

H. H. SCOTT  
**FULL COLOR**  
INSTRUCTION BOOK

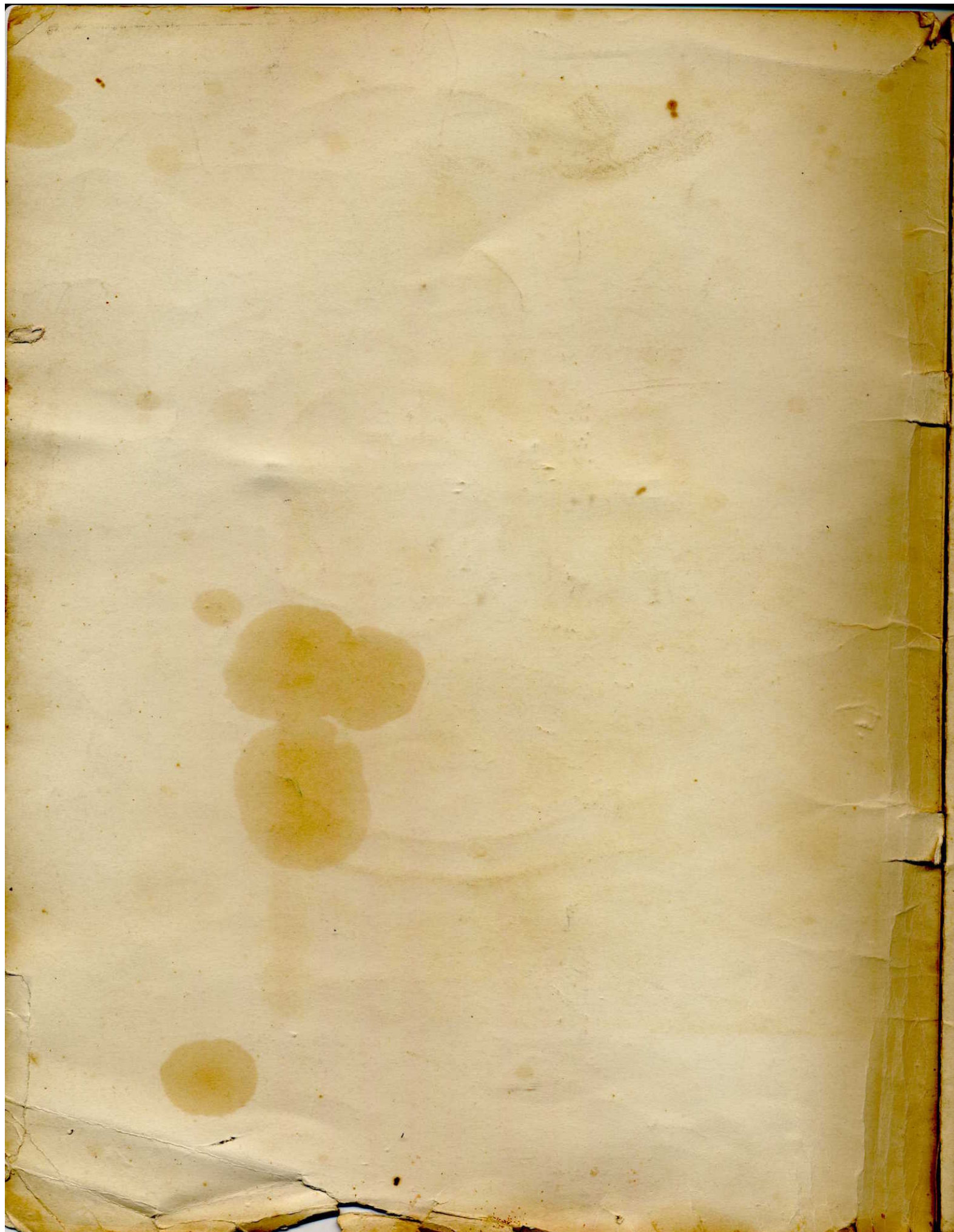
LK-48

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\$2.00

LK-48B / 222 D  
circuit







## IN PRODUCTION

The first true high fidelity complete amplifier appeared in 1947, H. H. Scott's Model 210A. This remarkable instrument introduced a score of unusual design features, which today are accepted and used by all manufacturers. The engineering innovations introduced in the 210A are typical of H. H. Scott, a company which has continued to pioneer in designing and producing new and better audio instruments. The exceptional design and careful manufacture that went into the 210A have been proven over the years . . . most of them are *still* in service, after more than 16 years. They work perfectly and compare favorably to products available today.

H. H. Scott's philosophy is not only to develop new and better instruments, but also to produce equipment that will last. There is no built-in obsolescence in H. H. Scott products. These brief notes try to indicate how this is accomplished by using the latest example of the H. H. Scott engineering laboratories, the LK-48.

## WHAT IS THE FUNCTION OF A POWER AMPLIFIER AND A PREAMPLIFIER CONTROL CENTER

The purpose of a high fidelity power amplifier is to take weak signals, increase their strength tremendously, and convert them into watts of power necessary to move the cone of a speaker. It must do this without adding, subtracting, or altering the contents of the original signal in any way. Such alteration of the original program is referred to as "distortion."

The purpose of the preamplifier control center is twofold. First, it takes the exceptionally small output from the conventional magnetic phono pickup (3 to 16 millivolts in most cases) and steps it up to a level where it can be properly accepted by the power amplifier. The outputs of FM tuners, complete tape recorders, and crystal pickups are sufficiently strong so they do not need this preliminary preamplification and can be fed directly into the power amplifier.

The second function of the preamplifier control center is to permit the user to vary the sound to suit his taste. It permits him to increase or decrease the treble, bass, and volume. It permits him to select a wide range of program sources, reduce record scratch, and adjust record or tape equalization.

You, LK-48 offers on one compact chassis, four

pieces of precision equipment. There is a preamplifier control center and power amplifier for the left channel (Channel L), and a preamplifier control center and power amplifier for the right channel (Channel R). It is actually a remarkable accomplishment in engineering design, to have such outstanding laboratory performance on so simple and compact a unit.

## HOW DOES THE COMPLETE AMPLIFIER WORK

### PREAMPLIFIER STAGE

The very weak signals coming from the magnetic cartridge or tape head are fed into Mag High or Mag Low Inputs. They go to the first duo-triode 12AX7 tubes (V1 for the left or L channel, V101 for the right or R channel), where preamplification occurs.

Any noise or hum that creeps in at this critical stage will be amplified along with the program material and will be audible in the resultant sound. To avoid introducing noise, special pre-selected low noise tubes are used. Hum is usually caused by the 60-cycle AC used to heat the tubes. On all H. H. Scott amplifiers, DC is used instead of AC, so there is no possibility of hum appearing from this source. This DC is derived from the selenium rectifier, SRI, on your LK-48.

In addition to the preamplification, equalization is also accomplished. Equalization involves correcting for the bass cut and treble boost introduced on all phonograph records and prerecorded tapes to allow their manufacture. The equalization characteristics of H. H. Scott amplifiers is always within 2 db of the record manufacturer's (RIAA) specification.

Naturally, any distortion introduced at this first stage would be amplified along with the music in the subsequent stages. To keep distortion down to virtually unmeasurable amounts, negative feedback is employed in every stage of your LK-48.

Feedback is a method whereby part of the output signal is fed back into the input. Negative feedback indicates that the resultant input signal is reduced in strength. While this causes a loss in gain, it also virtually eliminates distortion.

## FIRST AUDIO AMPLIFIER STAGE

The preamplified signal goes to the first audio stage, another duo triode 12AX7 (V2 for Channel L, V102 for Channel R). The signal from tuners,



complete tape recorders, ceramic cartridges, and other high level program sources being much stronger, bypasses the preamplifier stage and goes directly to this first audio stage. Here the signal is further amplified and modified (if desired) by the tone controls. H. H. Scott uses feedback-type tone controls, giving the advantage of low distortion, of not affecting the midrange response, and of *being flat* when the control is in the flat position (flat position is "O" on the front panel, indicating that there is no tone control boost or attenuation).

The first audio amplifier stage also includes the low-frequency cutoff filter. The human ear cannot hear signals below 20 cycles per second. However, a good turntable or record will contain noises of lower frequency. These noises, which you cannot hear, are capable of being reproduced by the amplifier. Often these subsonic sounds will generate such enormous signals that they will waste much of the amplifier's power and adversely affect its ability to reproduce the desirable program material. The special filter used by H. H. Scott eliminates all these subaudible noises and permits the amplifier to concentrate its power in the audible range of 20 to 20,000 cycles per second.

## SECOND AUDIO STAGE AND PHASE SPLITTER

The pentode-triode 6U8/6GH8 (V3 for Channel L, V103 for Channel R) provides an additional stage of gain, and splits the phase for the push-pull output stage. The advantages of a push-pull output stage are higher power and lower distortion. To obtain the advantages of this system, it is necessary to have some means of inverting the phase of the signal so that one tube in the output stage will be exactly out of phase with the other (in other words — one will be "pushing" while the other is "pulling").

It is also essential that the phase splitter be able to send signals of exactly equal strength to each output tube. In most circuits this is accomplished by having special AC balance controls which can only be set with expensive laboratory equipment. In the LK-48, the AC balance controls are eliminated by using a true self-balancing phase splitter with special matched components. The DC balance controls are easily set by following the simple instructions given. No test equipment is needed. To further reduce distortion, negative feedback is applied to this stage as well.

## OUTPUT STAGES

Two 7189 pentodes are used in push-pull for each output stage (Channel L are V4 and V5, Channel R V104 and V105). The way these output

tubes are operated is typical of H. H. Scott standard design procedure. A tube manufacturer usually rates his tubes according to the average amount of heat dissipation they can handle. It is standard procedure for most engineers to use this "design center" in their circuits or even go beyond it to squeeze the maximum amount of power out of their amplifiers regardless of how this may affect tube life. H. H. Scott amplifiers operate all tubes, *particularly* the output tubes, well *below* manufacturer's dissipation design center. This assures long tube life and superior performance. On the LK-48 for example, the output tubes are operated at 75% of manufacturer's dissipation average.

There are other benefits from this conservative operation of the output tubes. Variations in tubes are not critical. It is not necessary to match the tubes to get low distortion as bias adjustments may be made.

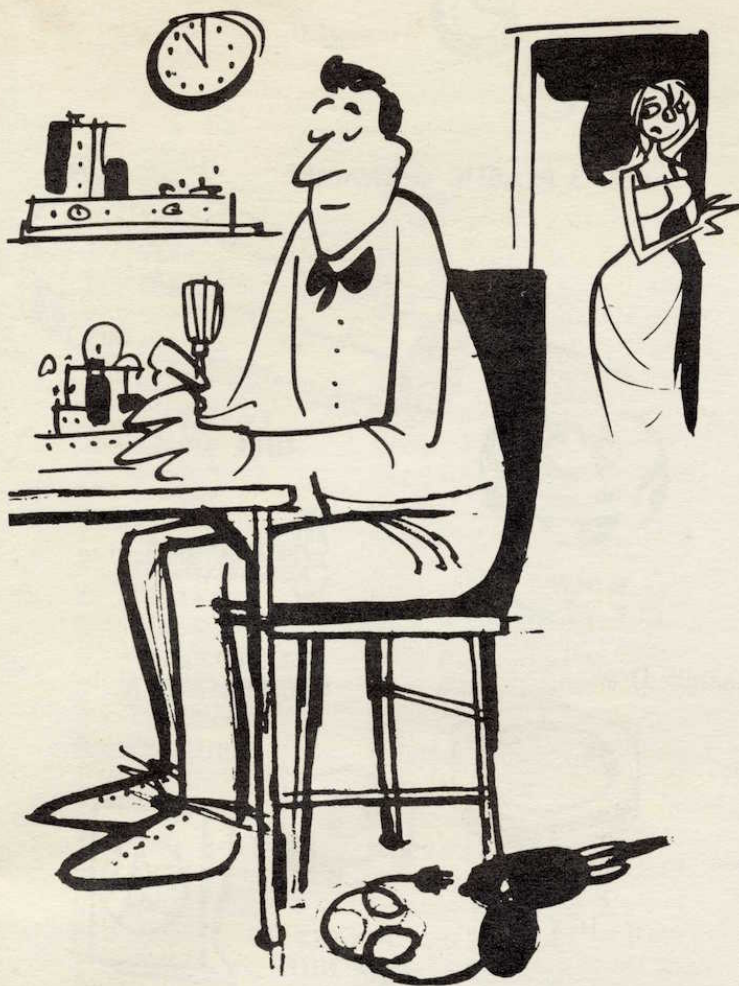
The output tubes supply the necessary power to drive the speaker, but unfortunately the output impedance of the tubes will be high, while most speakers are of low impedance. In order to match these impedances, it is necessary to use output transformers. You can have the most elaborate and complicated amplifier circuitry in the world, but you will not have a good amplifier unless you have good output transformers. Unfortunately, good output transformers are very expensive. One of the indications of a good output transformer is its size and weight. Only a large well-designed transformer can supply low distortion and clean response from the lowest audible frequencies to the highest. The oversize transformers on your LK-48 do just that.

The most conspicuous aspect of an amplifier's performance is its power output. The LK-48 is rated at 24 watts per channel. You may notice that other amplifiers (many less expensive) with smaller transformers also claim similar or greater power. All amplifiers are rated at 1000 cycles, a frequency at which you do not need a particularly good amplifier to get good power measurements. The vital frequencies are those between 20 and 50 cycles. Here is where you need the power, and here is where only quality amplifiers can give it to you.

The Institute of High Fidelity Manufacturers (IHFM) recognized this problem and has evolved a new amplifier measurement — the "power band." Simply, the power band represents the range of frequencies over which the amplifier can supply a specified amount of power at the amplifier's rated distortion. The LK-48 has a power band extending down below 19 cycles and over 25,000 cycles. This is a meaningful specification of the performance of this remarkable amplifier.

An amplifier's stability is also important. An amplifier should only reproduce signals fed to it,





not originate signals of its own. Many amplifiers under certain conditions will start to produce a powerful supersonic oscillation. This can happen when the amplifier is used with electrostatic speakers (which act as a capacitive load), or if the amplifier is operated with no speakers attached (no load). In extreme cases this oscillation is capable of burning out an amplifier in a few minutes. H. H. Scott amplifiers, like the LK-48, are completely stable under all conditions — no load, resistive, inductive or capacitive load. This means that if the speaker wire should accidentally be disconnected, you need have no fear of damaging your amplifier.

We have often referred to the desirability of low distortion. A wide frequency response, ample power, and low hum and noise are important but cannot compensate for high distortion. This is important, but even more important is the distortion at normal listening levels. Many amplifiers will exhibit reasonably low distortion at full output, but actually turn out to have as much or more distortion at normal listening levels of 1 to 5 watts. This is self-defeating.

At normal listening levels, the total harmonic

distortion of the LK-48 is below 0.5%, which means it is so low it cannot be accurately measured with even the finest of laboratory instruments! The translucent sound from your LK-48 is proof of this low distortion.

## POWER SUPPLY

In order to supply the necessary voltages to all the stages of the amplifier a rugged power supply is needed. The husky oversize power transformer along with the GZ34/5AR4 rectifier and SRI selenium rectifier comprise the heart of the power supply. An important characteristic of the GZ34 is its slow warmup. This gives the other tubes and components an opportunity to reach normal operating condition before the full force of the high voltages and currents are transmitted by the rectifier. The electrolytics (condenser cans) are all specially designed and conservatively operated. These are other factors in the long life you can expect from the amplifier.

Heat can be a problem in any high power amplifier. Under normal conditions you can expect the amplifier to use about 175 watts of electricity. This will generate a considerable amount of heat. The heat has to be rapidly transferred away from the output stages where most of it is generated. If it is not, the life of the tubes and other components will be greatly curtailed. One of the ways the heat is carried away is by convection to the air. The many holes in the chassis are designed to encourage air circulation which well perform this function. Equally important is the use of electrolytic aluminum for the chassis material.

Most amplifier chassis are steel which is a less expensive material. Unfortunately steel is not a good conductor of heat so such units will have their output stages overheating even though the rest of the amplifier is cool. Aluminum is an excellent conductor of heat, so it rapidly conducts the heat away from output stages to other parts of the chassis where it can be readily transferred to the air.

In fact you may notice that your aluminum front panel is warm to the touch. This means that the heat is being transported away from the heat sources and that your amplifier is operating safely.

Another advantage of the aluminum chassis is that it is nonmagnetic so acts as a shield against induced hum from the power transformer. Conventional chassis made of steel, which is magnetic, are much more prone to this type of difficulty.

## CONCLUSION

There are many ingredients involved in designing a high quality complete stereo amplifier. However, as this discussion has attempted to show, compromise is not one of them.

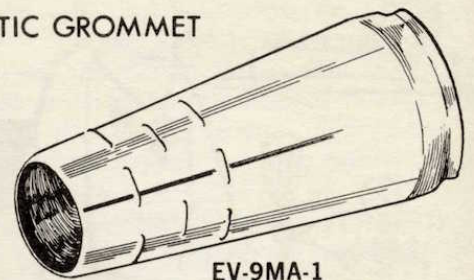
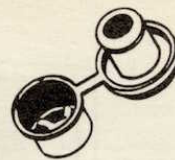


# LK-48 PARTS LIST

## MECHANICAL AND HARDWARE PARTS

1	A-BC-10	Bottom Cover
4	A-FT-1	Plastic Feet
2	A-GR-3	Plastic Grommets
1	A-RC-2	Rear Chassis
1	LK-48-M3	Control Shield
1	E-LT-AV-Y	Solder Pack
1	E-LT-SD	Screwdriver
4	EV-9MA-1	Tube Shields
1	F-SB-2.5	Fuse
4	H-DLW-8	Cup Washers
1	H-LW-3/8	Lock Washer
1	H-MS-632x1/4 B	Machine Screw (#6)
13	H-N-3/8x1/2 B	Brass Hex Nuts
4	H-N-832	Nuts
8	H-NC-8	Spring Clip Fasteners (4 installed)
1	H-NK-632	Lock Nut
22	H-SMS-6x1/4 HW	Sheet Metal Screws
1	H-SMS-6x1/4 HW-B	Sheet Metal Screw (Bronze)
4	H-SMS-6x5/8 HWA	Sheet Metal Screws
8	H-SMS-8x3/8 HW	Sheet Metal Screws
4	I-NS-8	Nylon Sleeves
1	J-3-ST-5	Phone Jack
2	KN-P-6C	Knobs
4	KN-P-8	Knobs
2	KN-P-9C	Knobs
1	A-MC-6	Main Chassis
1	LK-48-M2	Front Chassis
1	N-LK-48-1	Front Panel
1	V-SPL-NE-YF	Pilot Light
1	X-F-3AG	Fuse Post

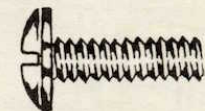
AGR-3 PLASTIC GROMMET



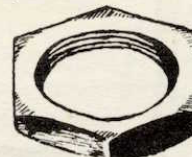
EV-9MA-1  
TUBE SHIELD



H-DLW-8  
CUP WASHER



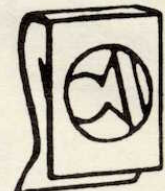
H-MS-632 x 1B  
MACHINE SCREW



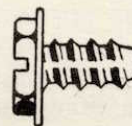
H-N-3/8 x 1/2  
HEX NUT



H-N-832  
HEX NUT



SPRING CLIP FASTENER



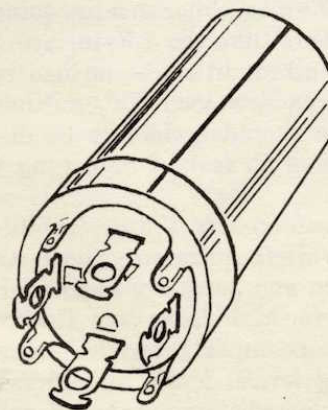
H-SMS-6 x 1/4 HW  
SHEET METAL SCREW



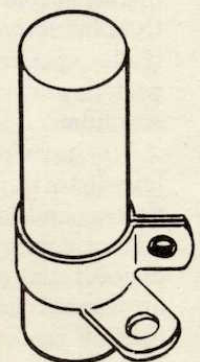
I-NS-8 NYLON SLEEVE

## ELECTRICAL COMPONENTS

1	CEC-2x20/2x25	Electrolytic (C201)
1	CEC-4x20/475	Electrolytic (C203)
1	CEC-4x100/75-CP	Electrolytic (C202)
2	PEC-222E	Pkg. Elect. Circuits
1	RCVD-500KT-3FSW	Potentiometer (P1)
1	RCV-1MST-3F	Potentiometer (P2)
2	RCVC-1MT-F	Potentiometers (P3, P4)
2	RCV-100K-PH	Potentiometers (P5, P6)
2	RCV-50K-PH	Potentiometers (P7, P8)
1	RWS-10-20	Stand-up Resistor (RWS-1)
1	SR-B60/C200	Selenium Rectifier (SR-1)
1	SRW-27	Stereo Selector (SW-1)
1	SRW-33-1	Input Selector (SW-2)
1	TR-12-13	Power Transformer (T1)
2	TRA-8-5-1	Output Transformers (T2, T3)



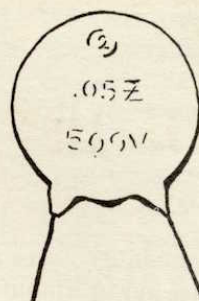
CEC  
ELECTROLYTIC  
CAPACITOR



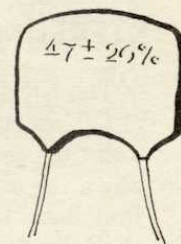
STANDUP RESISTOR



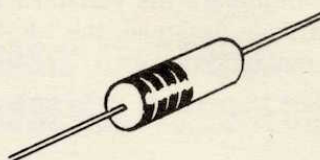
1	5AR4	Tube
2	6U8/6GH8	Tubes
4	12AX7	Tubes
4	7189	Tubes
1	WAC-1.5	1½ Ft. Audio Cable
1	WAC-3A	3 Ft. Audio Cable
4	CC-.001	Ceramic Capacitors
1	CC-.01	Ceramic Capacitor
2	CC-.05	Ceramic Capacitors
1	CC-.02	Ceramic Capacitor
2	CC-5 NPO	Ceramic Capacitors
4	CC-220	Ceramic Capacitors
4	CC-6800	Ceramic Capacitors
4	CM15-47	Mica Capacitors
2	CM15-62	Mica Capacitors
2	CM15-120	Mica Capacitors
2	CM15-150	Mica Capacitors
2	CM19-330	Mica Capacitors
2	CM20-680	Mica Capacitors
8	CPM-.022	Tubular Capacitors
10	CPM-.1	Tubular Capacitors
2	CET-4/250	Electrolytic Capacitors
1	CET-50/75	Electrolytic Capacitor
2	RC21-150 Ohm	½ Watt Resistors
2	RC21-1.2K	½ Watt Resistors
5	RC21-1.5K	½ Watt Resistors
4	RC21-2.2K	½ Watt Resistors
4	RC21-2.7K	½ Watt Resistors
1	RC21-3.9K	½ Watt Resistor
6	RC21-8.2K	½ Watt Resistors
3	RC21-10K	½ Watt Resistors
2	RC21-22K	½ Watt Resistors
2	RC21-47K	½ Watt Resistors
5	RC21-82K	½ Watt Resistors
8	RC21-100K	½ Watt Resistors
5	RC21-150K	½ Watt Resistors
4	RC21-220K	½ Watt Resistors
6	RC21-270K	½ Watt Resistors
4	RC21-330K	½ Watt Resistors
4	RC21-390K	½ Watt Resistors
1	RC21-470K	½ Watt Resistor
1	RC21-680K	½ Watt Resistor
6	RC21-1M	½ Watt Resistors
6	RC21-2.2M	½ Watt Resistors
3	RC21-3.3M	½ Watt Resistors
3	RC31-18 Ohm	1 Watt Resistors
2	RC31-68 Ohm	1 Watt Resistors
4	RC31-15K	1 Watt Resistors
4	RC31-100K	1 Watt Resistors
3	RC41-10 Ohm	2 Watt Resistors
1	RC41-220 Ohm	2 Watt Resistor
1	RC41-1K	2 Watt Resistor
1	RC51-4.7K	3 Watt Resistor
1	RC51-10K	3 Watt Resistor
2	RW-5-60	Wire Wound Resistors



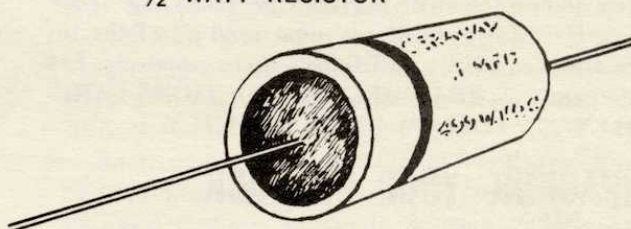
CC  
CERAMIC  
CAPACITOR



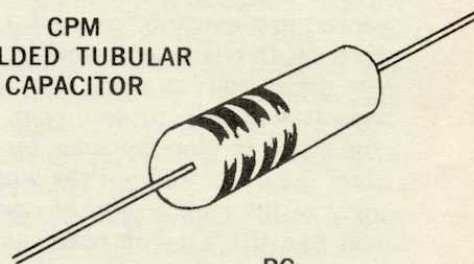
CM  
MICA  
CAPACITOR



RC  
½ WATT RESISTOR

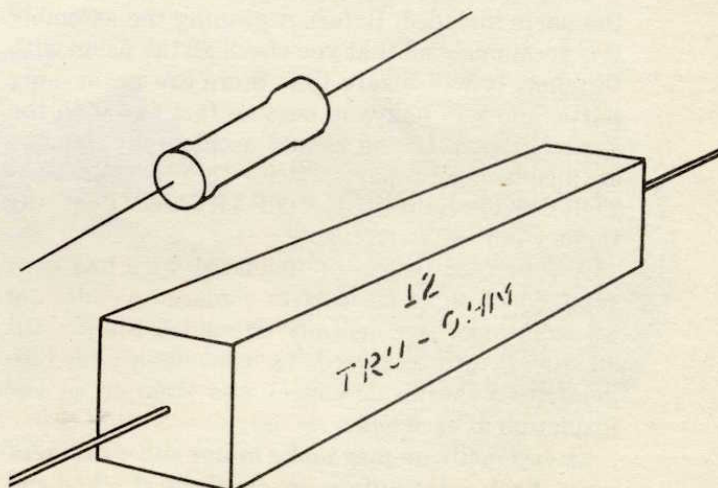


CPM  
MOLDED TUBULAR  
CAPACITOR



RC  
1 WATT RESISTOR

3 WATT RESISTOR



RW  
WIRE WOUND RESISTOR



# INSTRUCTION FOR THE MODEL LK-48 48 WATT COMPLETE STEREO AMPLIFIER

The LK-48 is a complete two-channel stereo amplifier consisting of dual 24 watt power amplifiers and dual preamplifiers on a single chassis. It employs the same engineering concepts and features that have made Scott amplifiers the standard in the industry. Conservatively designed, the LK-48 will bring you years of listening pleasure.

## IMPORTANT:

Every effort has been made to insure that this kit, when assembled, will perform perfectly. In order to achieve this result, you must read all of the instructions carefully and follow them precisely. Let us repeat . . . **READ ALL INSTRUCTIONS CAREFULLY . . . FOLLOW THEM EXACTLY.**

## UNPACKING YOUR KIT-PACK

There are no particular precautions to be observed in unpacking your kit, but you should take care not to mislay any small items or packages. If you desire you can work right inside the kit package. It will help protect your work table. When you want to stop working for a few hours, just close the cover and put the whole kit away out of sight of the wife . . . out of reach of the kids. You will find the Kit-Pak cover an ideal rest for the instruction book and Part-Charts.

## CHECK THE PARTS

On page 4 of this manual is a descriptive list of the parts included. Before beginning the assembly it is recommended that you check all the parts with this list. It will insure that there are no missing parts, and will help you become familiar with the various items. If you should accidentally damage or misplace any parts, write to the **LABORATORY KIT SERVICE DEPARTMENT** at the factory immediately.

A four foot length of insulated wire has been supplied. It is to be used to replace any missing wires or ones accidentally damaged. Simply cut off the length required (a convenient ruler is printed on the inside cover) and strip off  $\frac{1}{4}$ " of insulation at each end.

Occasionally we may make minor substitution of parts. Such substitutions are carefully checked and the parts supplied will work as satisfactorily as those specified in the manual. These changes will

be obvious and are mentioned here only to prevent confusion in checking the parts list. For example, .005  $\mu$ f capacitors are used interchangeably with .0047  $\mu$ f capacitors. This will also be true as regards the body colors of parts in relation to the colors shown in the booklet.

## TOOLS REQUIRED

A small screwdriver is provided. In addition, you will need a pair of long nose pliers, a regular size screwdriver, a pair of wirecutters, and a soldering iron or gun. A 35 watt (or more) pencil type soldering iron is actually the easiest to use. The iron should be supplied with a small tip. If a soldering gun is used, it should also have a small tip, and should be used carefully because of the enormous heat it supplies.

## SIMPLIFIED SOLDERING AND WIRING INSTRUCTIONS

**THE ONLY TYPE OF SOLDER YOU SHOULD USE IS 60/40 ROSIN CORE SOLDER.** Under no circumstances should you use Acid Core solder. All guarantees are voided if Acid Core solder is used.

Here's how to solder joints correctly (see Figure 2):

1. ☐ Before using the soldering iron or gun, the tip must be tinned for ease of use. First heat up the iron. Then when the tip is hot, wipe with a cloth till bright and shiny, and apply a generous amount of solder. Remove any excess. Repeat this process for all sides of the tip.
2. ☐ Make sure that all leads (wires) and terminals to be soldered are completely clean. Do not use fluxes or paste of any sort.
3. ☐ The leads should be mechanically secure before soldering. This does not mean wrapping leads around the contacts several times. It means a single turn around the contact which is then pinched tightly with the long nose pliers. If the wire is too large for bending, position the wire so that a good solder connection can still be made.
4. ☐ **LEADS ON RESISTORS, CAPACITORS, AND SIMILAR COMPONENTS ARE GENERALLY MUCH LONGER THAN THEY NEED TO BE TO MAKE THE INDICATED CONNECTIONS. IN THESE CASES, THE EXCESS LEADS SHOULD BE CUT OFF BEFORE THE PART IS ADDED TO THE CHASSIS.** In general, the leads should be long enough to reach their termination allowing for a little left over to make a good mechanical



joint. A very handy way of gauging the length of lead to trim off is to superimpose the capacitor or resistor right on the pictorial. The pictorials are all full scale, so by placing the component over its picture and allowing about  $\frac{1}{4}$ " extra on each end for the mechanical joint, you can shorten the leads quickly and accurately.

Sometimes a lead will not seem quite long enough to reach the desired mounting point. In such a case, the terminal lug can be bent slightly to make the connection possible.

5. ☐ Place a flat side of the soldering iron tip against the joint to be soldered until it is heated sufficiently to melt the solder.
6. ☐ Place the solder against the heated terminal (with the soldering iron still in contact) and it will immediately flow over the joint. Use only enough solder to thoroughly wet the joint. Too much solder may cause short circuits. The soldering iron does not actually come into contact with the solder, only with the joint. It is the heated joint that melts the solder.
7. ☐ As soon as sufficient solder has flowed, remove the solder and then a second later, the iron. Use care not to move the leads until the joint has hardened (about 5 seconds). A good solder joint should appear to be bright and shiny. Check the joint for rigidity. If it is not firm and tight, reheat the joint and permit the solder *already present* to flow again. Sometimes a little more solder will have to be added.
8. ☐ When soldering certain of the components, such as diodes and resistors, it is advisable to use no more heat than is necessary. Excessive heat can damage these components.

9. ☐ Keep the soldering iron clean and bright by occasionally wiping with a rag. The iron does not have to be cooled for this purpose. If you have never done any soldering before, it would be an excellent idea to practice on scraps of wires before beginning.

10. ☐ THE BOTTOM VIEW PICTURE OF THE COMPLETED AMPLIFIER (FIGURE 1) WILL BE VERY HELPFUL AS A GUIDE TO THE CONSTRUCTION OF YOUR AMPLIFIER

## BASIC ELECTRICAL ASSEMBLY PROCEDURE

Your amplifier kit includes three separate sub-assemblies: the front (with all the controls and knobs), the main (with all the tube sockets), and the rear (with all the input and output jacks and terminals). You will construct each sub-assembly separately and then combine them to make a complete amplifier. The symbol *F* refers to the front, *M* to the main, and *R* to the rear.

Each terminal, tube, transformer, etc. has a code number (i.e. T1, V2, and so forth). Every pin on each of these terminals, or tube sockets is also numbered (i.e. pin 1, pin 2, and so forth). The instructions will call for a wire to be connected to pin 3, V4, for example. With the instructions will be a pictorial, clearly showing in full color the connection to be made and its location. With this information you should experience no difficulty in making the correct connection.

A series of Part-Charts are provided with all the necessary resistors and capacitors mounted. Each chart applies to a particular page of the electrical assembly instructions.

For example — in the instructions that follow

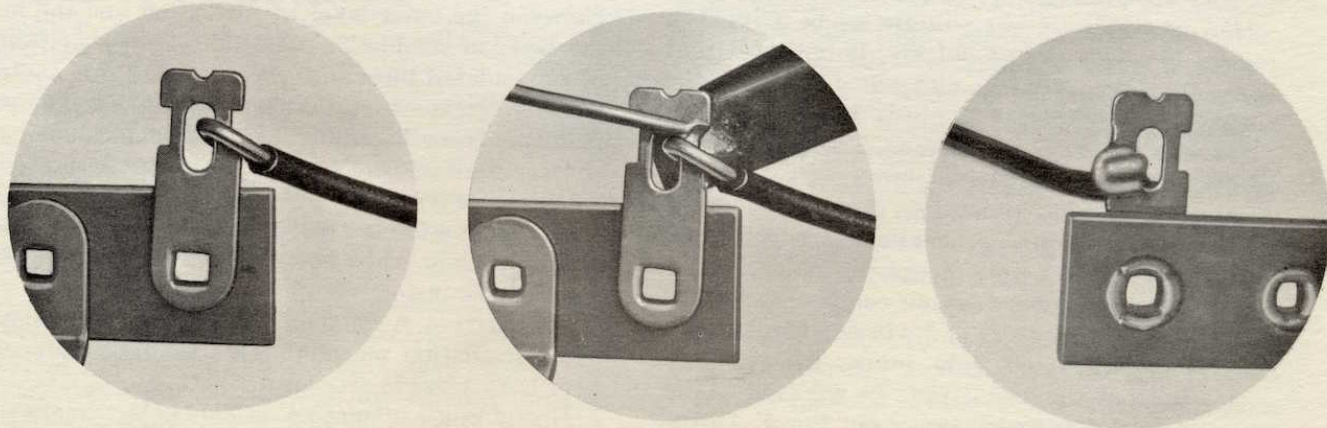


FIGURE 2



you will find a page marked "Assembly Group BF-4." The "B" indicates that this is part of the electrical assembly. The "F" indicates that you will be working on the "front." The "4" means that this is the fourth page of instructions for electrical assembly of the front. On the sheet of Part-Charts, you will find a Part-Chart BF-4. Take this out and keep it next to you when working on this page. The first step on the page is called BF4-1 and refers to a 100K resistor. The first part on the Part-Chart is a 100K resistor. The pictorial on the top of the page will show exactly where this part will go. The part is mounted as directed and the step is checked off as completed.

The many wires used in the amplifier kit are packed in a small plastic sleeve. This sleeve contains three separate bundles, clearly marked. For example — Assembly Group BF-1 involves connecting a group of wires of different colors and lengths. Open the bundle of wires marked "Front," and spread them out near you. The first step, BF1-1, calls for a 4" Blue/White wire. From the Blue/White wires select the ones of the appropriate length and hold them up to the ruler printed on the inside cover of the Kit-Pak. Once you have the correct one, you may proceed as above.

IT IS IMPORTANT TO POSITION THE WIRES OR COMPONENTS IN APPROXIMATELY THE SAME POSITION AS SHOWN IN THE PICTORIAL. BE AS NEAT AS POSSIBLE AS THIS WILL GREATLY CUT DOWN ON MISTAKES, SHORTS, AND OTHER DIFFICULTIES. NEATNESS WILL ALSO ALLOW YOU TO MORE EASILY CHECK YOUR WIRING.

If the symbol — (S-) appears in the instructions after any connection, it means that the particular connection with all other wires on the same pin, should be soldered. After the "S" will appear a number. This number indicates exactly how many leads or wires are supposed to be connected to the terminal or pin in question. For example: connect an Orange wire to pin 2, V6 (S-3). The soldering number (S-3) will always be printed in red, so it can be found quickly. It indicates that there should be 3 wires or leads (including the Orange one) connected to pin 2, V6, and that all three of them are to be soldered. This provides an additional check for wiring errors.

Do not solder any connection that is not marked with an (S-). Other connections are yet to be made to this pin before it can be soldered. Frequently one end of a lead or component will be soldered while the other end will not (for the moment). The (S-) will only appear after the description of the end that is to be soldered. After completing the soldering, cross out the (S-) symbol with your pencil indicating that it has been done. This is in addition to checking off each step.

In this way you can glance over the assembly instructions and spot any (S-) that has not been crossed out, indicating that you may have overlooked a joint to be soldered.

A new easy method for checking each step for soldered joints has been provided. Every pin that should have been soldered on any given page is colored red. When you complete each page, check the soldered pins on your unit against the colored pins on the drawing. If they do not agree, you have made a mistake. Go back through the step and check the soldering instructions once again to find the mistake.

The instructions which follow have been arranged in a logical order to insure perfect results. Follow them exactly, checking off each step as completed.

## TYPES OF WIRE PROVIDED

Regular hook-up wire — These are the standard insulated wires that you will be using most of the time. They will be found in bundles for the different portions of the assembly procedure.

Buss wire — This is a term used to describe short pieces of uninsulated wire. A bundle of buss wire will be found in one of the hardware bags.

Mic Lapel — This is a type of cable which has one insulated length and one uninsulated length of buss wire inside. The cable itself has a brightly colored outside insulation.

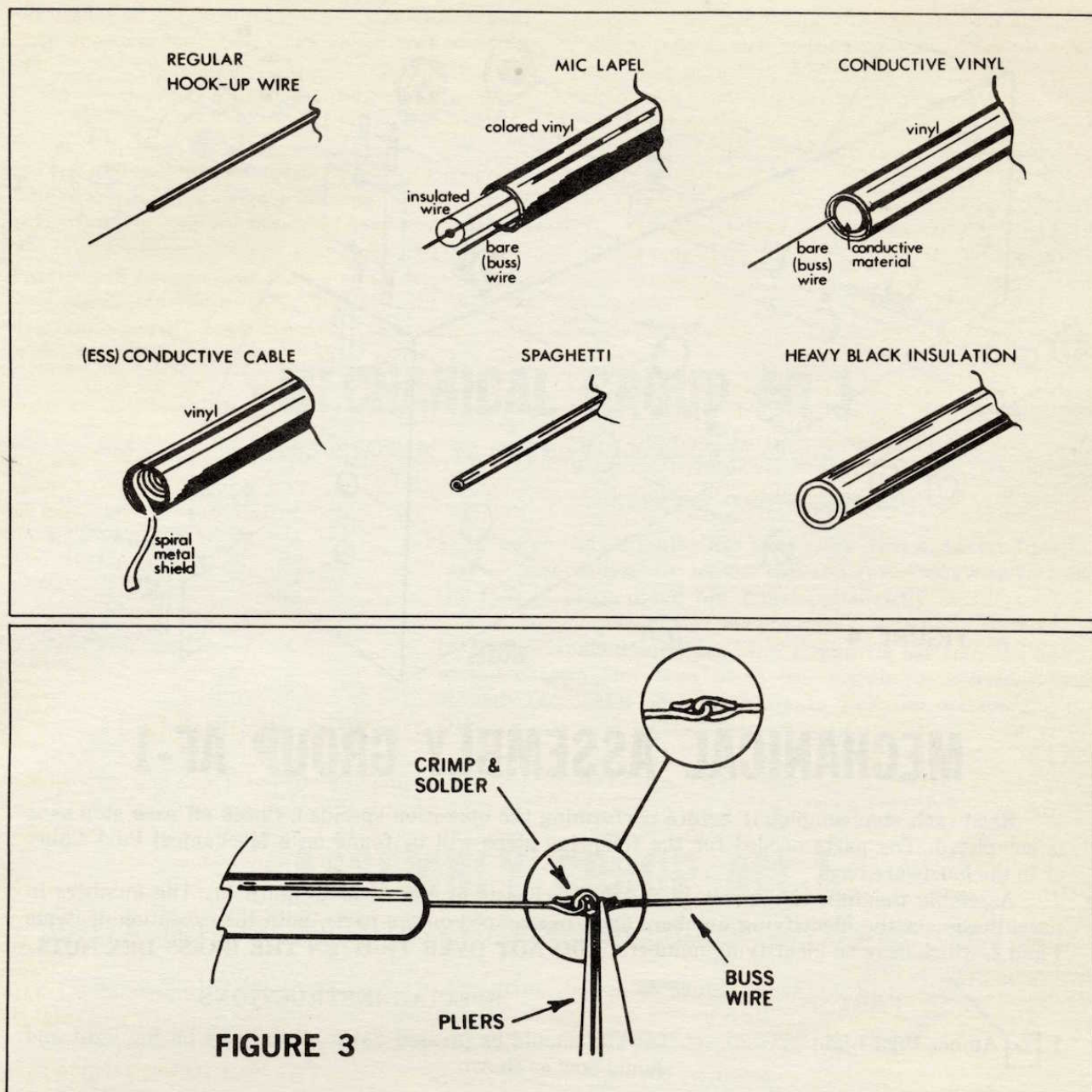
Conductive Vinyl — This is large hollow tubing, usually either black or white in color, which has a hollow tube of conductive material inside. Between the outer layer of insulation and the inner layer of conductive material is a single strand of uninsulated buss wire. When using this cable, it is important to prevent the inner conductive material from becoming exposed and causing a short circuit. Always keep the outer insulation completely over it.

Conductive Cable (ESS) — This is hollow tube with a black or white outer insulation and a spiral metal shield inside.

Spaghetti — A common name to describe hollow black insulation material. This tubing is slipped over bare wires to provide protection.

Heavy Black Insulation — This is 1/4" diameter, flexible, hollow tubing, somewhat like spaghetti but of larger size.





## WHAT TO DO IF YOU MAKE A MISTAKE

No matter how careful you may be, it is still possible to break something accidentally or to cut a lead too short. We might add that if you work when tired, or try to do too much, too fast, then the possibility of mishap increases greatly. Nevertheless, it is easy to correct most common errors.

**1. Cutting a wire or lead too short** — If you cut the wire from one of the components too short you can easily correct it by taking a small piece of uninsulated wire (buss wire) and splicing it on as shown in Fig. 3. If a wire supplied is damaged, you can cut off a replacement from the 4 feet of spare wire supplied.

**2. Breaking a terminal strip** — The terminal strips are quite sturdy and will withstand a great deal of handling. Nevertheless, if you are extremely rough, a terminal pin can be broken off. If this happens, make all connections to the small hole below the broken pin. Be careful to avoid having any of the bare wires touch the chassis. If the phenolic material cracks but does not break off, you can continue on as the wires themselves will keep the broken piece in place.

In the unlikely circumstance that the entire terminal strip breaks off, it is necessary to replace it. Write to the parts department at the factory for a replacement. Drill out the rivet holding the broken strip, using a number 28 drill. Mount the replacement with a regular 6-32 x 1/4" machine screw, lockwasher, and nut.



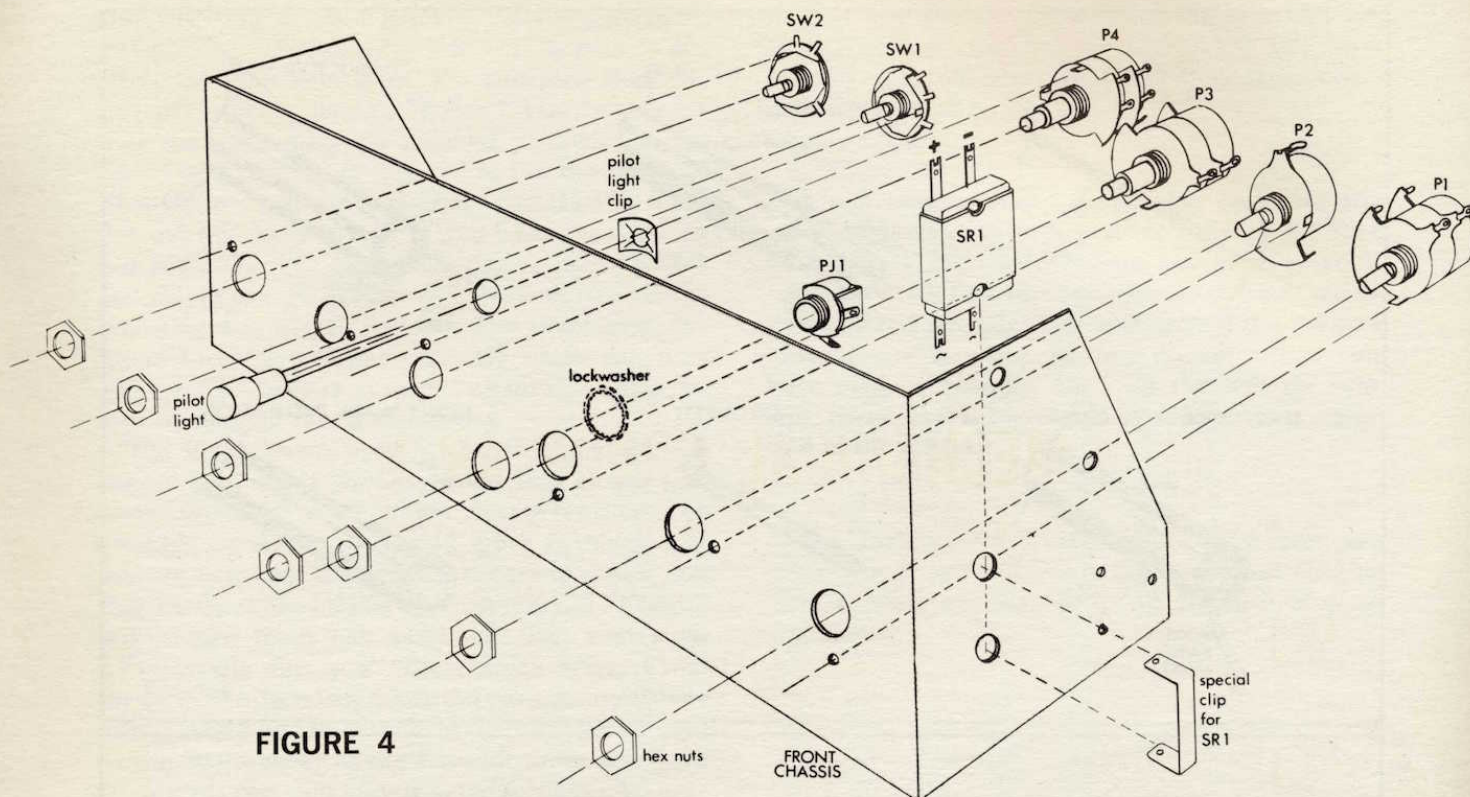


FIGURE 4

## MECHANICAL ASSEMBLY GROUP AF-1

Read each step completely before performing the operation specified. Check off each step as it is completed. The parts needed for the following steps will be found on a Mechanical Part Chart or in the hardware bags.

Assemble the following parts to the front chassis as shown in (Figure 4). The numbers in parenthesis are the identifying numbers and are stamped on the parts, with the exception of items 1 and 2, which have no identifying numbers. **DO NOT OVER TIGHTEN THE BRASS HEX NUTS.**

PART	SPECIAL INSTRUCTIONS
1. <input checked="" type="checkbox"/> Amber Pilot Light	The clip should be pressed down all the way on the light and should bow as shown.
2. <input checked="" type="checkbox"/> PJ-1 Phone Jack	Place the lockwasher on the shaft before assembling to chassis. <b>Be sure to position as shown.</b>
3. <input checked="" type="checkbox"/> SR-1 (B60 C200)	Plus (+) and minus (-) signs <b>MUST</b> be positioned as shown. Twist both ends of the clip 90° to lock SR-1 in place.
4. <input checked="" type="checkbox"/> P1 (RCVD-500KT-3FSW)	Insert as shown in (Figure 4). Align the locating lug with the small hole.
5. <input checked="" type="checkbox"/> P2 (RCV-1MST-3F)	Assemble as in step 4.
6. <input checked="" type="checkbox"/> P3 (RCVC-1MT-F)	Assemble as in step 4.
7. <input type="checkbox"/> P4 (RCVC-1MT-F)	Assemble as in step 4.
8. <input checked="" type="checkbox"/> SW-1 (SRW-27)	Assemble as in step 4.
9. <input checked="" type="checkbox"/> SW-2 (SRW-33-1)	Assemble as in step 4.



## MECHANICAL GROUP AR-1

Assemble the following parts to the rear chassis as shown in (Figure 5).

### PART

1. ☒ Fuse Post
2. ☒ Plastic Grommets

### SPECIAL INSTRUCTIONS

Position so that the pins are **exactly** as shown. Insert fuse in cap — push in slightly on the cap and turn clockwise to lock the fuse in place. Bend pin 2 upward slightly.

Insert the smaller portion of the grommets through the holes in the chassis and then press the remaining section down through the center portion firmly to lock the grommets in place.

## ASSEMBLY GROUP AM-1

**NOTE: REMOVE THE THREE TRANSFORMERS FROM THE CHASSIS AND SET THEM ASIDE.**

Assemble the following parts to the main chassis as shown in (Figure 5).

### PART

1. ☒ P5 (RCV-100K-PH)
2. ☒ P6 (RCV-100K-PH)
3. ☒ P7 (RCV-50K-PH)
4. ☒ P8 (RCV-50K-PH)
5. ☒ RWS-1 (20 $\Omega$ )
6. ☒ C201 (CEC-2x20/2x25)
7. ☒ C202 (CEC-4x100/75 CP)
8. ☒ C203 (CEC-4x20/475)

### SPECIAL INSTRUCTIONS

Insert locating lug into small hole.

Assemble as in step 1.

Assemble as in step 1.

Assemble as in step 1.

Insert from top of chassis.

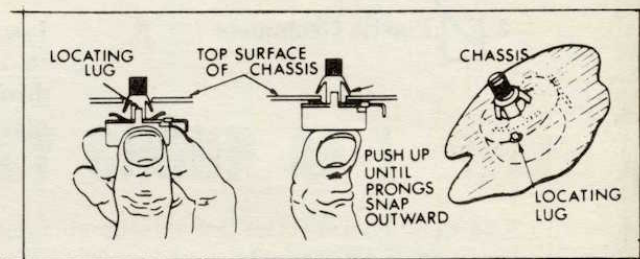
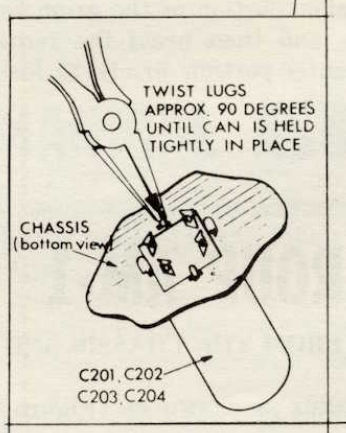
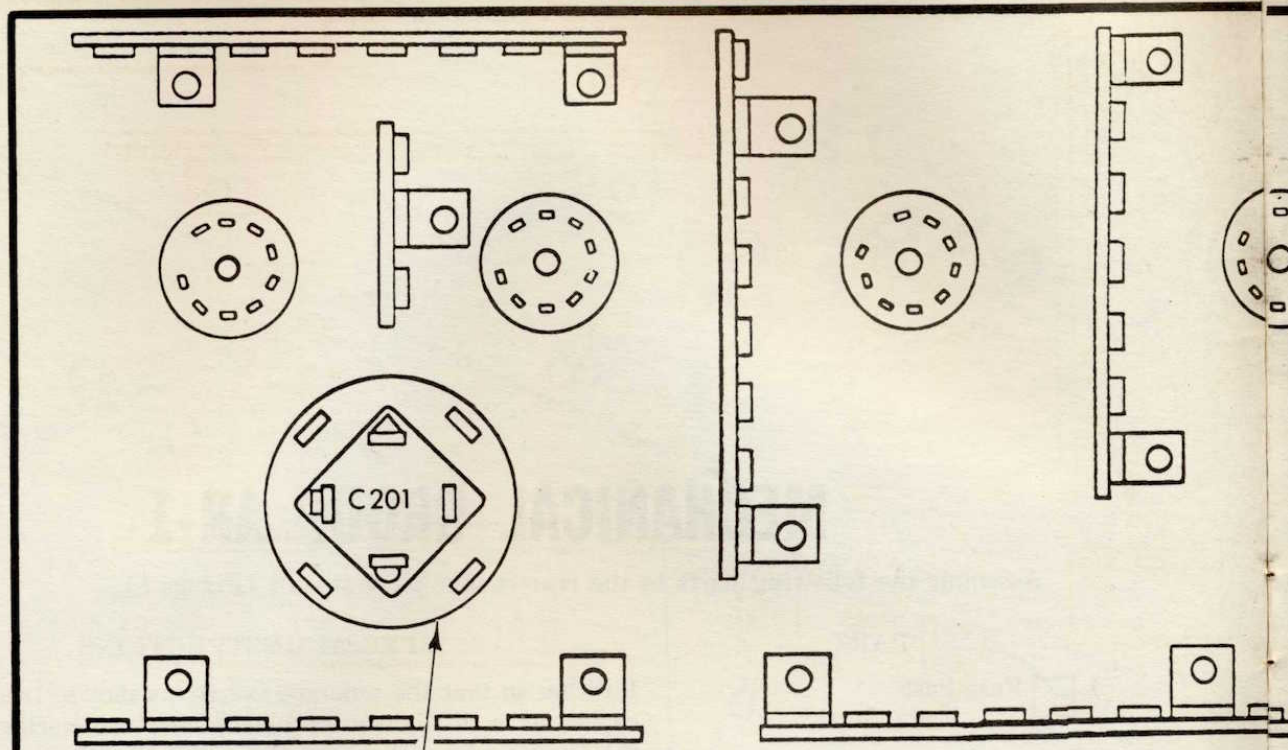
Orient the square, triangle and semi-circle identification marks on the base of the capacitor as shown and insert it into the matching hole on the top surface of the chassis.

Assemble as in step 6.

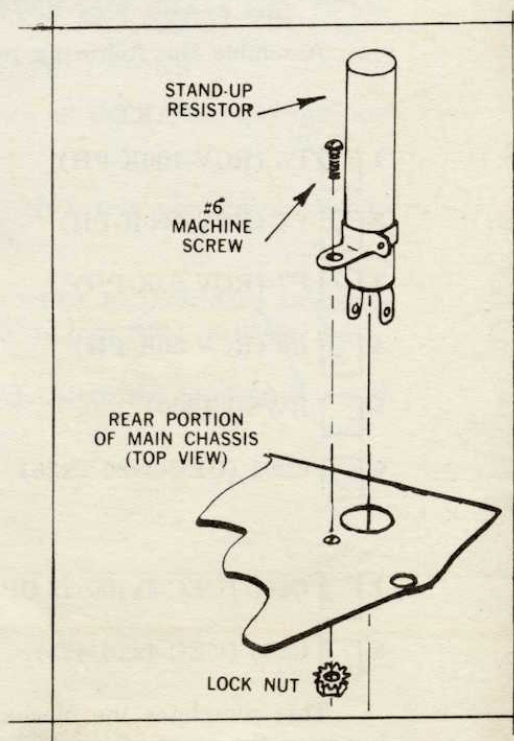
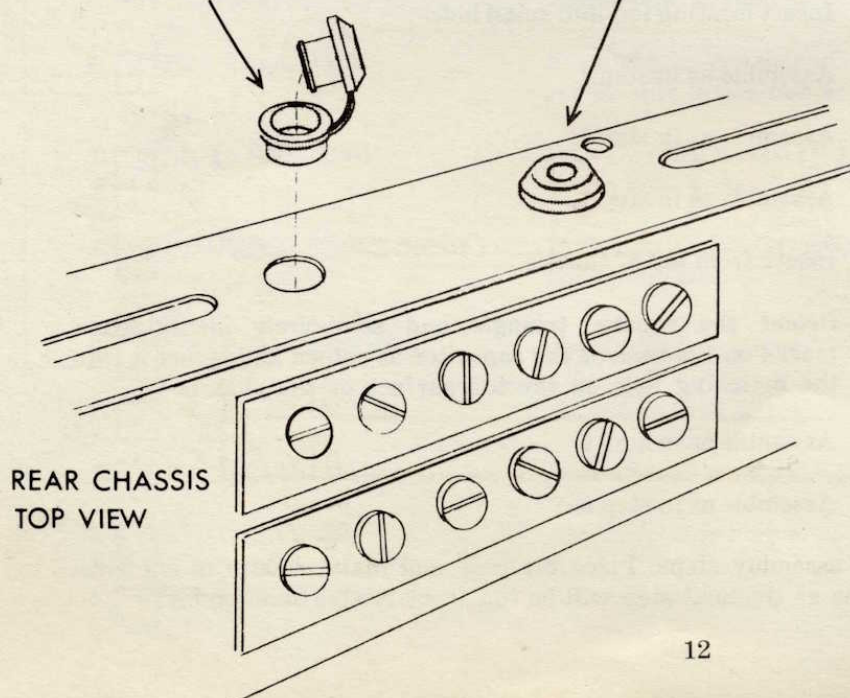
Assemble as in step 6.

This completes the mechanical assembly steps. Place the rear and main chassis to one side, but keep the front at your work area as the next step will be the front electrical assembly.





2 - AGR3 PLASTIC GROMMETS





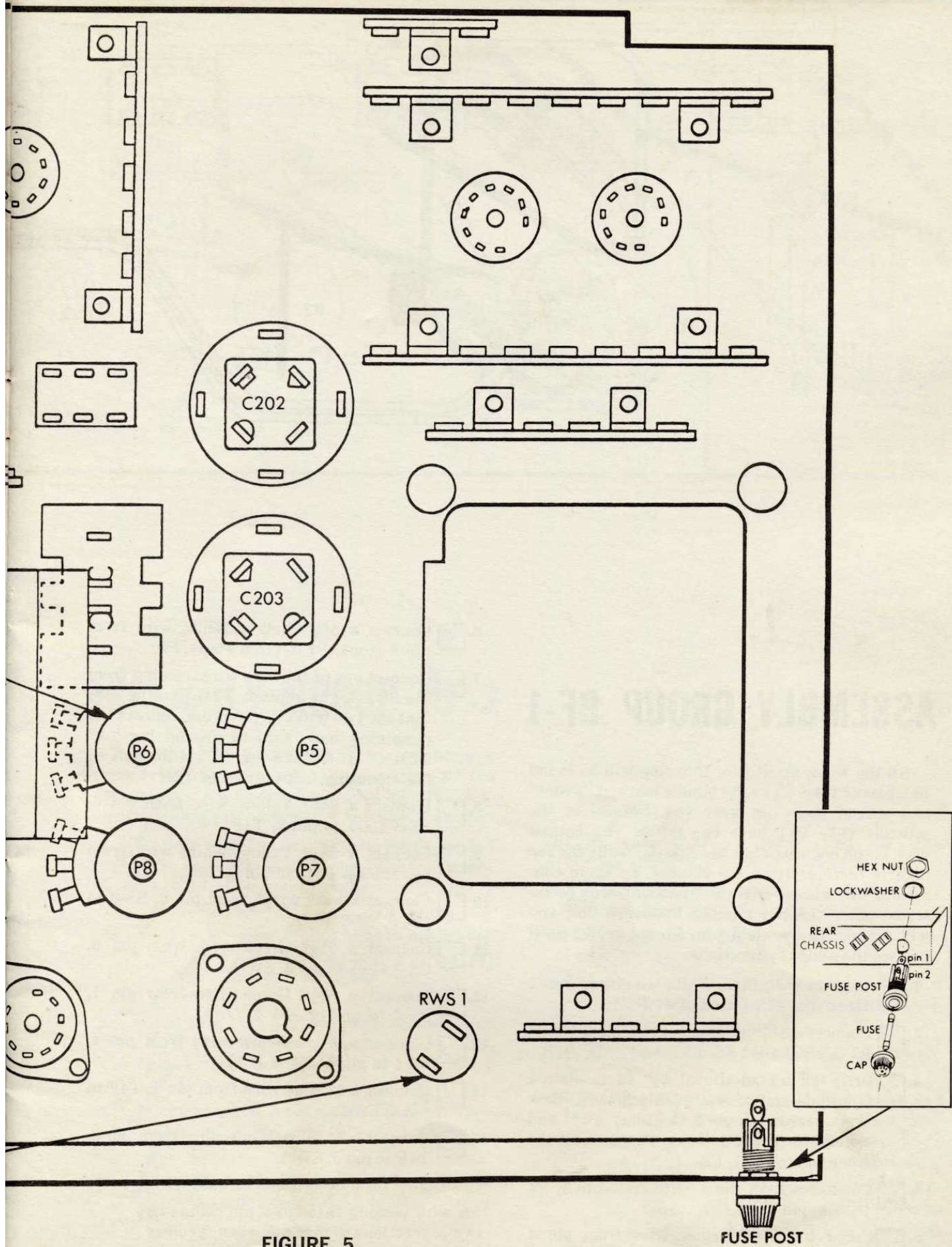
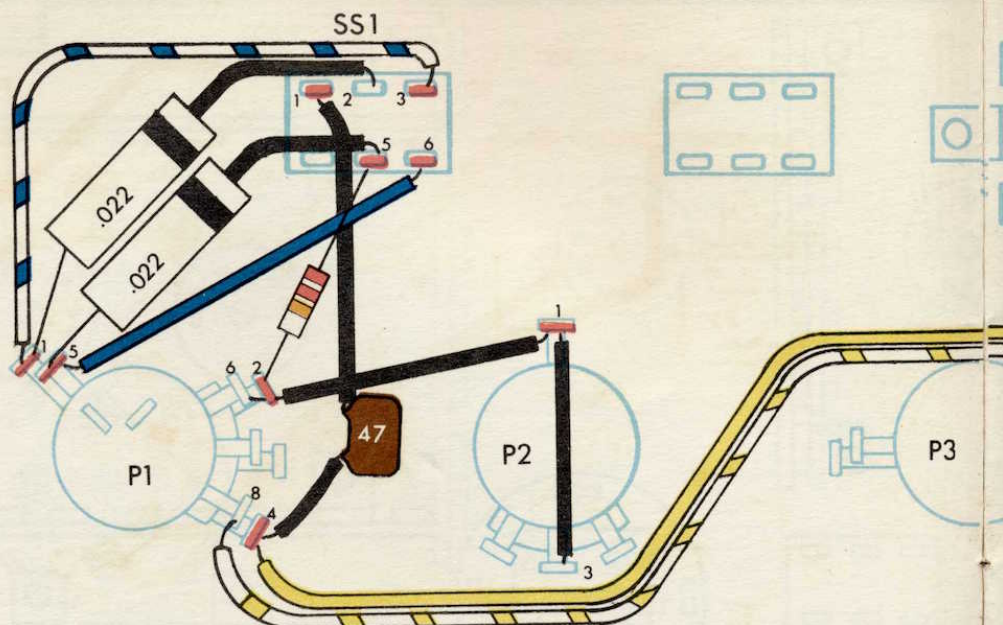
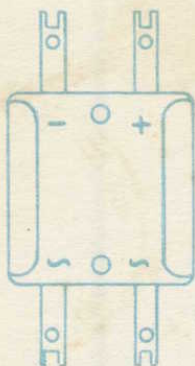


FIGURE 5





## ASSEMBLY GROUP BF-1

All the wires needed for this step will be found in a plastic tube. Take the bundle marked "Front" and spread them out near you. Several of the controls (like P1) have two decks. The *bottom* deck is the one *closest* to the chassis, while the *top* deck is *farthest* from the chassis. To avoid confusion, the word "Top" or "Bottom" will be inserted after the pin number to insure that you will connect to the right pin. Do not solder until you see the solder instructions.

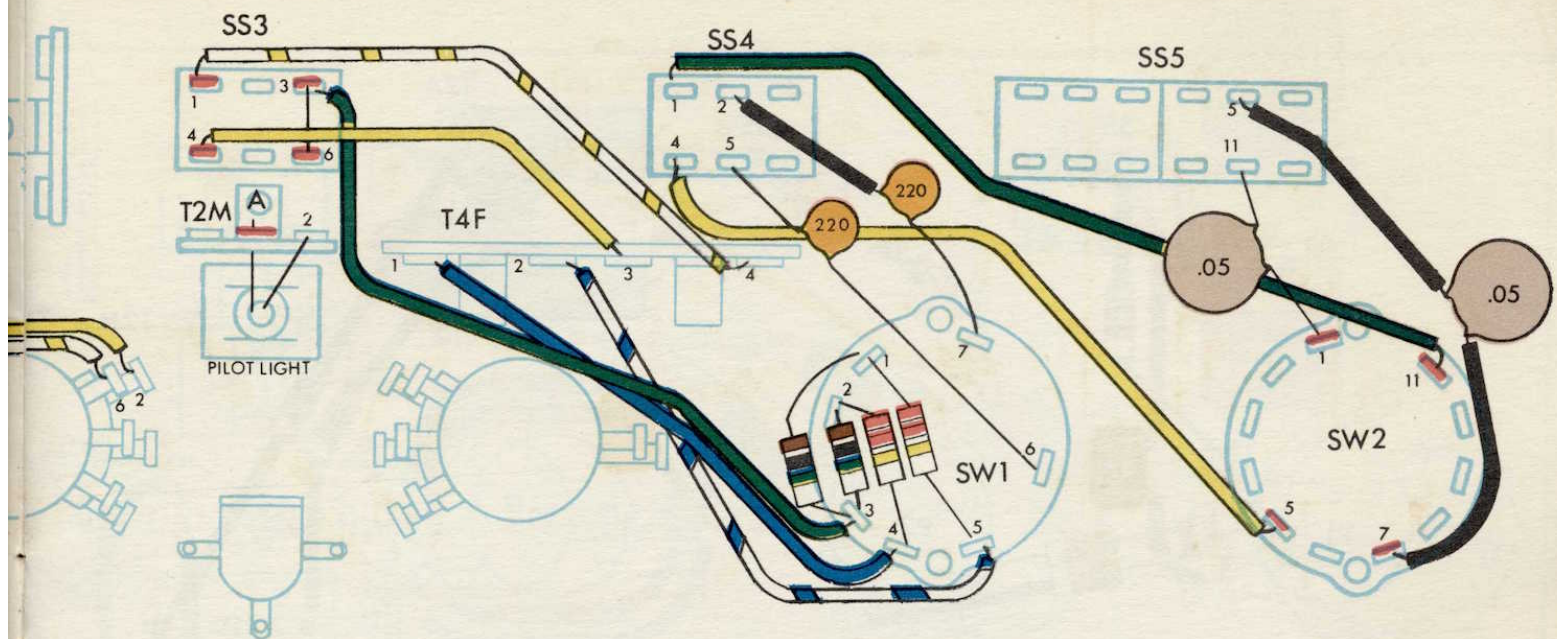
1. ☒ Connect a 4" Blue/White wire from pin 1 (bottom), P1 to pin 3, SS-1 (S1).
2. ☒ Connect a 3¼" Blue wire from pin 5 (top), P1 to pin 6, SS-1 (S1).
3. ☒ Strip off an additional ½" of insulation from one end of a 2½" Black wire. Pass this end through pin 2 (bottom), P1\*\* and connect it to pin 6 (top), P1. Connect the other end to pin 1, P2.
4. ☒ Connect a 2½" Black wire from pin 1, P2 (S2) to pin 3, P2.
5. ☒ Connect a 5½" Yellow wire from pin 4 (bottom), P1 to pin 2 (bottom), P3.

6. ☒ Connect a 5½" Yellow/White wire from pin 8 (top), P1 to pin 6 (top), P3.
7. ☒ Connect one of the bare wires coming from the Pilot Light to pin 2, T2M. Making sure that the two wires do not cross, connect the remaining bare wire to ground lug "A" T2M (S1). Ground lug "A" is the hole in the mounting foot portion of T2M.
8. ☒ Connect a 3½" Yellow wire from pin 4, SS-3 (S1) to pin 3, T4F.
9. ☒ Connect a 5½" Yellow/White wire from pin 1, SS-3 (S1) to pin 4, T4F.
10. ☒ Connect a buss wire\* from pin 3, SS-3 to pin 6, SS-3 (S1).
11. ☒ Connect a 5½" Green wire from pin 3, SS-3 (S2) to pin 3, SW-1.
12. ☒ Connect a 5½" Green wire from pin 1, SS-4 to pin 11, SW-2 (S1).
13. ☒ Connect a 4¾" Yellow wire from pin 4, SS-4 to pin 5, SW-2 (S1).
14. ☒ Connect a 5" Blue wire from pin 1, T4F to pin 4, SW-1.
15. ☒ Connect a 5" Blue/White wire from pin 2, T4F to pin 5, SW-1.

\*See page 8 for a description of buss wire.

\*\*A wire passing through a pin counts as two connections to that pin when it comes time to solder.





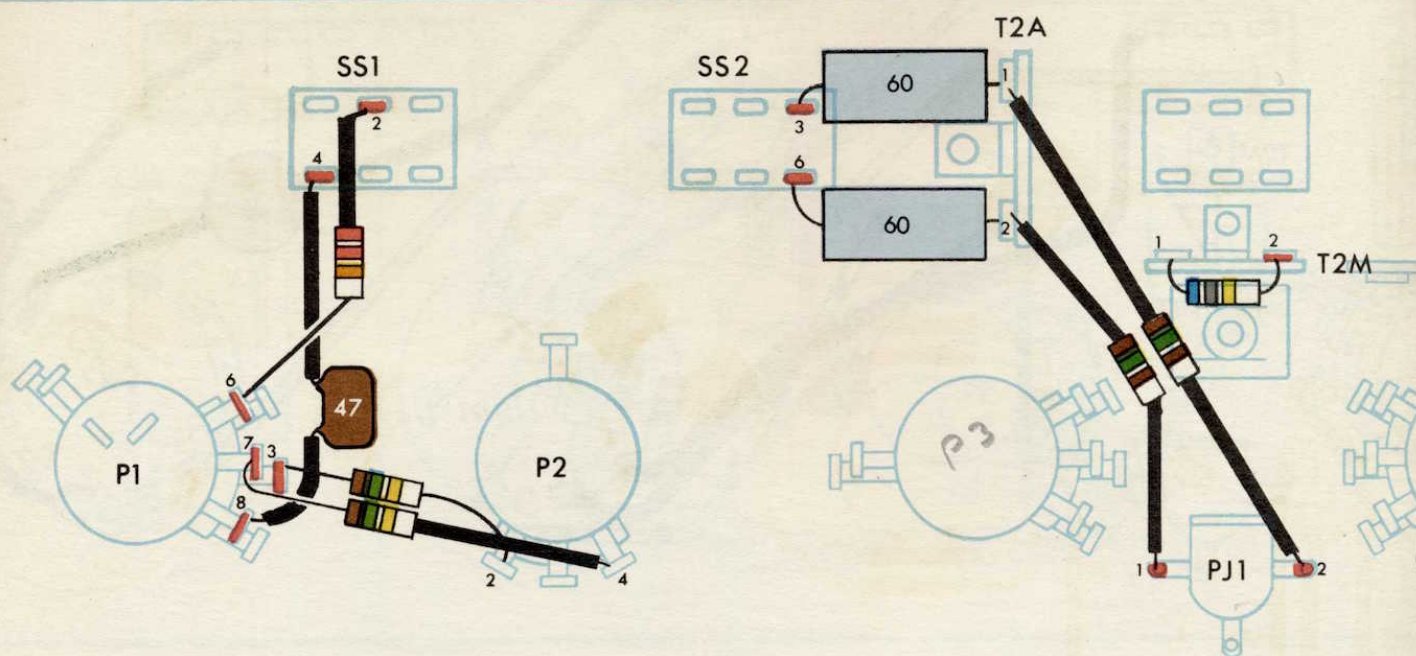
## ASSEMBLY GROUP BF-2

Part Chart BF-2 contains all the components needed for this step with the exception of the "spaghetti" (see page 8 for a description of spaghetti) which will be found in the hardware bag.

1. ☒ Add a  $\frac{3}{4}$ " piece of spaghetti to the banded end of a CPM-.022. Connect this end to pin 2, SS-1. Connect the other end to pin 1 (bottom), P1 (S2).
2. ☒ Add a  $\frac{3}{4}$ " piece of spaghetti to the banded end of a CPM-.022. Connect this end to pin 5, SS-1. Connect the other end to pin 5 (top), P1 (S2).
3. ☒ Add a  $1\frac{1}{4}$ " piece of spaghetti to both ends of a CM-47. Connect this capacitor from pin 4 (bottom), P1 (S2) to pin 1, SS-1 (S1).
4. ☒ Connect a 22K resistor (Red, Red, Orange) from pin 2 (bottom), P1 (S3) to pin 5, SS-1 (S2).
5. ☒ Connect a 1M resistor (Brown, Black, Green) from pin 1, SW-1\* to pin 3, SW-1.
6. ☒ Connect a 1M resistor (Brown, Black, Green) from pin 2, SW-1\* to pin 3, SW-1.
7. ☒ Connect a 220K resistor (Red, Red, Yellow) from pin 2, SW-1 to pin 4, SW-1.
8. ☒ Connect a 220K resistor (Red, Red, Yellow) from pin 1, SW-1 to pin 5, SW-1.
9. ☒ Connect a CC-220 from pin 5, SS-4 to pin 6, SW-1.
10. ☒ Add a  $\frac{1}{2}$ " piece of spaghetti to one end of a CC-220. Connect this end to pin 2, SS-4. Connect the other end to pin 7, SW-1.
11. ☒ Connect a CC-.05 from pin 11, SS-5 to pin 1, SW-2 (S1).
12. ☒ Add a  $1\frac{1}{4}$ " piece of spaghetti to each end of a CC-.05. Connect one end to pin 5, SS-5 and the other end to pin 7, SW-2 (S1).

\*SW-1 and SW-2 have several pins which are double (such as pins 1 and 2 on SW-1). When making connections to these pins, be sure that the wire is connected and soldered to **both** sections of the pin.

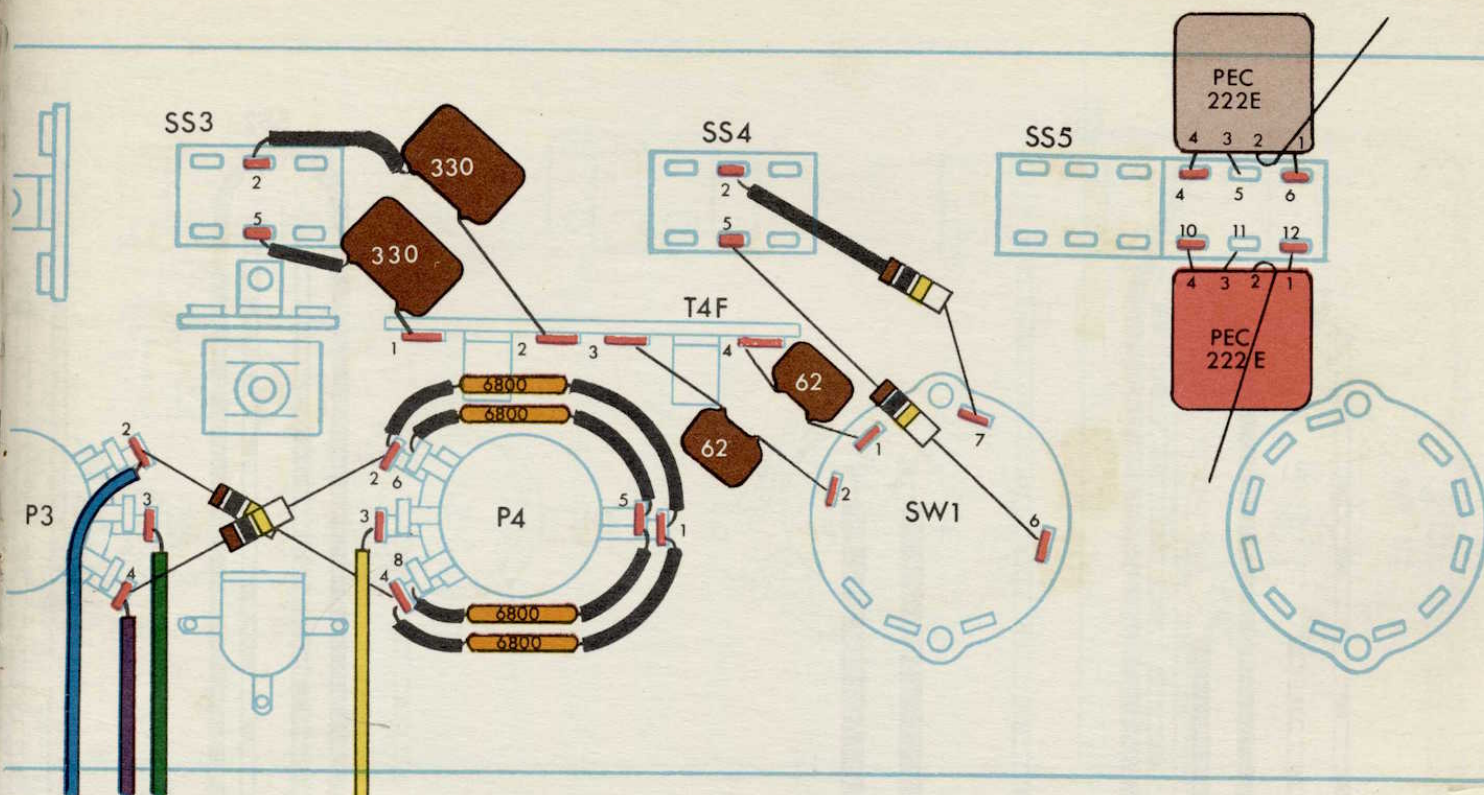




## ASSEMBLY GROUP BF-3

1. ☒ Connect a 150K resistor (Brown, Green, Yellow) from pin 3 (bottom), P1 (S1) to pin 2, P2.
2. ☒ Add a  $\frac{3}{4}$ " piece of spaghetti to each end of a CM-47. Connect this capacitor from pin 4, SS-1 (S1) to pin 8 (top), P1 (S2).
3. ☐ Add a  $\frac{3}{4}$ " piece of spaghetti to one end of a 22K resistor (Red, Red, Orange). Connect this end to pin 2, SS-1 (S2). Connect the other end to pin 6 (top), P1 (S2).
4. ☒ Add a 1" piece of spaghetti to one end of a 150K resistor (Brown, Green, Yellow). Connect this end to pin 4, P2. Connect the other end to pin 7 (top), P1 (S1).
5. ☒ Connect an RW-60 from pin 3, SS-2 (S1) to pin 1, T2A.
6. ☒ Connect an RW-60 from pin 6, SS-2 (S1) to pin 2, T2A.
7. ☒ Add a  $\frac{3}{4}$ " piece of spaghetti to each end of a 150 ohm resistor (Brown, Green, Brown). Connect this resistor from pin 2, T2A to pin 1, PJ-1 (S1).
8. ☒ Add a 1" piece of spaghetti to each end of a 150 ohm resistor (Brown, Green, Brown). Connect one end to pin 1, T2A. Connect the other end to pin 2, PJ-1 (S1).
9. ☒ Connect a 680K resistor (Blue, Grey, Yellow) from pin 1, T2M to pin 2, T2M (S2).

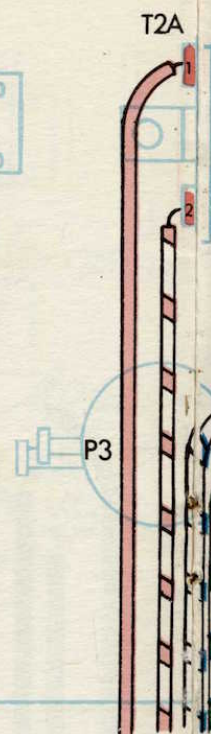
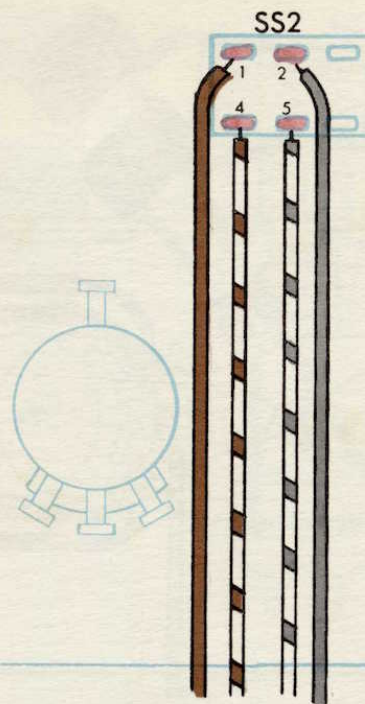
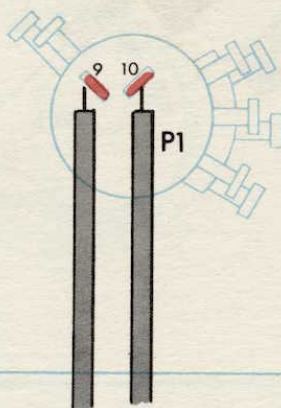
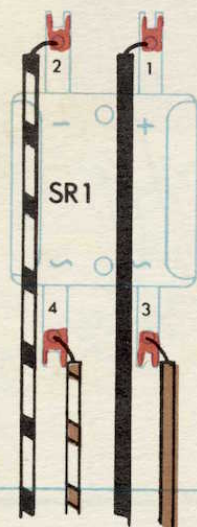




## ASSEMBLY GROUP BF-4

1. ☒ Connect a 100K resistor (Brown, Black, Yellow) from pin 2 (bottom), P3 to pin 4 (bottom), P4.
  2. ☒ Connect a 100K resistor (Brown, Black, Yellow) from pin 4 (bottom), P3 to pin 2 (bottom), P4.
  3. ☒ Add a  $\frac{1}{2}$ " piece of spaghetti to each end of a CC-6800. Connect this capacitor from pin 1 (bottom), P4 to pin 2 (bottom), P4 (S2).
  4. ☒ Add a  $\frac{1}{2}$ " piece of spaghetti to each end of a CC-6800. Connect this capacitor from pin 5 (top), P4 to pin 6 (top), P4.
  5. ☒ Add a  $\frac{1}{2}$ " piece of spaghetti to each end of a CC-6800. Connect this capacitor from pin 1 (bottom), P4 (S2) to pin 4 (bottom), P4 (S2).
  6. ☒ Add a  $\frac{1}{2}$ " piece of spaghetti to each end of a CC-6800. Connect this capacitor from pin 5 (top), P4 (S2) to pin 8 (top), P4.
  7. ☒ Add a  $\frac{1}{2}$ " piece of spaghetti to one end of a CM-330. Connect this end to pin 2, SS-3 (S1). Connect the other end to pin 2, T4F (S2).
  8. ☒ Add a  $\frac{1}{2}$ " piece of spaghetti to one end of a CM-330. Connect this end to pin 5, SS-3 (S1). Connect the other end to pin 1, T4F (S2).
  9. ☒ Connect a CM-62 from pin 3, T4F (S2) to pin 2, SW-1 (S3).
  10. ☒ Connect a CM-62 from pin 4, T4F (S2) to pin 1, SW-1 (S3).
  11. ☒ Connect a 100K resistor (Brown, Black, Yellow) from pin 5, SS-4 (S2) to pin 6, SW-1 (S2).
  12. ☒ Add a  $\frac{3}{4}$ " piece of spaghetti to one end of a 100K resistor (Brown, Black, Yellow). Connect this end to pin 2, SS-4 (S2). Connect the other end to pin 7, SW-1 (S2).
  13. ☒ Connect lead 4 of the Red PEC-222-ER to pin 10, SS-5 (S1), lead 3 to pin 11, SS-5, and lead 1 to pin 12, SS-5 (S1). Do not connect lead 2 at this time.
  14. ☒ Connect lead 4 of the Brown PEC-222-E to pin 4, SS-5 (S1), lead 3 to pin 5, SS-5, and lead 1 to pin 6, SS-5 (S1). Do not connect lead 2 at this time.
- In the following four steps you will connect only one end of the wires being assembled.
15. ☒ Connect an 8" Blue wire to pin 2 (bottom), P3 (S3).
  16. ☒ Connect a  $7\frac{1}{2}$ " Green wire to pin 3 (bottom), P3 (S1).
  17. ☒ Connect a 6" Purple wire to pin 4 (bottom), P3 (S2).
  18. ☒ Connect a 5" Yellow wire to pin 3 (bottom), P4 (S1).





## ASSEMBLY GROUP BF-5

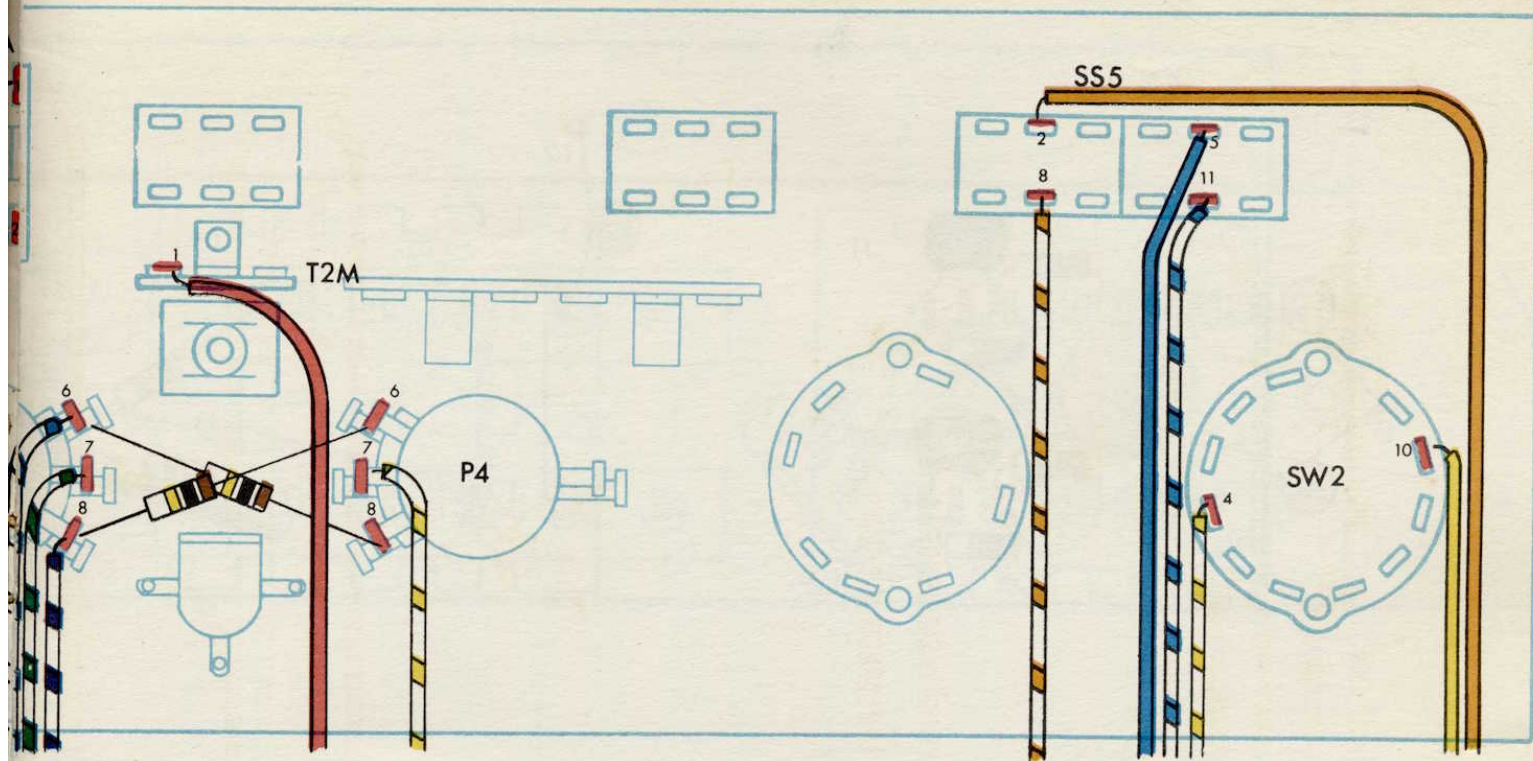
The resistors needed for steps 1 and 2 will be found on Part-Chart BF-4.

1. ☒ Connect a 100K resistor (Brown, Black, Yellow) from pin 6 (top), P3 to pin 8 (top), P4 (S2).
2. ☒ Connect a 100K resistor (Brown, Black, Yellow) from pin 8 (top), P3 to pin 6 (top), P4 (S2).

For the remainder of this assembly group, you will connect only one end of the wires being assembled. The other ends will be connected later.

3. ☒ Connect an 8½" Black wire to pin 1, SR-1 (S1).
4. ☒ Connect an 8" Black/White wire to pin 2, SR-1 (S1).
5. ☒ Connect a 9" Brown wire to pin 3, SR-1 (S1).
6. ☒ Connect a 9" Brown/White wire to pin 4, SR-1 (S1).
7. ☒ Connect a 12½" Heavy Grey wire to pin 9, P1 (S1).



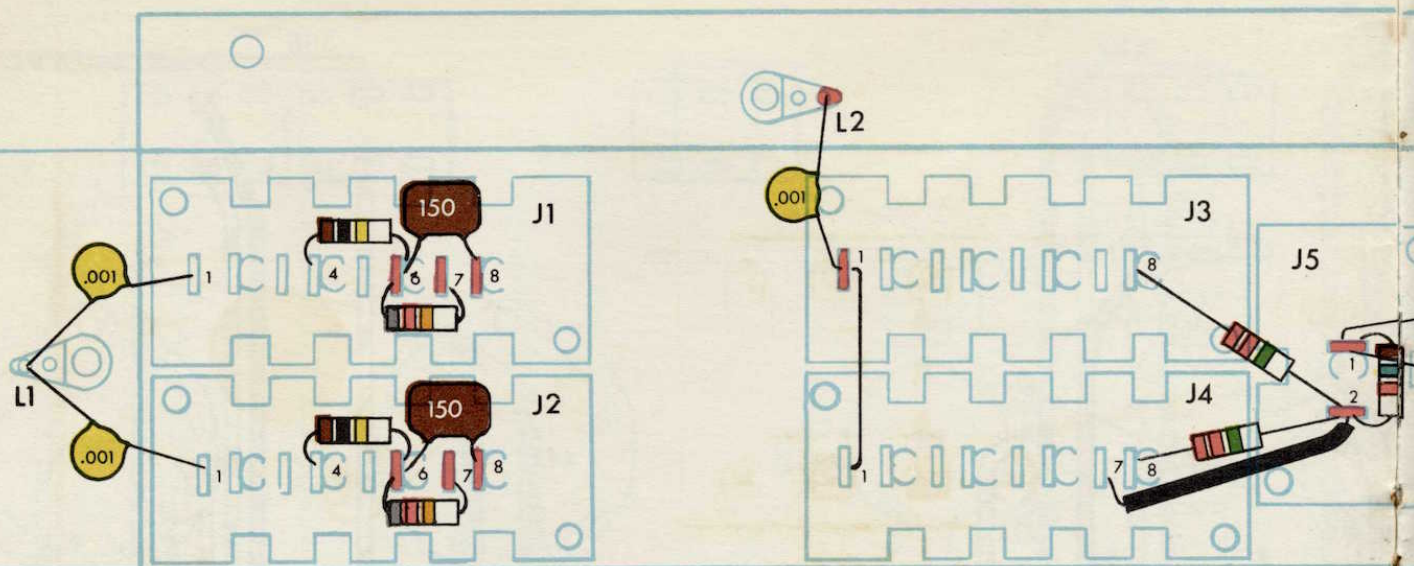


8. ☒ Connect a 14" Heavy Grey wire to pin 10, P1 (S1).
9. ☒ Connect a 15" Brown wire to pin 1, SS-2 (S1).
10. ☒ Connect a 14" Grey wire to pin 2, SS-2 (S1).
11. ☒ Connect a 15" Brown/White wire to pin 4, SS-2 (S1).
12. ☒ Connect a 10" Grey/White wire to pin 5, SS-2 (S1).
13. ☒ Connect a 15" Orange wire to pin 1, T2A (S3).
14. ☒ Connect a 10½" Orange/White wire to pin 2, T2A (S3).
15. ☒ Connect a 5" Red wire to pin 1, T2M (S2).
16. ☒ Connect a 5" Blue/White wire to pin 6 (top), P3 (S3).
17. ☒ Connect a 4½" Green/White wire to pin 7 (top), P3 (S1).
18. ☒ Connect a 3½" Purple/White wire to pin 8 (top), P3 (S2).

19. ☒ Connect a 5" Yellow/White wire to pin 7 (top), P4 (S1).
20. ☒ Connect a 4" Orange/White wire to pin 8, SS-5 (S1).
21. ☒ Connect a 5" Blue/White wire to pin 11, SS-5 (S3).
22. ☒ Connect a 6" Orange wire to pin 2, SS-5 (S1).
23. ☒ Connect a 6" Blue wire to pin 5, SS-5 (S3).
24. ☒ Connect a 4" Yellow wire to pin 10, SW-2 (S1).
25. ☒ Connect a 5" Yellow/White wire to pin 4, SW-2 (S1).

This completes most of the electrical work on the front. Using Chart AF-1 and following the Double-Check instructions on page 50, check your work. At this time, check only those pins that have **uncircled** numbers beside them. A circled number indicates that more connections will be made to this pin at a later time.





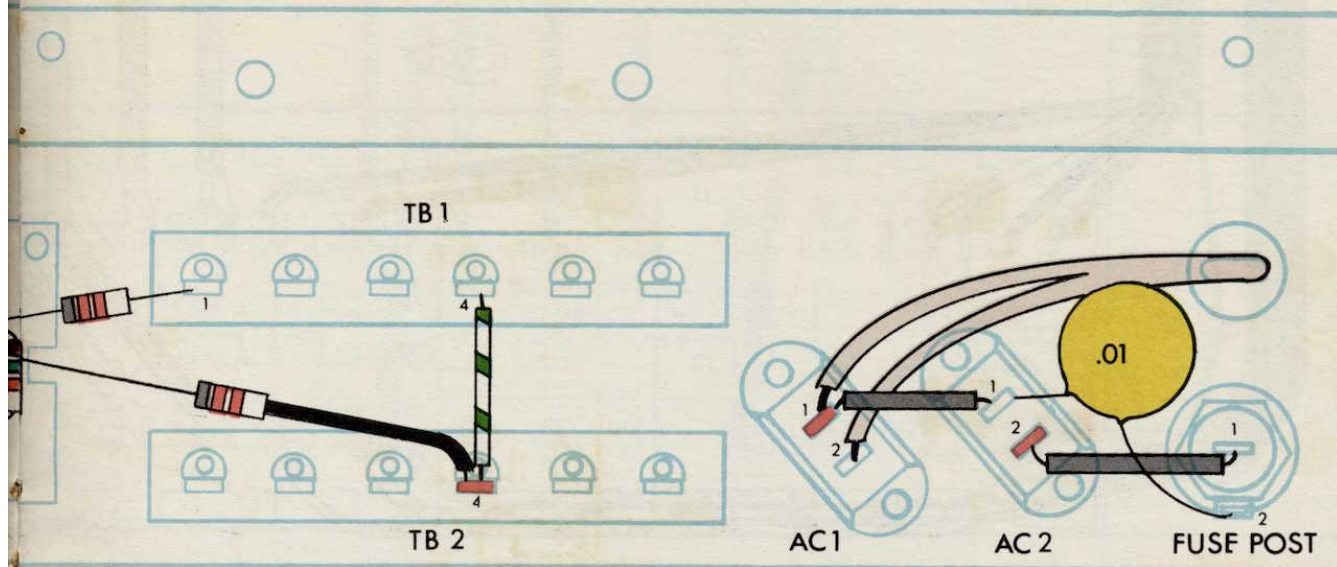
## ASSEMBLY GROUP BR-1 ASSEMBLY GROUP BR-2

When making connections to the long pins on the input jacks (J1, J2, etc.) use the holes at the very tip of the pins. This will make it easier to insert the audio cables in your completed amp.

1. ☒ Connect a 2½" Black wire from pin 7, J4 to pin 2, J5.
2. ☒ Connect a 2½" Green/White wire from pin 4, TB-1 to pin 4, TB-2.
3. ☒ Connect either end of the Brown AC Line Cord to pin 1, AC-1. Connect the other end to pin 2, AC-1.
4. ☒ Connect a 2½" Heavy Grey wire from pin 1, AC-1 (S2) to pin 1, AC-2.
5. ☒ Connect a 2½" Heavy Grey wire from pin 2, AC-2 (S1) to pin 1 on the Fuse Post.

1. ☒ Connect a CC-.001 from L1 to pin 1, J1.
2. ☒ Connect a CC-.001 from L1 to pin 1, J2.
3. ☒ Connect a 100K resistor (Brown, Black, Yellow) from pin 4, J1 to pin 6, J1.
4. ☒ Connect a 100K resistor (Brown, Black, Yellow) from pin 4, J2 to pin 6, J2.
5. ☒ Connect an 82K resistor (Grey, Red, Orange) from pin 6, J1 to pin 7, J1 (S1).
6. ☒ Connect an 82K resistor (Grey, Red, Orange) from pin 6, J2 to pin 7, J2 (S1).
7. ☒ Connect a CM-150 from pin 6, J1 (S3) to pin 8, J1 (S1).
8. ☒ Connect a CM-150 from pin 6, J2 (S3) to pin 8, J2 (S1).



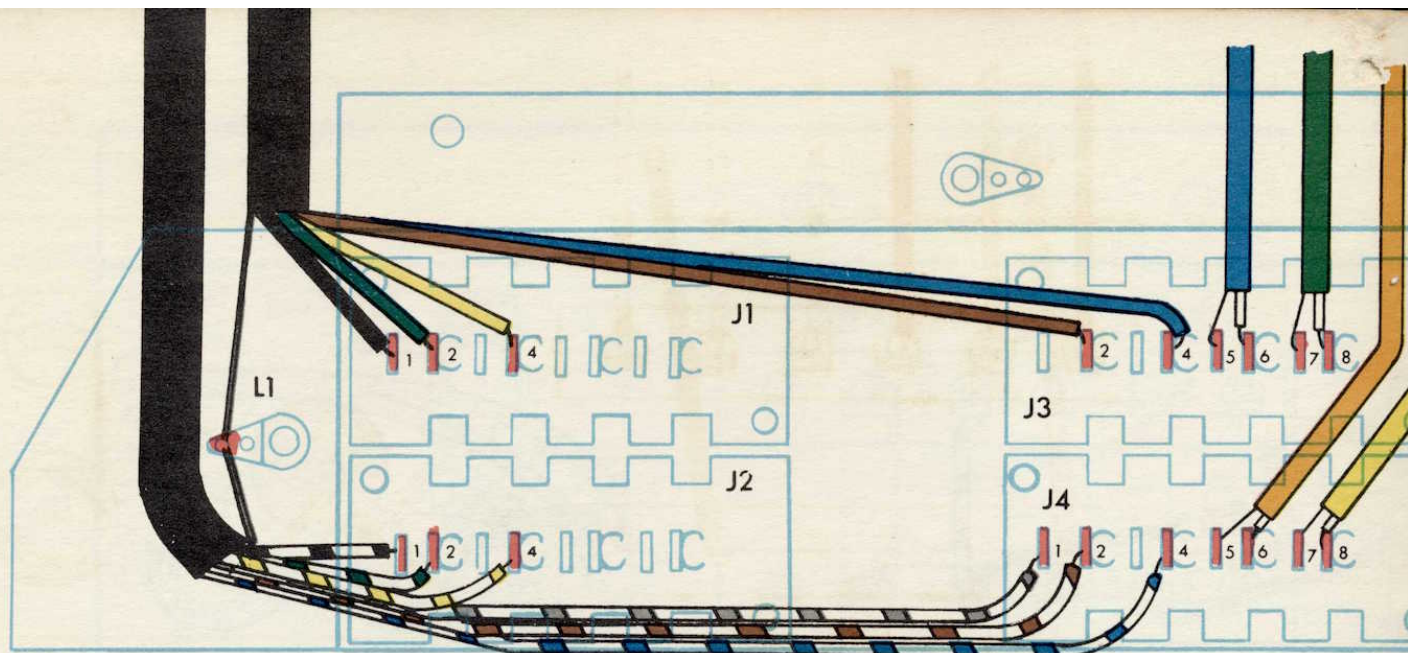


## ASSEMBLY GROUP BR-3

1. ☒ Connect one end of a CC-.001 to L2 (S1). Pass the other end through pin 1, J3 (S2)\* and connect it to pin 1, J4.
2. ☐ Connect a 2.2M resistor (Red, Red, Green) from pin 8, J3 to pin 2, J5.
3. ☒ Connect a 2.2M resistor (Red, Red, Green) from pin 8, J4 to pin 2, J5.
4. ☒ Connect a 1.5K resistor (Brown, Green, Red) from pin 1, J5 to pin 2, J5 (S4).
5. ☐ Connect an 8.2K resistor (Grey, Red, Red) from pin 1, J5 to pin 1, TB-1.
6. ☒ Add a 1" piece of spaghetti to one end of an 8.2K resistor (Grey, Red, Red). Connect this end to pin 4, TB-2 (S2). Connect the other end to pin 1, J5 (S3).
7. ☒ Connect a CC-.01 from pin 1, AC-2 to pin 2 on the Fuse Post.

\*A wire passing through a pin counts as two connections to that pin when it is soldered.





## ASSEMBLY GROUP BR-4

Only one end of the wires being assembled in this step will be connected at this time.

1. ☒ Connect a 16½" Blue wire to pin 4, J3 (S1).
2. ☒ Connect a 16" Brown wire to pin 2, J3 (S1).
3. ☒ Connect a 17" Yellow wire to pin 4, J1 (S2).
4. ☒ Connect a 16½" Green wire to pin 2, J1 (S1).
5. ☒ Connect a 22" Black wire to pin 1, J1 (S2).
6. ☒ At one end of a 10" Black E-SS conductive cable\*, unwrap about 1" of the metal shield. Insert a small nylon sleeve\* into the cable at this end (See Figure 6). Place this cable over the five wires connected in steps 1 through 5 so that the end with the nylon sleeve is towards the rear chassis. Connect the unwrapped shield to L1. Slide another nylon sleeve over the wires at the other end and push it into the sleeve. Bend the wire back to hold the cable and sleeve in place.
7. ☒ Connect an 18" Blue/White wire to pin 4, J4 (S1).
8. ☒ Connect a 17" Brown/White wire to pin 2, J4 (S1).
9. ☒ Connect a 19½" Grey/White wire to pin 1, J4 (S2).
10. ☒ Connect a 17½" Yellow/White wire to pin 4, J2 (S2).
11. ☒ Connect a 17½" Green/White wire to pin 2, J2 (S1).
12. ☒ Connect a 19" Black/White wire to pin 1, J2 (S2).
13. ☒ Repeat the procedure used in step 6 and assemble a 10" E-SS cable to the six wires connected in steps 7 through 12, connect the unwrapped shield to L1 (S4).
14. ☒ Connect the insulated wire of a 14½" Green mic lapel\* to pin 8, J3 (S2). Connect the bare wire at this end to pin 7, J3 (S1).

\*See page 8 for a description of this item.

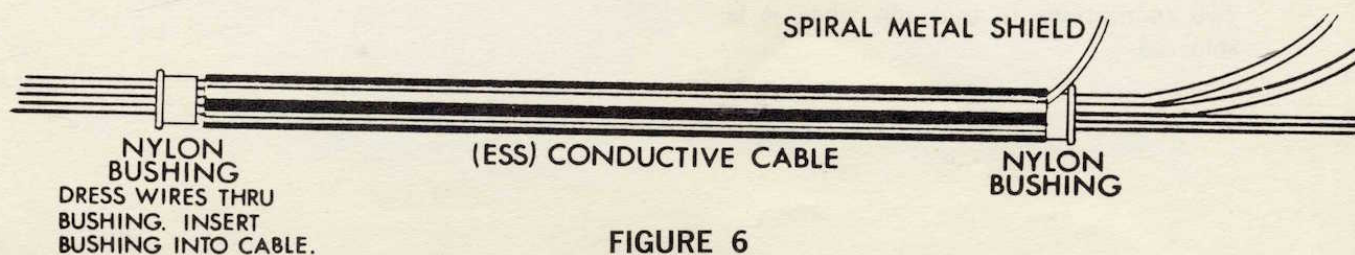
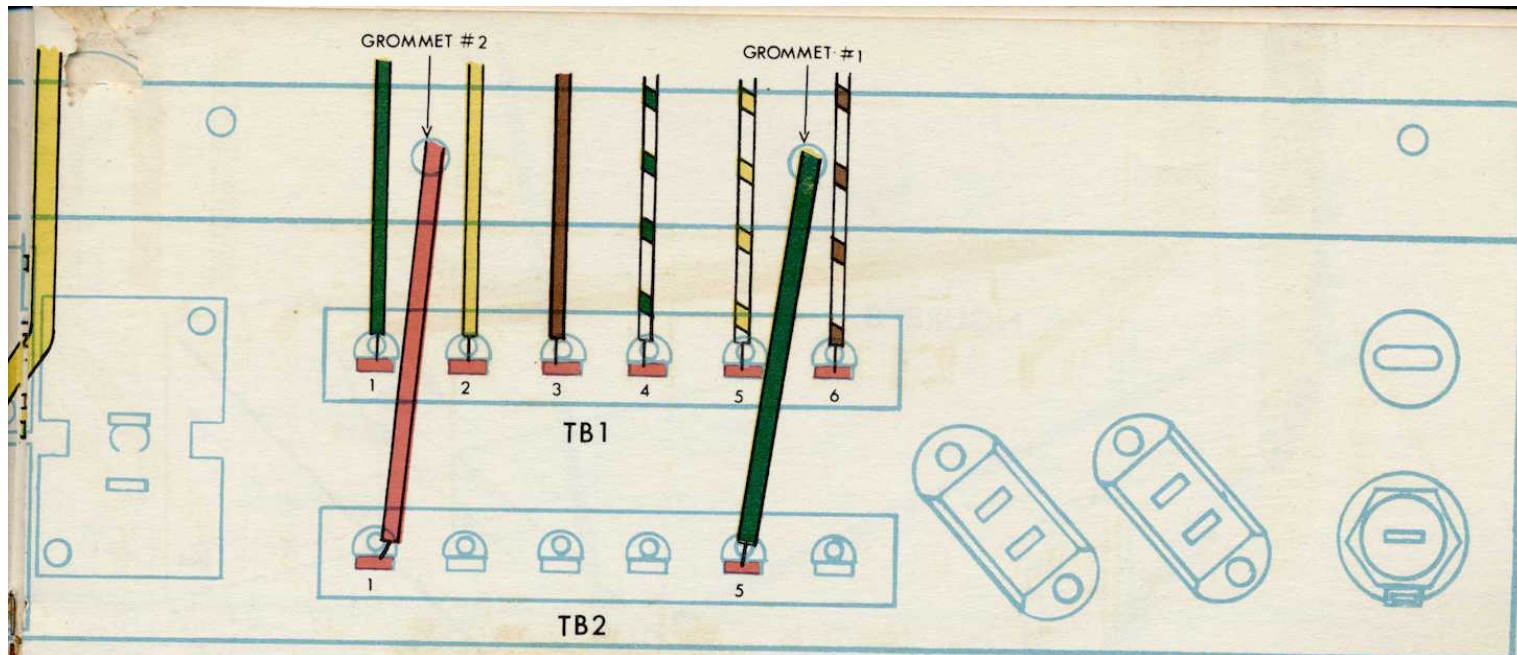


FIGURE 6





15. ☒ Connect the insulated wire of a 14½" Blue mic lapel to pin 6, J3' (S1). Connect the bare wire at this end to pin 5, J3 (S1).
16. ☒ Connect the insulated wire of a 14½" Yellow mic lapel to pin 8, J4 (S2). Connect the bare wire at this end to pin 7, J4 (S2).
17. ☒ Connect the insulated wire of a 14½" Orange mic lapel to pin 6, J4 (S1). Connect the bare wire at this end to pin 5, J4 (S1).
18. ☒ Connect a 15" Green wire to pin 1, TB-1 (S2).
19. ☒ Connect a 14" Yellow wire to pin 2, TB-1 (S1).
20. ☒ Connect a 13" Brown wire to pin 3, TB-1 (S1).
21. ☒ Connect an 11½" Green/White wire to pin 4, TB-1 (S2).
22. ☒ Connect an 11" Yellow/White wire to pin 5, TB-1 (S1).
23. ☒ Connect an 11" Brown/White wire to pin 6, TB-1 (S1).
24. ☒ Connect a 6" Heavy Green wire to pin 5, TB-2 (S1). Pass the other end thru grommet #1, but do not connect it.
25. ☒ Connect a 6" Heavy Red wire to pin 1, TB-2 (S1). Pass the other end thru grommet #2, but do not connect it.

This completes most of the electrical assembly on the rear. Using Chart AR-1 and following the instructions on page 50, check your work. Once again, as on the front, refer only to the numbers that are *not* circled.



FIGURE 8

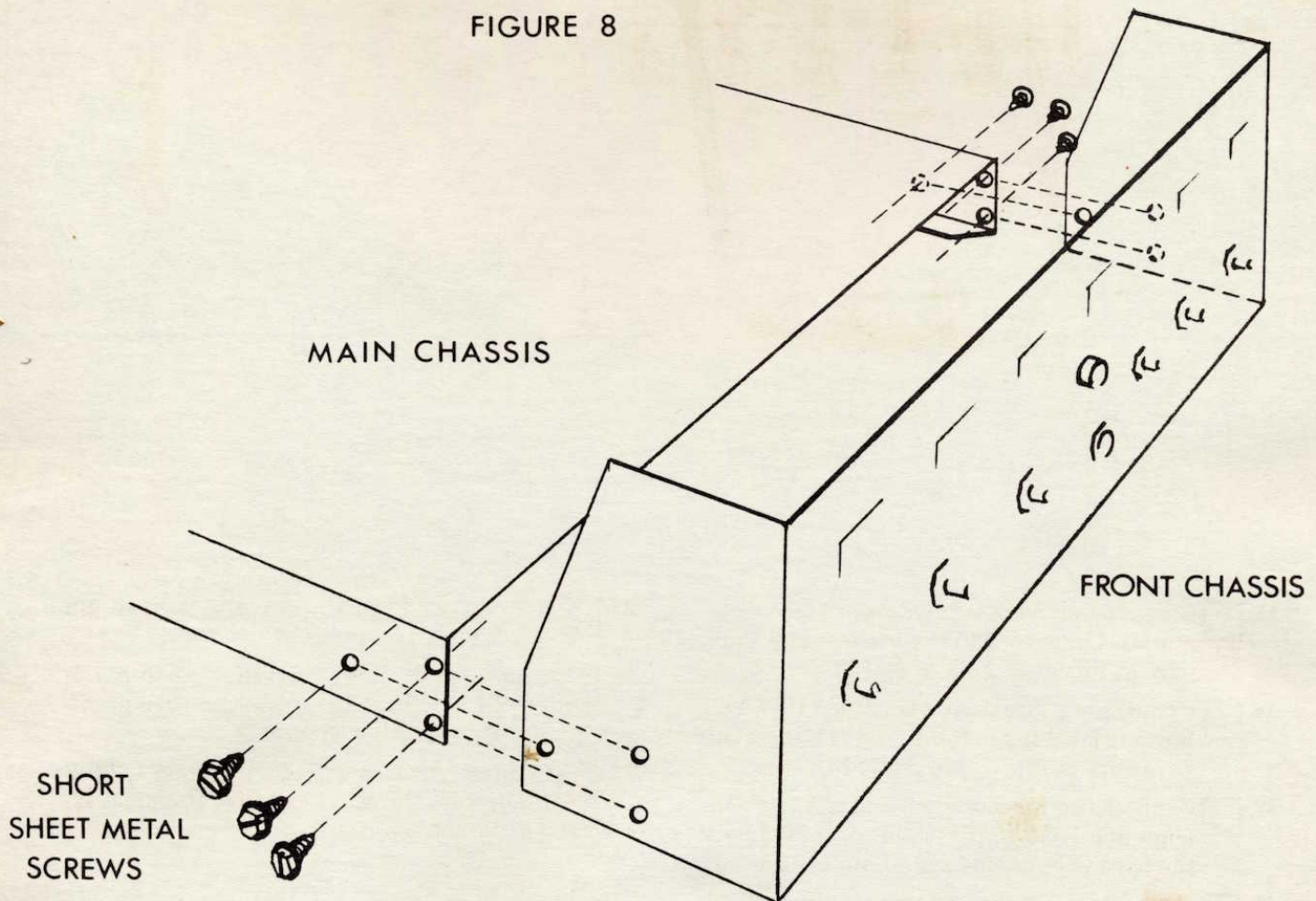


FIGURE 7

## MECHANICAL ASSEMBLY GROUP A-2

1. ☒ Bend all of the wires attached to the front downward, towards the row of pots.
2. ☒ Assemble the front to the main as shown in (Figure 7). Use six of the short  $\frac{1}{4}$ " sheet metal screws to fasten the sections together. Use a fairly good-sized screwdriver and don't be afraid to push down hard on the screws to get them started.
3. ☐ Position the main chassis in front of you with the underside facing up and the back facing you. You will note that there is a shield on the left rear of the main chassis.



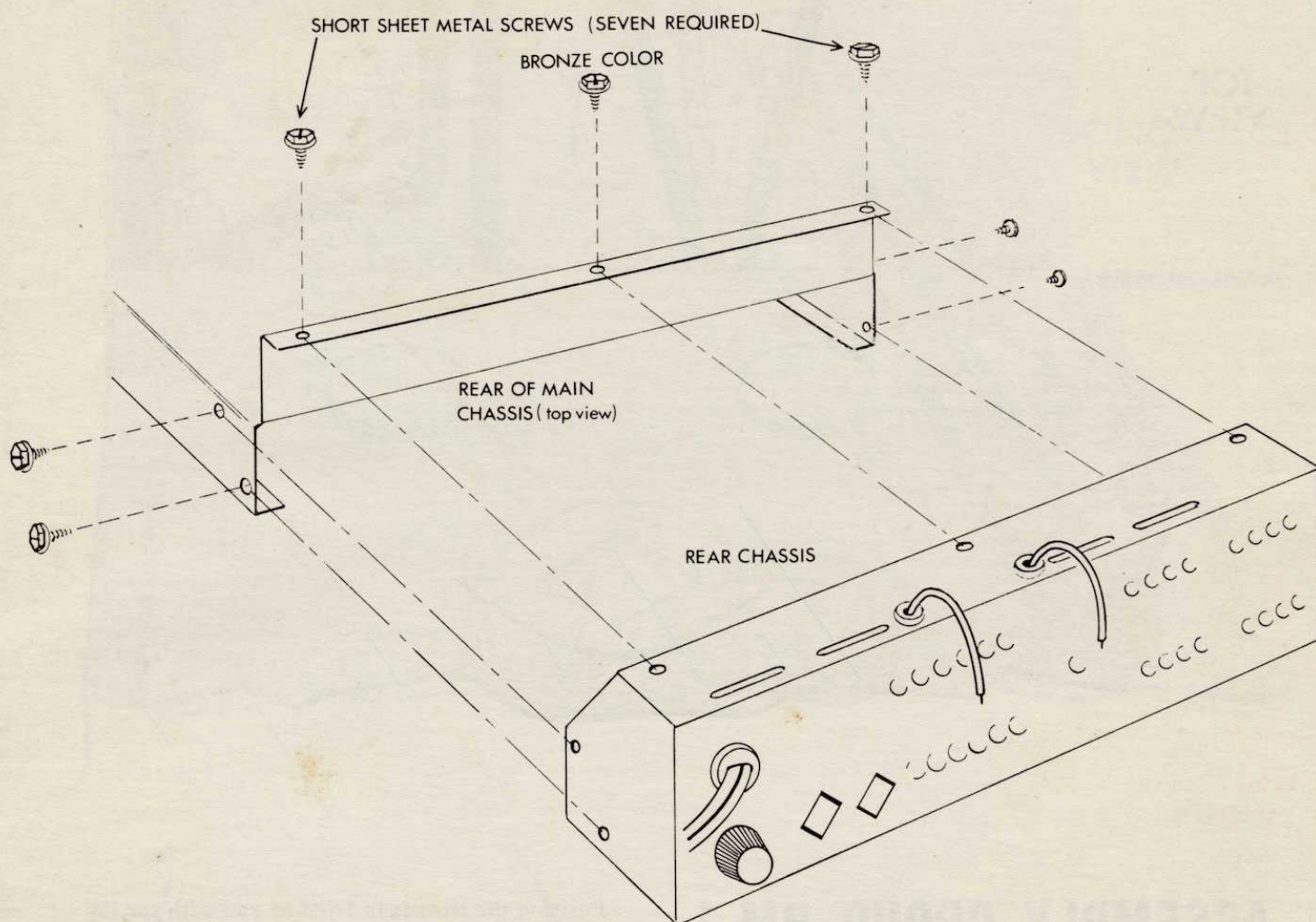


FIGURE 8

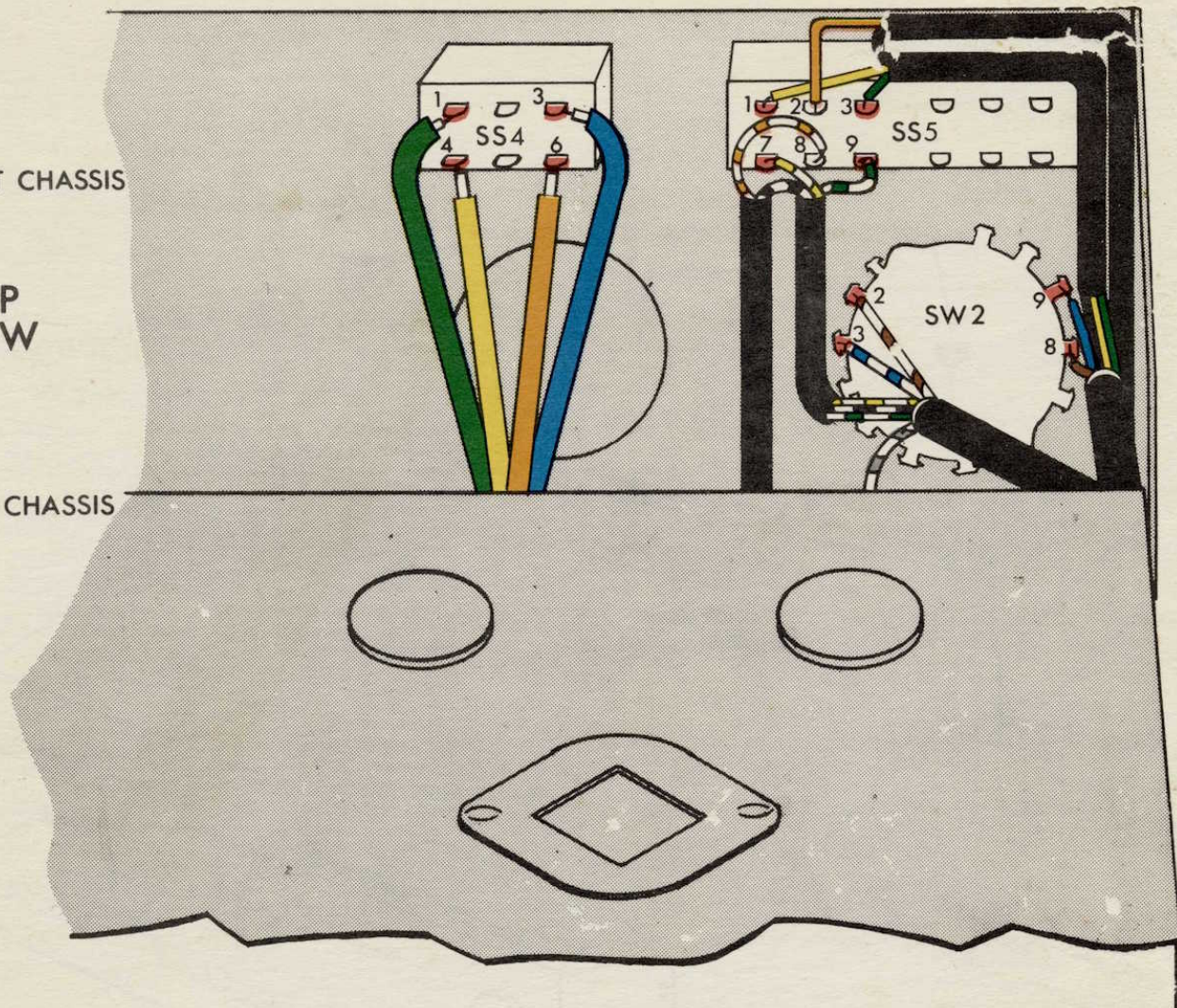
Take the two Black cables that are connected to the rear, and feed them through the space to the left of the shield. Position them along the side of the main chassis. Position the Heavy Red and Green wires, that pass through the grommets, towards the outside of the rear chassis. Position all the other wires that are connected to the rear towards the underside of the main. Turn the chassis over and fasten the rear to the main with six of the short  $\frac{1}{4}$ " sheet metal screws and one short Bronze sheet metal screw. The Bronze screw is to be inserted in the middle hole on the top of the rear chassis. (See Figure 8).



FRONT CHASSIS

TOP  
VIEW

MAIN CHASSIS



## ASSEMBLY GROUP BM-1

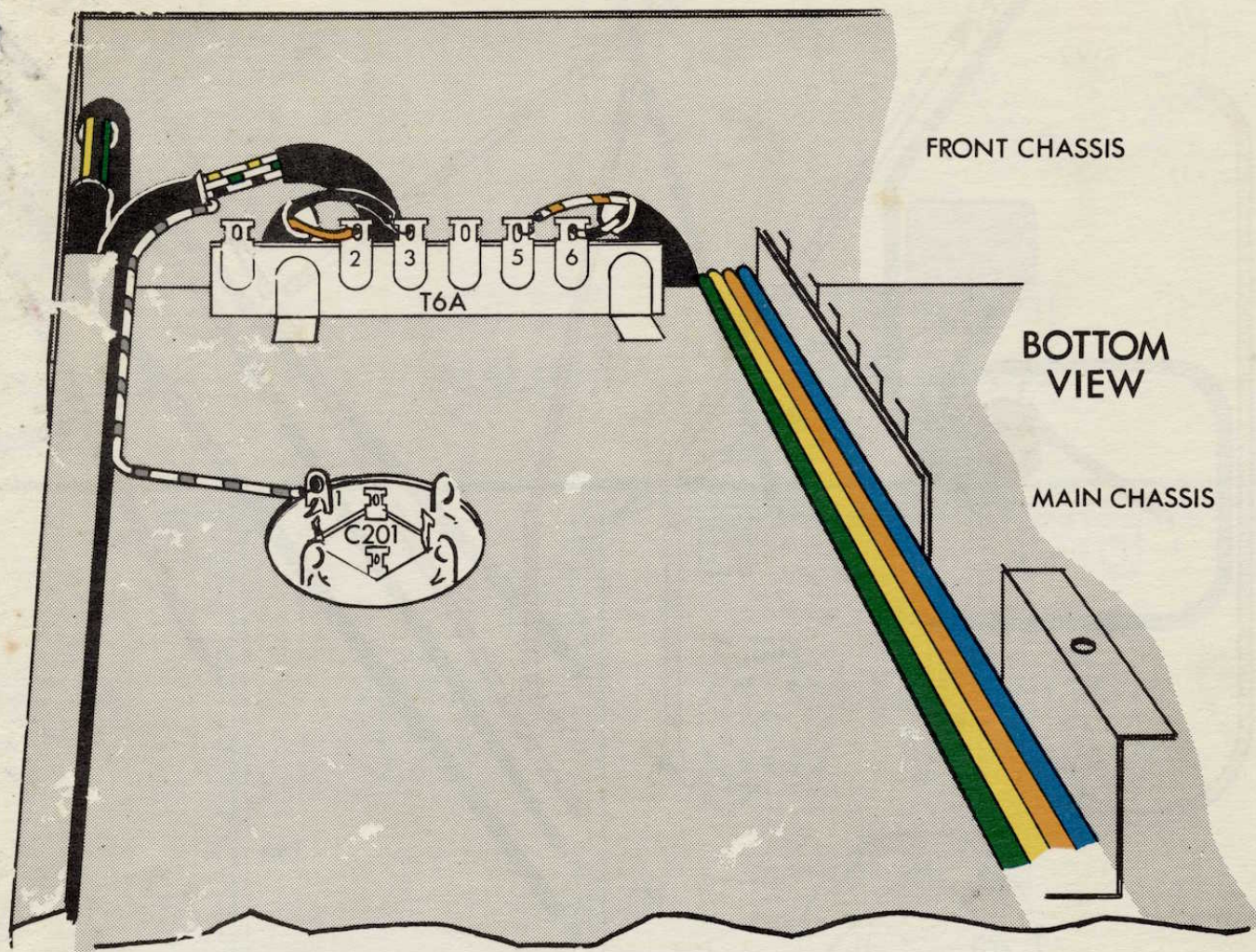
The next two steps are somewhat complex. Proceed slowly and carefully.

Position the chassis in front of you with the top side up and the rear facing you.

1. ☒ Connect the Blue wire coming from the Black Cable containing the solid colored wires (Blue, Brown, Yellow, etc.) to pin 9, SW-2 (S1). Connect the Brown wire to pin 8, SW-2 (S1). Place a 3½" piece of Heavy Black Insulation\* over the Yellow, Black, and Green wires. Connect the Yellow wire to pin 1, SS-5 (S1), and the Green wire to pin 3, SS-5 (S1). Take the Black wire coming from the cable and the Orange wire coming from pin 2, SS-5. Add a 3½" piece of Heavy Black Insulation to these two wires. Turn the chassis over and connect the Black wire to pin 3, T6A on the main chassis. Connect the Orange wire to pin 2, T6A. See the bottom view drawing for the connections that are made to the main chassis.

\*See page 8 for a description of this item.



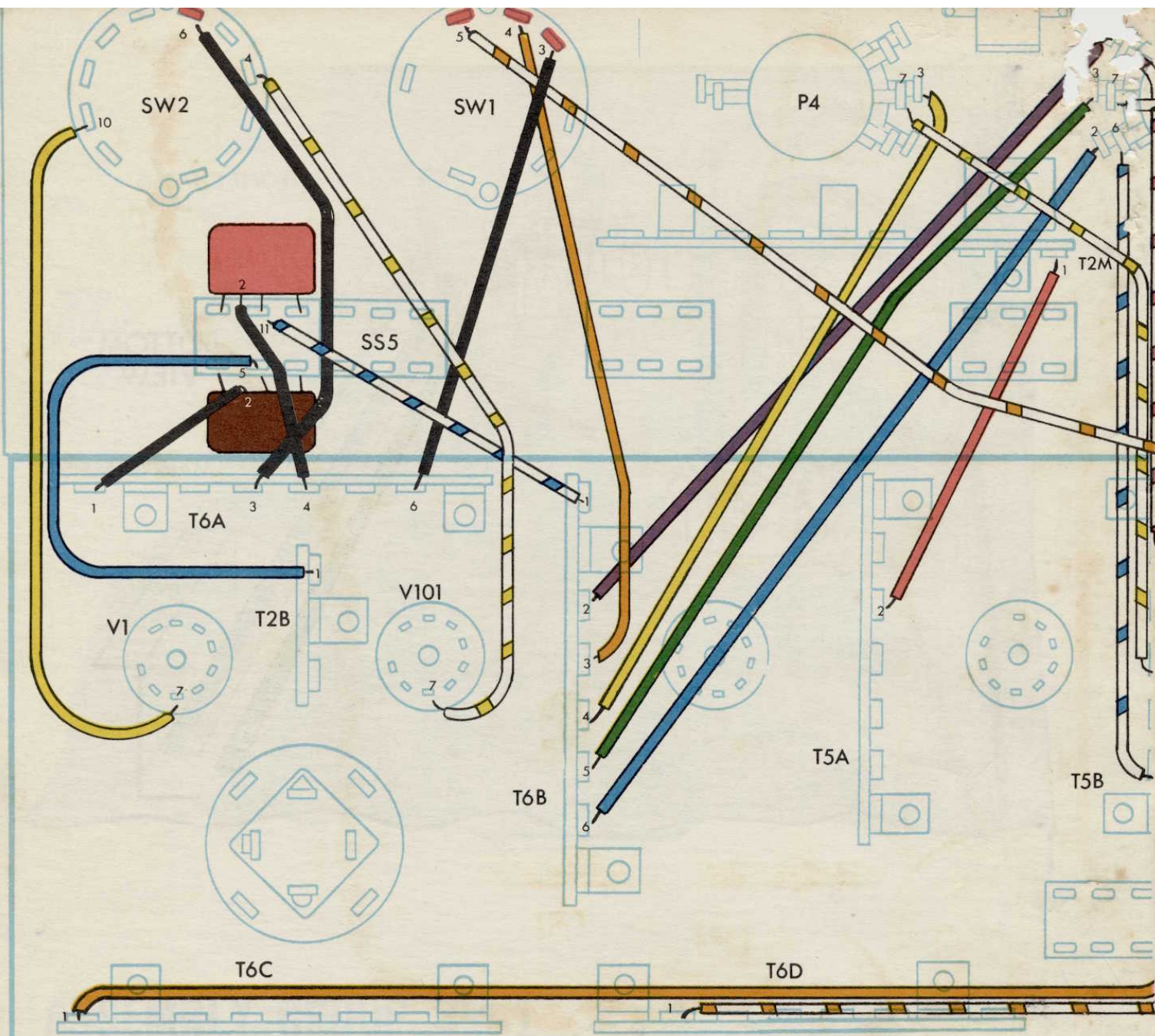


2. ☒ Turn the chassis right side up again and connect the Blue/White wire coming from the second Black cable to pin 3, SW-2 (S1). Connect the Brown/White wire to pin 2, SW-2 (S1). Place a  $2\frac{1}{2}$ " piece of Heavy Black Insulation over the Yellow/White, Green/White, and Black/White wires. Connect the Yellow/White wire to pin 7, SS-5 (S1) and the Green/White wire to pin 9, SS-5 (S1). Take the Black/White wire coming from the cable and the Orange/White wire coming from pin 8, SS-5. Add a  $3\frac{1}{2}$ " piece of Heavy Black Insulation to these two wires. Turn the chassis over and connect the Orange/White wire to pin 5, T6A on the main chassis. Connect the Black/White wire to pin 6, T6A. There is a Grey/White wire coming from the main cable that has not

been connected. Connect it now to pin 1, C201 on the main. See the bottom view drawing for the connections that are made to the main chassis.

3. ☒ Turn the chassis over again so that the top is up. Clip out the bare wire of the Green mic label coming from the rear. Connect the insulated wire to pin 1, SS-4 (S2).
4. ☒ Clip out the bare wire of the Blue mic label coming from the rear. Connect the insulated wire to pin 3, SS-4 (S1).
5. ☒ Clip out the bare wire of the Yellow mic label coming from the rear. Connect the insulated wire to pin 4, SS-4 (S2).
6. ☒ Clip out the bare wire of the Orange mic label coming from the rear. Connect the insulated wire to pin 6, SS-4 (S1).

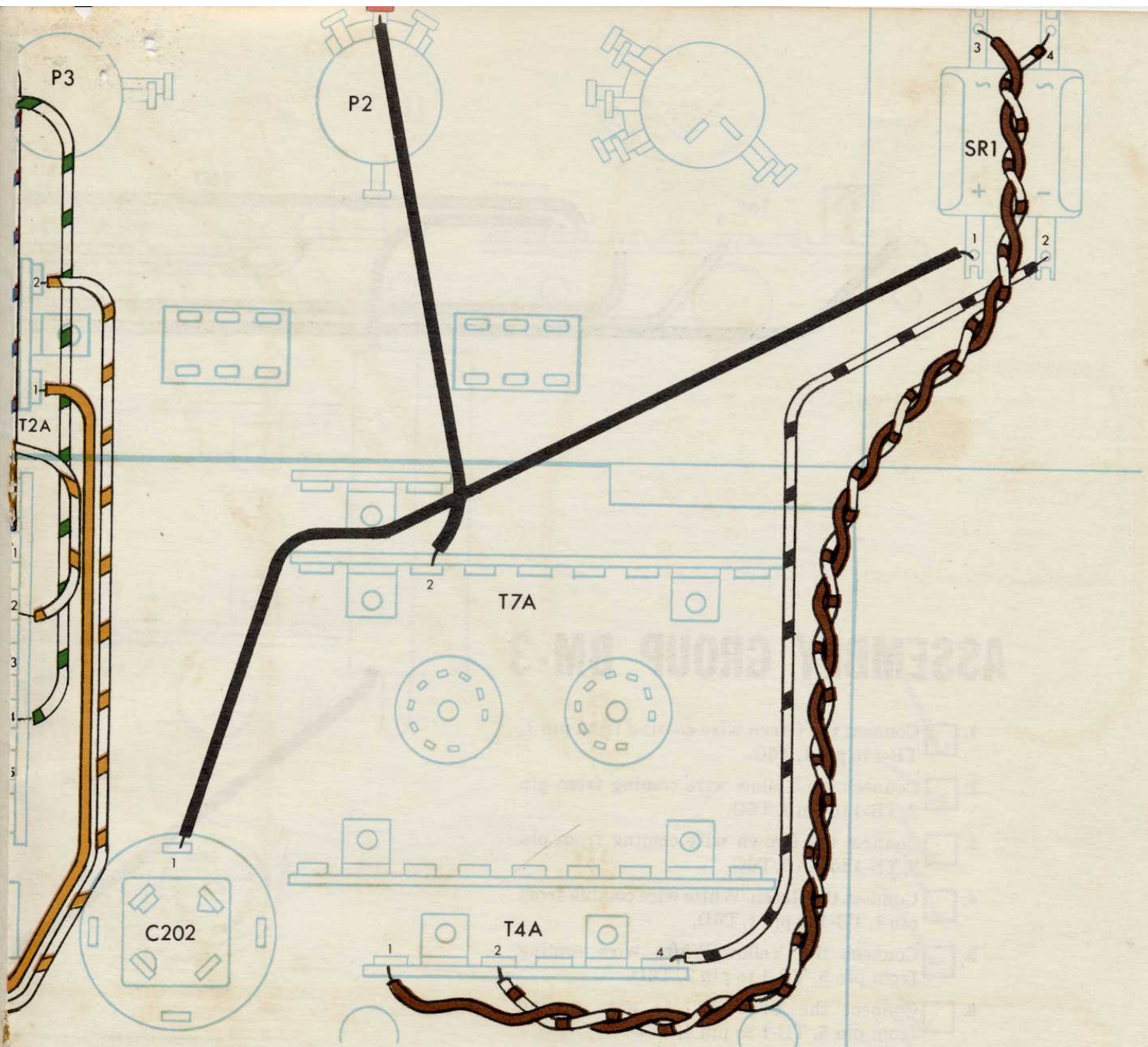




## ASSEMBLY GROUP BM-2

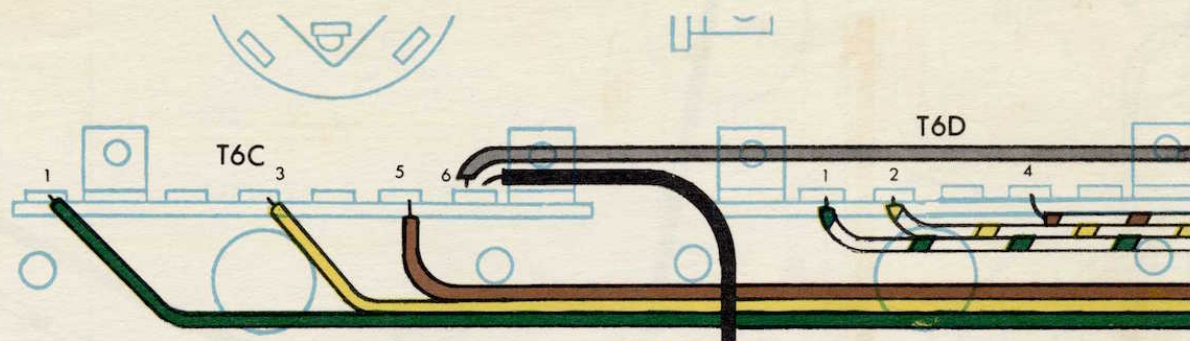
1. ☒ Add a 3½" piece of spaghetti to lead 2 of the Brown PEC-222-E. Connect this lead to pin 1, T6A.
2. ☒ Add a 3½" piece of spaghetti to lead 2 of the Red PEC-222-E. Connect this lead to pin 4, T6A.
3. ☒ Connect the Yellow wire coming from pin 10, SW-2 to pin 7, V1.
4. ☒ Connect the Yellow/White wire coming from pin 4, SW-2 to pin 7, V101.
5. ☒ Connect the Blue wire coming from pin 5, SS-5 to pin 1, T2B.
6. ☒ Connect the Blue/White wire coming from pin 11, SS-5 to pin 1, T6B.
7. ☒ Connect a 2½" Black wire from pin 6, SW-2 (S1) to pin 3, T6A.
8. ☒ Connect a 2½" Black wire from pin 3, SW-1 (S4) to pin 6, T6A.
9. ☒ Connect a 4" Orange wire from pin 4, SW-1 (S3) to pin 3, T6B.
10. ☒ Connect an 8" Orange/White wire from pin 5, SW-1 (S3) to pin 2, T5B.
11. ☒ Connect the Yellow wire coming from pin 3, P4 to pin 4, T6B.
12. ☒ Connect the Yellow/White wire coming from pin 7, P4 to pin 3, T5B.





13. ☒ Connect the Red wire coming from pin 1, T2M to pin 2, T5A.
14. ☒ Connect the Blue wire coming from pin 2, P3 to pin 6, T6B.
15. ☒ Connect the Green wire coming from pin 3, P3 to pin 5, T6B.
16. ☒ Connect the Purple wire coming from pin 4, P3 to pin 2, T6B.
17. ☒ Connect the Blue/White wire coming from pin 6, P3 to pin 5, T5B.
18. ☒ Connect the Green/White wire coming from pin 7, P3 to pin 4, T5B.
19. ☒ Connect the Purple/White wire coming from pin 8, P3 to pin 1, T5B.
20. ☒ Connect the Orange wire coming from pin 1, T2A to pin 1, T6C.
21. ☒ Connect the Orange/White wire coming from pin 2, T2A to pin 1, T6D.
22. ☒ Connect a 4" Black wire from pin 3, P2 (S2) to pin 2, T7A.
23. ☒ Connect the Black wire coming from pin 1, SR-1 to pin 1, C202.
24. ☒ Connect the Black/White wire coming from pin 2, SR-1 to pin 4, T4A.
25. ☒ Twist together the Brown and Brown/White wires coming from SR-1. Connect the Brown wire to pin 1, T4A and the Brown/White wire to pin 2, T4A.

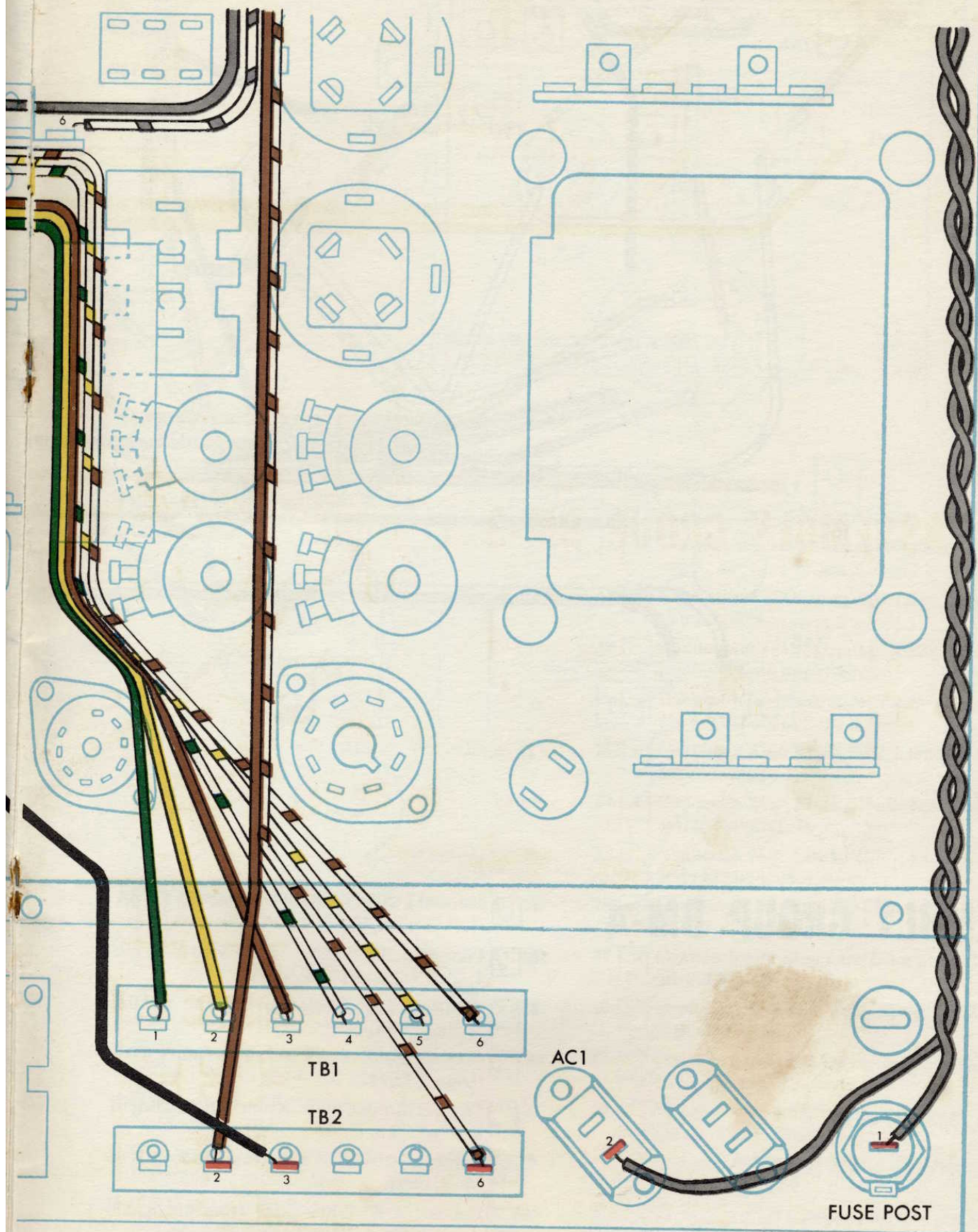




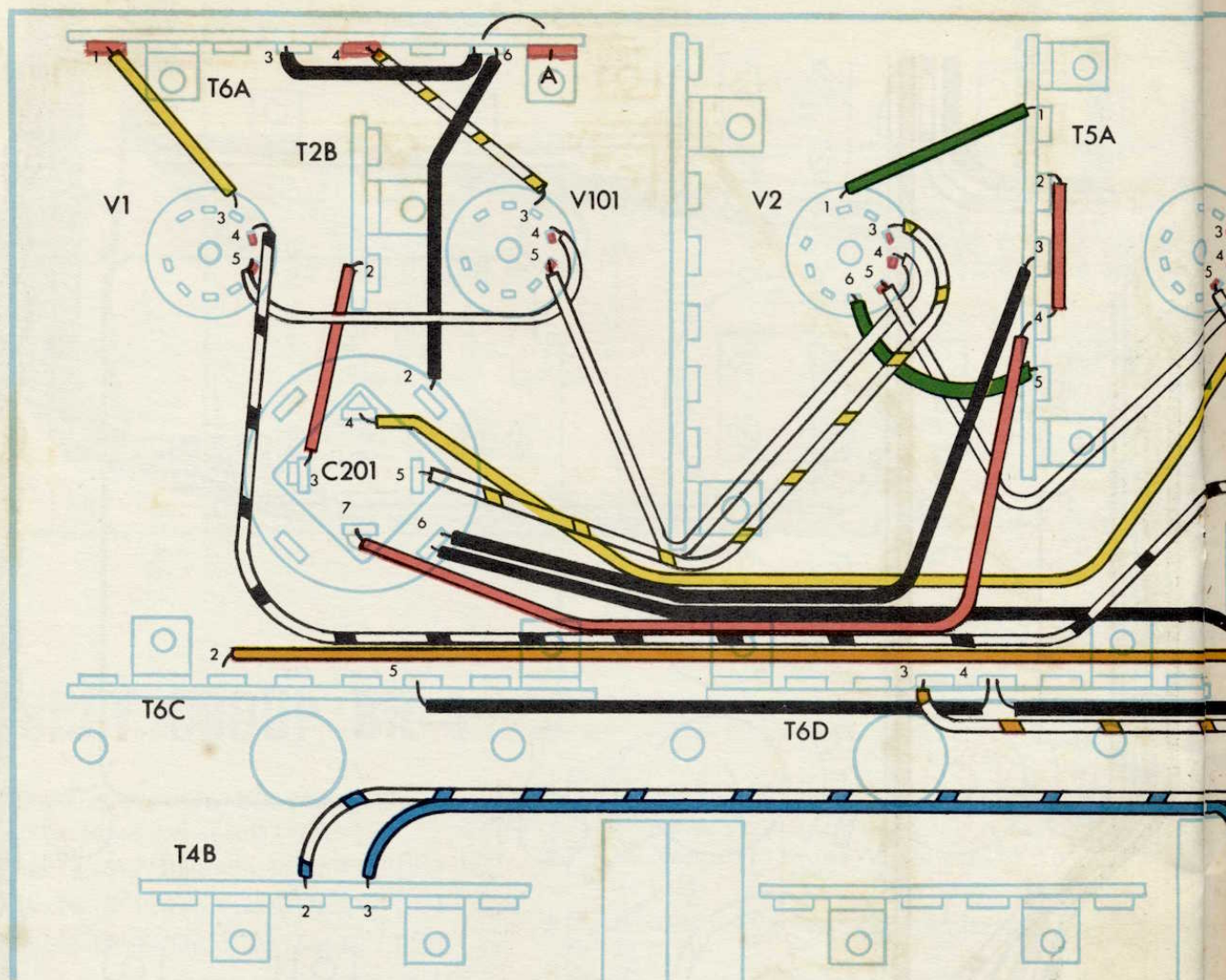
## ASSEMBLY GROUP BM-3

1. ☒ Connect the Green wire coming from pin 1, TB-1 to pin 1, T6C.
2. ☒ Connect the Yellow wire coming from pin 2, TB-1 to pin 3, T6C.
3. ☒ Connect the Brown wire coming from pin 3, TB-1 to pin 5, T6C.
4. ☒ Connect the Green/White wire coming from pin 4, TB-1 to pin 1, T6D.
5. ☒ Connect the Yellow/White wire coming from pin 5, TB-1 to pin 2, T6D.
6. ☒ Connect the Brown/White wire coming from pin 6, TB-1 to pin 4, T6D.
7. ☒ Connect the Brown wire coming from pin 1, SS-2 to pin 2, TB-2 (**S1**).
8. ☒ Connect the Brown/White wire coming from pin 4, SS-2 to pin 6, TB-2 (**S1**).
9. ☒ Connect the Grey wire coming from pin 2, SS-2 to pin 6, T6C.
10. ☒ Connect the Grey/White wire coming from pin 5, SS-2 to pin 6, T6D.
11. ☒ Twist together the two Heavy Grey wires coming from P1. Connect the longer one to pin 2, AC-1 (**S2**). Connect the remaining one to pin 1 on the Fuse Post (**S2**).
12. ☒ Connect a 12" Black wire from pin 3, TB-2 (**S1**) to pin 6, T6C.





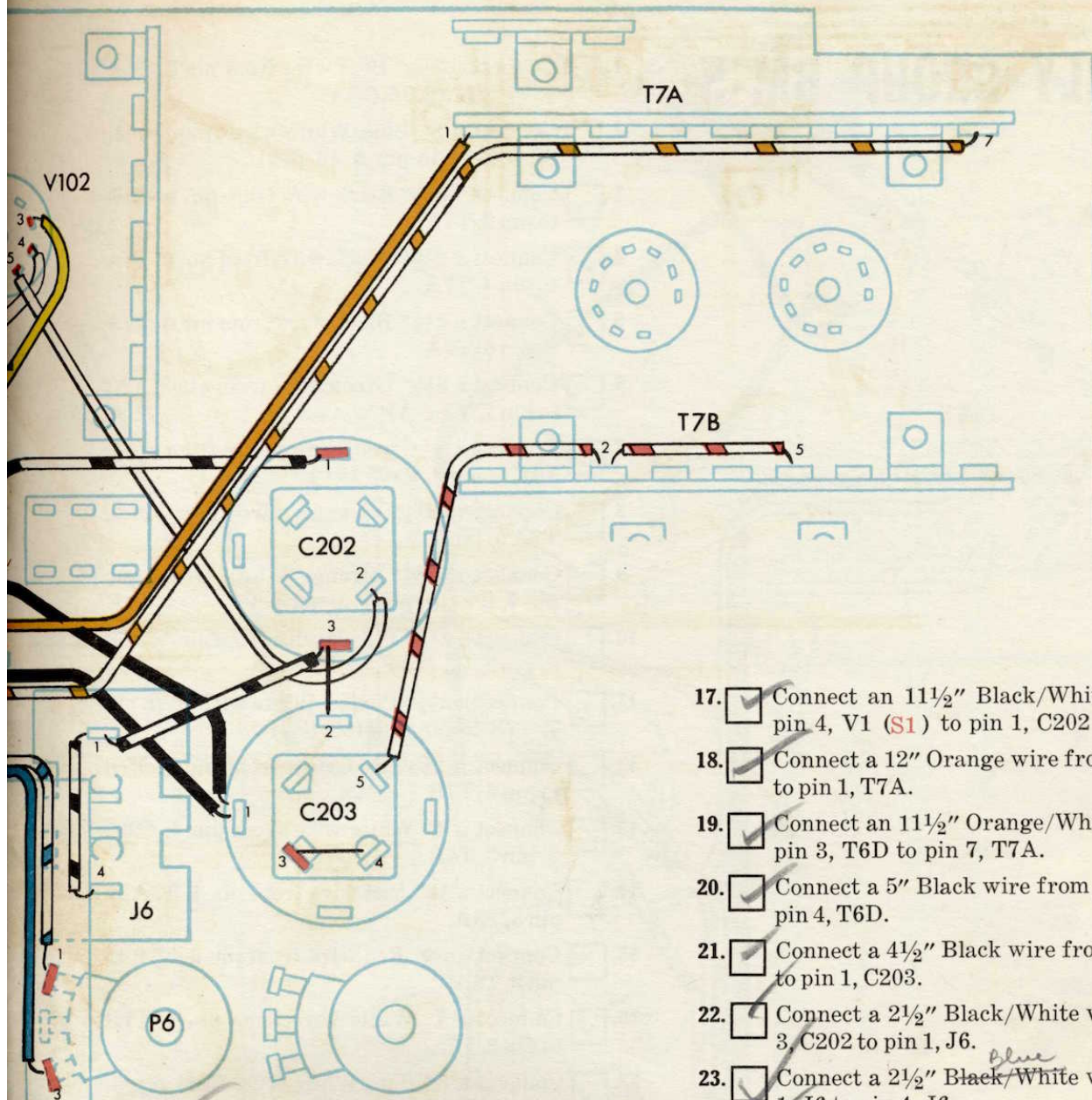




## ASSEMBLY GROUP BM-4

1. ☒ Connect a 2½" Yellow wire from pin 1, T6A (S2) to pin 3, V1.
2. ☒ Connect a 2½" Yellow/White wire from pin 4, T6A (S2) to pin 3, V101.
3. ☒ Connect a 2½" Black wire from pin 3, T6A to pin 6, T6A.
4. ☒ Connect a 3½" Black wire from pin 6, T6A to pin 2, C201.
5. ☒ Connect a buss wire from pin 6, T6A to lug "A" T6A (S1).
6. ☒ Connect a 2½" Red wire from pin 2, T2B to pin 3, C201.
7. ☒ Connect a 4" White wire from pin 5, V1 (S1) to pin 4, V101 (S1).
8. ☒ Connect a 6½" White wire from pin 5, V101 (S1) to pin 1, V2 (S1).





9. ☒ Connect a 5" White wire from pin 5, V2 (S1) to pin 4, V102 (S1).
10. ☒ Connect a 5" White wire from pin 5, V102 (S1) to pin 2, C202.
11. ☒ Connect an 8" Yellow wire from pin 4, C201 to pin 3, V102 (S1).
12. ☒ Connect a 6" Yellow/White wire from pin 5, C201 to pin 3, V2 (S1).
13. ☒ Connect a 5½" Black wire from pin 6, C201 to pin 3, T5A.
14. ☒ Connect an 8½" Black wire from pin 6, C201 to pin 1, C203.
15. ☒ Connect a 6" Red wire from pin 7, C201 to pin 4, T5A.
16. ☒ Connect a 2½" Red wire from pin 2, T5A to pin 4, T5A.

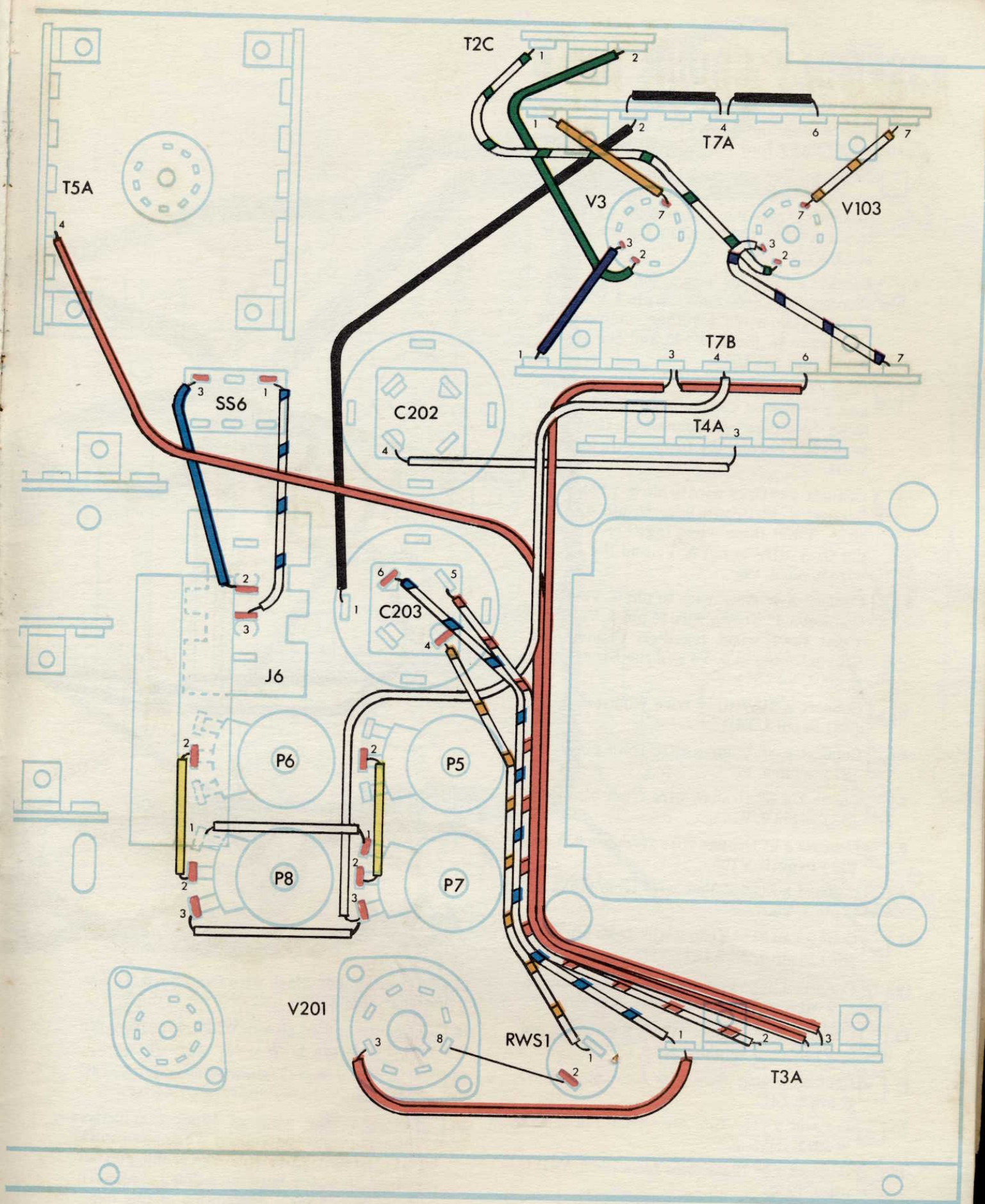
17. ☒ Connect an 11½" Black/White wire from pin 4, V1 (S1) to pin 1, C202 (S2).
18. ☒ Connect a 12" Orange wire from pin 2, T6C to pin 1, T7A.
19. ☒ Connect an 11½" Orange/White wire from pin 3, T6D to pin 7, T7A.
20. ☒ Connect a 5" Black wire from pin 5, T6C to pin 4, T6D.
21. ☒ Connect a 4½" Black wire from pin 4, T6D to pin 1, C203.
22. ☒ Connect a 2½" Black/White wire from pin 3, C202 to pin 1, J6.
23. ☒ Connect a 2½" <sup>Blue</sup> Black/White wire from pin 1, J6 to pin 4, J6.
24. ☒ Connect an 8" Blue/White wire from pin 2, T4B to pin 1, P6 (S1).
25. ☒ Connect an 8" Blue wire from pin 3, T4B to pin 3, P6 (S1).
26. ☒ Connect a buss wire from pin 3, C202 (S2) to pin 2, C203.
27. ☒ Connect a buss wire from pin 3, C203 (S1) to pin 4, C203.
28. ☒ Connect a 4" Red/White wire from pin 5, C203 to pin 2, T7B.
29. ☒ Connect a 2½" Red/White wire from pin 2, T7B to pin 5, T7B.
30. ☒ Connect a 2½" Green wire from pin 1, T5A to pin 1, V2.
31. ☒ Connect a 2½" Green wire from pin 5, T5A to pin 6, V2.



# ASSEMBLY GROUP BM-5

1. ☒ Connect a 2½" Blue wire from pin 3, SS-6 (S1) to pin 2, J6 (S1).
2. ☒ Connect a 3" Blue/White wire from pin 1, SS-6 (S1) to pin 3, J6 (S1).
3. ☒ Connect a 6½" Black wire from pin 1, C203 to pin 2, T7A.
4. ☒ Connect a 2½" Black wire from pin 2, T7A to pin 4, T7A.
5. ☒ Connect a 2½" Black wire from pin 4, T7A to pin 6, T7A.
6. ☒ Connect a 3½" Green wire from pin 2, T2C to pin 2, V3 (S1).
7. ☒ Connect a 4" Green/White wire from pin 1, T2C to pin 2, V103 (S1).
8. ☒ Connect a 2½" Orange wire from pin 1, T7A to pin 7, V3 (S1).
9. ☒ Connect a 2½" Orange/White wire from pin 7, T7A to pin 7, V103 (S1).
10. ☒ Connect a 2½" Purple wire from pin 1, T7B to pin 3, V3 (S1).
11. ☒ Connect a 2½" Purple/White wire from pin 7, T7B to pin 3, V103 (S1).
12. ☒ Connect a 2½" Red wire from pin 3, T7B to pin 6, T7B.
13. ☒ Connect a 4" White wire from pin 4, C202 to pin 3, T4A.
14. ☒ Connect a 12" Red wire from pin 4, T5A to pin 3, T3A.
15. ☒ Connect an 9" Red wire from pin 3, T7B to pin 3, T3A.
16. ☒ Connect a 7" White wire from pin 4, T7B to pin 3, P7.
17. ☒ Connect a 6" Blue/White wire from pin 6, C203 (S1) to pin 1, T3A.
18. ☒ Connect a 6½" Red/White wire from pin 5, C203 to pin 2, T3A.
19. ☒ Connect a 5" Orange/White wire from pin 4, C203 (S2) to pin 1, RWS-1.
20. ☒ Connect a buss wire from pin 8, V201 to pin 2, RWS-1 (S1).
21. ☒ Connect a 4½" Red wire from pin 3, V201 to pin 1, T3A.
22. ☒ Connect a 2½" White wire from pin 3, P8 (S1) to pin 3, P7 (S2).
23. ☒ Connect a 2½" White wire from pin 1, P8 to pin 1, P7 (S1).
24. ☒ Connect a 2½" Yellow wire from pin 2, P6 (S1) to pin 2, P8 (S1).
25. ☒ Connect a 2½" Yellow wire from pin 2, P5 (S1) to pin 2, P7 (S1).



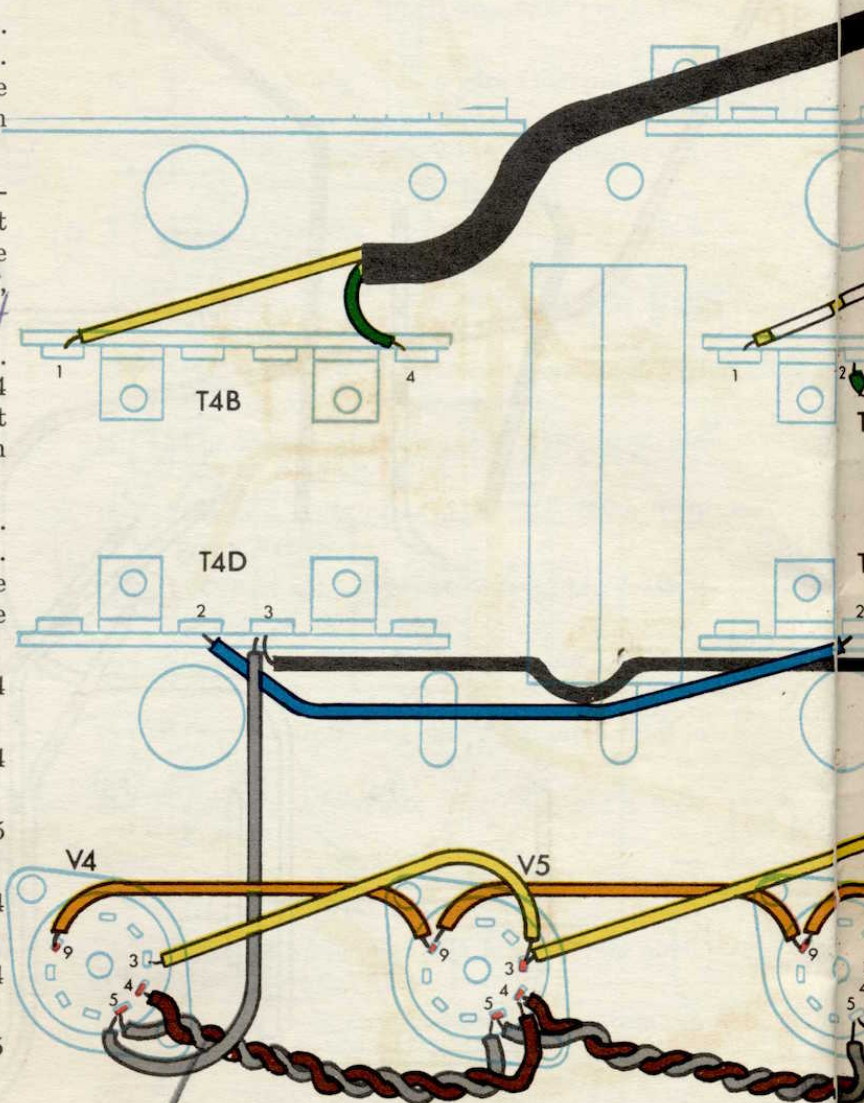




# ASSEMBLY GROUP BM-6

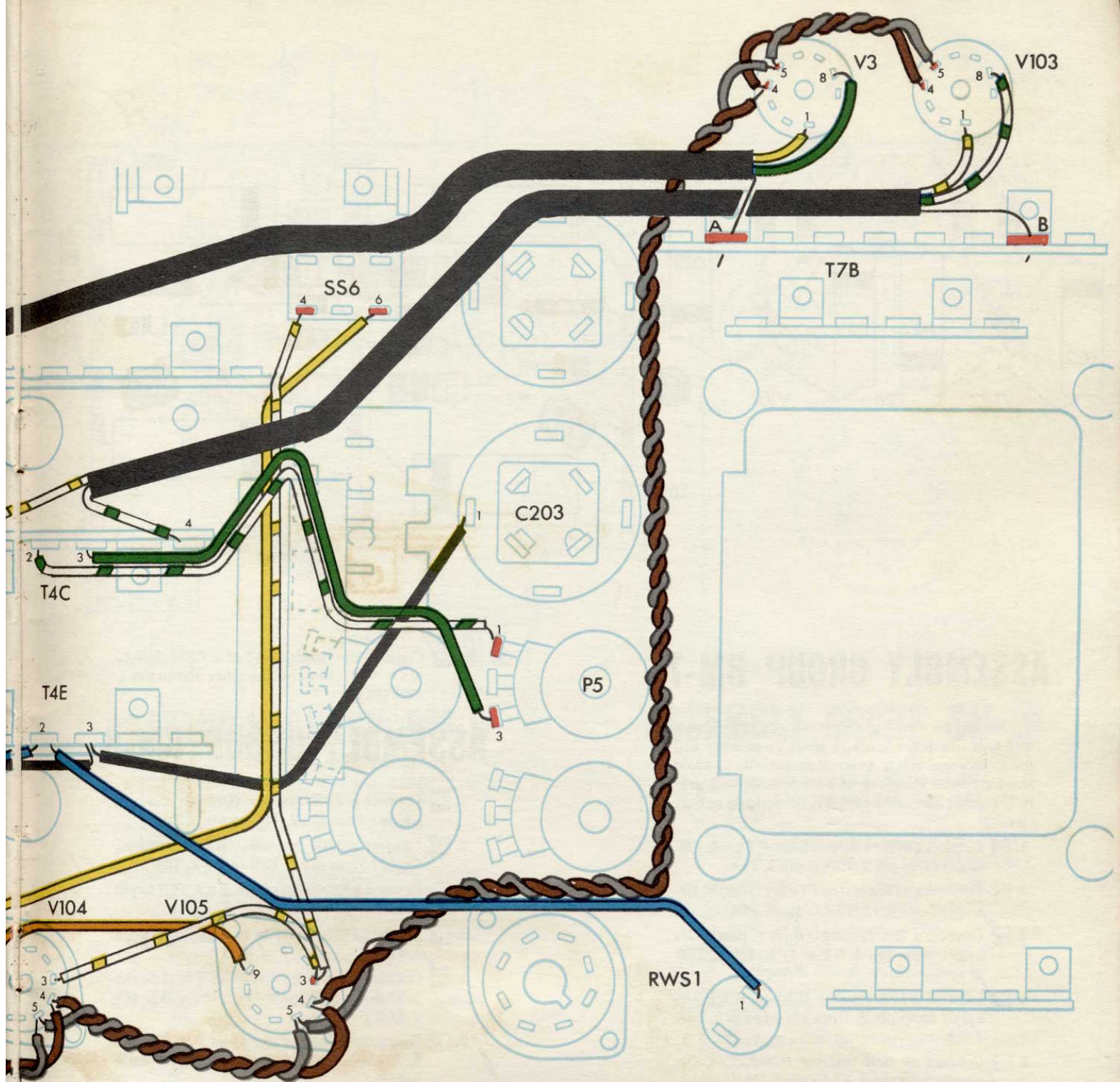
Twist the Brown and Grey wires in the following steps AT LEAST four (4) turns per inch.

1. ☐ Connect a 3" Grey wire to pin 5, V3. Connect a 3" Brown wire to pin 4, V3. Twist these wires together. Connect the Grey wire to pin 5, V103 (S1) and the Brown wire to pin 4, V103 (S1).
2. ☐ Connect a 12" Grey wire to pin 5, V3 (S2). Connect a 12" Brown wire to pin 4, V3 (S2). Twist these wires together. Connect the Grey wire to pin 5, V105 and the Brown wire to pin 4, V105.
3. ☒ Connect a 4" Grey wire to pin 5, V105. Connect a 4" Brown wire to pin 4, V105. Twist these wires together. Connect the Grey wire to pin 5, V104 and the Brown wire to pin 4, V104.
4. ☐ Connect a 4" Grey wire to pin 5, V104 (S2). Connect a 4" Brown wire to pin 4, V104 (S2). Twist these wires together. Connect the Grey wire to pin 5, V5 and the Brown wire to pin 4, V5.
5. ☐ Connect a 4" Grey wire to pin 5, V5 (S2). Connect a 4" Brown wire to pin 4, V5 (S2). Twist these wires together. Connect the Grey wire to pin 5, V4 and the Brown wire to pin 4, V4 (S1).
6. ☒ Connect a 3½" Grey wire from pin 5, V4 (S2) to pin 3, T4D.
7. ☒ Connect a 3" Orange wire from pin 9, V4 (S1) to pin 9, V5.
8. ☒ Connect a 3" Orange wire from pin 9, V5 (S2) to pin 9, V104.
9. ☒ Connect a 3" Orange wire from pin 9, V104 (S2) to pin 9, V105.
10. ☐ Connect a 3½" Yellow wire from pin 3, V4 to pin 3, V5.
11. ☒ Connect an 8½" Yellow wire from pin 3, V5 (S2) to pin 6, SS-6 (S1).
12. ☐ Connect a 3½" Yellow/White wire from pin 3, V104 to pin 3, V105.
13. ☒ Connect a 7" Yellow/White wire from pin 3, V105 (S2) to pin 4, SS-6 (S1).
14. ☐ Connect a 4½" Blue wire from pin 2, T4D to pin 2, T4E.
15. ☒ Connect a 7½" Blue wire from pin 2, T4E to pin 1, RWS-1.
16. ☒ Connect a 5" Black wire from pin 3, T4D to pin 3, T4E.



17. ☒ Connect a 6" Black wire from pin 3, T4E to pin 1, C203.
  18. ☒ Connect a 6½" Green/White wire from pin 2, T4C to pin 1, P5 (S1).
  19. ☒ Connect a 6½" Green wire from pin 3, T4C to pin 3, P5 (S1).
  20. ☒ Place a 7½" piece of Black Conductive Vinyl\* over a 10" Yellow/White wire and a 9½" Green/White wire. At one end, pull out about 1" of the bare wire that passes thru
- \*See page 8 for a description of this item.



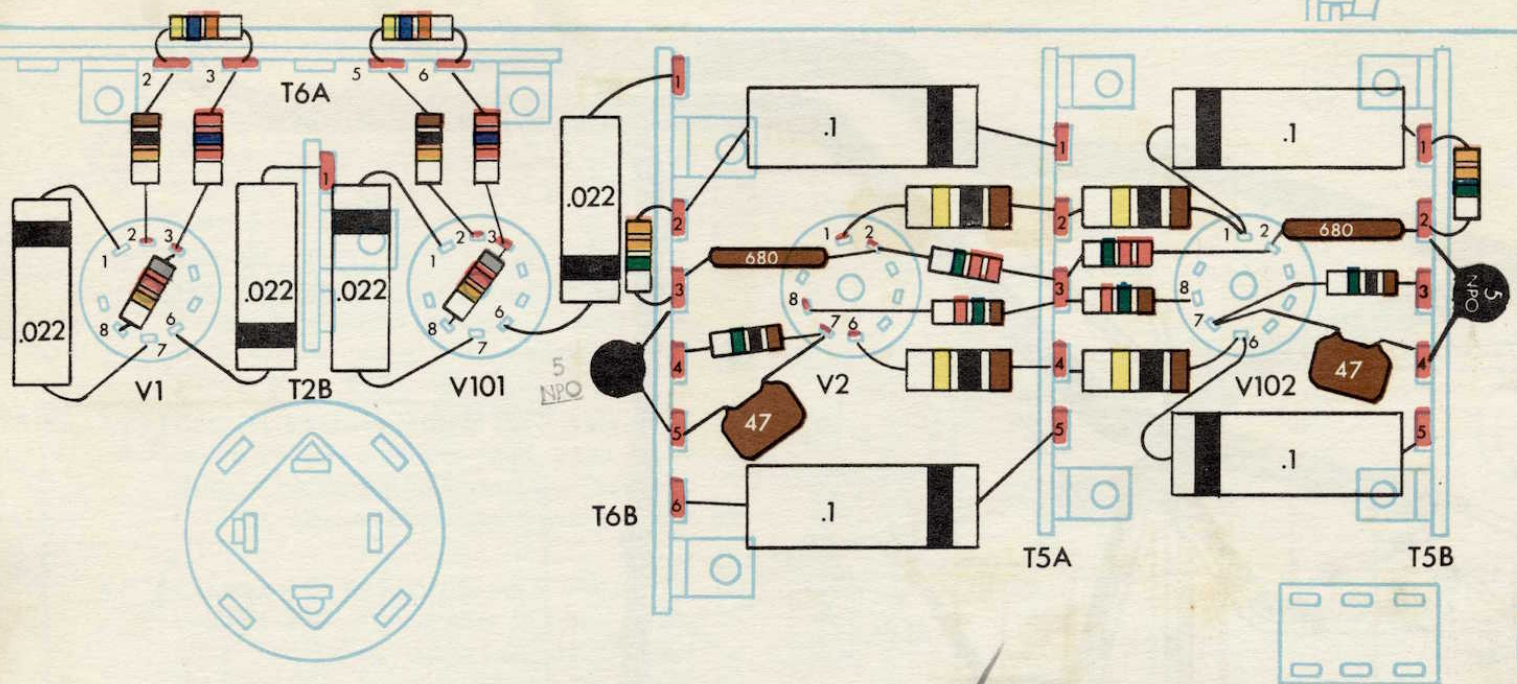


the vinyl. At this end, connect the Yellow/White wire to pin 1, V103, the Green/White wire to pin 8, V103, and the bare wire to lug "B" T7B (S1). At the other end, connect the Yellow/White wire to pin 1, T4C and the Green/White wire to pin 4, T4C.

21. ☒ Place an 8½" piece of Black Conductive Vinyl over a 12" Yellow wire and an 11" Green wire. At one end, pull out about 1" of the bare wire that passes thru the vinyl. At

this end, connect the Yellow wire to pin 1, V3, the Green wire to pin 8, V3, and the bare wire to lug "A" T7B (S1). At the other end, connect the Yellow wire to pin 1, T4B and the Green wire to pin 4, T4B.





## ASSEMBLY GROUP BM-7

You will be working with resistors and capacitors now. Keep the leads as short as possible and the mechanical joints as small as possible to avoid short circuits. Whenever a wire is soldered, carefully inspect it to make sure it is not causing a short circuit.

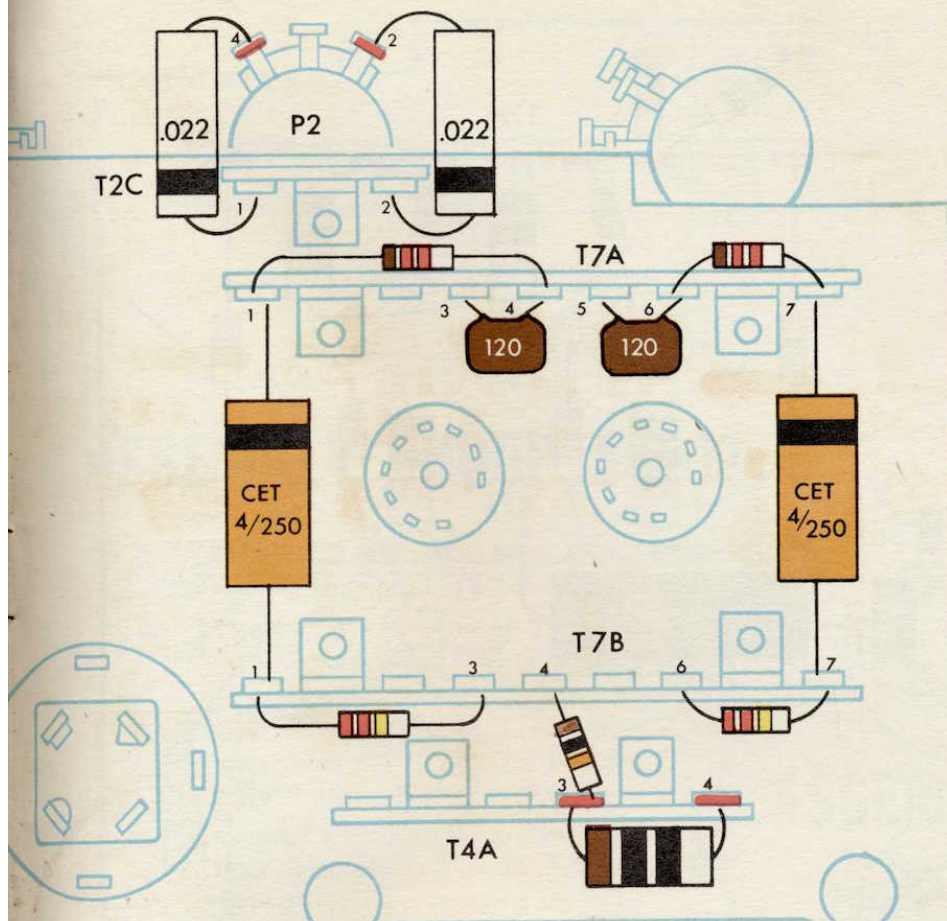
1. ☐ Connect a 47K resistor (Yellow, Purple, Orange) from pin 2, T6A to pin 3, T6A.
2. ☐ Connect a 47K resistor (Yellow, Purple, Orange) from pin 5, T6A to pin 6, T6A.
3. ☐ Connect a 10K resistor (Brown, Black, Orange) from pin 2, V1 (S1) to pin 2, T6A (S3).
4. ☐ Connect a 10K resistor (Brown, Black, Orange) from pin 2, V101 (S1) to pin 5, T6A (S3).
5. ☐ Connect an 82K resistor (Grey, Red, Orange) from pin 8, V1 to pin 3, V1.
6. ☐ Connect an 82K resistor (Grey, Red, Orange) from pin 8, V101 to pin 3, V101.
7. ☐ Connect a 2.7K resistor (Red, Purple, Red) from pin 3, V1 (S3) to pin 3, T6A (S5).
8. ☐ Connect a 2.7K resistor (Red, Purple, Red) from pin 3, V101 (S3) to pin 6, T6A (S7).
9. ☐ Connect the banded end of a CPM-.022 to pin 1, V1. Connect the other end to pin 7, V1.
10. ☐ Connect the banded end of a CPM-.022 to pin 6, V1. Connect the other end to pin 1, T2B (S2).
11. ☐ Connect the banded end of a CPM-.022 to pin 1, V101. Connect the other end to pin 7, V101.

12. ☐ Connect the banded end of a CPM-.022 to pin 6, V101. Connect the other end to pin 1, T6B (S2).

## ASSEMBLY GROUP BM-8

1. ☐ Connect a 3.3M resistor (Orange, Orange, Green) from pin 2, T6B to pin 3, T6B.
2. ☐ Connect a 3.3M resistor (Orange, Orange, Green) from pin 1, T5B to pin 2, T5B.
3. ☐ Connect a CC-5 NPO from pin 3, T6B to pin 5, T6B.
4. ☐ Connect a CC-5 NPO from pin 2, T5B to pin 4, T5B.
5. ☐ Connect the banded end of a CPM-.1 to pin 1, T5A (S2). Connect the other end to pin 2, T6B (S3).
6. ☐ Connect the banded end of a CPM-.1 to pin 5, T5A (S2). Connect the other end to pin 6, T6B (S2).
7. ☐ Connect the banded end of a CPM-.1 to pin 1, V102. Connect the other end to pin 1, T5B (S3).
8. ☐ Connect the banded end of a CPM-.1 to pin 6, V102. Connect the other end to pin 5, T5B (S2).
9. ☐ Connect a CM-680 from pin 2, V2 to pin 3, T6B (S4).
10. ☐ Connect a CM-680 from pin 2, V102 to pin 2, T5B (S4).
11. ☐ Connect a 1M resistor (Brown, Black, Green) from pin 7, V2 to pin 4, T6B (S2).
12. ☐ Connect a 1M resistor (Brown, Black, Green) from pin 7, V102 to pin 3, T5B (S2).





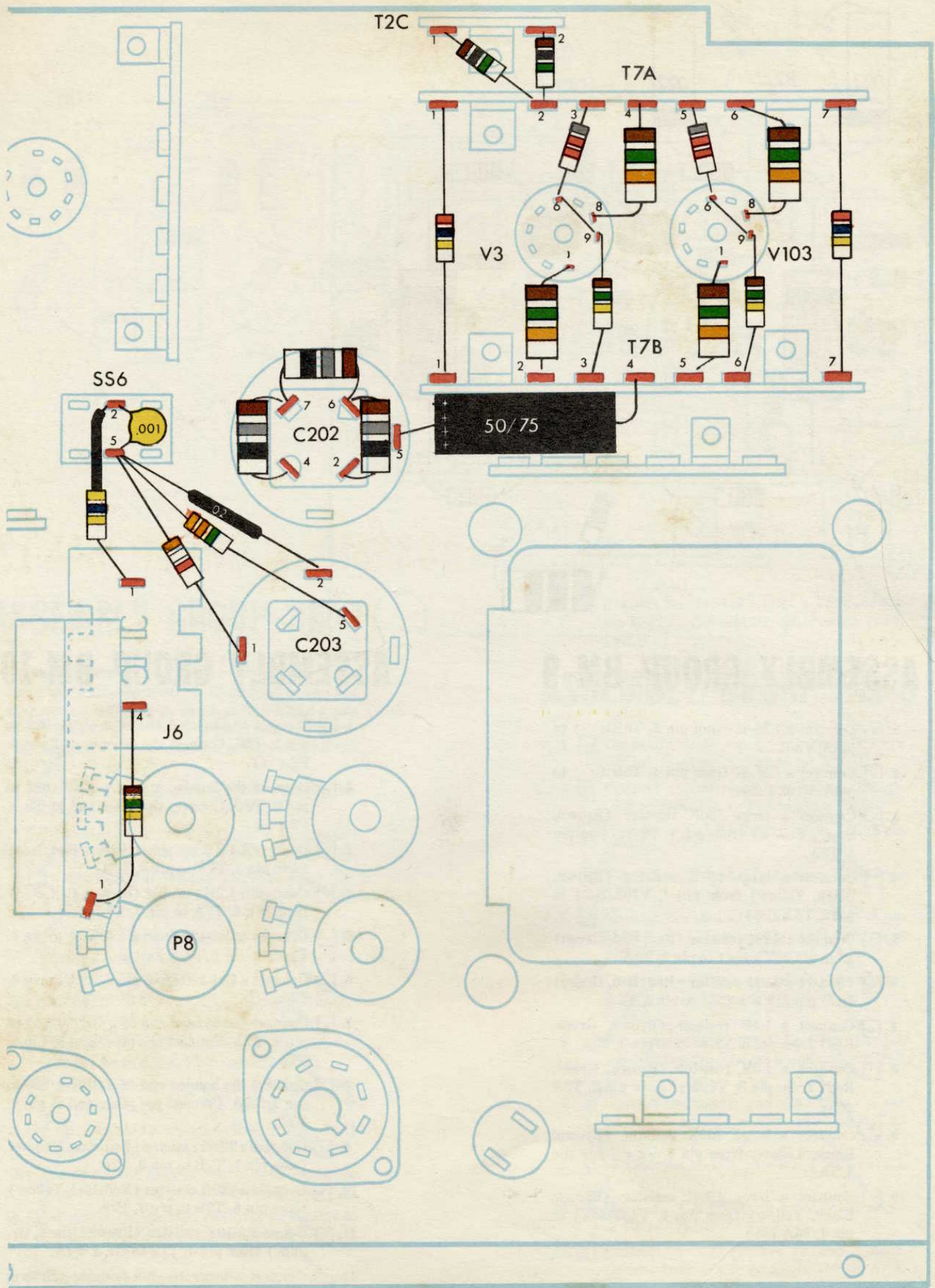
## ASSEMBLY GROUP BM-9

1. ☒ Connect a CM-47 from pin 5, T6B (S3) to pin 7, V2 (S2).
2. ☒ Connect a CM-47 from pin 4, T5B (S3) to pin 7, V102 (S2).
3. ☒ Connect a large 100K resistor (Brown, Black, Yellow) from pin 1, V2 (S2) to pin 2, T5A.
4. ☒ Connect a large 100K resistor (Brown, Black, Yellow) from pin 1, V102 (S2) to pin 2, T5A (S4).
5. ☒ Connect a 2.2M resistor (Red, Red, Green) from pin 2, V2 (S2) to pin 3, T5A.
6. ☒ Connect a 2.2M resistor (Red, Red, Green) from pin 2, V102 (S2) to pin 3, T5A.
7. ☒ Connect a 1.5K resistor (Brown, Green, Red) from pin 8, V2 (S1) to pin 3, T5A.
8. ☒ Connect a 1.5K resistor (Brown, Green, Red) from pin 8, V102 (S1) to pin 3, T5A (S5).
9. ☒ Connect a large 100K resistor (Brown, Black, Yellow) from pin 6, V2 (S2) to pin 4, T5A.
10. ☒ Connect a large 100K resistor (Brown, Black, Yellow) from pin 6, V102 (S2) to pin 4, T5A (S5).

## ASSEMBLY GROUP BM-10

1. ☒ Connect the banded end of a CPM-.022 to pin 1, T2C. Connect the other end to pin 4, P2 (S2).
2. ☒ Connect the banded end of a CPM-.022 to pin 2, T2C. Connect the other end to pin 2, P2 (S2).
3. ☒ Connect a 1.2K resistor (Brown, Red, Red) from pin 1, T7A to pin 4, T7A.
4. ☒ Connect a 1.2K resistor (Brown, Red, Red) from pin 6, T7A to pin 7, T7A.
5. ☒ Connect a CM-120 from pin 3, T7A to pin 4, T7A.
6. ☒ Connect a CM-120 from pin 5, T7A to pin 6, T7A.
7. ☒ Connect the banded end of a CET-4/250 to pin 1, T7A. Connect the other end to pin 1, T7B.
8. ☒ Connect the banded end of a CET-4/250 to pin 7, T7A. Connect the other end to pin 7, T7B.
9. ☒ Connect a 220K resistor (Red, Red, Yellow) from pin 1, T7B to pin 3, T7B.
10. ☒ Connect a 220K resistor (Red, Red, Yellow) from pin 6, T7B to pin 7, T7B.
11. ☒ Connect a 10K resistor (Brown, Black, Orange) from pin 4, T7B to pin 3, T4A.
12. ☒ Connect a large 10 ohm resistor (Brown, Black, Black) from pin 3, T4A (S3) to pin 4, T4A (S2).







## ASSEMBLY GROUP BM-11

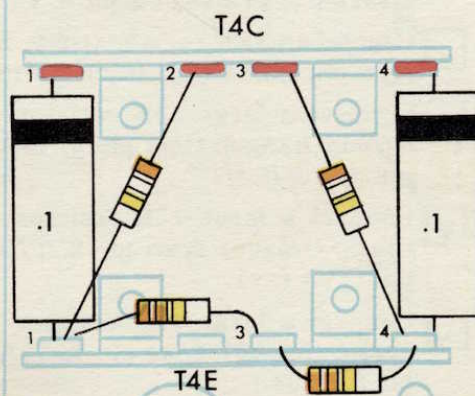
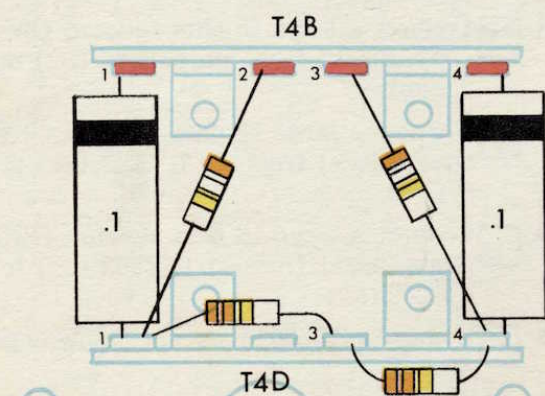
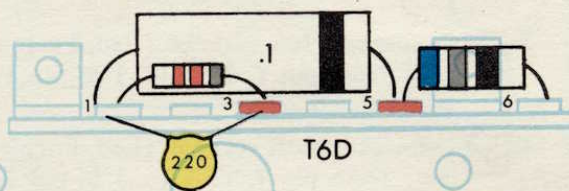
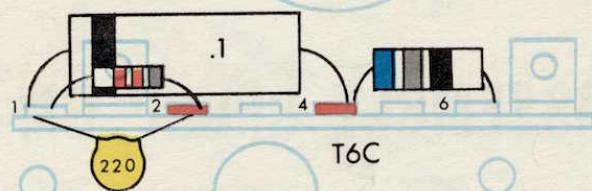
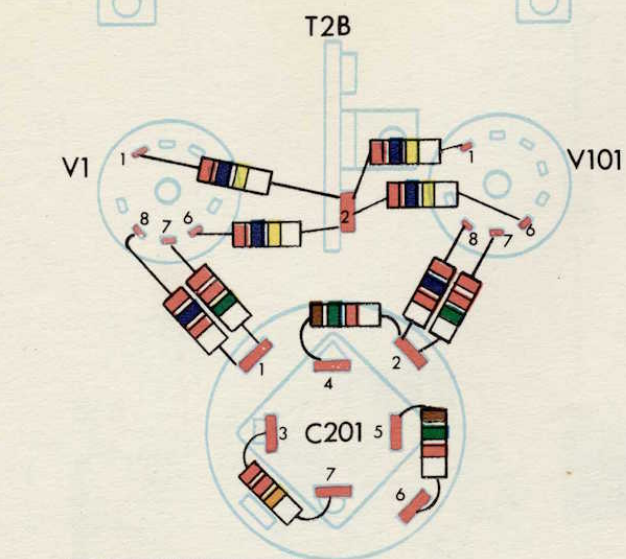
1. ☒ Connect a 1M resistor (Brown, Black, Green) from pin 1, T2C (S3) to pin 2, T7A.
2. ☒ Connect a 1M resistor (Brown, Black, Green) from pin 2, T2C (S3) to pin 2, T7A (S5).
3. ☒ Connect a 270K resistor (Red, Purple, Yellow) from pin 1, T7A (S5) to pin 1, T7B (S4).
4. ☒ Connect a 270K resistor (Red, Purple, Yellow) from pin 7, T7A (S5) to pin 7, T7B (S4).
5. ☒ Connect an 8.2K resistor (Grey, Red, Red) from pin 3, T7A (S2) to pin 6, V3.
6. ☒ Connect an 8.2K resistor (Grey, Red, Red) from pin 5, T7A (S2) to pin 6, V103.
7. ☒ Connect a large 15K resistor (Brown, Green, Orange) from pin 4, T7A (S5) to pin 8, V3 (S2).
8. ☒ Connect a large 15K resistor (Brown, Green, Orange) from pin 2, T7B (S3) to pin 1, V3 (S2).
9. ☒ Connect a large 15K resistor (Brown, Green, Orange) from pin 6, T7A (S4) to pin 8, V103 (S2).
10. ☒ Connect a large 15K resistor (Brown, Green, Orange) from pin 5, T7B (S2) to pin 1, V103 (S2).
11. ☒ Connect one end of a 150K resistor (Brown, Green, Yellow) to pin 6, T7B (S3). Pass the other end thru pin 9, V103 (S2)\*\* and connect it to pin 6, V103 (S2).
12. ☒ Connect one end of a 150K resistor (Brown, Green, Yellow) to pin 3, T7B (S4). Pass the other end thru pin 9, V3 (S2)\*\* and connect it to pin 6, V3 (S2).

\*\*A wire passing through a pin counts as two connections to that pin when it is soldered.

## ASSEMBLY GROUP BM-12

1. ☒ Connect the end of a CET-50/75 having the plus (+) signs to pin 5, C202 (S1). Connect the other end to pin 4, T7B (S3).
2. ☒ Connect a large 18 ohm resistor (Brown, Grey, Black) from pin 4, C202 (S2) to pin 7, C202.
3. ☒ Connect a large 18 ohm resistor (Brown, Grey, Black) from pin 7, C202 (S2) to pin 6, C202.
4. ☒ Connect a large 18 ohm resistor (Brown, Grey, Black) from pin 6, C202 (S2) to pin 2, C202 (S2).
5. ☒ Connect a CC-.001 from pin 2, SS-6 to pin 5, SS-6.
6. ☒ Connect a CC-.02 from pin 2, C203 (S2) to pin 5, SS-6.
7. ☒ Connect a 3.3M resistor (Orange, Orange, Green) from pin 5, C203 (S3) to pin 5, SS-6.
8. ☒ Connect a 3.9K resistor (Orange, White, Red) from pin 1, C203 (S5) to pin 5, SS-6 (S4).
9. ☒ Add a  $\frac{3}{4}$ " piece of spaghetti to one end of a 470K resistor (Yellow, Purple, Yellow). Connect this end to pin 2, SS-6 (S2). Connect the other end to pin 1, J6 (S3).
10. ☒ Connect a 150K resistor (Brown, Green, Yellow) from pin 4, J6 (S2) to pin 1, P8 (S2).







## ASSEMBLY GROUP BM-13

1. ☒ Connect a 270K resistor (Red, Purple, Yellow) from pin 1, V1 (S2) to pin 2, T2B.
2. ☒ Connect a 270K resistor (Red, Purple, Yellow) from pin 1, V101 (S2) to pin 2, T2B.
3. ☒ Connect a 270K resistor (Red, Purple, Yellow) from pin 6, V101 (S2) to pin 2, T2B.
4. ☒ Connect a 270K resistor (Red, Purple, Yellow) from pin 6, V1 (S2) to pin 2, T2B (S5).
5. ☒ Connect a 1.5K resistor (Brown, Green, Red) from pin 2, C201 to pin 4, C201 (S2).
6. ☒ Connect a 2.2M resistor (Red, Red, Green) from pin 7, V1 (S3) to pin 1, C201.
7. ☒ Connect a 2.2M resistor (Red, Red, Green) from pin 7, V101 (S3) to pin 2, C201.
8. ☒ Connect a 2.7K resistor (Red, Purple, Red) from pin 8, V101 (S2) to pin 2, C201 (S4).
9. ☒ Connect a 2.7K resistor (Red, Purple, Red) from pin 8, V1 (S2) to pin 1, C201 (S3).
10. ☒ Connect a 1.5K resistor (Brown, Green, Red) from pin 5, C201 (S2) to pin 6, C201 (S3).
11. ☒ Connect a 22K resistor (Red, Red, Orange) from pin 3, C201 (S2) to pin 7, C201 (S2).

## ASSEMBLY GROUP BM-14

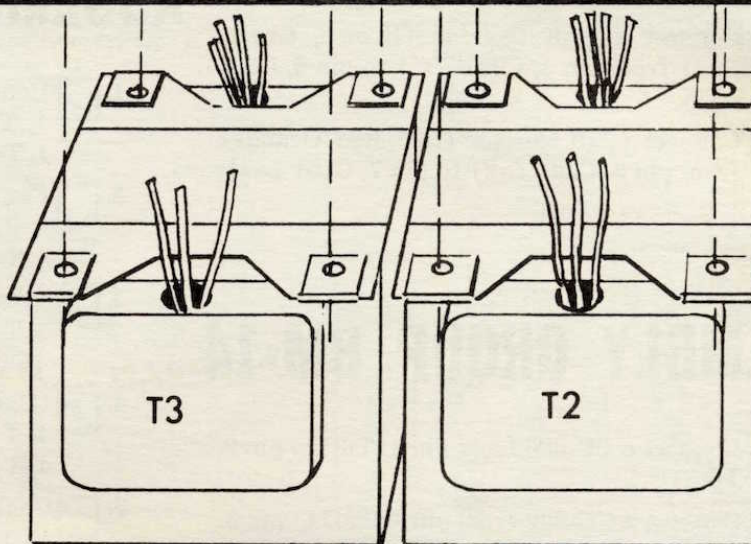
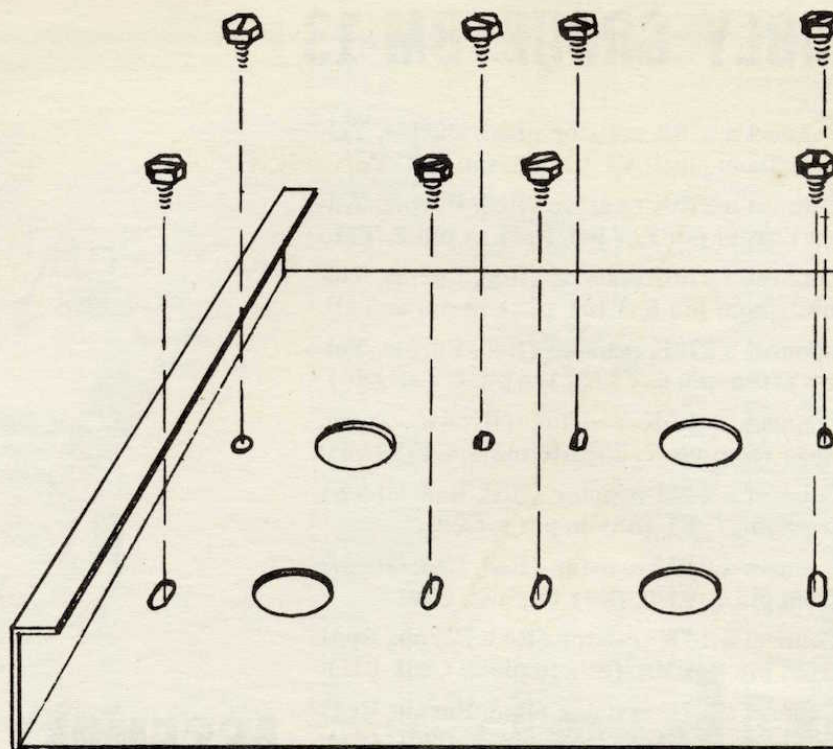
1. ☒ Connect a CC-220 from pin 1, T6C to pin 2, T6C.
2. ☒ Connect a CC-220 from pin 1, T6D to pin 3, T6D.
3. ☒ Connect the banded end of a CPM-.1 to pin 1, T6C. Connect the other end to pin 4, T6C.
4. ☒ Connect the banded end of a CPM-.1 to pin 5, T6D. Connect the other end to pin 1, T6D.
5. ☒ Connect an 8.2K resistor (Grey, Red, Red) from pin 1, T6C to pin 2, T6C (S3).
6. ☒ Connect an 8.2K resistor (Grey, Red, Red) from pin 1, T6D to pin 3, T6D (S3).
7. ☒ Connect a large 68 ohm resistor (Blue, Grey, Black) from pin 4, T6C (S2) to pin 6, T6C.
8. ☒ Connect a large 68 ohm resistor (Blue, Grey, Black) from pin 5, T6D (S2) to pin 6, T6D.

## ASSEMBLY GROUP BM-15

1. ☒ Connect the banded end of a CPM-.1 to pin 1, T4B (S2). Connect the other end to pin 1, T4D.
2. ☒ Connect the banded end of a CPM-.1 to pin 4, T4B (S2). Connect the other end to pin 4, T4D.
3. ☒ Connect the banded end of a CPM-.1 to pin 1, T4C (S2). Connect the other end to pin 1, T4E.
4. ☒ Connect the banded end of a CPM-.1 to pin 4, T4C (S2). Connect the other end to pin 4, T4E.
5. ☒ Connect a 390K resistor (Orange, White, Yellow) from pin 1, T4D to pin 2, T4B (S2).
6. ☒ Connect a 390K resistor (Orange, White, Yellow) from pin 4, T4D to pin 3, T4B (S2).
7. ☒ Connect a 390K resistor (Orange, White, Yellow) from pin 1, T4E to pin 2, T4C (S2).
8. ☒ Connect a 390K resistor (Orange, White, Yellow) from pin 4, T4E to pin 3, T4C (S2).
9. ☒ Connect a 330K resistor (Orange, Orange, Yellow) from pin 1, T4D to pin 3, T4D.
10. ☒ Connect a 330K resistor (Orange, Orange, Yellow) from pin 3, T4D to pin 4, T4D.
11. ☒ Connect a 330K resistor (Orange, Orange, Yellow) from pin 1, T4E to pin 3, T4E.
12. ☒ Connect a 330K resistor (Orange, Orange, Yellow) from pin 3, T4E to pin 4, T4E.



$\frac{3}{8}$ " SHEET METAL SCREWS (8)



### OUTPUT TRANSFORMERS

Dress leads from each end of the transformers thru the  $\frac{5}{8}$ " clearance holes

## MECHANICAL ASSEMBLY GROUP A-3

Check the four nuts on each transformer for tightness. If any are loose, tighten them before mounting the transformers to the chassis. Turn the chassis right side up. Take one of the output transformers (TRA-8-5-1) and, using the factory assembled clips as a guide, assemble a spring clip fastener to the two feet that do not already have a clip on them. This transformer will be called T2.



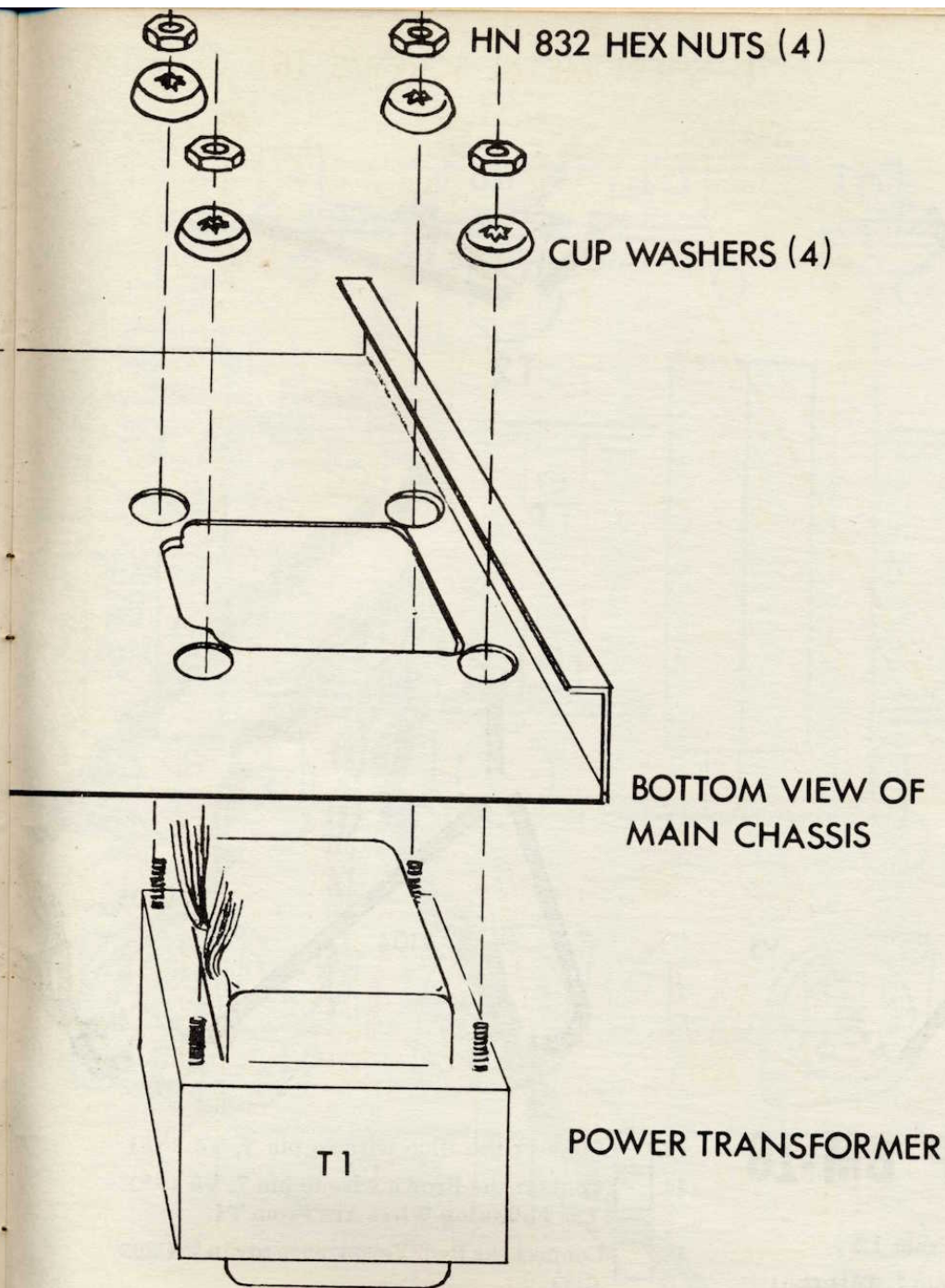
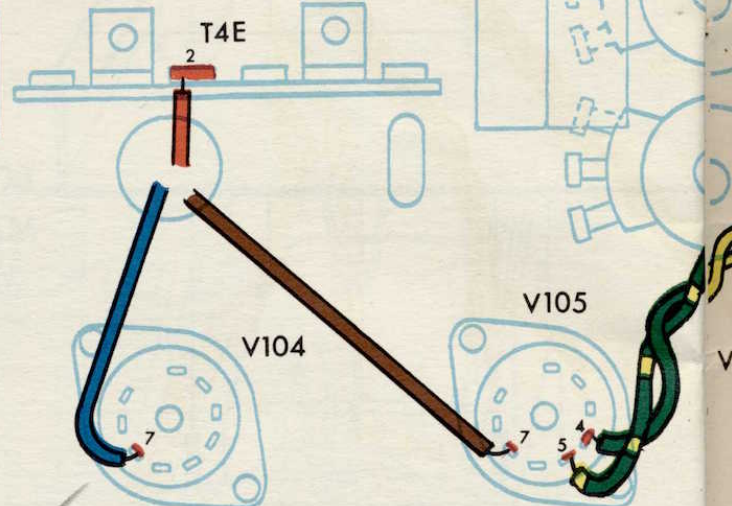
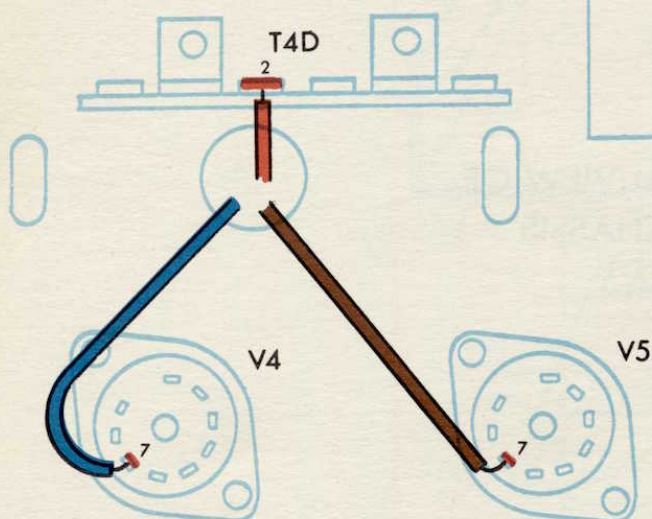
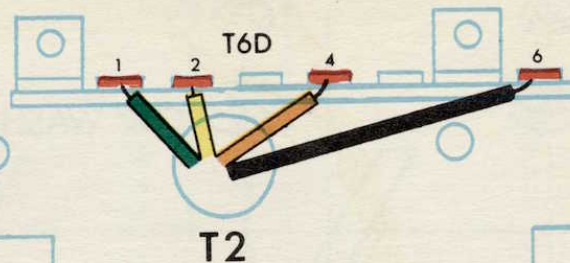
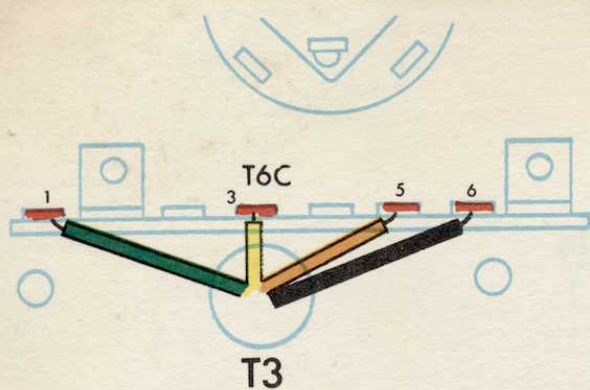


FIGURE 9

1. ☒ Position T2 on the chassis as shown in (Figure 9 ). Be sure that the Red, Blue, and Brown wires pass through the hole nearest the rear. Hold the transformer in place and slowly turn the chassis over. Pull up on all the wires to remove the slack. Fasten T2 to the chassis with four of the longer sheet metal screws.
2. ☒ Turn the chassis over again and mount the second output transformer using the above procedure. This transformer will be T3.
3. ☒ Mount the power transformer (TR-12-13) as shown in (Figure 9 ). Use four cupped washers and four #832 nuts to mount. This transformer will be called T1.





## ASSEMBLY GROUP BM-16

### The Following Wires Are From T2.

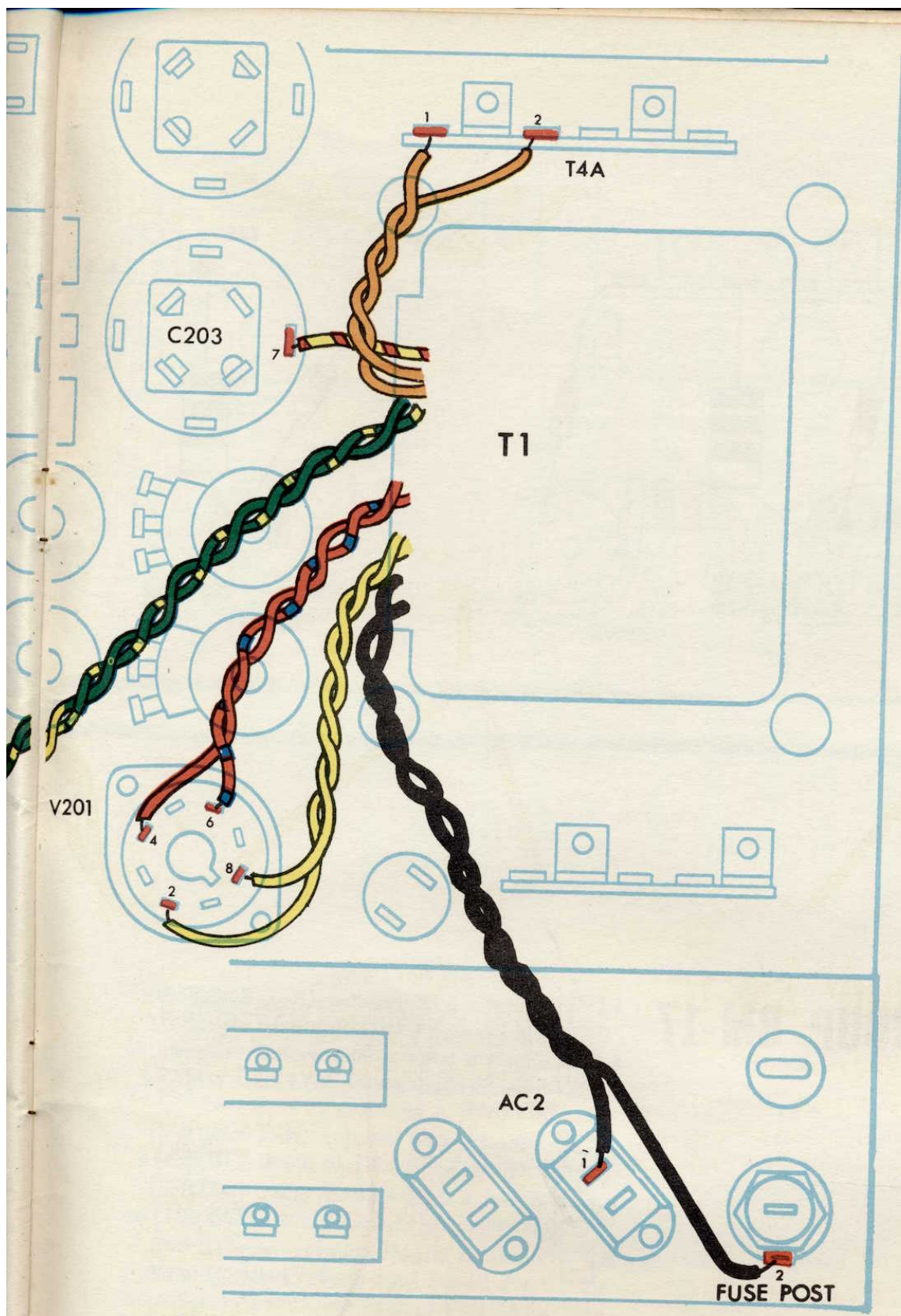
1. ☒ Connect the Green wire to pin 1, T6D (S6).
2. ☒ Connect the Yellow wire to pin 2, T6D (S2).
3. ☒ Connect the Orange wire to pin 4, T6D (S4).
4. ☒ Connect the Black wire to pin 6, T6D (S3).
5. ☒ Connect the Red wire to pin 2, T4E (S3).
6. ☒ Connect the Blue wire to pin 7, V104 (S1).
7. ☒ Connect the Brown wire to pin 7, V105 (S1).

### The Following Wires Are From T3.

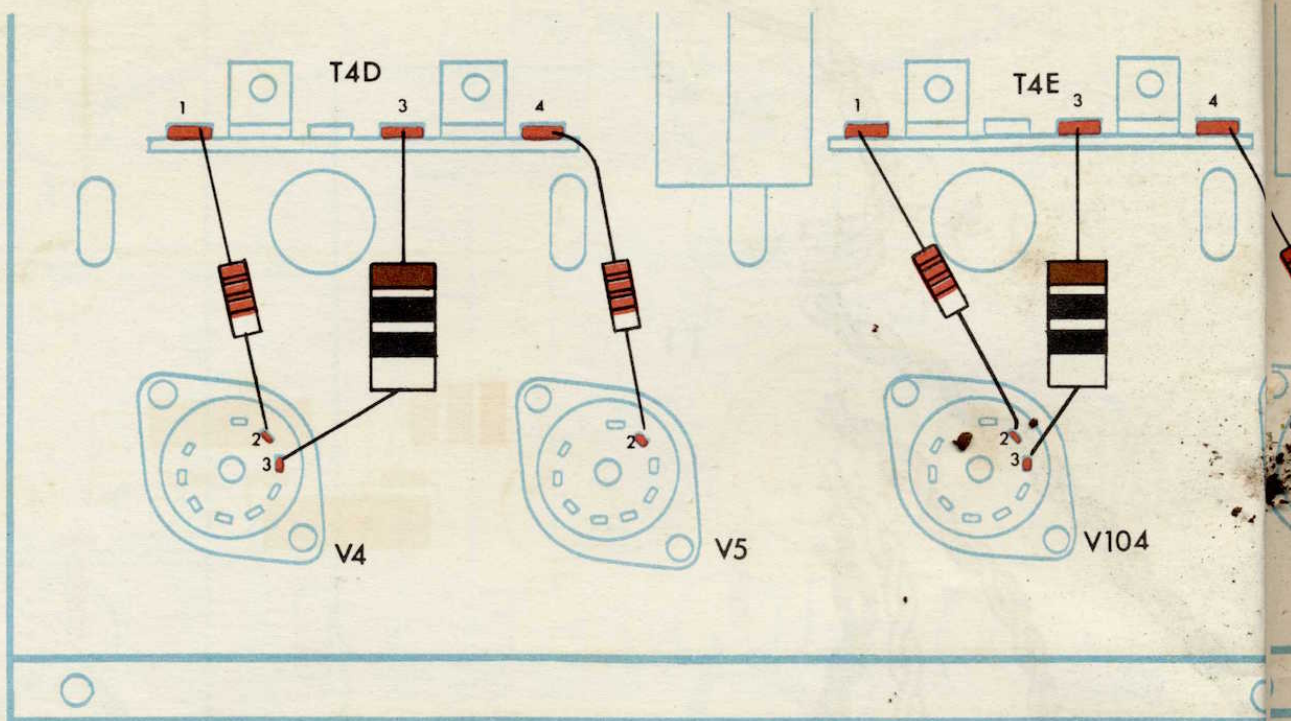
8. ☒ Connect the Green wire to pin 1, T6C (S6).
9. ☒ Connect the Yellow wire to pin 3, T6C (S2).
10. ☒ Connect the Orange wire to pin 5, T6C (S3).
11. ☒ Connect the Black wire to pin 6, T6C (S4).
12. ☒ Connect the Red wire to pin 2, T4D (S2).

13. ☐ Connect the Blue wire to pin 7, V4 (S1).
14. ☐ Connect the Brown wire to pin 7, V5 (S1).  
**The Following Wires Are From T1.**
15. ☒ Connect the Red/Yellow wire to pin 7, C203 (S1).
16. ☒ Twist the two Orange wires together. Connect one to pin 1, T4A (S2). Connect the other one to pin 2, T4A (S2).
17. ☒ Twist the Green and the Green/Yellow wires together. Connect the Green wire to pin 4, V105 (S3). Connect the Green/Yellow wire to pin 5, V105 (S3).
18. ☒ Twist the Red and Red/Blue wires together. Connect the Red wire to pin 4, V201 (S1). Connect the Red/Blue wire to pin 6, V201 (S1).
19. ☒ Twist the two Yellow wires together. Connect one to pin 2, V201 (S1). Connect the other one to pin 8, V201 (S2).
20. ☒ Twist the two Black wires together. Connect one to pin 2 on the Fuse Post (S2). Connect the other one to pin 1, AC-2 (S3).





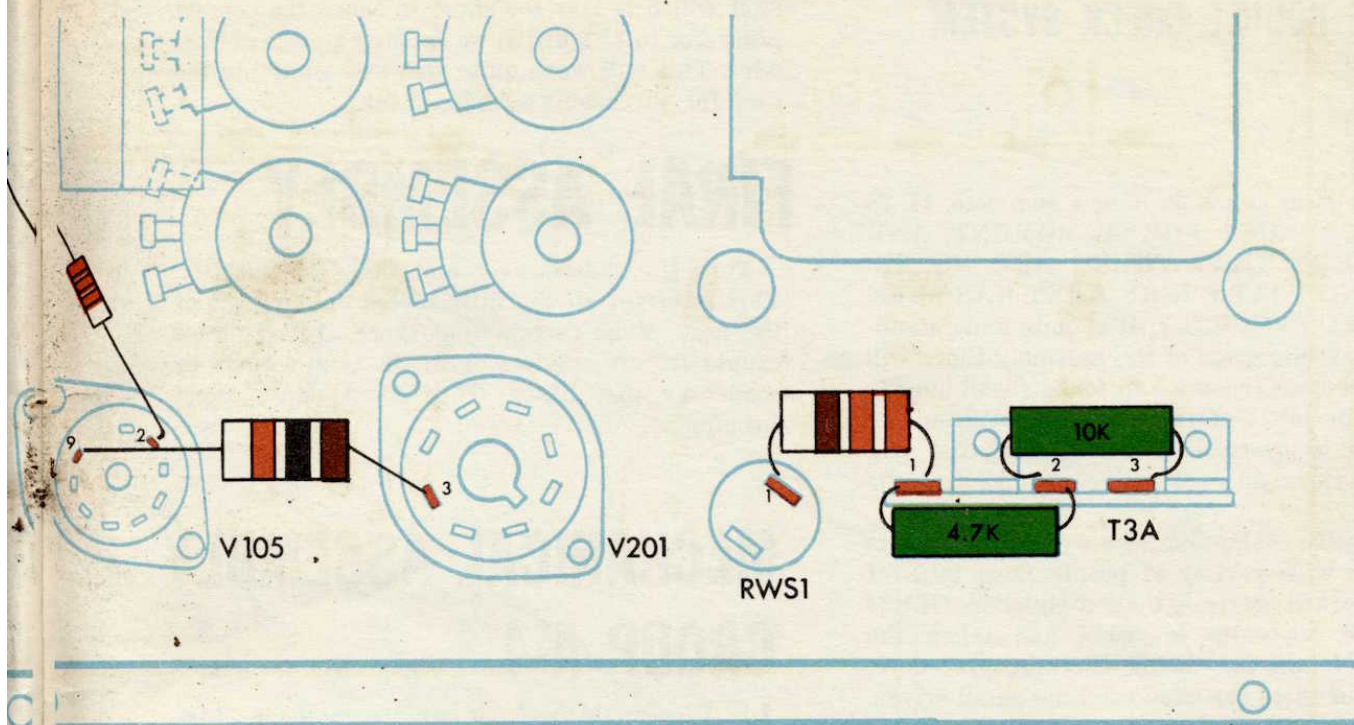




## ASSEMBLY GROUP BM-17

1. ☐ Connect a 2.2K resistor (Red, Red, Red) from pin 2, V4 (**S1**) to pin 1, T4D (**S4**).
2. ☒ Connect a large 10 ohm resistor (Brown, Black, Black) from pin 3, V4 (**S2**) to pin 3, T4D (**S5**).
3. ☒ Connect a 2.2K resistor (Red, Red, Red) from pin 2, V5 (**S1**) to pin 4, T4D (**S4**).
4. ☒ Connect a 2.2K resistor (Red, Red, Red) from pin 2, V104 (**S1**) to pin 1, T4E (**S4**).
5. ☒ Connect a large 10 ohm resistor (Brown, Black, Black) from pin 3, V104 (**S2**) to pin 3, T4E (**S5**).
6. ☒ Connect a 2.2K resistor (Red, Red, Red) from pin 2, V105 (**S1**) to pin 4, T4E (**S4**).





7. ☐ Connect a large 1K resistor (Brown, Black, Red) from pin 9, V105 (S2) to pin 3, V201 (S2).
8. ☒ Connect a large 220 ohm resistor (Red, Red, Brown) from pin 1, RWS-1 (S3) to pin 1, T3A.
9. ☒ Connect a 3 watt 4.7K resistor from pin 1, T3A (S4) to pin 2, T3A.
10. ☐ Connect a 3 watt 10K resistor from pin 2, T3A (S3) to pin 3, T3A (S3).

This completes the electrical assembly of the amplifier. It is time now to check your work. Turn to page 50 and complete the Double Check of your kit.



# VERY IMPORTANT

## THE DOUBLE CHECK SYSTEM

The electrical assembly is now complete. IT IS TIME TO PAUSE FOR A MOMENT AND MAKE SURE THAT THERE ARE NO ERRORS, AND THAT EVERY JOINT HAS BEEN SOLDERED PROPERLY. It is quite understandable that at this stage of the assembly there will be a tremendous incentive to forge ahead quickly to finish the job. Unfortunately this attitude can cause you to overlook a small error that will lead to serious and expensive damage to your amplifier.

In extensive evaluation tests we had LK-48 kits built by a wide variety of people. Over 90% of the kits worked perfectly upon completion. Of this percentage, virtually everyone had taken the trouble to follow this double checking procedure, and most of them reported catching small errors. In those units that did not work we discovered that malfunction could, in every case, be traced directly to skipping of the double-check. Simple miswiring errors or short circuits prevented proper operation of the amplifier. Stop for a moment, RELAX, and be sure to check over your work.

An easy method of doing this has been provided. Call in a friend or another member of the family. Have them look over charts AF-1, AR-1 and AM-1. On these diagrams of the underside of the chassis, a series of numbers have been placed next to each pin or terminal. These numbers indicate the number of wires and leads (including those from resistors or capacitors) that have been soldered to that pin. While you count off the number of leads on each pin and terminal, your assistant can check your count against the chart. When you count the leads going to pin 1 of V3, your helper will observe that this agrees with his chart and place a small check mark on it. This will be continued until the entire amplifier is checked over. It will seldom take more than 20 minutes for this complete check.

WHILE YOU ARE COUNTING THE WIRES, YOU CAN ALSO BE CHECKING FOR SHORT CIRCUITS AND PROPER SOLDERING. It would be very handy if you had a tool with a small sharp point (like an ice pick) to probe the connections and make certain they are soldered properly. A pencil with a sharp point can also be used. Even the most meticulous worker can make a mistake or have a poorly soldered joint. LOOK SHARP! Move every lead and wire a little bit to insure it

is not accidentally causing a short circuit with some other wire or pin.

If a mistake is caught and it involves a component which is now too short to reach the correct pin, refer to (Figure 3) on splicing a piece of buss wire. This will work quite well and eliminate the need for purchasing a replacement.

## FINAL ASSEMBLY

Turn the chassis over and shake it violently. This is to get all the little pieces of wire out of the unit. Make certain that there are no pieces caught in any crevices or in the tube sockets or condenser can bases. This could cause short circuits.

## MECHANICAL ASSEMBLY

### GROUP A-4

- ☒ Assemble the front panel as shown in (Figure 10). Tighten a brass hex nut on the six shafts to hold the panel in place. The shafts on which the four medium sized knobs are to be assembled have a flat surface on one side. Position the knobs on the shafts so that the set screws are tightened against this flat surface. The shafts of the Bass and Treble controls are both concentric. Turn these shafts *full counterclockwise*. Position a large knob on the shaft of the Bass controls so that the indicator line on the knob is in the most counterclockwise position. Tighten the set screw making sure that this shaft stays full counterclockwise, assemble a small knob in the same manner as above. Repeat this procedure for assembling a large and small knob to the shaft of the Treble control.
- ☒ Mount the tubes using the lettering on the chassis as a guide. Locate the Loudness control on the front panel. Make sure that it is in the OFF position (full counterclockwise). Turn the unit on its side so you can readily see both the underside and topside of the chassis. Insert the line cord into an A.C. outlet (**Do not use with D.C.**) and turn the loudness control until it clicks on. Watch both the underside and topside for any signs of overheating, sparks, smoke, or unusually bright glowing tubes. At the first sign of trouble, turn the unit off and refer to the section entitled "In Case Of Difficulty" on



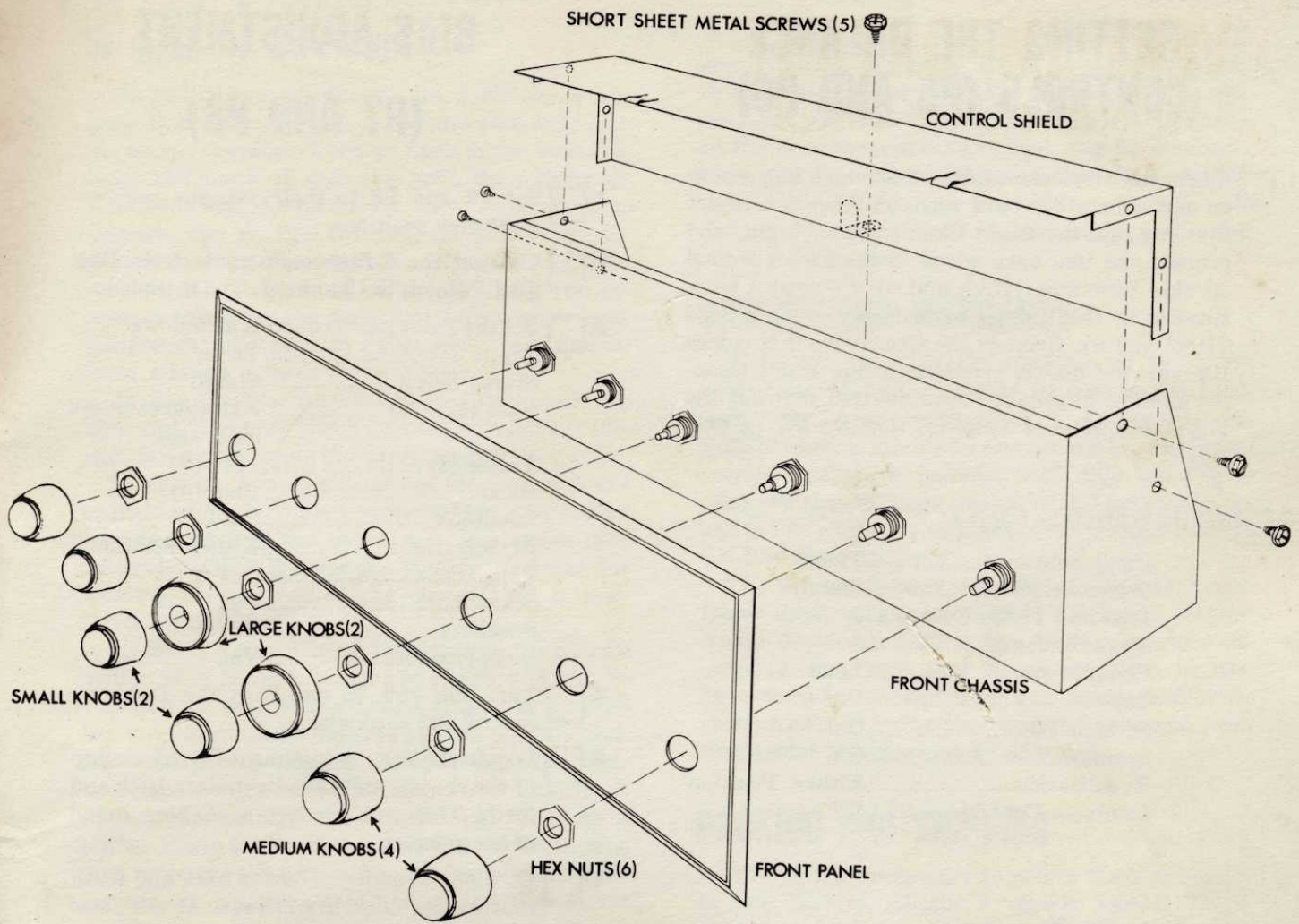


FIGURE 10

page 53 If all seems right, turn the unit off, remove the line cord from the outlet, and continue.

3. ☒ Place a tube shield over tubes V1, V101, V2, and V102. Press down hard with a counterclockwise motion to assemble the shields.
4. ☒ Assemble the control shield with five of the short  $\frac{1}{4}$ " sheet metal screws. (See Figure 10.)
5. ☒ Assemble the bottom cover as shown in (Figure 11).

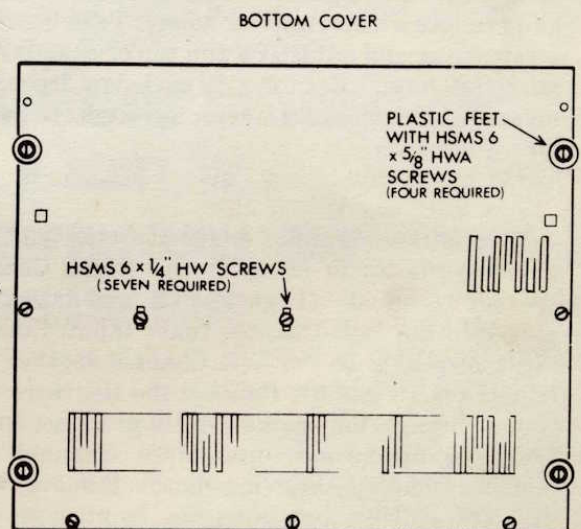


FIGURE 11



## SETTING THE BALANCE CONTROLS (P5 AND P6)

## MAKE THIS FIRST ADJUSTMENT BIAS ADJUSTMENT (P7 AND P8)

1. ☒ Identify the short audio cable which has a plug on one end and the bare wires on the other. Insert the plug into the Right Channel tuner input, and connect the two bare wires to the Left Channel speaker terminals (High and 0). Connect a loudspeaker to the Right Channel speaker terminals (High and 0). Connect the Greenwire that comes through the plastic grommet to the Right Channel speaker impedance terminal that matches the impedance of your speaker. Remove V3 (a 6U8 tube).

2. ☒ Set the controls as follows:

Input Selector.....Tuner  
Stereo Selector.....Stereo  
Bass and Treble Controls..0  
Stereo Balance.....0  
Compensator.....Loud  
Tape.....Out  
Scratch Filter.....Out  
Speakers.....On  
Equalization.....Either Position  
Loudness Control.....Off

3. ☐ Insert the line cord into an A.C. outlet and turn the unit on. Wait a few minutes for the amplifier to completely warm up. Slowly turn the Loudness Control clockwise until you can just hear a low hum in the loudspeaker. (If you turn the volume up too high, the amplifier will oscillate and produce a motorboating noise). Take the small screwdriver and adjust P6 (on top of chassis) for minimum hum. (Hum is a 60-cycle low frequency noise — do not confuse it with any high frequency noises present).

4. ☐ Turn off the amplifier and replace the V3 tube. Connect the audio cable to the Right Channel speaker terminals (High and 0) and insert the plug into the Left Channel tuner input. Connect the loudspeaker to the Left Channel speaker terminals (High and 0). Connect the Red wire that comes through the second plastic grommet to the Left Channel speaker impedance terminal that matches your speaker impedance. Remove V103 (the other 6U8 tube). Keep the front panel controls the same. Turn on the unit, and adjust P5 for minimum hum. Turn off the amplifier and replace V103. Remove the short audio cable.

1. ☐ Set P7 and P8 to their extreme *counter-clockwise* positions.
2. ☐ Connect the 3 foot audio cable from Bias Test Point L to Channel L Tuner input.
3. ☐ Set the front panel controls as follows:  
Input Selector.....Tuner  
Stereo Selector.....Stereo  
Bass (L + R).....Extreme counter-clockwise  
Treble (L + R).....Flat (0)  
Balance.....Flat (0)  
Loudness.....Off  
Equalization.....Either Position  
Tape.....Out  
Scratch.....Out  
Speakers.....On  
Compensator.....Vol.
4. ☐ Turn the unit on and turn the Loudness control full clockwise.
5. ☐ Locate the Bias Adjustment Switch on top of the chassis and slide the button back and forth. This will produce a *clicking* sound in the speaker.
6. ☐ Continue to slide the button back and forth causing the click to continue. At the same time, using the small screwdriver, turn P8 clockwise slowly. The click will become very faint and then begin to increase. Re-adjust P8 to the point where the click is the faintest.
7. ☐ Remove the audio cable from Test Point L and insert the plug into Test Point R.
8. ☐ Repeat the procedure outlined in steps 5 and 6, BUT ADJUST P7.
9. ☐ Because P7 and P8 interact somewhat, you should repeat steps 6, 7 and 8 alternately until the faintest amount of clicking is heard.

### CONGRATULATIONS!

Now . . . sign your personal label "This kit was built by —" . . . connect your amplifier into the rest of your system (see instruction manual) . . . relax . . . with one of the finest amplifiers ever made.



## IN CASE OF DIFFICULTY

No matter how careful you are, a mistake is possible. Don't panic! First, make sure each tube is in the proper location. Then go back to the assembly notes and check off each step with the written instructions and the pictorials. Or if possible, have someone else do this for you. Often a fresh approach may disclose mistakes that you might be consistently overlooking. While checking for errors, carefully probe each and every wire, lead, component, and part to make sure there are no short circuits or poor solder joints.

In case the fuse has blown (the tubes will not light up) it is very likely that there is a short circuit. Before replacing the fuse search for the cause.

In case the tubes light up but the unit does not operate properly voltage readings are supplied on the schematic. If you obtain a good vacuum tube voltmeter (VTVM) use the voltage readings for locating the portion of the circuit that is malfunctioning.

As this is a stereo amplifier/preamplifier control center, it is possible that most of the unit will be functioning with sound heard from one channel but not the other. To help the portion malfunctioning when this occurs, try the following: (1) Connect speakers to both Channel L and Channel R speaker terminals on the rear. (2) Connect a stereo phono to Channel L and Channel R inputs, or a tuner to both Channel L and Channel R Tuner inputs. (3) Set the Input Selector to either Tuner or Phono as the case may be. (4) Rotate Stereo Selector between Bal L and Bal R. If sound is heard in the Bal L position but not in Bal R, then the Channel R power amplifier is not functioning (or vice versa). The introductory notes on Amplifiers will indicate what parts of the circuit make up the different amplifier and preamplifier sections. (5) Rotate Stereo Selector between Channel L and Channel R. If sound is heard in the Channel L position but not in the Channel R position, then the latter's preamplifier control center section is malfunctioning (or vice versa).

If none of the above suggestions help in curing the problem you should write to our Laboratory Kit Service Dept. for prompt assistance. There is no charge for this help. The engineers in this department are thoroughly familiar with all aspects

of the kit, and can probably localize the cause of your difficulty. However, you must be very explicit in describing your problem. Mention all the approaches you have undertaken to cure it. Describe all the symptoms and signs that may be involved. With complete information supplied, the possibilities of a cure through the mail are greatly increased. **Be sure to include the model and serial number of the unit.**

## SERVICE AND WARRANTY

When all else fails the facilities of the H.H. Scott Laboratory Kit Service Department and the vast network of Authorized Warranty Service Stations are available to you. A list of warranty service stations is included with this kit. For a complete statement of warranty and service on in and out of warranty equipment refer to your Scott Kit Warranty Policy.

The service policies described in the warranty folder apply only to completely assembled instruments constructed according to the instructions supplied. Any unit that is not complete, or has been modified in any way will not be accepted. Instruments showing the uses of fluxes and acid core solder will also not be accepted.

## PACKING AND SHIPPING

If it becomes necessary to return the instrument to the factory, obtain a sturdy carton, large enough to hold the amplifier and place protective material around it. Crumpled newspapers, Kim-sul, or similar packing material can be used. Make sure the amplifier is in tight so that it does not shake around. Mark: **FRAGILE DELICATE ELECTRONIC EQUIPMENT** on the outside of the carton. Insure for its full value and ship, prepaid, by Railway Express to:

## LABORATORY KIT SERVICE DEPT.

**H. H. SCOTT, INC.**

**111 POWDERMILL ROAD**

**MAYNARD, MASS.**





**H. H. SCOTT, INC.**

111 POWDER MILL RD., MAYNARD, MASS., 01754

MOUNTING INSTRUCTIONS FOR H. H. SCOTT COMPONENTS

"C" SIZE UNITS:

200, 222, 299, 310, 314, 333, 350, 370, LT-110, LT-111, LC-21, LK-30, LK-48, LK-72

Case Mounting Hardware

Hardware for mounting the above units is supplied with the accessory cases. Wooden cases are supplied with hardware packet ZP-10. Metal cases are supplied with hardware packet ZP-13.

See (1) and (2) below for mounting instructions.

Custom Mounting Hardware

All of the above units, except the 314 and LC-21 require hardware packet ZP-17 for custom mounting. The 314 and LC-21 require hardware packet ZP-5. Custom Mounting hardware may be ordered from our Parts Department. See (5) below for mounting instructions.

"G" SIZE UNITS:

340, 380, 4310, 4270, 4312

Case Mounting Hardware

Hardware for mounting the above units is supplied with the accessory cases. Wooden cases are supplied with hardware packet ZP-16. Metal cases are supplied with hardware packet ZP-12.

See (3) and (4) below for mounting instructions.

Custom Mounting Hardware

The above units require hardware packet ZP-16 for custom mounting. Custom mounting hardware may be ordered from our Parts Department.

See (6) below for mounting instructions.

ACCESSORY CASE MOUNTING

"C" Size (Wood and Metal)

(1) Remove the rubber feet if they are attached to the unit. Support the case on its rear edge between two books. The component is always inserted in the opening away from the grille. Slide the component down into the case by holding the back of the component with your left hand and the front with your right. SEE FIGURE 1. When the set is  $\frac{3}{4}$  in the case, lie the entire assembly down on its feet. Now slide the set the rest of the way in. Be very careful not to dislodge any tube while inserting the component. Stand the unit again on its rear edge and position the unit so that the four holes in the bottom line up with the four holes in the case. Should the holes not line up precisely, run one of the screws into the holes, without the foot attached, so that a thread is started.

(2) Install the longer, 1" sheet metal screws in the feet in place of the  $\frac{5}{8}$ " screws. Start the screws into the holes (see note below). DO NOT TIGHTEN. Correctly position the unit in the case and install the rubber spacers between the unit and the case near the screws, where needed to hold the set in position. SEE FIGURE 2. Tighten the feet and screws so that they are SNUG. Do not overtighten.

NOTE: The Metal Cases use spacers with a hole in the middle. The spacers should be installed between the unit and the case before the screws are started into the holes in the set. SEE FIGURE 3.

"G" Size (Wood and Metal)

(3) WOODEN CASE: Using ZP-16 hardware, snap the plastic inserts into the square holes near each edge of the bottom cover. Follow the instructions in (1) above and install the spacers as in (2). Install the drive screws and washers through the case and into the inserts. SEE FIGURE 4 AND 5. Screw in snugly. Do not overtighten.

(4) METAL CASE: Use ZP-12 hardware and follow the instructions in (1) and (2).

CUSTOM MOUNTING

"C" Size Units

(5) Remove the rubber feet attached to the unit. Using ZP-17 hardware (see note below for 314 and LC-21), snap the plastic inserts into the square holes near each edge of the bottom cover. Place the set into position and install the drive screws and washers through the mounting shelf and into the inserts. SEE FIGURE 4. Screw in snugly. Do not overtighten.

NOTE: The 314 and LC-21 require ZP-5 hardware. SEE FIGURE 6.

"G" Size Units

(6) Use ZP-16 hardware and follow the procedure in (5) above.

For more information or replacement of misplaced hardware, contact:  
(D - 3B)

H. H. SCOTT, INC.  
111 Powder Mill Road  
Maynard, Massachusetts

(SEE OVER ALSO)



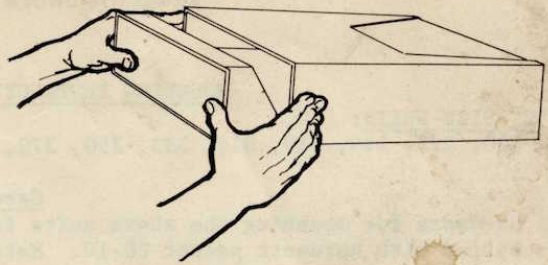
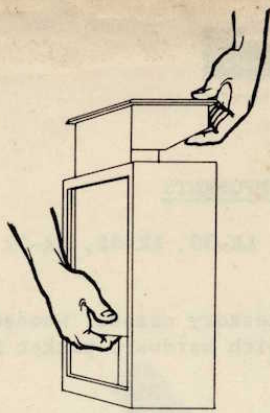


FIGURE 1

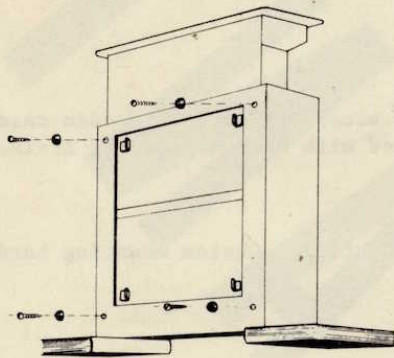


FIGURE 2

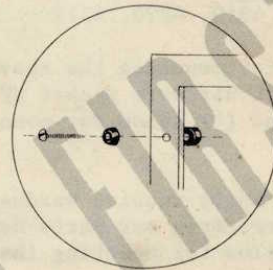


FIGURE 3

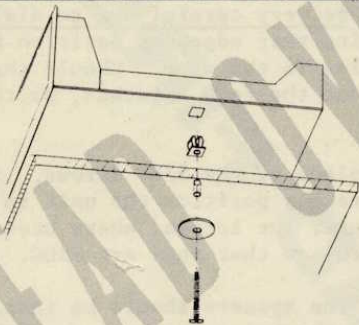


FIGURE 4

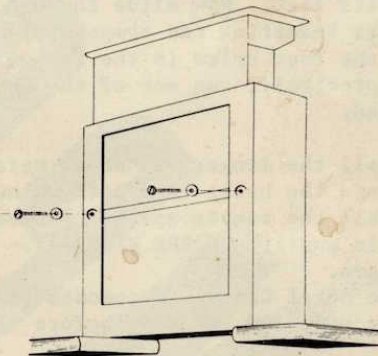


FIGURE 5

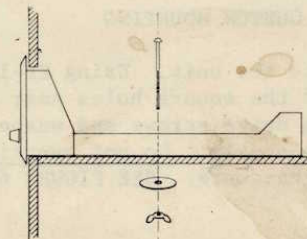


FIGURE 6

(SEE OVER ALSO)



