5-52. CAPACITOR AND CAPACITOR CLAMP INSTALLATION (Figures 5-44 and 5-45)

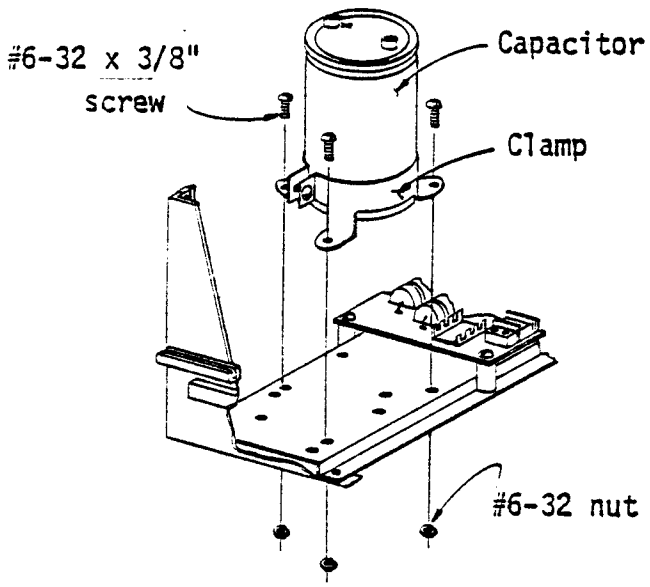
According to supply variations, your kit may contain either one capacitor (varying from 80,000uf - 100,000uf, 15V - 25V) or two capacitors (varying from 40,000uf - 50,000uf, 15V - 25V) to be mounted on the Cross Member. Figure 5-44 shows the proper placement for one capacitor. Figures 5-45A and 5-45B show the proper placement for two capacitors. The capacitor(s) are mounted in clamps using a #6-32 x 3/8" screw and a #6-32 nut (Bag 5).

Install the capacitor(s) according to the following instructions.

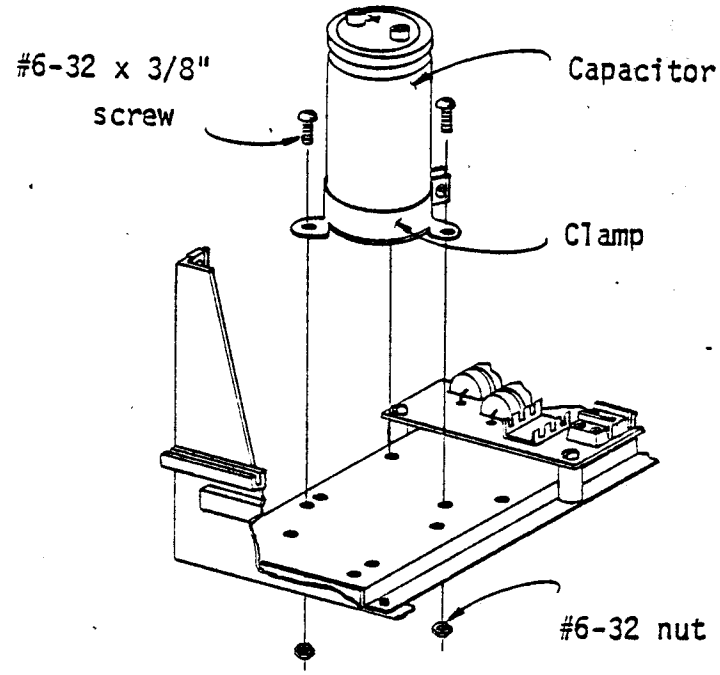
1. Secure the capacitor in the clamp with a #6-32 x 3/8" screw and orient the capacitor as shown in figure.

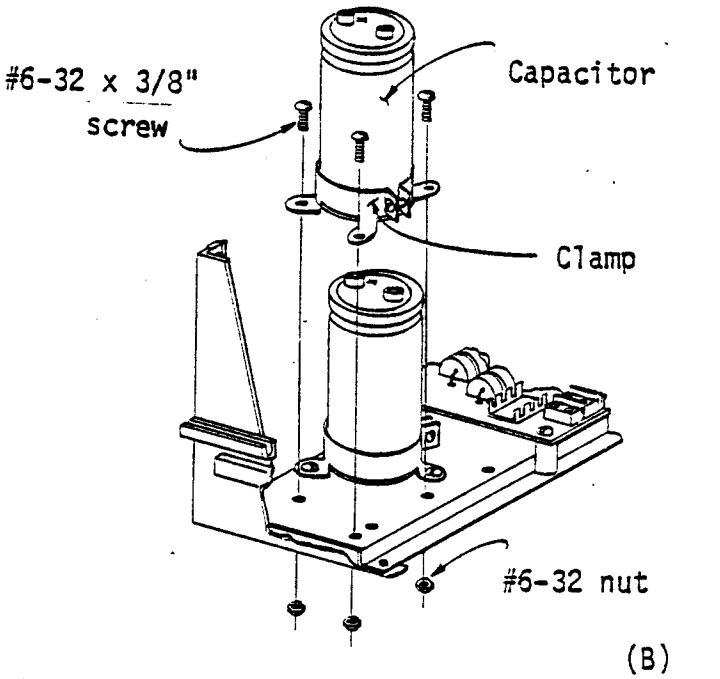
2. Place the clamp and capacitor on the Cross Member, aligning the mounting holes.

3. Secure the clamp to the Cross Member using three #6-32 x 3/8" screws and three #6-32 nuts.



5-44. Power Supply Capacitor and Clamp Installation (For One Capacitor)





5-45. Power Supply Capacitor and Clamp Installation (For Two Capacitors)

5-53. BACK PANEL ASSEMBLY (Figure 5-46)

The instructions for the assembly of the Altair 8800b back panel are divided into the following sections:

Procedural Instructions
Capacitor Wiring
Bridge Rectifier Installation
I/O Connectors
Fan Mounting
Fuse and Fuse Holder
AC Power Cord
Transformer
Back Panel Mounting

Before beginning the back panel assembly, remove the back panel from the mainframe and remove the mainframe from the case bottom. Set aside the mounting screws, as they will be replaced later in the assembly procedure.

To aid with the assembly of your unit, a view of a correctly assembled back panel is shown below in Figure 5-46.

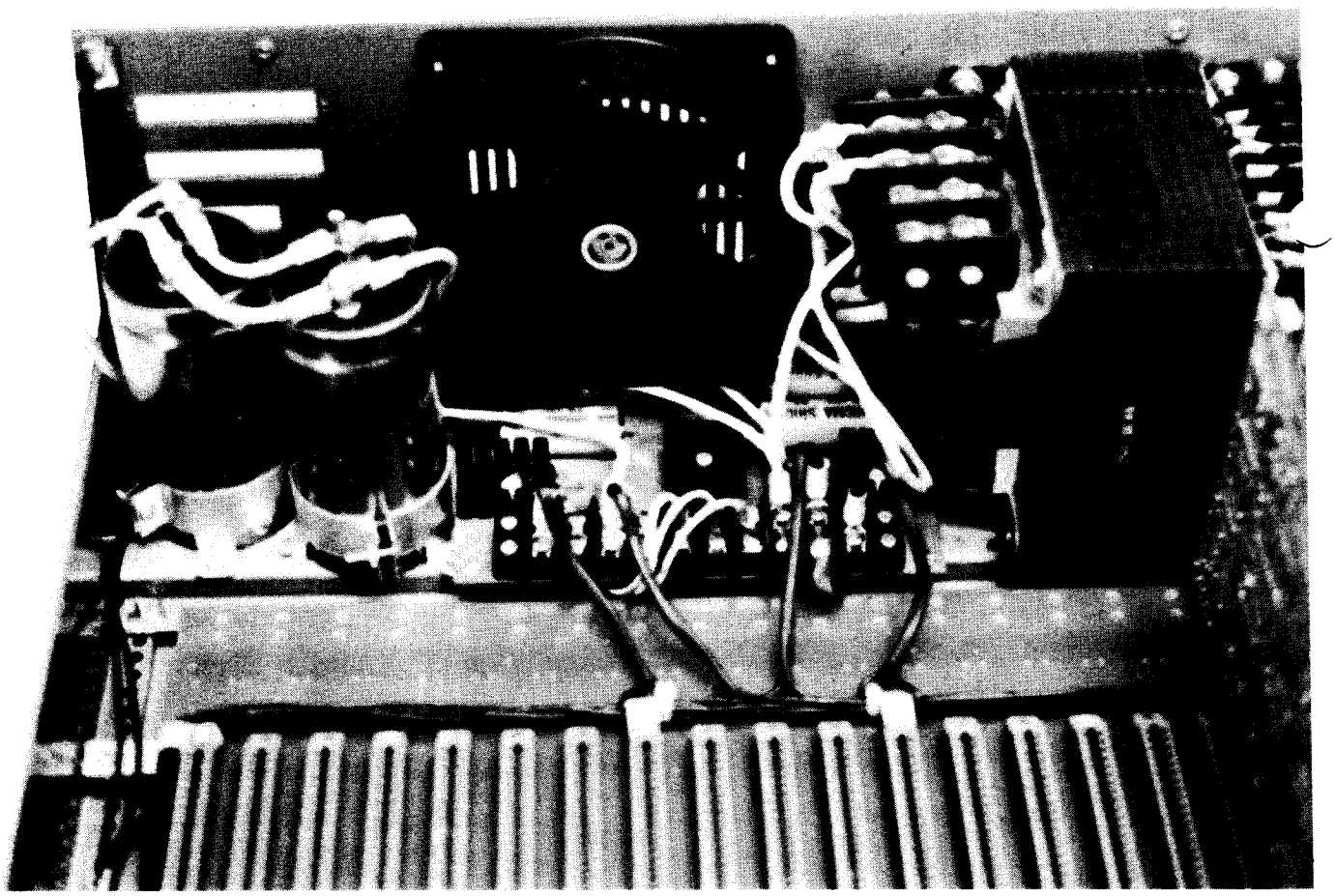


Figure 5-46. Completed Back Panel Assembly

5-54. PROCEDURAL INSTRUCTIONS (Figures 5-47 through 5-49)

Some of the terms and procedures that are repeatedly called out in the Back Panel Assembly Instructions will be explained in detail in Paragraphs 5-55 through 5-58. (The experienced kit builder who is already familiar with these procedures may wish to skip to Paragraph 5-59.)

5-55. Terminal Ends. There are five different sizes of terminal ends used in the wiring of the back panel. The sizes are shown in Figure 5-47. Refer to this figure whenever a terminal end size is called out in the assembly instructions.

5-56. Wire Preparation. Before any wire is used in an assembly step, it should be prepared as follows:

1. Cut the desired length of wire.
2. Strip 1/8" to 1/4" of insulation off the ends.
3. Tin the exposed portion of the wire by applying a thin coat of solder.

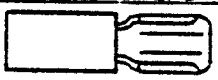
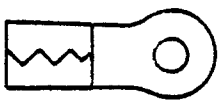
SIZE	BAG #	TERMINAL END	WIRE GAUGE	SCREW SIZE
A	2		12-10	slip on
B	2		22-18	#6 screw
C	2		12-10	#6 screw
D	2		12-10	#10 screw
E	2		12-10	#10 screw

Figure 5-47. Terminal End Sizes

5-57. Attaching Terminal Ends to Wires. Most of the wire connections in the Back Panel Assembly Instructions call for attaching a terminal end to a wire and mounting it to the proper terminal. This procedure is detailed below:

For terminal end sizes A through D:

1. Insert the exposed portion of a wire that you have prepared into the correct size terminal end as shown in Figure 5-48.

2. Heat the wire and terminal end with a soldering iron. Apply solder to the heated wire, allowing the solder to flow until there is a solid solder connection.

> NOTE
>
> If the insulator on the terminal end loosens during soldering, be sure to push it all the way back in place when soldering is completed.

> NOTE
>
> Be sure to hold A size terminal ends vertically (with the wire down) while soldering to prevent solder flowing onto the slip-on tabs.

For terminal end size E:

Size E terminal ends do not have insulators, and therefore must be insulated with heat shrink tubing. The procedure for attaching E size terminals ends varies slightly, as follows:

1. Set the E size terminal end on the work surface and heat it with a soldering iron until it is hot enough to allow solder to flow.

2. Insert the exposed portion of a wire you have prepared into the terminal end and apply solder until there is a solid connection.

3. After the wire has been soldered in place and the joint has cooled, cut a 1-inch piece of heat shrink tubing and place it over the terminal end. Use a heat gun, if available, or a match to shrink the tubing.

> CAUTION
>
> Terminal ends become extremely hot during soldering. Allow five minutes cooling time after soldering before touching the terminal ends.

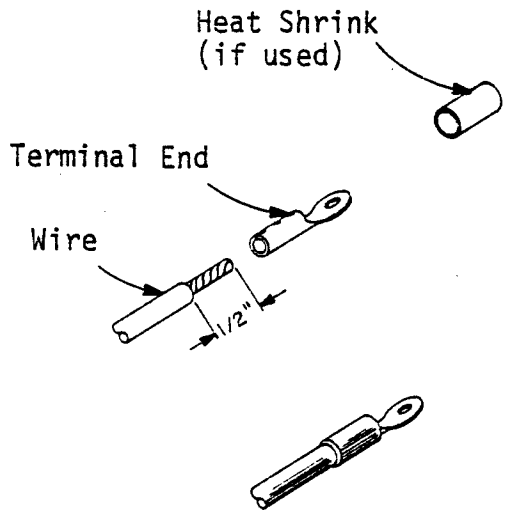


Figure 5-48. Terminal End Attachment

5-58. Connector Pins and Connector Sockets. Some of the wire connections in the back panel assembly instructions call for connector pins and connector sockets housed in a plastic plug. The general procedure for preparing these plug(s) is detailed below:

1. Insert the exposed portion of a wire that you have prepared into a connector pin or connector socket as shown in Figure 5-49A.

2. Crimp the lower portion of the pin or socket around the wire insulation. Solder the center portion of the pin or socket to the exposed portion of the wire.

3. Insert the pins and sockets into their respective housings as shown in Figure 5-49B.

4. Commoning tabs may be put into the pin housing over pins that must be shorted together. Push the commoning tabs all the way to the base of the pin housing, using the tip of a small screwdriver.

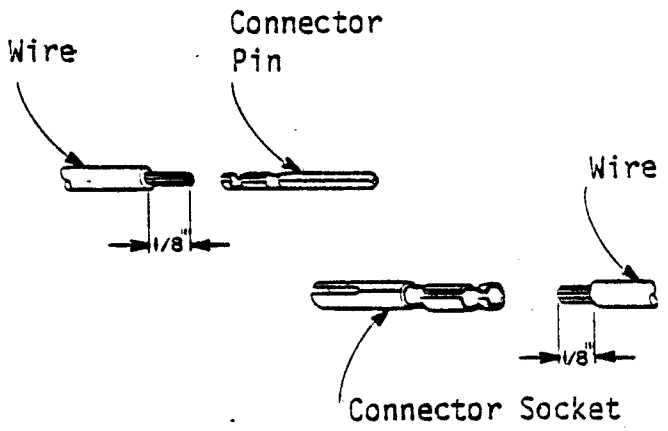


Figure 5-49A. Connector Pin and Connector Socket Wire Insertion

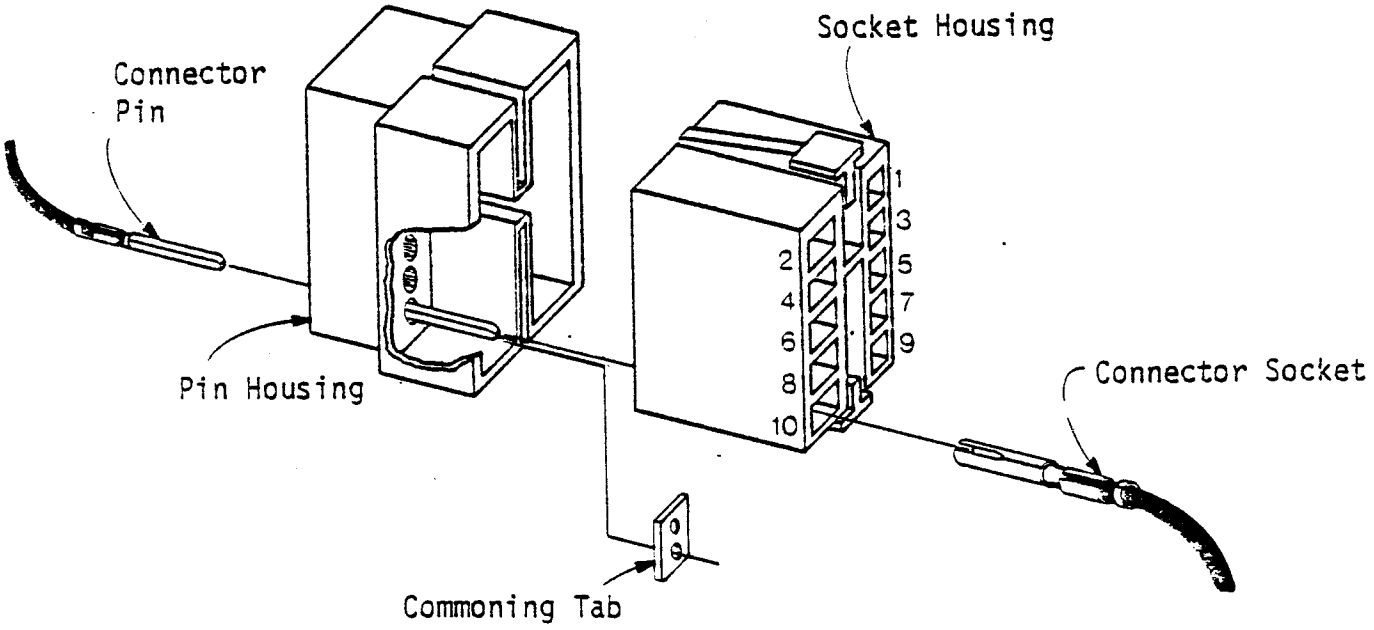


Figure 5-49B. Pin and Socket Housing Assembly

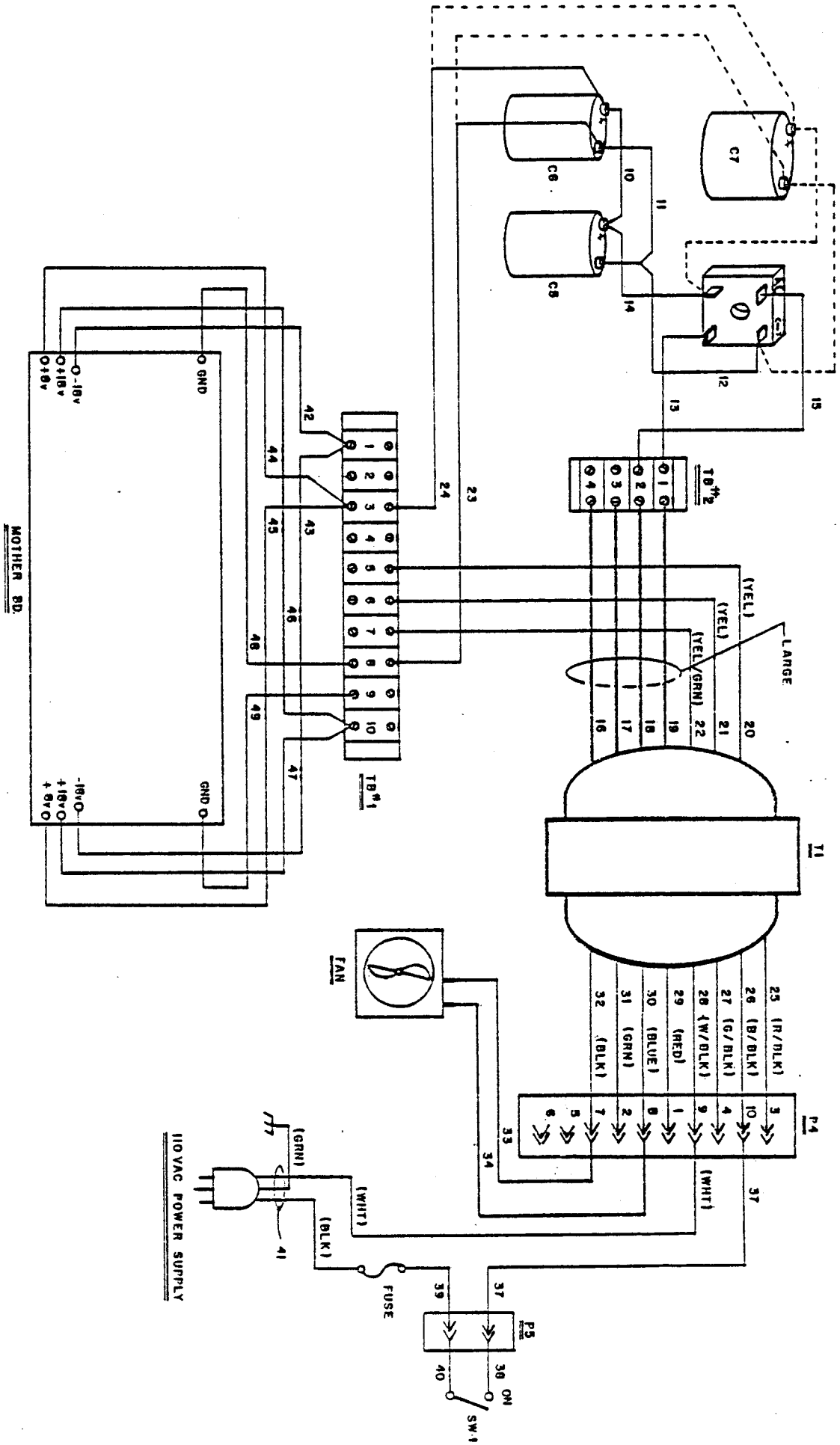


Figure 5-50. Wiring Diagram

5-59. CAPACITOR WIRING (Figure 5-50)

Before beginning assembly of the back panel, wire the capacitor or capacitors that are mounted on the Cross Member as follows:

Wiring For One Capacitor:

1. Cut two 9-inch lengths of 10-12 gauge wire. Attach C size terminal ends to one end of each wire. Attach D size terminal ends to the other end of each wire.

2. Connect the 9-inch wires to the capacitor by mounting the D size terminal ends to the "+" and ground terminals with the #10 screws provided.

3. Connect the wire from the "+" side of the capacitor to terminal #3 on the power supply board terminal block (TB1). (See wiring diagram, Figure 5-50.)

4. Connect the wire from the ground (-) side of the capacitor to terminal #8 of the terminal block (TB1). (See wiring diagram, Figure 5-50.)

Wiring For Two Capacitors:

1. Jumper the two "+" terminals to each other and the two ground terminals to each other with two 2-inch lengths of 10-12 gauge wire and four D size terminal ends.

2. Cut two 9-inch lengths of 10-12 gauge wire. Attach C size terminal ends to one end of each wire. Attach D size terminal ends to the other end of each wire.

3. Connect the 9-inch wires to C5 (capacitor closest to the Power Supply Board) by mounting the D size terminal ends to the "+" and ground terminals with the #10 screws.

4. Connect the wire from the "+" side of C5 to terminal #3 on the terminal block (TB1). (See wiring diagram, Figure 5-50.)

5. Connect the wire from the ground side of C5 to terminal #8 of the terminal block (TB1). (See wiring diagram, Figure 5-50.)

5-60. BRIDGE RECTIFIER INSTALLATION (Figure 5-51)

Use the following instructions to wire the bridge rectifier (Bag 1) and mount it to the back panel as shown in Figure 5-51. The bridge rectifier is part number KBH25005.

1. Mount the bridge rectifier to the back panel using a #6-32 x 3/4 inch screw, #6-32 nut, flat washer and lockwasher. Make sure the terminal labelled "-" is at the upper right corner.

2. Cut two 5-inch lengths of 12-10 gauge wire and two 19-inch lengths of 12-10 gauge wire.

3. Attach an A size terminal end to one end of each wire. Attach a D size terminal end to the other end of each wire.

4. Slip the A size terminal ends onto the bridge rectifier terminals as shown in Figure 5-51. Attach the two 5-inch wires to the "AC" terminals and use masking tape to label them 13 and 15. Attach the two 19-inch wires to the "+" and "-" terminals and label them 14 and 12 respectively.

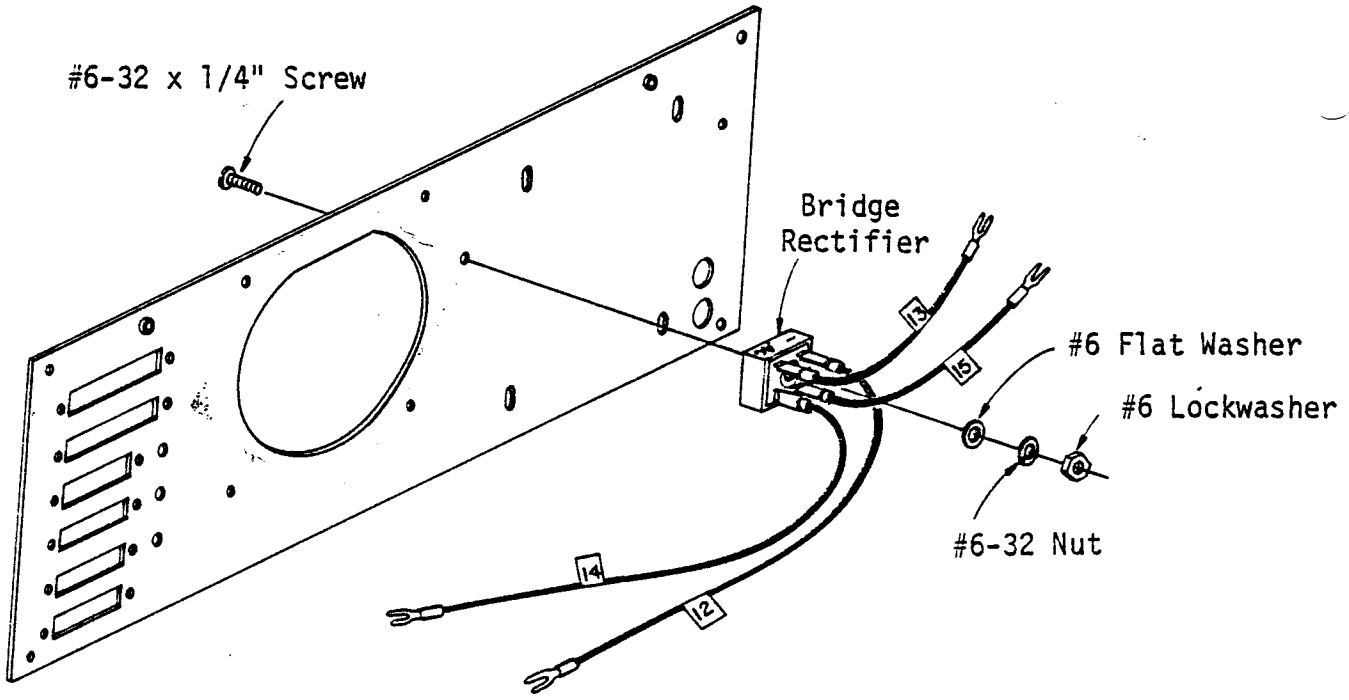


Figure 5-51. Bridge Rectifier Installation

5-61. FAN MOUNTING (Figure 5-52)

1. Before mounting the fan and fan screen to the back panel, install the female plug onto the terminals as shown in Figure 5-52. If your kit does not supply a plug, solder two 20-inch lengths of 22-18 gauge wire to the terminals.

2. Attach connector sockets (Paragraph 5-58) to the two wire ends. (The wire ends on the plug have been stripped and pretinned.) Label the wires 33 and 34.

3. Refer to Figure 5-52. Mount the fan screen and fan to the back panel (with the airflow flowing inward), using four #6-32 x 5/8 inch screws and four #6 "snap-on nuts."

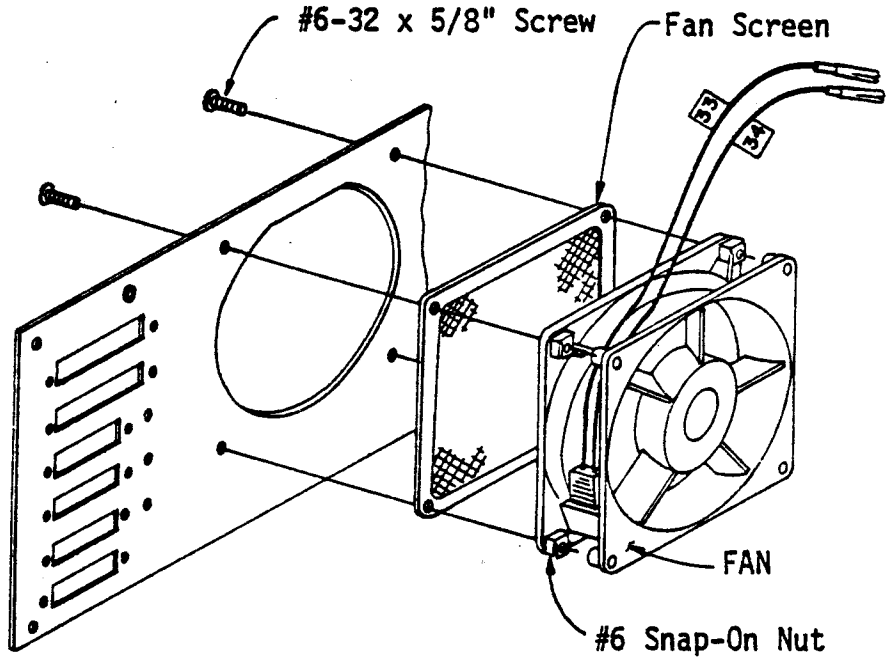


Figure 5-52. Fan and Fan Screen Mounting

5-62. FUSE AND FUSE HOLDER (Figure 5-53)

1. Secure the fuse holder (Bag 2) into the hole provided on the back panel using a fiber washer and mounting nut as shown in Figure 5-53.

2. Attach a 40-inch length of 22-18 gauge wire to the side terminal on the fuse. Mount a connector pin to the end of the 40-inch wire and label the wire #39 (see Paragraph 5-58).

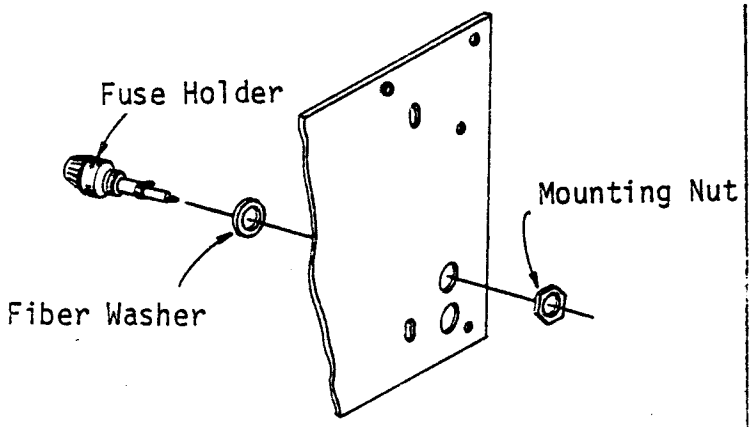


Figure 5-53. Fuse Holder Installation

5-63. AC POWER CORD (Figure 5-54)

1. Strip about 7 inches of casing off the end of the power cord to expose the three wires inside.

2. Put the strain relief (Bag 2) on the cord and position it as shown in Figure 5-54.

3. Snap the strain relief in place on the back panel.

4. Cut the black power cord wire to a length of 2 inches and solder it to the end of the fuse holder. Cut the green power cord wire to a length of 5 inches and attach a solder lug to the end. Attach a connector socket (Bag 4) (see Paragraph 5-58) to the end of the 7-inch white wire.

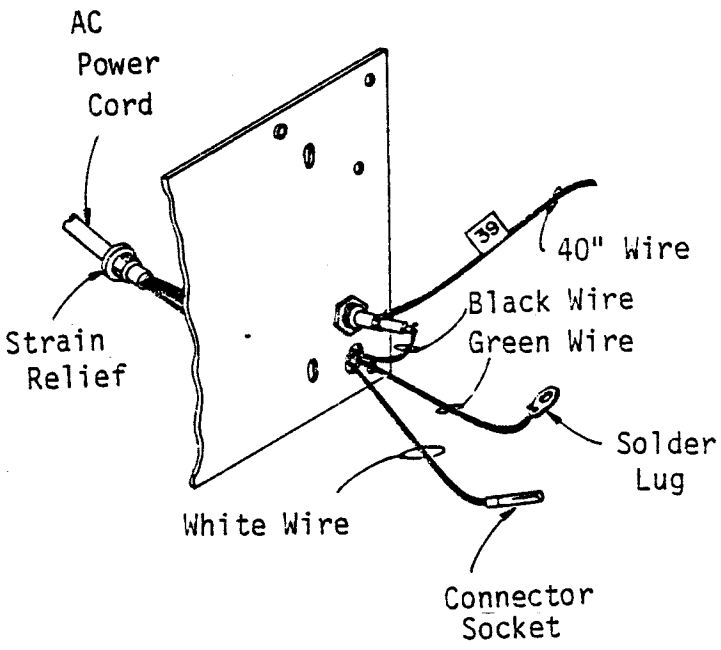


Figure 5-54. AC Power Cord Installation

5-64. TRANSFORMER (Figures 5-55 through 5-69)

The instructions for wiring and mounting the transformer will be divided into three parts: Secondary Wiring, Primary Wiring, and Transformer Mounting. Review Paragraphs 5-55 through 5-58 for the procedures involved.

5-65. Secondary Wiring.

1. Orient the transformer with the secondary side (four large wires) facing you. Remove the two top bolts and nuts and use them to mount two "L" brackets (Bag 2) as shown in Figure 5-55.

2. Attach an E size terminal end with heat shrink tubing (see Paragraph 5-58) to each of the four large transformer wires and label the wires 16-17-18-19 as shown in Figure 5-56.

3. Attach a B size terminal end to each of the three remaining secondary wires (Figure 5-56). Label the two yellow wires 20 and 21, and label the yellow/green wire 22.

4. Bend each of the E size terminal ends at a right angle as shown in Figure 5-56. Mount the four large wires to one side of the 4-terminal block (TB2), using the screws provided.

5. Mount the terminal block to the "L" brackets on the transformer using four #6-32 x 3/4 inch screws, four #6-32 nuts and four #6 lockwashers (Figure 5-57).

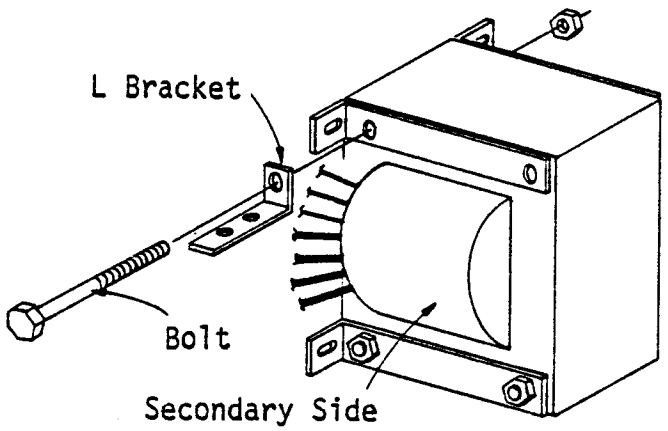


Figure 5-55. "L" Bracket Mounting

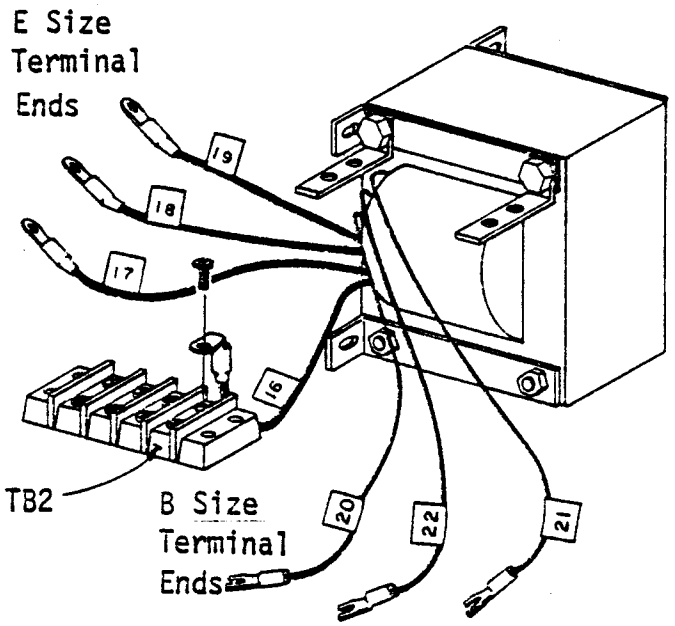


Figure 5-56. Terminal End Attachment

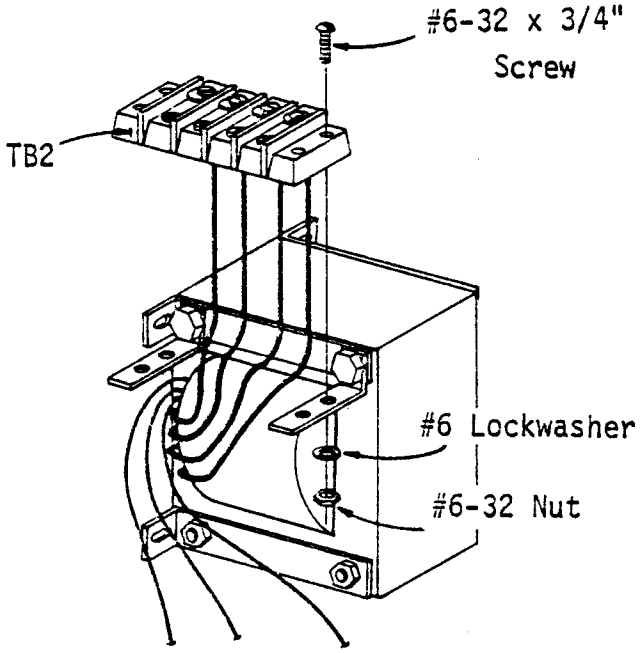


Figure 5-57. Terminal Block Mounting

5-66. Primary Wiring. The wires on the primary side of the transformer will be connected to the 110 volt source with a 10-pin plug (see Paragraph 5-58) according to the following instructions.

A. Pin Housing.

1. Attach a connector to each of the primary transformer wires.

2. When all eight wires on the primary side of the transformer have pins attached, insert the pin housing (P4) as shown in Figure 5-58. Insert the pins in the following order (see wiring diagram, Figure 5-50):

Wiring Diagram Designation	Transformer Wire Color (Primary Side)	P4 Pin Housing Slot Number
25	Red/Black	3
26	Blue/Black	10
27	Green/Black	4
28	White/Black	9
29	Red	1
30	Blue	8
31	Green	2
32	Black	7

Place a two-circuit commoning tab over the following pairs of pins:

2 and 4 1 and 3

7 and 9 8 and 10

Make sure the tabs do not come in contact with each other.

3. The two wires from the fan (33 and 34) are to be inserted into slots 7 and 8 of the P4 socket housing.

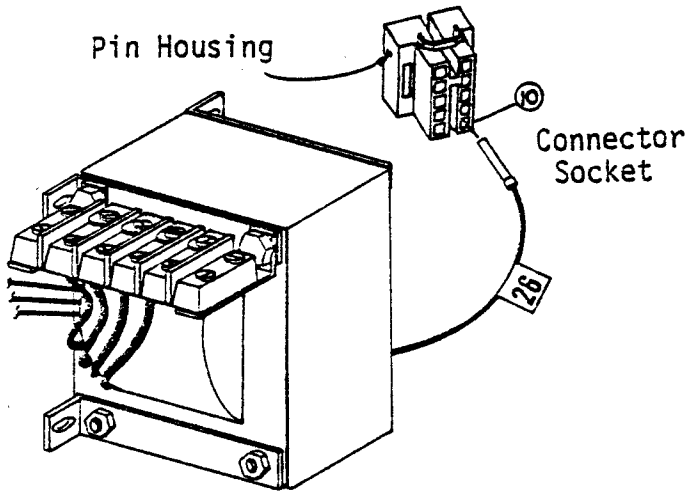


Figure 5-58. Pin Housing Insertion

B. Socket Housing.

1. Cut a 40-inch length of 22-18 gauge wire and attach a connector socket to each end. Label this wire 37.

2. Insert one connector socket of wire 37 into slot 9 of the 10-pin socket housing. Insert the socket on the 7-inch white AC power cord wire into slot 10 of the 10-pin socket housing.

3. Connect the socket housing to the pin housing, as shown in Figure 5-49.

5-67. Mount Transformer to Back Panel.

1. Mount the transformer to the back panel as shown in Figure 5-59 using four #10-32 x 1/2 inch screws, 4 nuts, 4 flat washers and four #10 lockwashers. (The transformer positioning may have to be adjusted later when the back panel is mounted to the mainframe, to insure the transformer is resting on the cross member.)

2. Attach wires 13 and 15 from the bridge rectifier to terminals 1 and 2 of the terminal block (TB2). (See Wiring Diagram, Figure 5-50.)

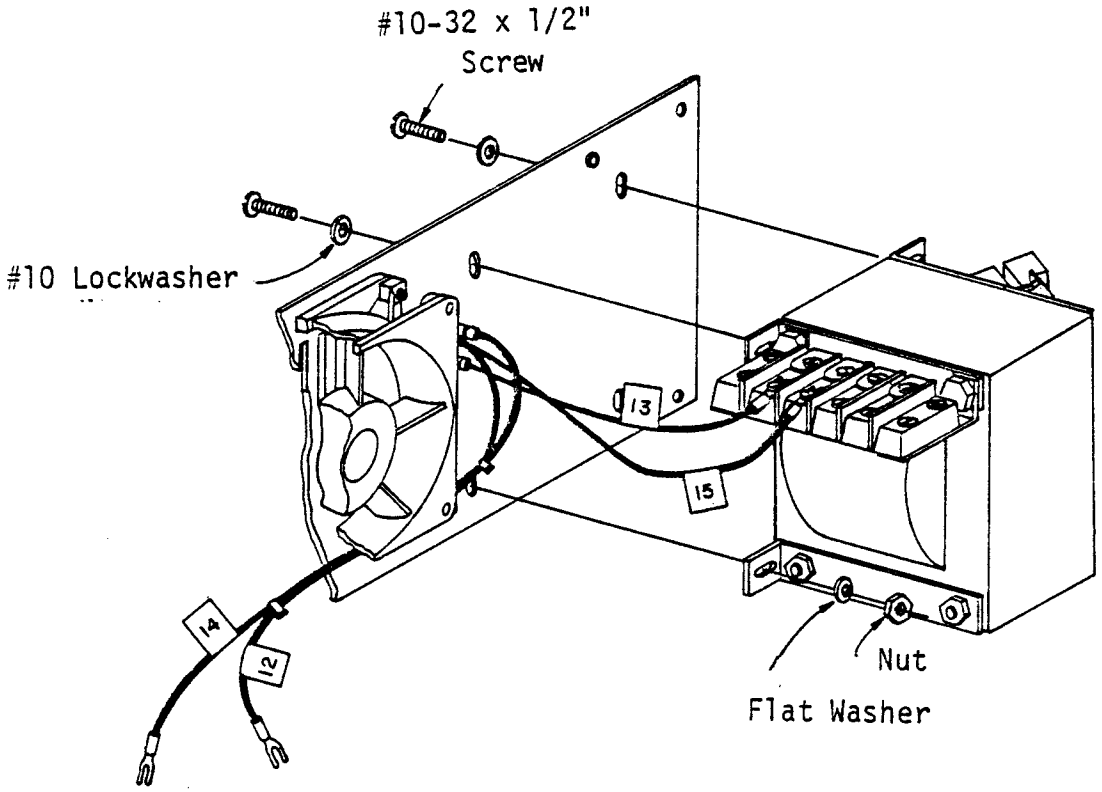


Figure 5-59. Transformer Mounting

5-68. MOUNT BACK PANEL TO MAINFRAME (Figure 5-60)

1. Mount the back panel to the mainframe as shown in Figure 5-60 using the original back panel mounting screws. (Tighten these screws down until they are just firm.)

2. Make sure the two 19-inch bridge rectifier wires, the 40-inch fuse wire (#39), and the 40-inch connector plug wire (#37) go under the fan as the back panel is mounted. Connect wire 14 from the bridge rectifier to the "+" side of the capacitor(s). Connect wire 12 from the bridge rectifier to the ground side of the capacitor(s). Make continuity checks (see wiring diagram, Figure 5-50).

NOTE

Make sure the wires from the fan go underneath the fan and the transformer as the back panel is mounted. Make sure the transformer rests solidly on the cross member when the back panel is in place.

3. Secure the solder lug on the green AC ground wire to one of the holes on the side of the mainframe using a #6-32 x 1/4" screw, a #6-32 nut, and a #6 lockwasher.

4. Connect three secondary wires from the transformer to Terminal Block #1 as follows:

Wire #20 (yellow) to slot #5, TB #1
Wire #21 (yellow) to slot #6, TB #1
Wire #22 (yellow/green) to slot #7, TB #1

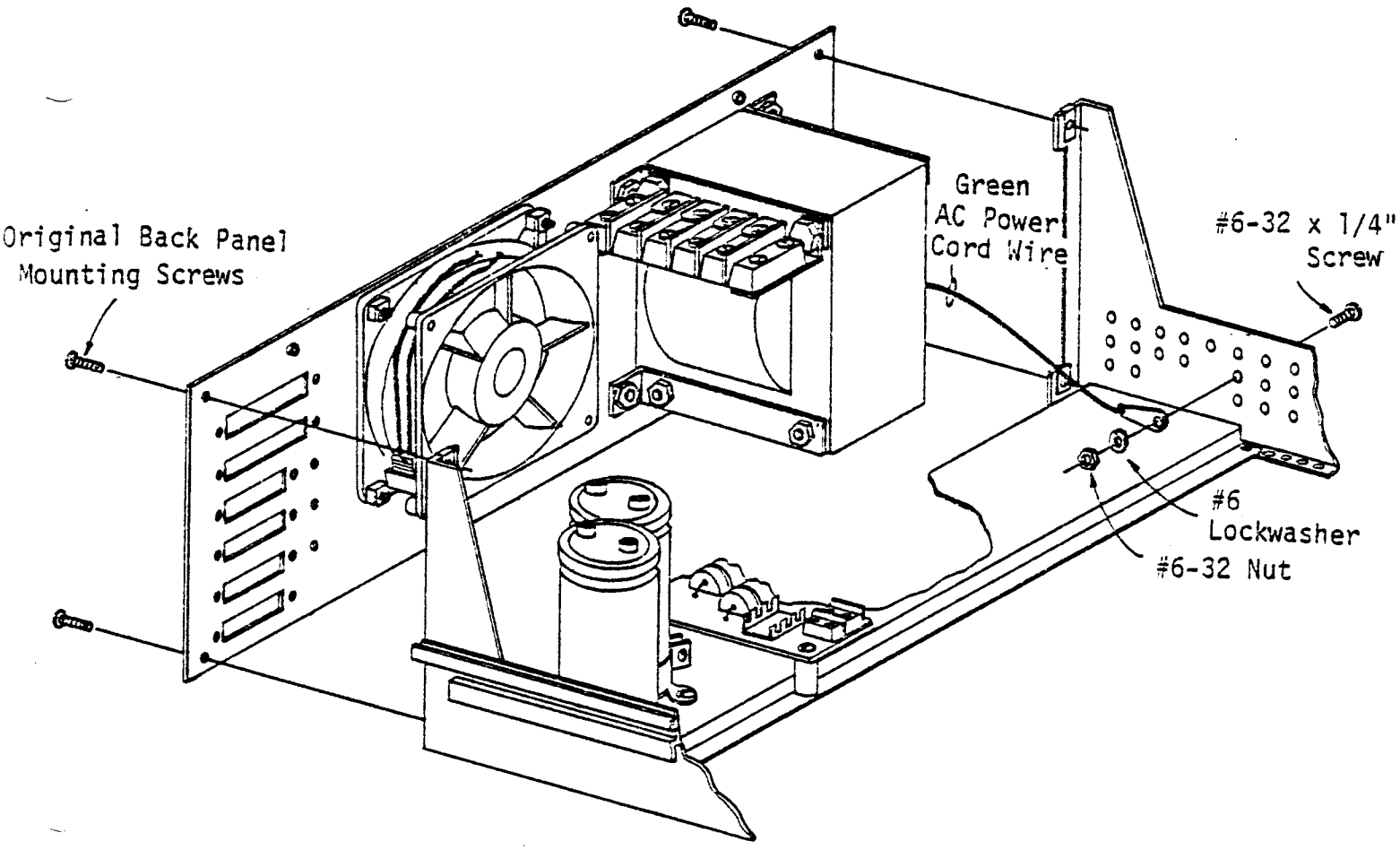


Figure 5-60. Back Panel Mounting

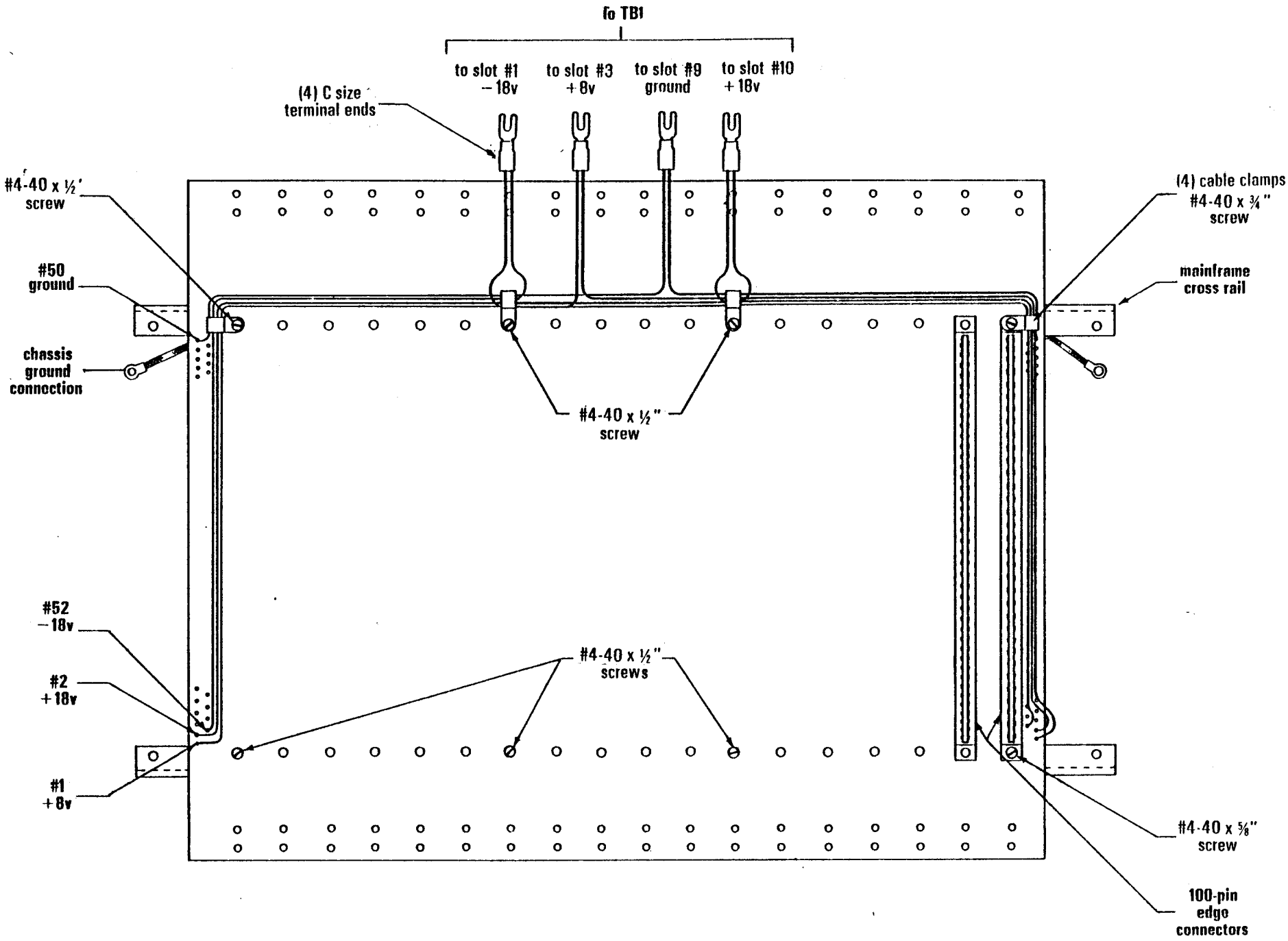


Figure 5-61. Motherboard Wire Connections

5-69. 18-SLOT MOTHERBOARD ASSEMBLY

5-70. BUS WIRE CONNECTIONS (Figure 5-61)

Refer to Figure 5-61. Note that the two outside rows of holes on either side of the motherboard each have four wire connections. These are the +8v, -18v, +18v and ground lines to the power supply from the bus. The wire connections are made by inserting the end of the wire from the top side of the motherboard and soldering it to the foil (bottom) side. On the foil side of the motherboard, hole #1 and hole #50 are marked on each side. Complete the wire connections according to the following instructions:

1. Cut six 20-inch lengths and two 14-inch lengths of 22-18 gauge wire.

On both sides of the motherboard:

2. Install one 20-inch wire into hole #1 (+8v).

3. Install one 20-inch wire into hole #2 (+18v).

4. Install one 20-inch wire into hole #52 (-18v).

5. Install one 14-inch wire into hole #50 (ground).

5-71. HARDWARE INSTALLATION (Figures 5-61 and 5-62)

At this time, the edge connectors, cable clamps, mainframe cross rails, and card guides will all be assembled onto the motherboard according to Figures 5-61 and 5-62 and the following instructions.

1. Position the two 100-pin edge connectors on the motherboard as shown in Figure 5-61. Carefully insert the connector pins into their respective holes. If necessary, guide some of the pins with the tip of a small screwdriver. Be sure that the connector is tight against the board and that all 100 pins have been inserted. Solder each connector pin to the foil pattern on the bottom of the board.

2. Visually inspect the connection to make sure there are no solder bridges.

3. Remove the two cross rails from the mainframe. Mount the cross rails to the bottom of the motherboard using eight screws, positioned as shown in Figure 5-61. Attach cable clamps to the four back mounting screws and run the bus wires through the cable clamps before tightening the screws down.

4. Match up the four pairs of bus wires at the back of the motherboard as shown in Figure 5-61. Attach a size C terminal end to each pair. Make sure the correct wires have been paired off:

   -18v with -18v
   +8v with +8v
   ground with ground
   +18v with +18v

5. Mount the card guides on both sides of the connectors, as shown in Figure 5-62.

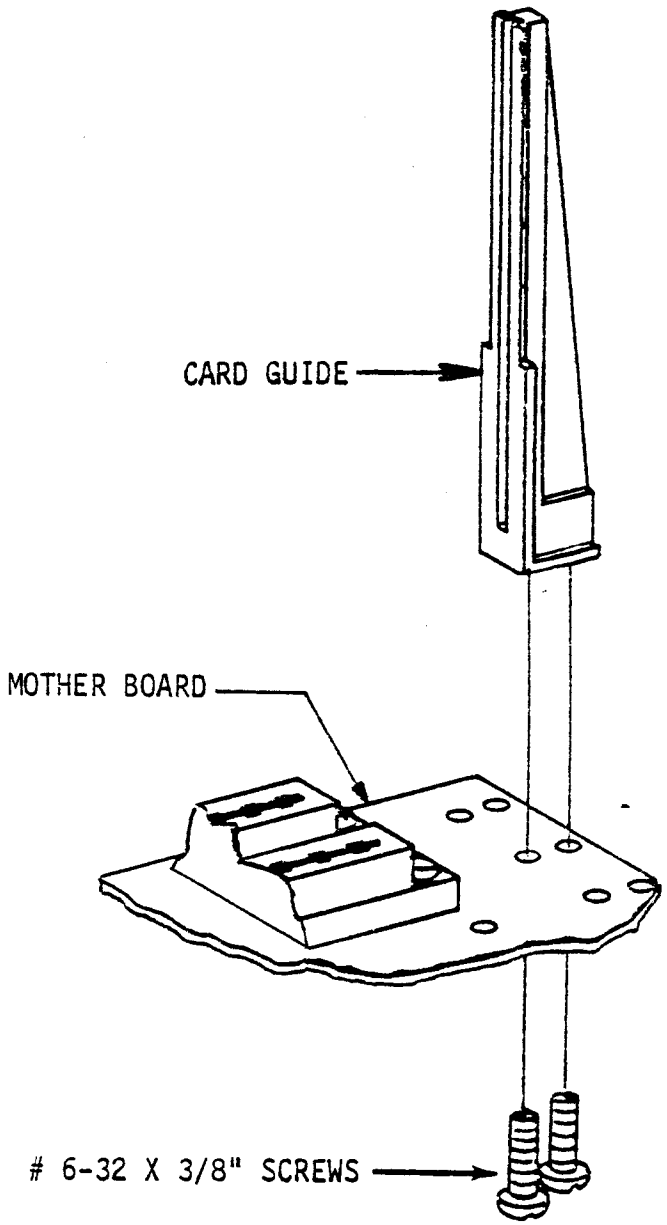


Figure 5-62. Card Guide Mounting

5-72. CHASSIS GROUND CONNECTION (Figure 5-63)

To insure a good ground connection between the motherboard and the chassis, two ground wires will be run from the ground land on the foil (bottom) side of the motherboard to the side rails of the mainframe. Refer to Figure 5-63 and make the ground connections according to the following instructions.

1. Cut two 6-inch pieces of wire braid.

2. Attach a solder lug to one end of each piece. To do this: twist the end of the wire braid; insert it into the small hole on the lug; solder the braid to the lug until the small hole is completely filled with solder.

On both sides of the motherboard:

3. Place the braid on the ground land along side the cross rail so that the lug and about three inches of braid hang over the side, as shown in Figure 5-63. Solder the remaining three inches to the ground land. It may be helpful to first "tack" the braid in place with small amounts of solder and then, using the flat of the soldering iron to heat the braid, make a solid solder connection over the entire three inches. Make sure there are no solder bridges to the adjacent lands on the board. The lugs will be attached to the side rails of the mainframe after the motherboard has been installed (Paragraph 5-73).

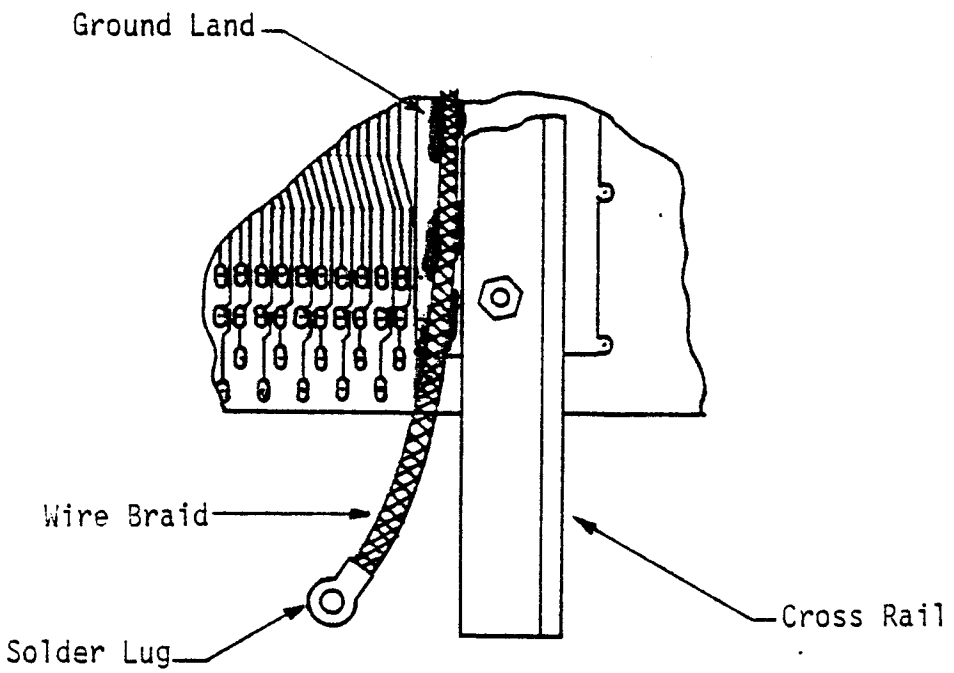


Figure 5-63. Chassis Ground Connection

5-73. INSTALL MOTHERBOARD ON MAINFRAME

1. Attach four #6-32 x 3/8" threaded spacers to the end holes in the crossrails, using #6-32 x 1/4" screws. Place the motherboard/crossrail assembly in the chassis so that the spacers at the front of the assembly align with the 8th hole (from the front) of the chassis side members. Secure the assembly to the chassis with four #6-32 x 1/4" screws.

2. Connect the four terminal ends on the bus wires to the terminal block (TB1) on the Power Supply Board as follows (see wiring diagram, Figure 5-50):

Voltage	Bus Connection	TB1 Connection
-18v	holes #52	slot #1
+8v	holes #1	slot #3
ground	holes #50	slot #9
+18v	holes #2	slot #10

Check for continuity between each bus connection and its respective terminal block connection.

3. To assure a good ground connection, rub the alodine coating off the chassis side member with steel wool. On each side of the board, connect the chassis ground wire from the motherboard to one of the holes on the chassis side member. Secure with a #6-32 x 3/8" screw and a #6-32 nut.

5-74. ON/OFF SWITCH WIRING (Figure 5-64)

The on/off switch (S1) on the Display/Control Board will connect to wires 37 and 39 from the power supply by means of a 2-pin plug, P5. (See wiring diagram, Figure 5-50.) Prepare the 2-pin plug (Bag 4) according to the following instructions. (Refer to Paragraph 5-58 for procedural instructions on preparing the connector sockets and pins.)

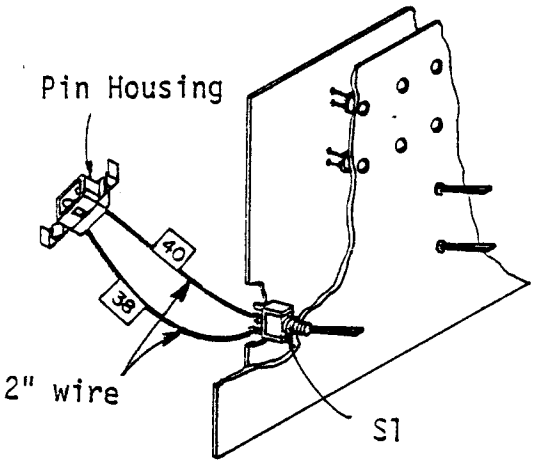
1. Cut two 2-inch pieces of 22-18 gauge wire.

2. Solder one wire (wire #40) to the center pin of S1 on the foil (bottom) side of the Display/ Control Board. Solder the other wire (wire #38) to the bottom pin of S1.

3. Attach a connector pin to the free end of both wires. Insert the connector pins into the 2-pin pin housing, as shown in Figure 5-64.

4. Insert the connector sockets of wires 37 and 39 from the power supply into the 2-pin socket housing.

> CAUTION
>
> These sockets (37 and 39) will be directly connected to the 110v source: Make sure the sockets are completely enclosed inside the socket housing. It is advisable to use tape or heat shrink to insulate the wires where they enter the socket housing.



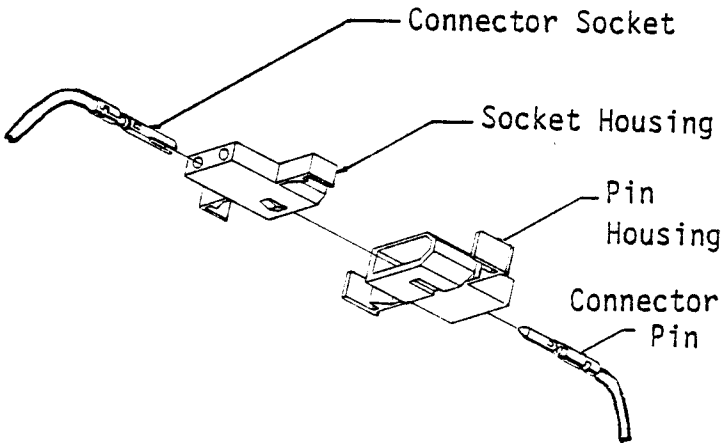


Figure 5-64. On/Off Switch Wiring

5-75. MOUNT PC BOARDS IN MAINFRAME

1. Slide the Sub Panel (with the Display/Control Board attached) onto the front of the mainframe so that the front uprights are in between the Display/Control Board and the Sub Panel.

2. Secure the Sub Panel in place from the front of the mainframe using the four #6-32 flathead screws that came with the chassis. Pull the ground strap taut and secure to the chassis with a #6-32 x 1/4" screw and a #6-32 nut.

3. Perform a voltage check before installing the Interface Board and CPU Board. Connect the pin and socket housings of P5, put the fuse into the fuse holder, plug in the power cord, and turn S1 on. Monitor the voltages on the motherboard. If the voltages are not correct, refer to Section IV, Troubleshooting. (Disconnect power before proceeding with the next steps.)

4. Install the Interface Board onto the motherboard in the first (right-most) 100-pin connector. The ribbon connectors, P1 and P2 should be next to the Display/Control Board. Connect P1 and P2 from the Interface Board to P1 and P2 on the Display/Control Board.

5. Install the CPU Board into the next 100-pin connector. Prepare two female connectors (see Paragraph 5-76) and mount them so that P3 on the Interface Board is connected to P3 on the CPU Board.

5-76. Instructions for Female Connectors, P3 (Figure 5-65)

1. Using the wire in Bag 4 of the Interface Board, cut the wire into eight 2-inch lengths.

2. Strip 1/8 inch of insulation from the ends of each wire and tin the exposed ends by applying a thin coat of solder.

3. Install a connector pin (Bag 3 of D/C Interface Board) onto both ends of each wire by crimping the wire into place as shown in Figure 5-65 A and B. Then solder the exposed portion of the wire to the pin.

4. Insert the 8 pins into connector slots 3 through 10 on both connectors, as shown in Figure 5-65(C).

5. Insert the key (Bag 3 of D/C Interface Board) into connector slot #2. This key is inserted to insure that the female connectors are installed correctly.

NOTE
Slot #1 will not be wired.

6. Aligning slot #1 with pin #1, install the female connector onto the male connector (P3) on the Interface Board and on the CPU Board.

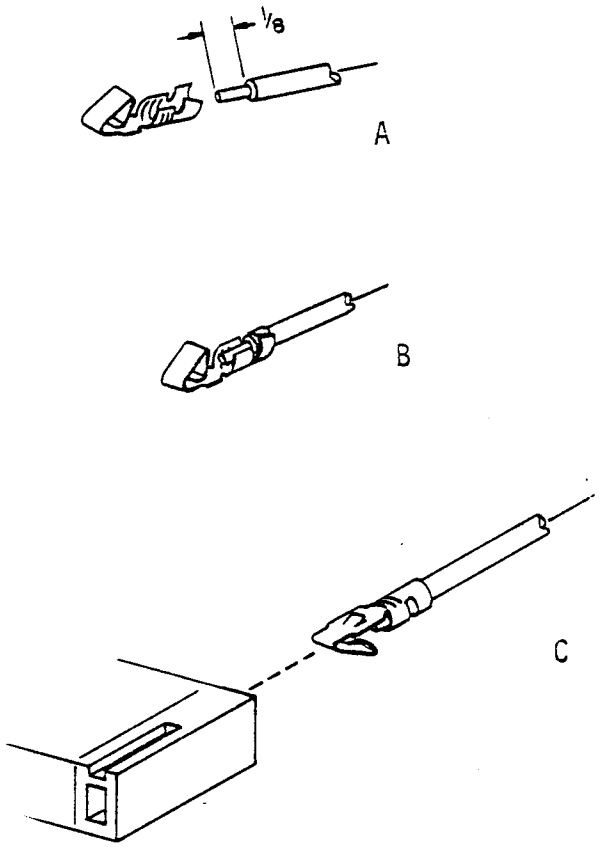


Figure 5-65. Female Connector Wiring for P3

5-77. CASE

The dress panel included with your kit may curve slightly outward. If so, it should be flattened before mounting on the 8800b.

1. Look at the dress panel from the top edge to see the curve. Then hold the panel against the edge of a table and lightly run the palm of your hand down the length of the panel until it appears to be flat.

2. Snap the dress panel in place in front of the case bottom.

3. Lower the mainframe into the case bottom at a front-to-back angle, so the switches on the Display/Control Board fit through the holes on the dress panel.

4. Secure the mainframe in place on both sides by replacing the two original #6-32 x 3/8" mounting screws.

5. Put the case top on the case bottom.