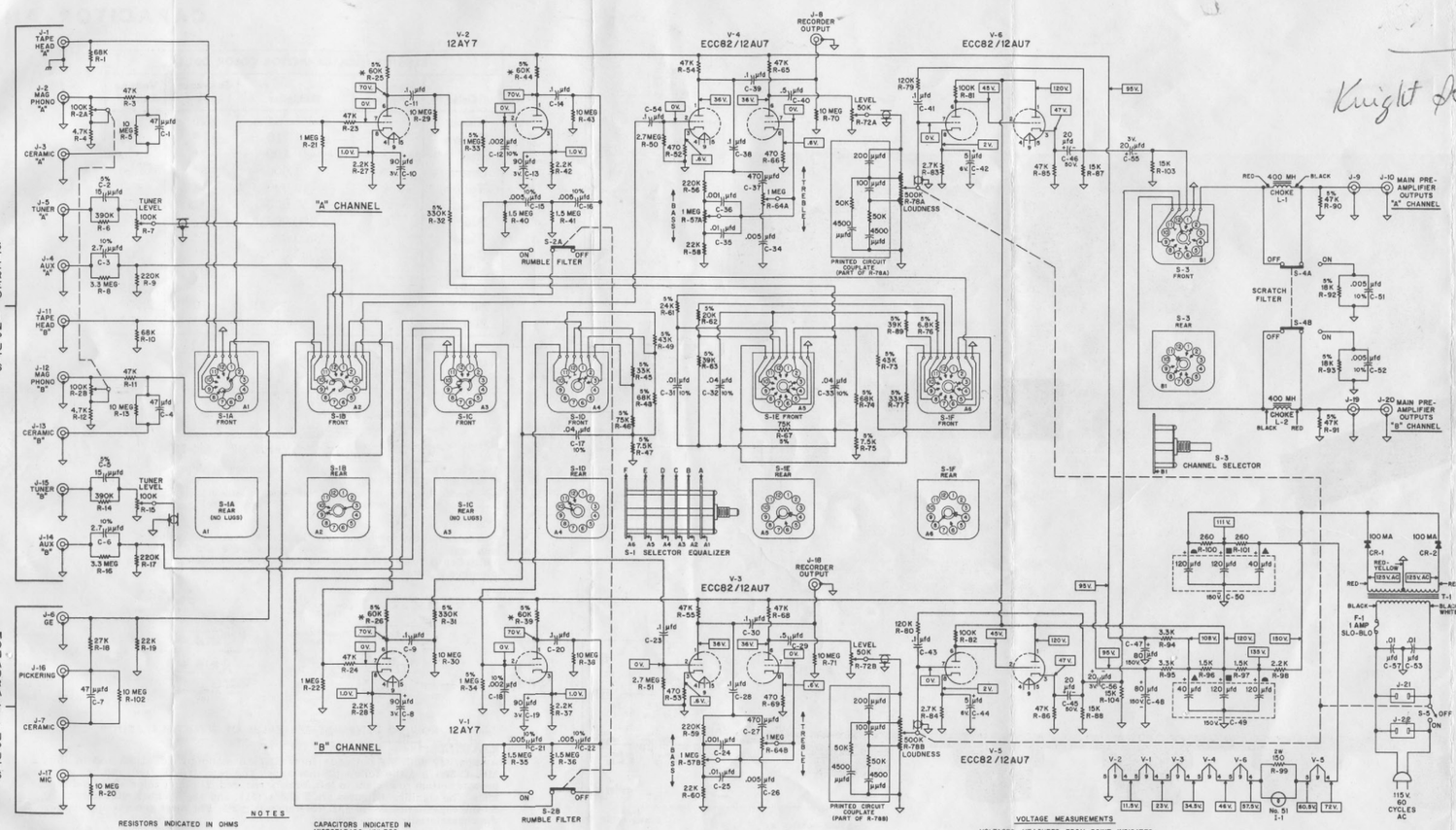
CABLE, WIRE AND SOLDER

8" shielded cable	3	803036
10" shielded cable	5	803038
38" shielded cable	2	803037
15" 3-conductor cable, red, green, black	1	804079
15" 3-conductor cable, brown, gray, tan	1	804098
20" bare wire, #18	1	804071
4" bare wire, #20	1	806004
2" red wire	14	801002
3" orange wire	8	801003
4" yellow wire	9	801004
5" green	9	801005
6" blue	11	801006
7" violet	1	801007
8" gray	3	801008
black/white	1	804043
brown/white	1	804044
green/white	1	804048
yellow/white	1	804047
black	1	804080
blue	1	804039
brown	1	804034
gray	1	804041
green	1	804038
orange	1	804036
red	1	804035
violet	1	804040
white	1	804042
yellow	1	804037
35' rosin core solder	1	930005

TOOLS YOU MAY NEED

Stock No.	Description	Price*
46N852	Solder iron, pencil type	$5.26
50N132	6" long-nose pliers	1.54
50N133	5" diagonal cutters	1.34
45N796	6" screw driver	.72

*Subject to change



NOTES

RESISTORS INDICATED IN OHMS
K = 1,000 OHMS
MEG = 1,000,000 OHMS
= DEPOSITED CARBON RESISTOR
RESISTORS ± 10% UNLESS OTHERWISE SPECIFIED.

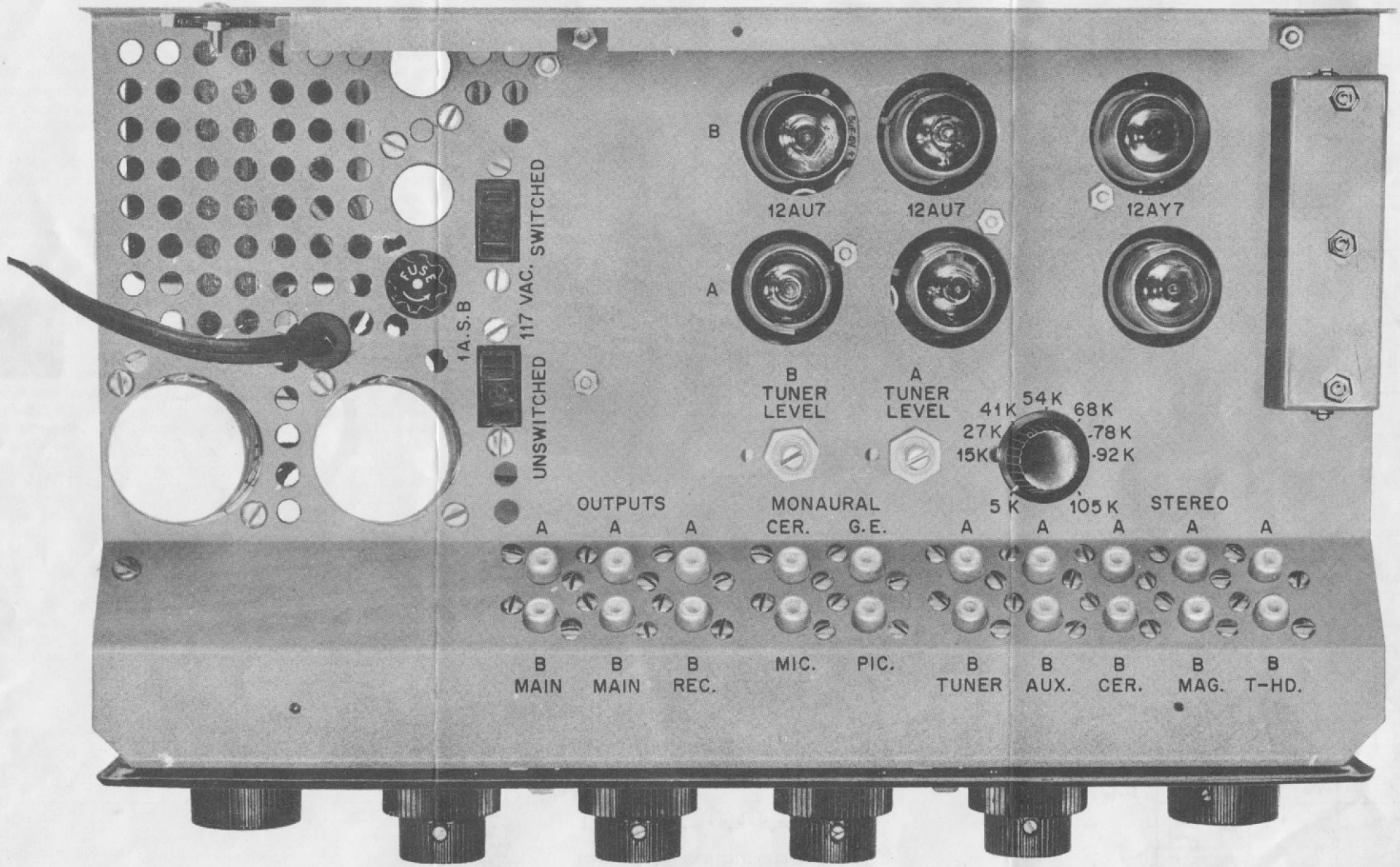
CAPACITORS INDICATED IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
CAPACITORS ± 20% UNLESS OTHERWISE SPECIFIED.
= COMMON GROUND (B-)
= CHASSIS GROUND

VOLTAGE MEASUREMENTS

VOLTAGES MEASURED FROM POINT INDICATED TO CHASSIS WITH A VTVM OR 20KΩ/V VOM.
TOLERANCE ± 20%.
SELECTOR EQUALIZER S-1 IN MAXIMUM COUNTER-CLOCKWISE POSITION.
CHANNEL SELECTOR S-3 IN 'STEREO' POSITION.
ALL OTHER CONTROLS IN MAXIMUM COUNTER-CLOCKWISE POSITION.
NO SIGNAL INPUT.

FIGURE 17. SCHEMATIC DIAGRAM

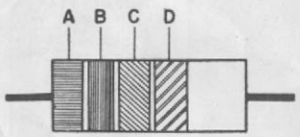
Knight Stereo Preamplifier


B
A
12AU7
12AU7
12AY7
FUSE
1A.S.B
117 VAC. SWITCHED
UNSWITCHED
B TUNER LEVEL
A TUNER LEVEL
41K
54K
68K
27K
78K
15K
92K
5K
105K
OUTPUTS
MONAURAL
STEREO
A A A CER. G.E. A A A A A
B MAIN
B MAIN
B REC.
MIC.
PIC.
B TUNER
B AUX.
B CER.
B MAG.
B T-HD.

CAPACITOR AND RESISTOR COLOR CODE

RESISTOR-MICA CAPACITOR COLOR CODE				
Color	Significant Figures	Multiplier	Tolerance %	Voltage Rating*
Black	0	1	±20*	—
Brown	1	10	±1*	100
Red	2	100	±2*	200
Orange	3	1,000	±3*	300
Yellow	4	10,000	±4*	400
Green	5	100,000	±5*	500
Blue	6	1,000,000	±6*	600
Violet	7	10,000,000	±7*	700
Gray	8	100,000,000	±8*	800
White	9	—	±9*	900
Gold	—	.1	±5	1,000
Silver	—	.01	±10	2,000
None	—	—	±20	500

*Applies to capacitors only

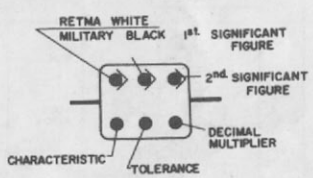


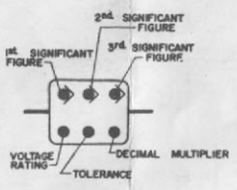
HOW TO DETERMINE THE VALUE OF A RESISTOR

A — First significant figure (digit) of resistance in ohms.
B — Second significant figure.
C — Decimal multiplier (number of zeros to be added).
D — Tolerance of resistor in percent. No color is 20%.

EXAMPLE:

A resistor has the following color bands: A, yellow; B, violet; C, yellow; and D, silver. The significant figures are 4 and 7 (47) and the multiplier is 10,000. The value of resistance is 470,000 ohms and the tolerance is ±10%.



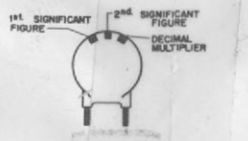


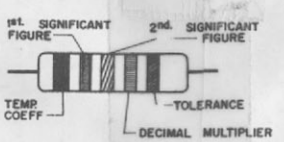
HOW TO DETERMINE THE VALUE OF A MICA CAPACITOR

EXAMPLES:

A capacitor with a 6 dot code (new RETMA standard REC-115A and military MIL-C-5A) has the following markings: Top row, left to right, white, green, brown; bottom row, right to left, brown, red, red. The first color white indicates mica. The significant figures are 5 and 1 (51), and the decimal multiplier is 10. So the capacitance is 510 $\mu\mu$f. Tolerance is ±2%. For most general applications the characteristic can be ignored.

A capacitor with a 6 dot code has the following markings: Top row, left to right, brown, orange, red; bottom row, right to left, brown, red, green. Since the first dot is neither black or white, this is the obsolete RETMA code. The significant figures are 1, 3, and 2 (132), and the decimal multiplier is 10. So the capacitance is 1320 $\mu\mu$f. Tolerance is ±2%. Voltage rating is 500 V DC.





CERAMIC CAPACITOR COLOR CODE					
Color	Significant Figures	Decimal Figures	Tolerance		Temp. Coef. (Parts per million per °C.)
			10 $\mu\mu$f or less ($\mu\mu$f)	Over 10 $\mu\mu$f (%)	
Black	0	1	±2.0	±20	0
Brown	1	10	±0.1	±1	−33
Red	2	100	—	±2	−75
Orange	3	1,000	—	±2.5	−150
Yellow	4	10,000	—	—	−220
Green	5	—	±0.5	±5	−330
Blue	6	—	—	—	−470
Violet	7	—	—	—	−750
Gray	8	0.01	±0.25	—	+150 to −1500
White	9	0.1	±1.0	±10	+100 to −750
Gold	—	—	—	—	—

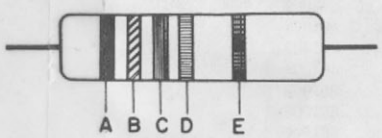
HOW TO DETERMINE THE VALUE OF A CERAMIC CAPACITOR

EXAMPLES:

A ceramic tubular capacitor has the following color bands: Black, red, red, red, green. The significant figures are 2 and 2 (22), and the decimal multiplier is 100. The capacitance is, therefore, 2200 $\mu\mu$f. Tolerance is ±5%. Temperature coefficient is 0. Voltage rating is always 500 V.

A ceramic disc capacitor has the following 5-dot code: Red, brown, green, red, green. The significant figures are 1 and 5 (15), and the decimal multiplier is 100. The capacitance is, therefore, 1500 $\mu\mu$f. The tolerance is ±5%. The temperature coefficients — 75. Voltage rating is always 500 V.

A ceramic disc capacitor has the following 3-dot code: Green, brown, brown. The significant figures are 5 and 1 (51), and the decimal multiplier is 10. Therefore, the capacity is 510 $\mu\mu$f. Voltage rating is always 500 V and the tolerance is always — 0.



TUBULAR PAPER CAPACITOR COLOR CODE				
Color	Significant Figures	Decimal Multiplier	Tolerance %	Voltage Rating (v d-c)
Black	0	1	±20	—
Brown	1	10	—	100
Red	2	100	—	200
Orange	3	1,000	±30	300
Yellow	4	10,000	—	400
Green	5	—	—	500
Blue	6	—	—	600
Violet	7	—	—	700
Gray	8	—	—	800
White	9	—	—	900
Gold	—	—	—	1,000
Silver	—	—	±10	—

HOW TO DETERMINE THE VALUE OF A PAPER TUBULAR CAPACITOR

A — First significant figure (digit) of capacitance in $\mu\mu$f.

B — Second significant figure.

C — Decimal multiplier (number of zeroes to be added).

D — Tolerance of capacitor in percent.

E — Voltage rating.

EXAMPLE:

A paper tubular capacitor has the following color bands: A, brown; B, green; C, orange; D, black; and E, yellow. The significant figures are 1 and 5 (15) and the decimal multiplier is 1,000. The value of capacitance is 15,000 $\mu\mu$f. The tolerance is ±20%. The voltage rating is 400 V DC.