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Assembling your

CONAR

**Adjustable Voltage-Regulated
Power Supply**

Model 320

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CONAR INSTRUMENTS

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THE CONAR MODEL 320 POWER SUPPLY



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THE CONAR MODEL 320 POWER SUPPLY

The output voltage from the CONAR Model 320 power supply is adjustable over the range of 5 volts to 15 volts. The power supply is capable of supplying 4 amps continuously and a current as high as 6 amps with a 50% duty cycle. Even with a widely varying load current, the output voltage from the power supply is maintained at a constant value. This value is set by an integrated circuit voltage regulator.

In addition to regulating the output voltage, the integrated circuit contains a shutdown circuit. If excessive current is drawn from the regulator, the regulator temperature will rise. This causes the shutdown circuit to work so that the IC will shut down and the output voltage will drop to zero. This will prevent the excessive current from damaging the regulator, the rectifier, or the power transformer.

Figure 16 shows the complete schematic diagram of the Model 320 power supply. The Model 320 power supply should give years of trouble-free service. You'll find many uses for it.

PREPARING FOR ASSEMBLY

Check the parts that you have received against the parts list. Most of the parts are rather large and you should have no difficulty identifying them. The small parts will be found in four plastic bags. Do *not* open the plastic bags to check the parts. The packages have been arranged so that you will need to open only one section of a bag at a time to perform the assembly steps called for in the manual. You can easily check the parts through the clear plastic without opening the bags. If you suspect that a part is missing, check to see if a part has been substituted for it before you decide that the part is indeed missing. If you do find that a part is missing or has been damaged in shipment, let us know right away so that we can send a replacement. After you have checked all the parts, read the section on assembly before you start the assembly work.

ASSEMBLY HINTS

There is no satisfaction like that of finishing a kit and having it work perfectly the first time you try it. The assembly of your Model 320 is quite straightforward, so you should not have any problems. However, here are a few general suggestions that will be helpful to you.

It is a good idea to look over the entire assembly section before beginning actual construction. In this way, you get an overall picture of what must be done and how each stage of the assembly relates to the others. When you are ready to begin construction, read each step through and make sure you understand what must be done. After you perform each step, check it off in the space () provided and proceed to the next step.

Follow the Instructions. Perform each step in the exact order given. Don't try shortcuts such as omitting steps or assembling the kit from the schematic diagram. Our experience has shown that even veteran kit builders make wiring errors when they fail to follow directions. Tracking down and correcting errors in completed kits can be a time-consuming process. The quickest way to complete the kit is to follow the assembly instructions to the letter.

When you make connections to the terminals, you will see a notation like (S1), (S2), (S3), or (NS). These notations tell you the number of wires or leads that are to be soldered to a particular terminal. In the case of the (NS) notation, you are not to solder the connection at this time. Other wires or leads will be added later to the terminal.

Do a Good Soldering Job. Poor soldering is the greatest single cause of problems in completed units. The soldering in this kit is particularly important because the power supply is capable of supplying a high current. For example, if you do a poor soldering job in one place so that the resistance is only 0.1 ohm, this small resistance will introduce a voltage drop of 0.6 volt at a maximum current output of 6 amps. The IC regulator is designed to keep the output voltage within 1% from no load to full load. At 15 volts, this is only 0.15 volt. Thus a resistance of only 0.1 ohm can introduce a voltage variation four times the normal variation.

Whenever you make a solder connection, make sure that the parts to be soldered are clean. If they are not, scrape them with a knife, a file, or a piece of sandpaper. Use enough solder to establish a good electrical connection, but avoid using excessive solder. Hold the soldering iron in place until solder runs and flows smoothly over the parts being soldered together. Let any excess solder flow onto the tip of your iron and wipe it off with a rag. Big blobs of solder on the terminals are almost certain to result in trouble. Use the solder supplied in this kit. If you buy more solder locally, make sure that the container is marked "rosin-core solder." Do not use acid-core solder or solder paste flux. If you use either of these, you will

ruin your instrument. We cannot service any instrument on which acid-core solder or solder paste flux has been used.

Use the Figures. Pictorial diagrams throughout this manual show the placement of parts and the details of construction steps. In some cases a part can be mounted in more than one way, only one of which is correct. Study the figures carefully and make sure that you know exactly how a part is to be mounted before proceeding. While the placement of the wires in the power supply is not particularly critical, we suggest placing them in the position shown so that you will have a neatly wired instrument.

Identifying Parts. There are not many electronic parts in this kit, so you should have no difficulty identifying them. However, there are a number of different types of screws because different length and different size screws are required in different applications. Be sure that you keep the screws separated. Do not use a 1/2" screw where a 3/8" screw is called for.

Most of the small parts are packaged in plastic bags. Do *not* remove the parts from the bags until you are told to

do so in the assembly instructions. The parts list on the next page shows all of the parts in this kit.

Tools Needed. Ordinary hand tools are all that you need to assemble this kit. You will need a screwdriver with about a 1/4" blade, longnose pliers, diagonal cutters, and a soldering iron. We recommend an iron rated at about 40 watts. You will also need a Phillips screwdriver. A set of hex nut drivers and a wire stripping tool will be helpful, but they are not absolutely necessary. CONAR Instruments stocks a complete line of high quality tools which are available at a nominal cost.

Be sure to use the exact color, length, and type of wire specified in each construction step. This will simplify tracing the wires later. Much of the wire used in this kit is a rather large gauge of stranded wire. Be sure to use the thinner solid hookup wire only when specifically told to do so.

When you make each connection, strip 1/4" of insulation from each end of the hookup wire. In the case of the stranded wire, after you remove the insulation, twist the strands together tightly and apply a small amount of solder. This process is called tinning and keeps the strands from separating when the wire is connected to a terminal.

PARTS LIST

Part No.	Quan.	Description	Price Each	Part No.	Quan.	Description	Price Each
Bag 2A-320							
Section 1							
X BR104	1	Capacitor mounting bracket	.48	X NU1	12	6-32 hex nuts	12/.15
X IN8	1	Fuse holder	.15	X PCI	1	AC line cord	.40
X NU1	6	6-32 hex nuts	12/.15	X RE29	1	4.7k-ohm 10%, 1/2 watt resistor	.15
X NU7	4	10-32 hex nuts	12/.15	X SC42	6	6-32 X 3/8" Phillips screws	12/.25
X SC13	4	6-32 X 3/8" machine screws	12/.15	X SC97	6	6-32 X 3/8" black Phillips screws	12/.25
X SC14	4	10-32 X 3/8" machine screws	12/.25	X WA26	12	No. 6 lockwashers	12/.15
X SC24	1	6-32 X 1/2" machine screw	12/.25	Section 3			
X SC37	1	6-32 X 3/4" machine screw	12/.25	X HA93	4	Square plastic feet	4/.35
X SR28	1	50 PIV, 10 amp bridge rectifier	2.75	X NU18	8	8-32 Tinnerman nuts	4/.15
X ST10	1	3-lug terminal strip with insulated mounting foot	.10	X SC95	8	8-32 X 3/8" black screws	12/.25
X ST14	1	3-lug terminal strip	.10				
X WA17	4	No. 10 lockwashers	12/.15				
X WA26	6	No. 6 lockwashers	12/.15				
Section 2							
X JA8	1	Red banana jack with nut	.25	X WR901	2'	Red hookup wire	*
X JA9	1	Black banana jack with nut	.25	X WR909	3'	Black hookup wire	*
X KN46	1	Knob with indicator	.40	X WR946	2'	Red stranded wire	.15
X LP18	1	Pilot lamp assembly	.65	X WR947	2'	Black stranded wire	.15
X LU10	1	No. 6 solder lug	12/.15	X WR952	1'	White stranded wire	.08
X NU1	2	6-32 hex nuts	12/.15	*Additional wire is available in 12' lengths, .25 each			
X NU15	1	Control nut	12/.15	Bag 1C-320			
X PO131	1	10k-ohm control	.60	X CL8	2	Alligator clips	.15
X RS138	1	330 ohm, 1 watt resistor	.20	X HA72	1	Black alligator clip boot	.06
X SC97	2	6-32 X 3/8" black Phillips head screws	12/.25	X HA73	1	Red alligator clip boot	.06
X SW67	1	SPST slide switch	.25	X PL3	1	Black insulated banana plug	.25
X WA14	1	Flat control washer	12/.15	X PL4	1	Red insulated banana plug	.25
X WA25	1	Control lockwasher	12/.15	X WR946	3'	Red stranded wire	.24
X WA26	2	No. 6 lockwashers	12/.15	X WR947	3'	Black stranded wire	.24
Bag 3B-320							
Section 1							
X CN300	1	10 µf tantalum capacitor	.50	Bag 1D-320			
X GR4	1	7/8" diameter rubber grommet	.15	X CL8	2	Alligator clips	.15
X IG78	1	UA78HG 4-terminal regulator	15.00	X HA72	1	Black alligator clip boot	.06
X LU10	1	No. 6 solder lug	12/.15	X HA73	1	Red alligator clip boot	.06
X MS46	1	Package, silicone grease	.60	X PL3	1	Black insulated banana plug	.25
X NU1	6	6-32 hex nuts	12/.15	X PL4	1	Red insulated banana plug	.25
X SC24	2	6-32 X 1/2" screws	12/.25	X WR946	3'	Red stranded wire	.24
X SC42	4	6-32 X 3/8" Phillips head screws	12/.15	X WR947	3'	Black stranded wire	.24
X WA26	4	No. 6 lockwashers	12/.15	Large parts that are not in bags			
Section 2							
X FU5	1	2 amp fuse	.22	X BR103	2	Cabinet alignment brackets	.55
X GR8	1	Line cord strain relief	.15	X CB47	2	Cabinets, blue <i>Mining</i>	3.68
X LU7	2	No. 10 solder lugs	12/.15	X CB49	2	Cabinet trim strips, black	1.15
				X CH99	1	Power supply chassis	2.08
				X CN346	1	18,000 µf, 25 volt electrolytic	6.48
				X HS1	1	Heat sink	4.10
				X ME31	1	0 - 15 voltmeter with hardware	15.15
				X PA61	1	Front panel	1.75
				X PA62	1	Back panel, blue	1.38
				X TR109	1	Power transformer	11.58

10-3-78 LTR to NRI FOR MISSING PARTS
 2 ea CB47 CABINET, BLUE
 1 ea PL3 BLACK INSULATED BANANA PLUG
 6 ea SC97 6-32 X 3/8" BLACK PHILLIPS SCREWS

CHASSIS ASSEMBLY

The chassis has two 1/2" lips that point down. The lip that is nearest the large circular hole is at the rear of the chassis. The two long pieces pointing up are the sides of the chassis. Place the chassis on your bench with the rear of the chassis toward you.

MOUNTING THE PARTS

Figure 1 is a top view of the chassis with the parts mounted on it. This is the way you will see the chassis with the long side pieces pointing up. You will need parts from the bag marked "2A-320."

(1) Locate the rectifier and mount it as shown in Fig. 1 using a 3/4" long 6-32 screw. Put the screw through the top of the rectifier and through the hole in the chassis. Then put a lockwasher and nut on the screw and tighten with the rectifier in the position shown. Notice two terminals are marked ac, one terminal is marked with a plus (+) sign, and another is

marked with a minus (-) sign. The terminal marked minus (-) and one of the ac terminals should be positioned near the side of the chassis. The other ac terminal and the plus (+) terminal should be positioned toward the center as shown.

(2) Next, locate the capacitor mounting bracket and the 3-lug terminal strip B with the mounting foot on the left. Mount them on top of the chassis using two 3/8" X 6-32 screws, lockwashers, and nuts. Tighten the nuts to hold the terminal strip and bracket firmly in place

(3) Next, slip a 1/2" long 6-32 screw through the two holes in the clamp as shown, put a lockwasher and nut on, but do not tighten. This will be tightened after the capacitor is put in place

(4) Next, mount the power transformer on the top of the chassis, using four 3/8" long 10-32 machine screws, No. 10 lockwashers, and 10-32 hex nuts. Be sure that you position the transformer as shown, so that the black leads are facing the

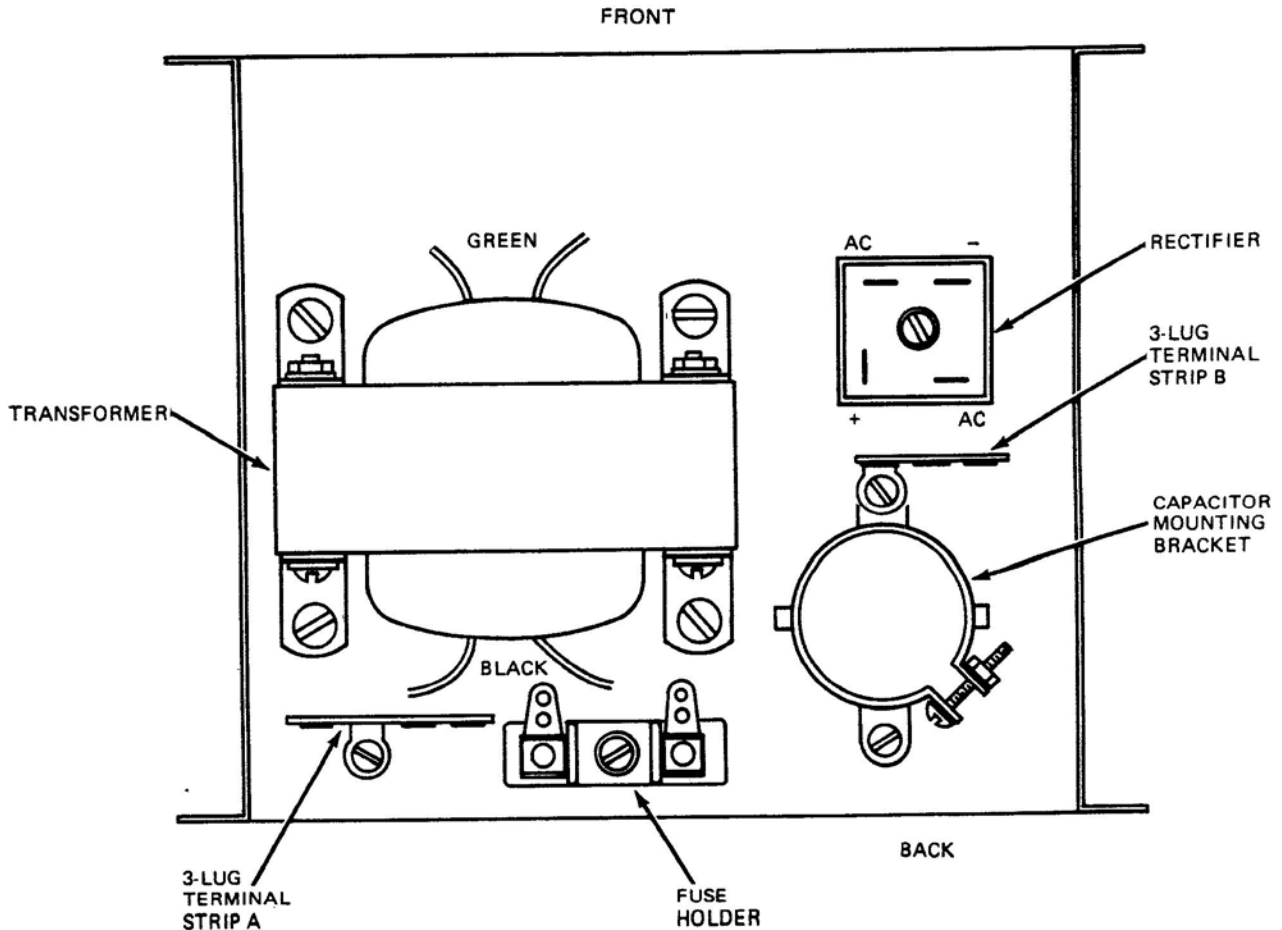


Fig. 1. Top view of the power supply chassis with the parts mounted.

rear of the chassis and the green leads are facing the front of the chassis. Tighten the nuts and screws to hold the transformer securely in place ()

(5) Now use a 3/8" long 6-32 screw, lockwasher, and nut to mount the 3-lug terminal strip A, with the mounting foot between terminals 1 and 2, on the chassis in the position shown. Tighten the nut and screw to hold the terminal strip securely in place ()

(6) Finally, mount the fuse holder using a 3/8" long 6-32 screw, a lockwasher, and a 6-32 hex nut. Notice that the terminals of the fuse holder face toward the transformer. Be sure to tighten the screw and nut securely ()

WIRING THE CHASSIS

As you wire the chassis, refer to Fig. 2 and be sure to check off each step as you complete it. The wire you need is in the bag marked "1C-320."

(1) Cut the left-hand black transformer lead to a length of 1-1/2". Remove 1/4" of insulation and connect it to terminal 1 of terminal strip A (NS) ()

(2) Trim the other black transformer lead to 2", remove 1/4" of insulation, and connect it to terminal 2 of terminal strip A (NS) ()

(3) Twist the green transformer leads together and dress them down against the chassis. Connect one of the green leads to one of the ac terminals on the rectifier (S1). Connect the other green lead to the other ac terminal on the rectifier (S1) ()

(4) Cut a length of solid black hookup wire 1-1/2" long and remove 1/4" of the insulation from each end. Connect one end of the wire to terminal 3 of the 3-lug terminal strip A (NS) and connect the other end to terminal 1 of the fuse block (S1) ()

(5) Cut a 3" length of black stranded wire. Remove the insulation from both ends and tin both ends. Connect one end to the minus (-) terminal of the rectifier (S1) and the other end to terminal 1 of terminal strip B (NS) ()

(6) Cut a 6" length of stranded red wire. Remove the insulation from both ends and tin both ends. Connect one end to the plus (+) terminal of the rectifier (S1) ()

This completes the wiring of the chassis at this time.

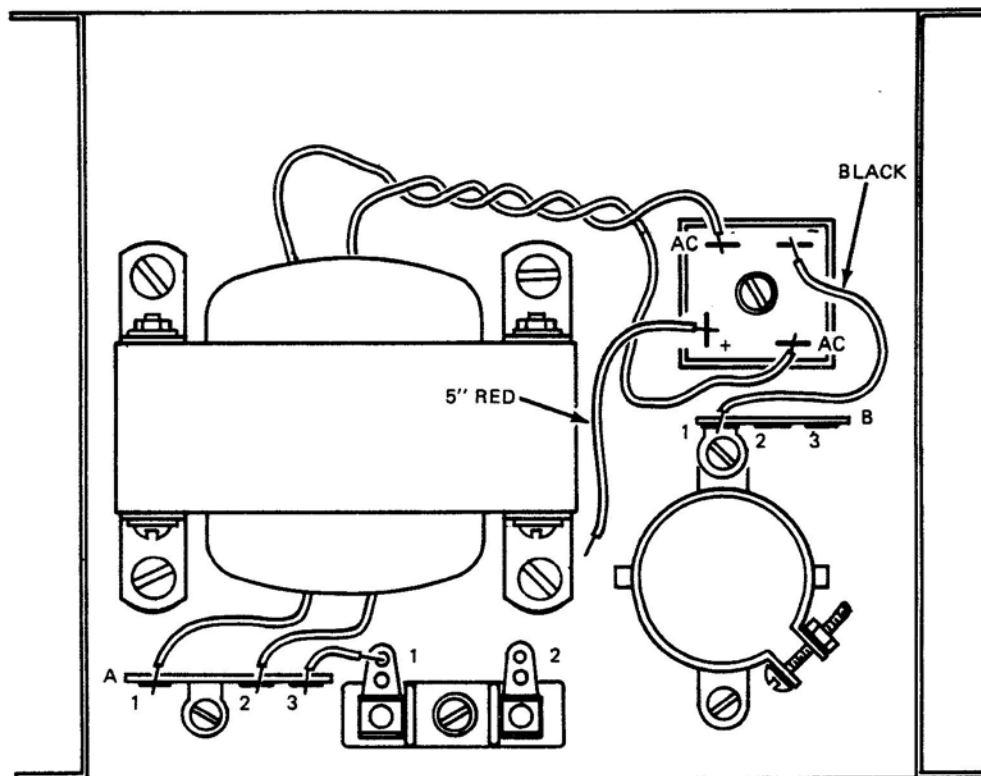


Fig. 2. Preliminary chassis wiring.



THE FRONT PANEL

Before you start working on the front panel, make sure that you have a clean clear spot on your workbench. Place a piece of soft cloth or some other material on the workbench to avoid the possibility of scratching the panel.

MOUNTING THE PARTS

Figure 3 shows the parts installed on the front panel (PA61), looking at the rear of the panel.

(1) Insert the red jack through the hole in the front of the panel marked with the plus (+) sign, and secure it by threading the nut provided on the back of the panel. Tighten the nut securely

(2) Insert the black jack through the hole in the front of the panel marked with the minus (-) sign, and secure it by threading the nut provided on the back of the panel. Tighten it securely

(3) Place the control lockwasher over the bushing of the 10k-ohm control. Insert the 10k-ohm potentiometer through the back of the panel in the 3/8" hole in the lower center of the panel. Place a flat washer and a control nut over the bushing. Position the terminals on the potentiometer as shown in Fig. 3, and then tighten the nut to hold the potentiometer

securely in place. Now rotate the potentiometer shaft all the way in a counterclockwise direction. Put the knob on the potentiometer shaft so that the white dot on the knob is beside the printing marked MIN. Tighten the knob set screw securely

(4) Locate two 3/8" X 6-32 black Phillips head screws and insert them through the holes adjacent to the words OFF and ON on the front of the panel. Hold the screws in place and turn the panel over. Then put the on-off switch into place over the screws. Notice that the two terminals on the on-off switch are toward the center of the panel. Now put a lockwasher on each screw and then a 6-32 hex nut and tighten securely.

(5) Insert the leads on the pilot light assembly through the hole beneath the word POWER on the front of the panel and then push the light assembly firmly up against the front panel. Slide the spring clip over the leads and over the barrel of the light until it is pressed firmly against the rear of the panel. If the pilot light is not held firmly in place, it is because you haven't pushed the clip against the back of the panel firmly enough

(6) Mount the meter on the front of the panel. The barrel goes through the large hole and the four mounting screws through the four small holes. Slip a solder lug over the lower left mounting screw and position it as shown in Fig. 3. Place

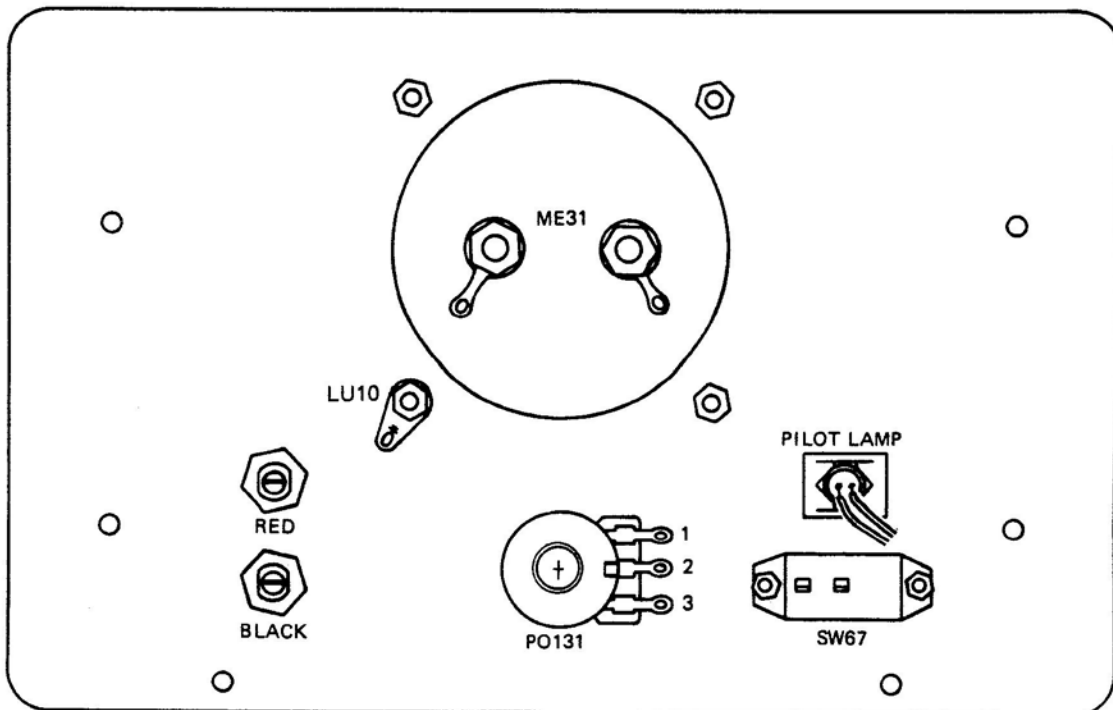


Fig. 3. Rear view of the front panel with the parts in place.

the lockwashers and nuts supplied with the meter on the four mounting screws and tighten firmly. Avoid overtightening, or you might crack the meter case ()

(7) Place the two large solder lugs supplied with the meter hardware over the two large studs on the back of the meter. Then place a lockwasher and one of the nuts supplied on each stud and tighten securely

This completes the mounting of the parts on the front panel.

WIRING THE FRONT PANEL

As you wire the front panel, refer to Fig. 4, which is a pictorial diagram showing the wiring that is to be completed in this stage.

(1) Cut a piece of solid black wire 7" long, remove the insulation from both ends, and connect one end to one of the terminals of the on-off switch (S1)

(2) Cut a piece of solid black hookup wire 8" long, remove the insulation from both ends, and connect one end of this wire to the other terminal on the on-off switch (S1)

(3) Cut a piece of solid red wire 6" long and remove 1/4" of insulation from one end. Remove an additional 3/4" of insulation from one end. Connect this end of the wire to terminal 2 (S1) and terminal 3 (S1) of the potentiometer

(4) Connect the 330 ohm, 1 watt resistor from the negative meter terminal (NS) to the positive meter terminal

(5) Cut a piece of solid red wire 3" long and remove the insulation from both ends. Connect one end to terminal 1 of the potentiometer (S1) and the other end to the positive terminal of the meter (NS)

(6) Cut a piece of solid red wire 3" long. Remove the insulation from both ends. Connect one end to the red banana jack (NS) and the other end to the positive terminal of the meter (S3)

(7) Cut a 7" length of black stranded wire and remove the insulation from both ends. Twist the strands together and tin the wire. Connect one end to the black banana jack and use your longnose pliers to bend the wire to hold it firmly in place (NS)

(8) Cut a 2-1/2" length of solid black wire and remove the insulation from both ends. Connect one end to the black banana jack (S2) and the other to the solder lug on the meter mounting terminal (NS)

(9) Cut a 3-1/2" length of solid black wire and remove the insulation from both ends. Connect one end to the solder lug mounted on the meter mounting screw (S2) and the other end to the negative terminal of the meter (S2)

This completes the preliminary assembly of the front panel.

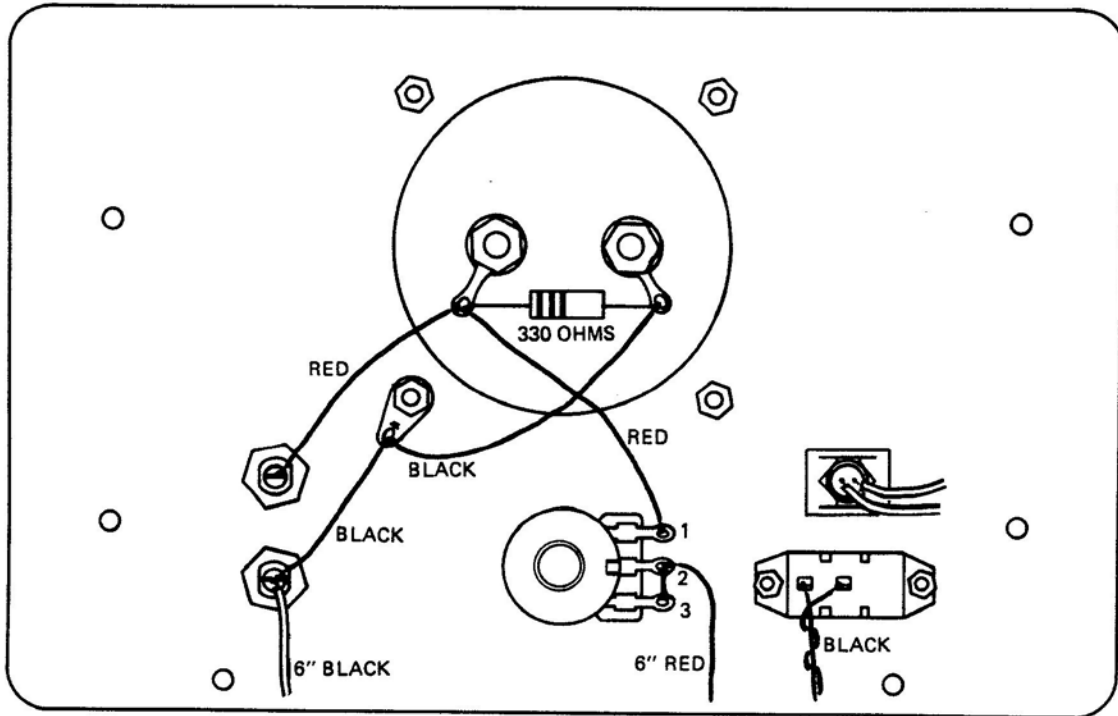
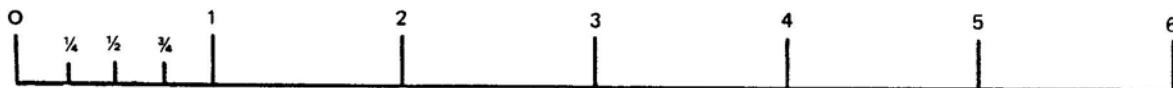


Fig. 4. Front panel wiring.



THE BACK PANEL

The voltage regulator is mounted on the large heat sink supplied with the kit and the heat sink is secured to the outside of the back panel of the power supply. The regulator must dissipate a large amount of power, particularly when the power supply is supplying a high current at a low voltage. Use the parts in Bag "3B-320" for this part of the assembly.

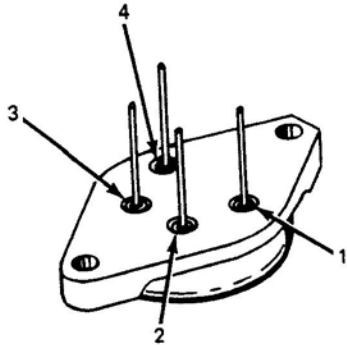


Fig. 5. Bottom view of the voltage regulator.

MOUNTING THE REGULATOR

Figure 5 is a bottom view of the voltage regulator. Notice that the two pins on the right are spaced farther apart than the two pins on the left. In other words, the spacing between pins 1 and 4 is greater than the spacing between pins 2 and 3.

Notice that there are six holes in the center leg of the heat sink as shown in Fig. 6. The two holes at the top and bottom that are marked A and B are used to secure the voltage regulator to the heat sink. Notice that holes marked 1 and 4 are spaced farther apart than holes 2 and 3. Pins 1 and 4 of the regulator must go through holes 1 and 4 on the heat sink.

(1) Before mounting the regulator on the heat sink, coat the metal mounting surface of the regulator with a generous coating of silicon grease ()

(2) Now mount the voltage regulator on the heat sink so that pins 1 and 4 of the regulator go through holes 1 and 4 of the heat sink. Pass two 1/2" long 6-32 screws through the mounting holes in the regulator and the mounting holes in the

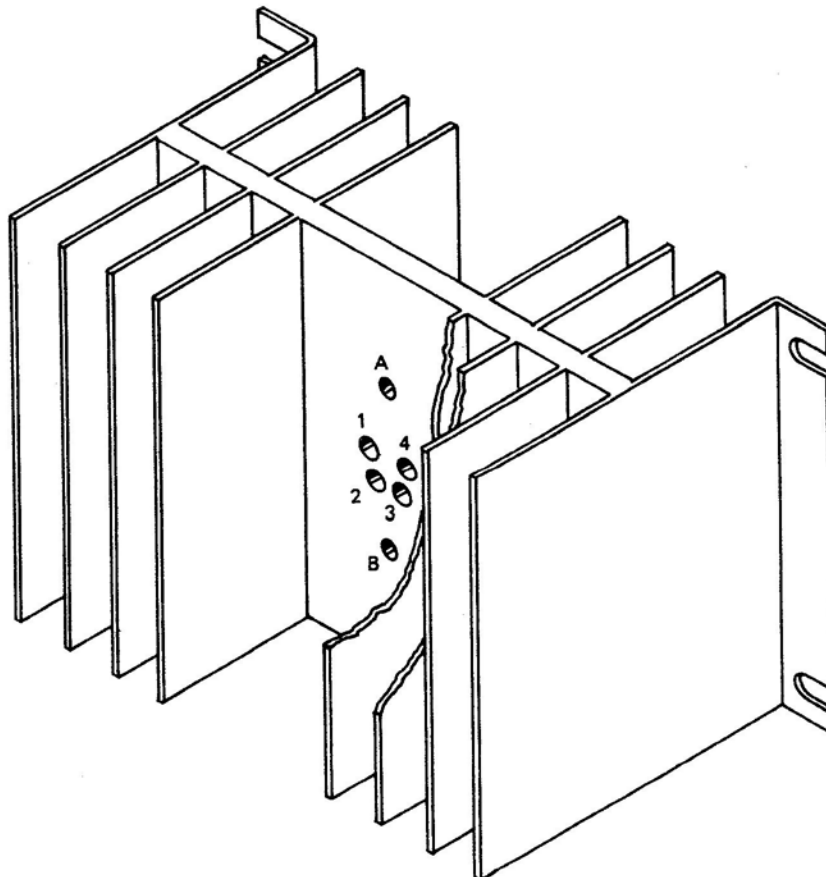


Fig. 6. Hole identification for the heat sink.

heat sink. Hold the screws and regulator in place, turn the heat sink over, and then slip a solder lug over the upper screw as shown in Fig. 7. Now put a 6-32 hex nut on each screw and tighten securely.

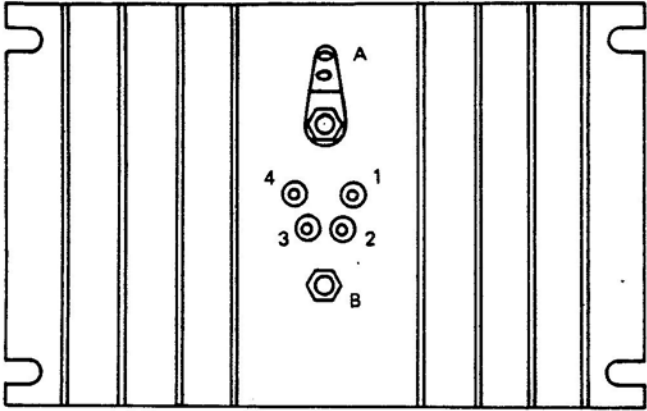


Fig. 7. Installing the regulator on the heat sink.

WIRING THE REGULATOR

Now look at Fig. 8. This is a view of the bottom of the heat sink showing in detail the solder lug, the four pins of the voltage regulator, and the wiring you are now going to add. Use this as a guide in wiring the voltage regulator.

- (1) Prepare 6" lengths of stranded white wire, stranded black wire, and solid red wire.
- (2) Prepare a 10-1/2" length of stranded red wire
- (3) Remove all the insulation from a 2" length of solid black wire. Pass one end of the bare wire through the hole in the solder lug A as shown. Twist the wire to hold it securely in place (NS). Use your longnose pliers to wrap the other end around the end of pin 4 of the voltage regulator (NS)
- (4) Wrap one end of the stranded black wire around the end of pin 4 of the voltage regulator. Place the heat sink on its side so that the pins are horizontal. Then solder pin 4 of the regulator so that the bare wire and the stranded black wire are firmly soldered to pin 4 of the regulator (S2)
- (5) Wrap one end of the white stranded wire around pin 1 of the voltage regulator, turn the heat sink on its side, and then carefully solder the white stranded wire to the end of pin 1 (S1)

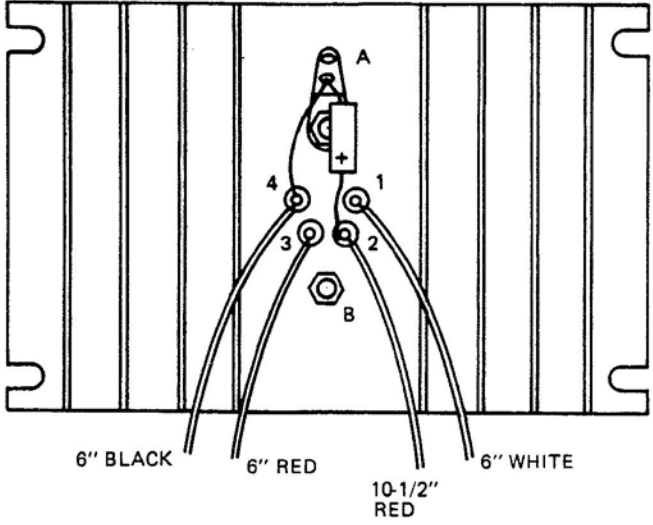
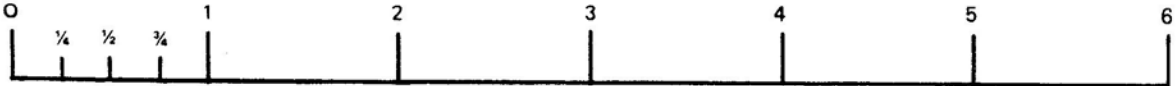


Fig. 8. Wiring the regulator.

- (6) Wrap one end of the solid red wire around the end of pin 3 of the voltage regulator. Now place the heat sink on its side again and solder the red wire to pin 3 of the regulator (S1)
 - (7) Connect the positive lead of the 10 μf capacitor to pin 2 of the voltage regulator (NS). Wrap the capacitor lead around the end of the pin to hold it in place. Connect the other lead to solder lug A (S2)
 - (8) Wrap the end of the red stranded wire around the end of pin 2 of the regulator. Place the heat sink on its side and solder the red stranded wire and the capacitor to terminal 2 of the regulator (S2)
 - (9) Carefully inspect the regulator to be sure that no solder has run down the pins leaving a large glob of solder. If there is a large glob of solder, heat the pin with your soldering iron and let the solder roll off the pin onto your iron
 - (10) Insert the 7/8" rubber grommet in the large hole in the back panel (PA62). Place the back panel so that the 3/8" hole is at the lower left
 - (11) Now feed the leads soldered to the regulator through the grommet and mount the heat sink on the panel as shown in Fig. 9, using four 3/8" long 6-32 Phillips head screws. Place a lockwasher and nut on each screw. Tighten the four mounting screws and nuts to hold the heat sink in firm contact with the back panel
- This completes the back panel subassembly. This is the last of the subassemblies, so you are now ready to finish the assembly of your power supply.



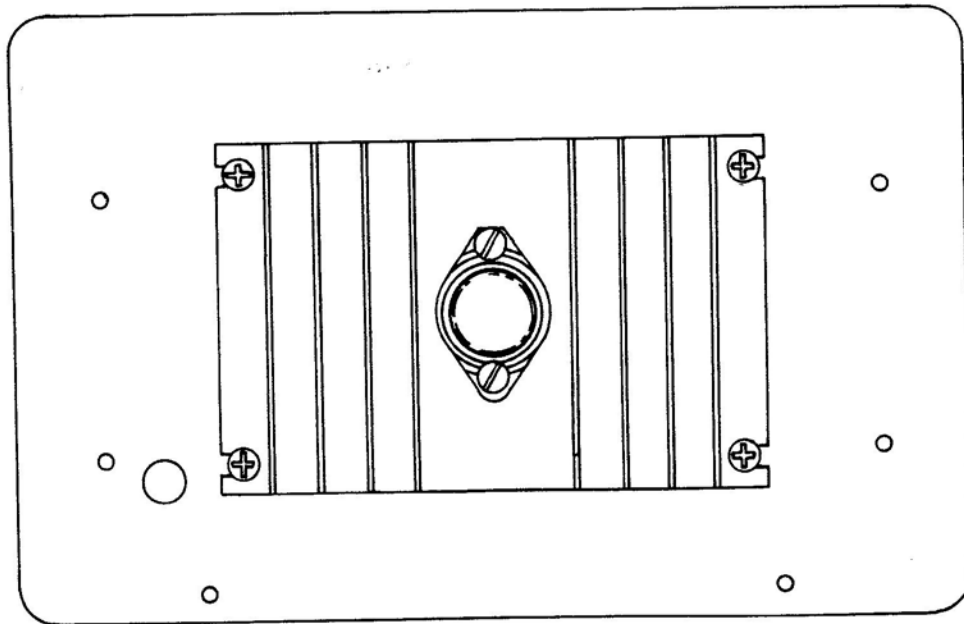


Fig. 9. The heat sink and the regulator mounted on the back panel.

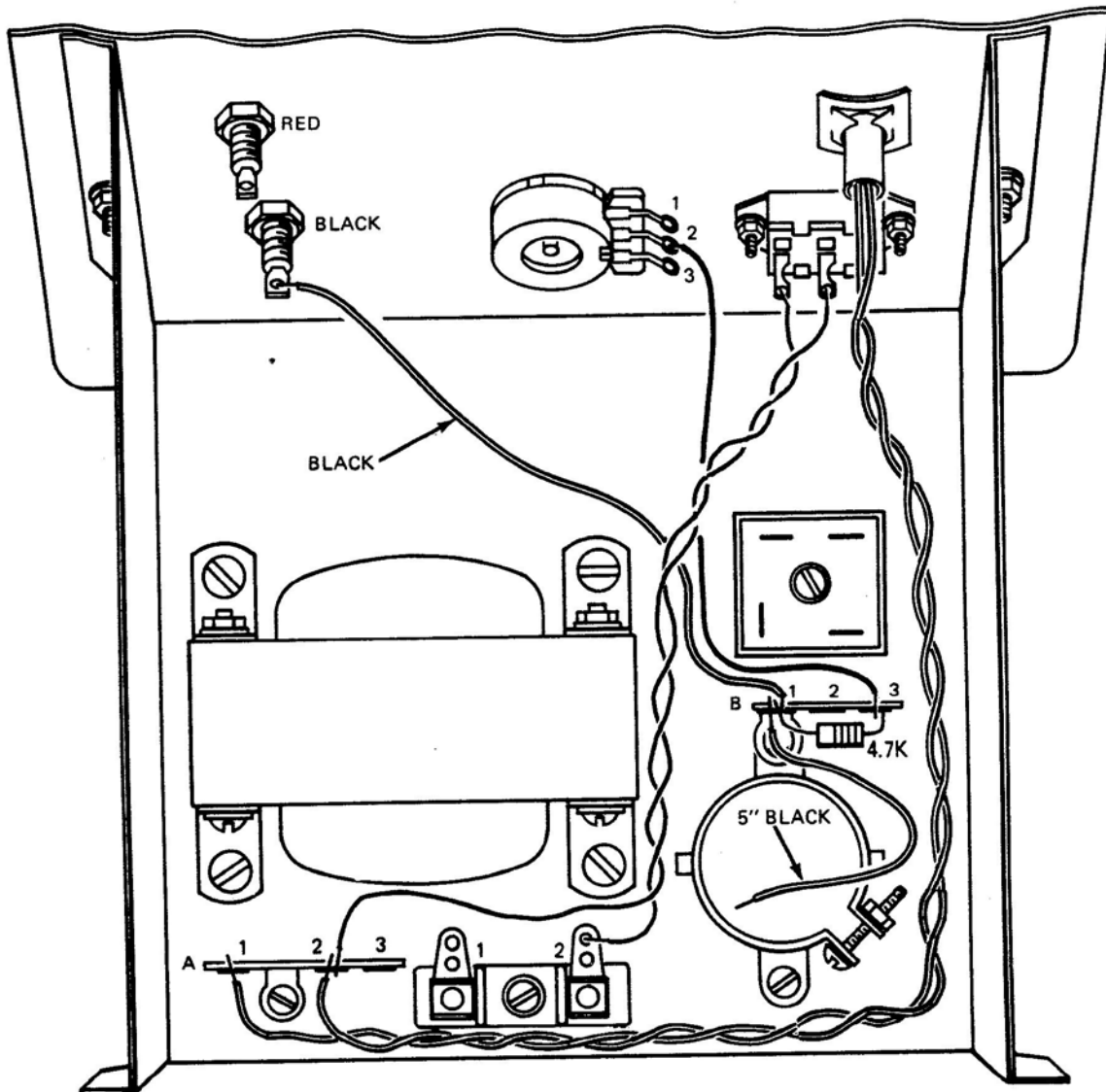


Fig. 10. Wiring the front panel.

FINAL ASSEMBLY

You are now ready to complete the final assembly of your power supply. First you will fasten the front panel to the chassis and complete the wiring between the front panel and the chassis. Then you will complete the wiring between the back panel and chassis and secure the chassis and the back panel. The parts you will need are in Bag "3B-320."

WIRING THE FRONT PANEL TO THE CHASSIS

The front panel is secured to the chassis by means of six black 3/8" long 6-32 Phillips head screws, which are inserted through the remaining six holes in the panel.

(1) Place the chassis on your workbench and bring the front panel to the chassis as shown in Fig. 10. Insert the four screws through the panel and the sides of the chassis. Use a lockwasher and a 6-32 hex nut on each screw. After you have the four screws in place, tip the chassis on its side and insert the screws through the two remaining holes in the bottom chassis lip. Again, use lockwashers and 6-32 hex nuts. Tighten the two screws through the bottom lip of the chassis and then tighten the four screws through the panel and at the sides of the chassis

(2) Loosely twist together the two black leads connected to the on-off switch. Dress the leads against the chassis and route

them as shown in Fig. 10, connecting the shorter of the two leads to terminal 2 of the fuse holder (S1), and the longer to terminal 2 of the 3-lug terminal strip A (NS) near the rear of the chassis

(3) Loosely twist together the two leads from the pilot light and route them as shown in Fig. 10. Connect one lead to terminal 1 of the 3-lug terminal strip A (NS) and connect the other lead to terminal 2 of the 3-lug terminal strip (S3)

(4) Connect the 4.7k-ohm resistor from terminal 1 (NS) to terminal 3 (NS) of terminal strip B

(5) Connect the stranded black wire from the black jack on the front panel to terminal 1 of the 3-lug terminal strip B (NS)

(6) Prepare a 5" length of stranded black wire and connect one end of it to terminal 1 of terminal strip B (S4)

(7) Connect the solid red wire from terminal 2 of the potentiometer to terminal 3 of terminal strip B (NS)

This completes the wiring between the front panel and the chassis.

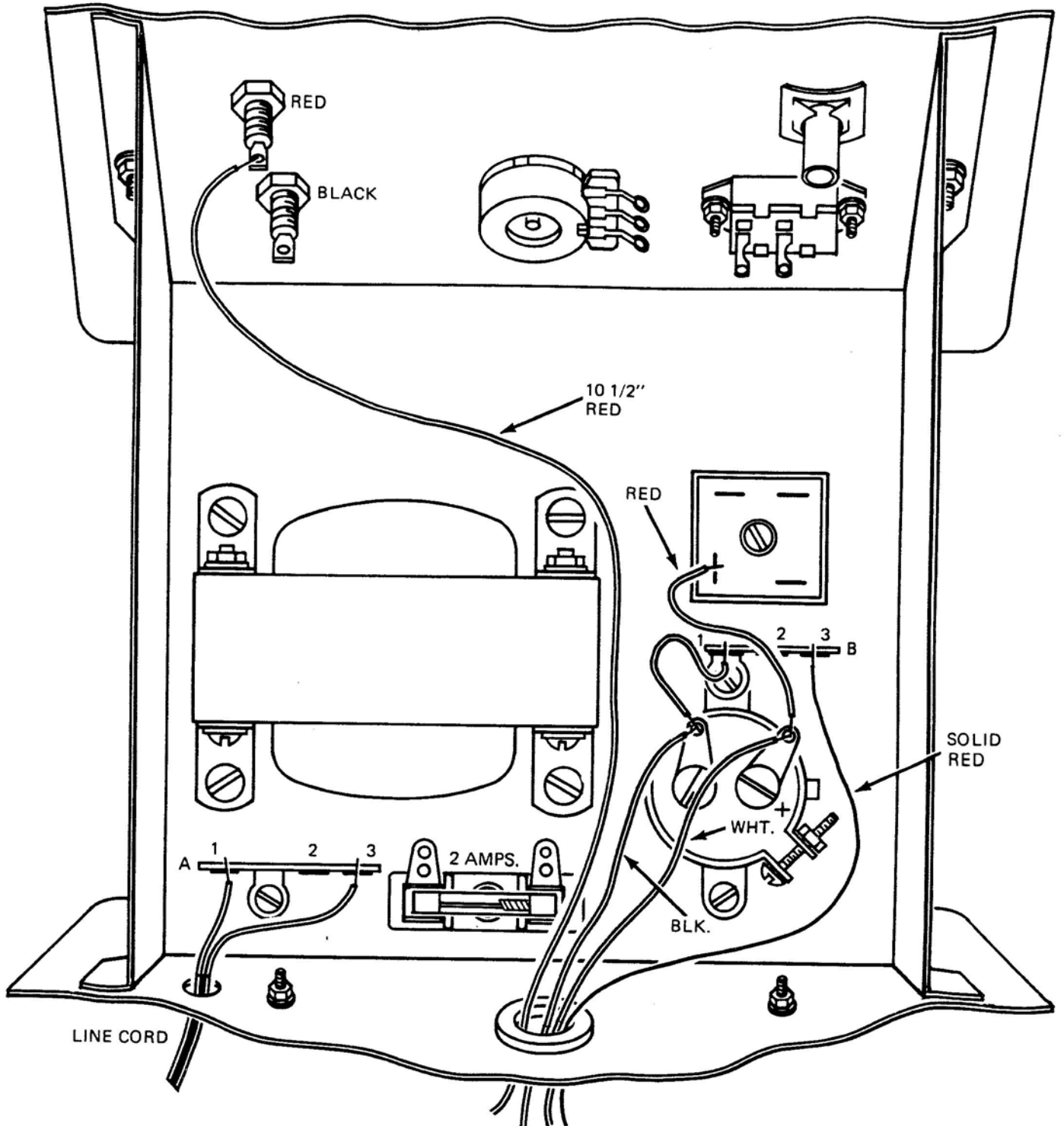


Fig. 11. Wiring the back panel to the chassis.

WIRING THE BACK PANEL TO THE CHASSIS

To make it easier to get at the various connections between the chassis and the back panel, make these connections before you secure the back panel to the chassis.

(1) Place the power supply chassis on your workbench with the rear of the chassis toward you. With the rear of the back panel facing you (the side on which you have the heat sink mounted), you will find a 3/8" hole to the left of the heat sink. Slip the line cord through this hole. Connect one lead from the line cord to terminal 1 (S2) of the 3-lug terminal strip A, and the other lead to terminal 3 (S2) as shown in Fig. 11

(2) Connect the solid red wire from the voltage regulator to terminal 3 (S3) of the 3-lug terminal strip B

(3) Now insert the 18,000 μ f capacitor inside the capacitor mounting bracket and push the capacitor down until it touches the workbench. Rotate the capacitor until the two terminals are positioned as shown in Fig. 11. The plus (+) terminal should be on your right. Now tighten the screw through the capacitor mounting bracket until the capacitor is held firmly in place

(4) Remove the two screws in the terminals on the top of the capacitor. Run the screws through the hole in a solder lug and put each screw back in the capacitor with the solder lugs facing as shown. Bend the solder lugs up slightly so that they will not touch the outer edge of the capacitor

(5) Connect the stranded black wire from lug 1 of terminal strip B to the negative capacitor terminal (NS)

(6) Connect the black stranded wire from the voltage regulator to the negative terminal of the capacitor (S2)

(7) Connect the stranded white wire from the voltage regulator to the positive terminal of the capacitor (NS).

(8) Connect the stranded red wire from the plus (+) terminal of the rectifier to the solder lug on the positive terminal of the capacitor (S2)

(9) Connect the stranded red wire from the voltage regulator to the red banana jack on the front panel (S2)

(10) Insert the 2 amp fuse in the fuse holder

This completes the power supply wiring. Now you will secure the back panel to the power supply.

(11) Pass the 3/8" long 6-32 screws through the holes in the back panel and through the holes in the chassis mounting flanges. It is best to put the screws through the holes in the two side-mounting flanges first. Use a lockwasher and a 6-32 hex nut on each of the four screws. Then put the power

supply on its side and pass 6-32 screws through the back panel and the bottom-mounting flange of the chassis. Use lockwashers and 6-32 hex nuts on both of these screws. Tighten all six screws securely

(12) Refer to Details A, B, and C of Fig. 11 to install the line cord strain relief. Pull the line cord fully out of the 3/8" hole, and insert the line cord in the center of the strain relief. Close the other half of the strain relief over the line cord and squeeze tightly with a pair of pliers. Then snap the strain relief into the 3/8" hole

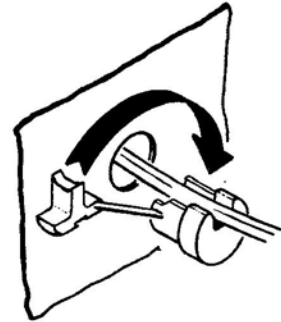


Fig. 11. Detail A.

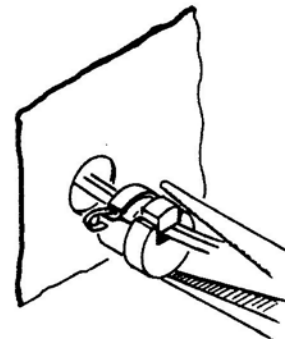


Fig. 11. Detail B.

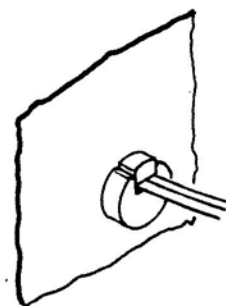


Fig. 11. Detail C.

TESTING THE POWER SUPPLY

Before putting the bottom and top covers on the power supply, it is a good idea to test it. Put the on-off switch in the OFF position and rotate the voltage control beneath the meter to the minimum voltage position. Plug the power supply into a 120 volt ac outlet and turn the switch on. If there is anything seriously wrong with the wiring, the fuse will blow.

Assuming that the fuse does not blow, notice the reading on the voltmeter. It should be 5 volts, although it may be a little below or a little above due to parts tolerances. Now, advance the control to the maximum voltage position. The maximum voltage should be 15 volts, although the reading may be slightly below or slightly above 15 volts due to parts tolerances. If the voltage control controls the voltage over this range, your power supply is working. Turn off the power and unplug the line cord.

NOTE: You will notice that with no load on the power supply, the voltmeter will take several seconds to drop to zero. This is normal.

INSTALLING THE POWER SUPPLY IN THE CABINET

(1) Before installing the power supply in the cabinet, locate the four plastic mounting feet found in Bag "3B-320." Remove the backing from the feet and mount them on one of the cabinet halves as shown in Fig. 12

(2) Now locate the two cabinet alignment brackets (BR103) and mount four Tinnerman nuts on the brackets over the four holes as shown in Fig. 13. The raised portion of the Tinnerman nut goes on the inside of the U-shaped brackets.

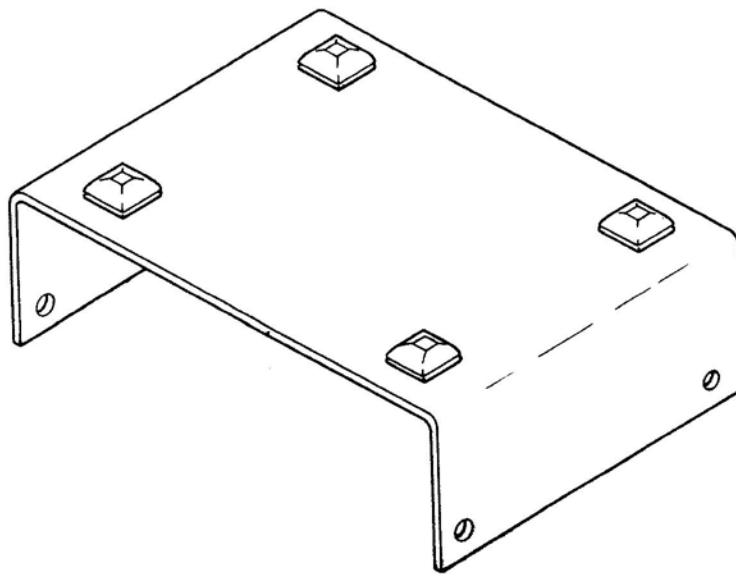


Fig. 12. Mounting the feet on one of the cabinet halves.

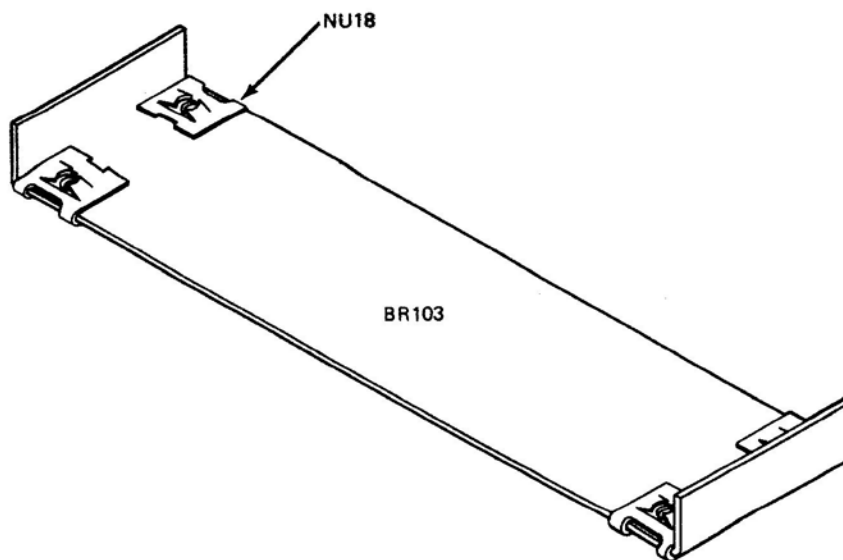


Fig. 13. The alignment bracket with four Tinnerman nuts in place.

(3) Next, locate two of the black Phillips head 8-32 screws. Put the screws through the two holes on one side of the black trim strip, and through the holes in the cabinet half on which you mounted the feet. Then screw them into the Tinnerman nuts on the cabinet aligning brackets as shown in Fig. 14. Do *not* tighten the screws. Do the same thing with the second cabinet trim strip and alignment bracket on the other side of the cabinet bottom

(4) Now carefully lift the power supply and lower it inside the cabinet bottom so that the alignment brackets are on the inside of the front and back panels

(5) Now take the top cabinet half and place it over the top of the power supply, aligning the holes with the holes in the black trim strips. Secure it to the lower cabinet assembly with four 8-32 black Phillips head screws

(6) Tighten all eight of the black Phillips head screws

ASSEMBLING THE POWER LEADS

Locate the plastic bag marked "1D-320" and remove the parts. Refer to Fig. 15 for the assembly of the power leads.

(1) Strip 1/2" of insulation from both ends of the red wire. Tin the leads

(2) Remove the banana plug from the red barrel by unscrewing it. Insert one end of the red wire into the red barrel and through to the end of the banana plug. The wire will come out

the small hole just in front of the threaded part of the plug. Twist this end around the plug and then screw the red barrel back onto the plug

(3) Slip the red alligator clip boot onto the other end of the red wire and solder the alligator clip to the end of the wire as shown

(4) In a similar manner, install the black banana plug, boot, and alligator clip on the length of black stranded wire

This completes the assembly of the power leads.

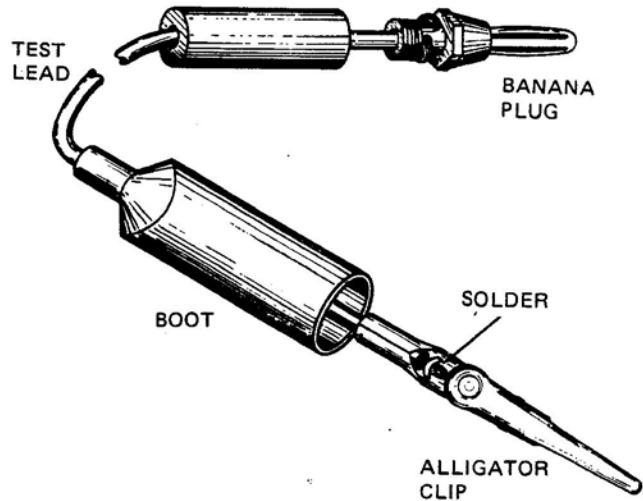


Fig. 15. Assembling the power leads.

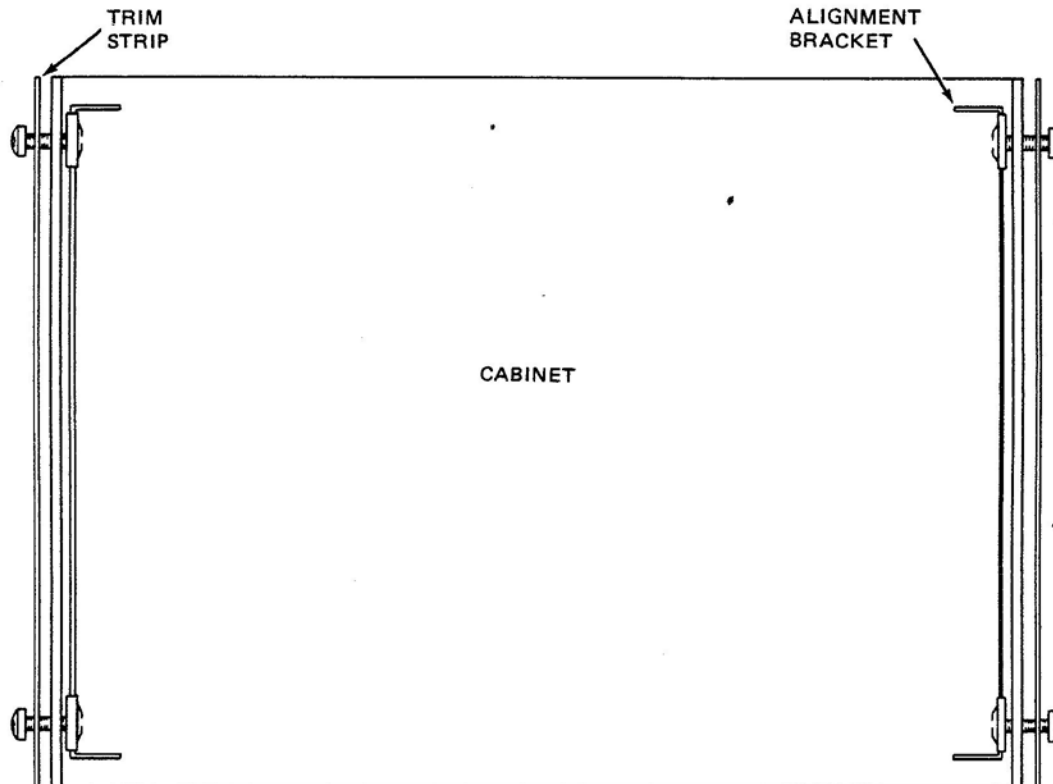


Fig. 14. Mounting the trim strips and the alignment brackets on the cabinet bottom.

MAINTENANCE

Figure 16 is a schematic diagram of the Model 320 Power Supply. As you can see, there are very few parts in the unit, and the internal protection circuitry in the regulator (VR1) will provide almost absolute protection for the entire power supply. The only thing that can possibly go wrong with the supply is a blown fuse. A blown fuse could occur if C1 were to short circuit or if a short circuit were to be placed accidentally across the terminals of C1. Such an occurrence could also destroy the bridge rectifier (BR1), so be very careful not to let anything near the terminals of C1.

The voltage at the positive terminal of C1 should be between 20 and 23 volts under full load. If the voltage is considerably less than this, there is a possibility that one of the diodes in BR1 is damaged. In this case the rectifier is operating as a half-wave rectifier instead of a bridge rectifier. Replace BR1.

The voltage at terminal 3 of the regulator (across R1) will always be 5 volts (or whatever the minimum voltage of your regulator happens to be), regardless of the setting of the voltage adjust control (R2). By measuring this voltage as you adjust the control, you can assure yourself that the regulator is working properly. If too much current is drawn from the regulator, it will overheat. This causes the internal circuitry to drop the output voltage and current to a safe level. When the overload is removed, the output voltage will return to its set value.

If you should encounter difficulty with your Model 320 Power Supply that you are unable to fix, write CONAR Instruments consultants for further help. If you are still unable to fix your power supply, send the unit prepaid via United Parcel Service to CONAR for repair. Be sure to include the minimum service charge of \$7.50. We will repair your power supply and return it to you.

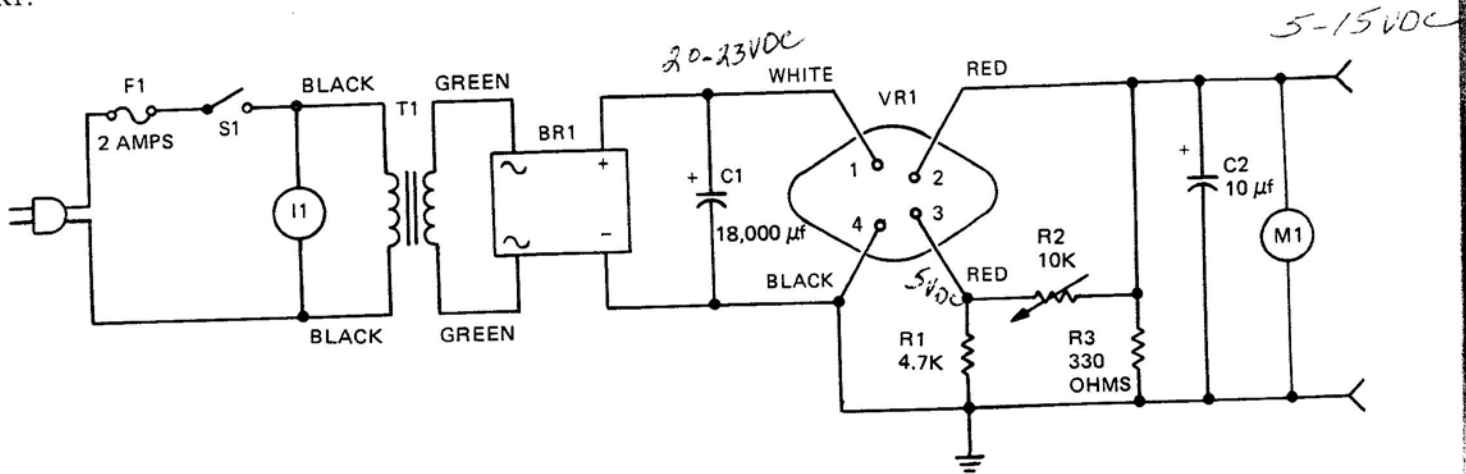


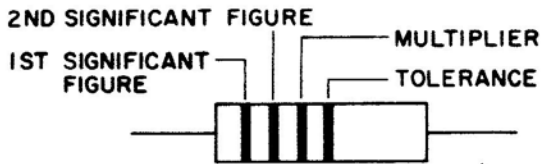
Fig. 16. The schematic diagram of the Model 320.

RESISTOR AND CAPACITOR COLOR CODES

JAN and EIA stand for the two common color codes (Joint Army-Navy and Electronics Industries Association). The two codes are the same except as indicated. We have not indicated temperature coefficients or characteristics of capacitors, because they are not necessary for identifying your parts.

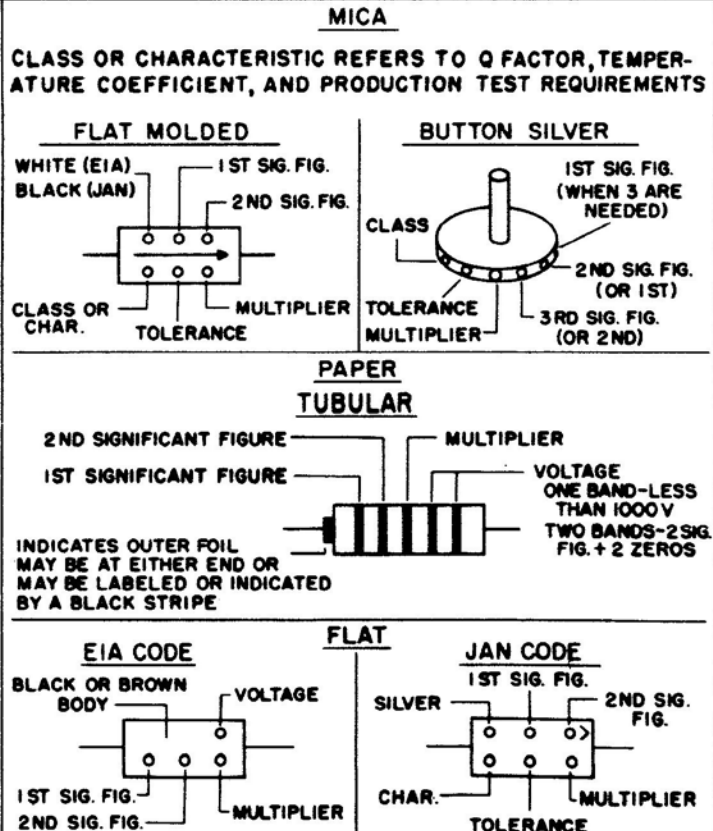
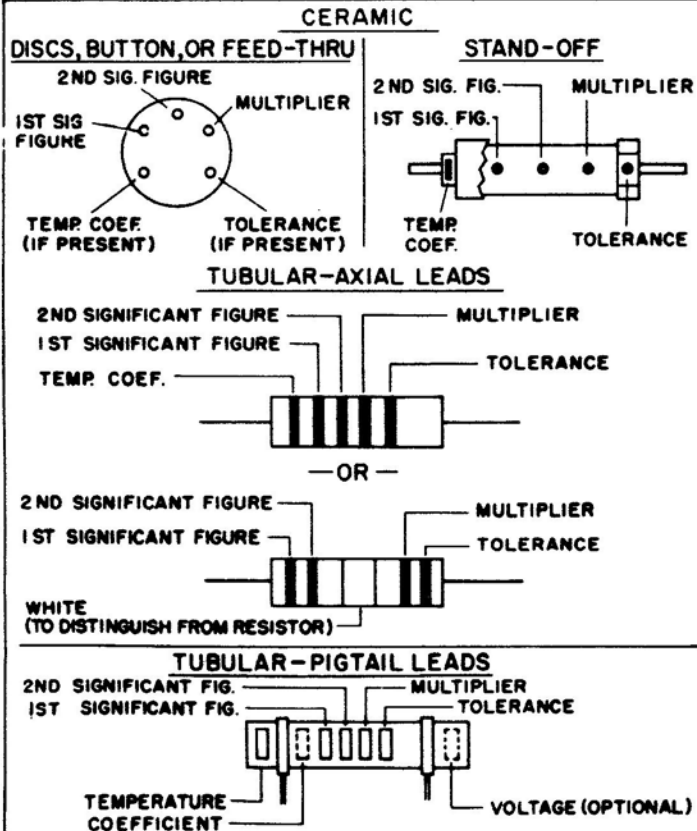
COLOR	SIG. FIG.	MULTIPLIER	RESIS.	TOLERANCE			
				CERAMIC CAPACITORS		MICA CAPACITORS	PAPER CAP
				10 MMF OR LESS	OVER 10 MMF	(As below, or ± 1 mmf, whichever is larger)	
Black	0	1		± 2.0 MMF	$\pm 20\%$	$\pm 20\%$	20%
Brown	1	10		± 1.0 MMF	$\pm 1\%$	$\pm 1\%$	
Red	2	100			$\pm 2\%$	$\pm 2\%$	
Orange	3	1000			$\pm 2.5\%$	$\pm 2.5\%$	
Yellow	4	10,000					
Green	5	100,000		± 0.5 MMF	$\pm 5\%$	$\pm 5\%$ (EIA)	5%
Blue	6	1,000,000					
Violet	7	10,000,000					
Gray	8			± 0.25 MMF			
White	9			± 1.0 MMF	$\pm 10\%$		10%
Gold		.1	$\pm 5\%$			5% (JAN)	5%
Silver		.01	$\pm 10\%$			10%	10%
No color			$\pm 20\%$				20%

RESISTORS - RESISTANCE GIVEN IN OHMS



Black body = composition, non-insulated.
 Colored body = composition, insulated.
 Double width band for 1st sig. figure indicates wire-wound.

CAPACITORS - CAPACITY GIVEN IN MMF



USE THIS HANDY RULER FOR MEASURING LENGTHS OF WIRE

