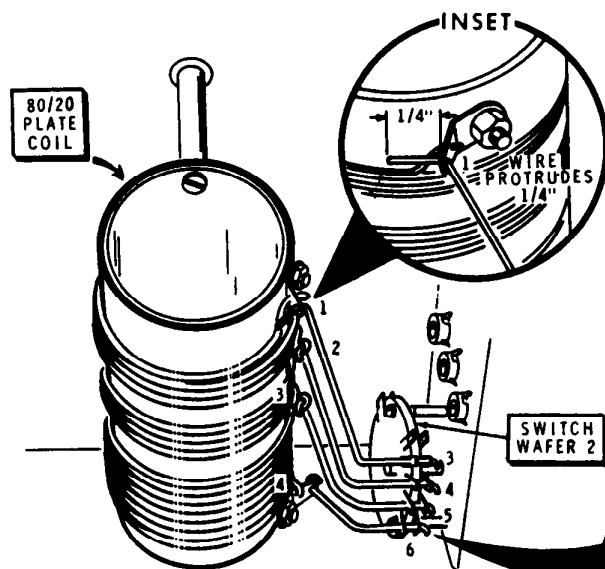


Detail 4-5C

- ( ) Refer to Detail 4-5C and install a ceramic feedthrough insulator (#71-2) at CK. In addition to the parts in the plastic bag, use a 7/8" tapped spacer, two #6 solder lugs, and a 6-32 x 1/4" binder head screw. Before the spacer is screwed onto the threaded stud running through the insulator, hold the brass spring down so it will bear against the under side of the installed spacer as shown in the Pictorial. Discard the unused nut.

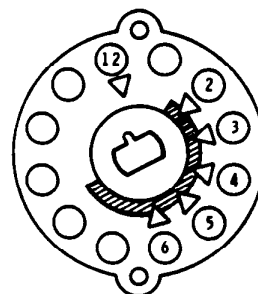


Detail 4-5E

NOTE: In the following steps, wires will be connected between wafer 2 of switch CZ and the taps on the plate coil. Each wire should be fitted before it is soldered in place. The end of each wire going through the switch lugs must first be flattened as shown in the inset drawing of Detail 4-5E. **DO NOT** use the switch lugs to hold one end of the wire when forming it, as the switch lugs and the ceramic switch wafer can be damaged.

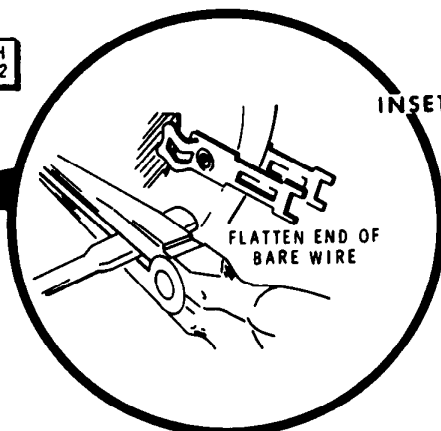
When soldering wires to the switch, make sure the wire is soldered to **both** switch lugs. After you fit the wires, cut off any excess wire lengths.

Refer to Detail 4-5D for the switch lug numbering system. The Detail shows the switch rotor as it was positioned when the shaft was installed (viewed from the rear).



Detail 4-5D

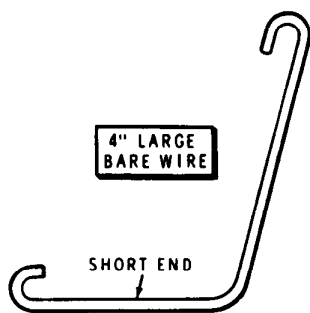
Refer to Detail 4-5E and connect small bare wires from wafer 2 of rotary switch CZ to the taps on the plate coil as follows. Be sure to connect to both lugs at each switch position.



Wire Length	Switch Lug No.	Coil Tap
( ) 1-1/2"	6 (S-3)	4 (S-1)
( ) 2-1/2"	5 (S-3)	3 (S-1)
( ) 3"	4 (S-3)	2 (S-1)
( ) 3-1/2"	3 (S-3)	1 (NS)*

\*Extend the wire 1/4" through the solder lug as shown in the upper inset.

- ( ) Refer to Detail 4-5F and bend a 4" length of large bare wire. Use the illustration as a template to form the wire.

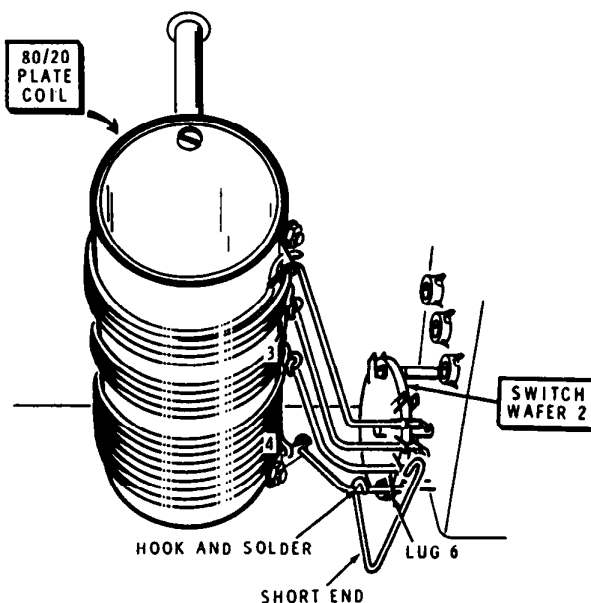


Detail 4-5F

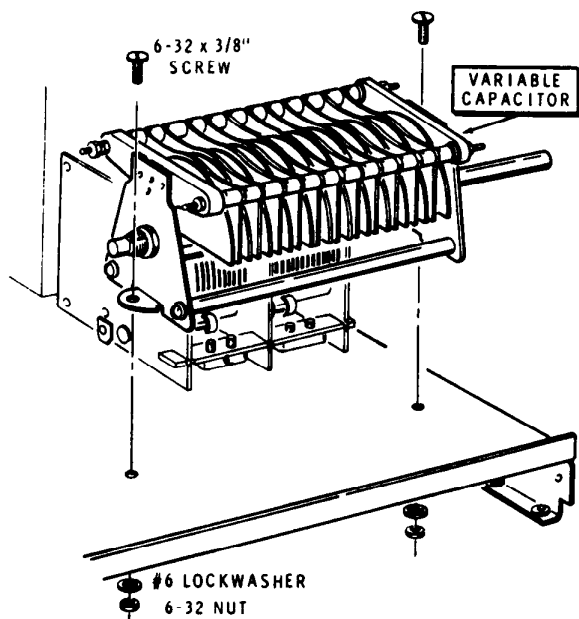
- ( ) Refer to Detail 4-5G and hook the short end of the bare wire around the switch wire at lug 4 of the 80/20 plate coil. Position the wire as shown. Then crimp and solder the hook to the wire.

Refer to Detail 4-5H Part 1 (fold-out from Page 35) for the following numbered steps.

- ( ) 1. Close the end of the spade lug with a pair of pliers as shown in inset drawing #1.
- ( ) 2. Loosen the 10-32 nut on the 840 pF variable capacitor (#26-145) at screw DP. Position the spade lug as shown and mount the lug on the screw. Retighten the nut.
- ( ) 3. Refer to inset drawing #2 and bend the spade lug over the edge of the capacitor 90° as shown.
- ( ) 4. Mount the prepared 840 pF variable capacitor on the chassis. Use 6-32 × 3/8" hardware at BB. Use a cable clamp and 6-32 × 3/8" hardware at G. You will loosen the cable clamp later to install a coaxial cable.
- ( ) Refer to Detail 4-5H Part 2 and hook the remaining end of the 4" large bare wire around the spade lug on the variable capacitor at DP. Crimp and solder the connection. Make sure the wire is positioned away from the capacitor body and any adjacent wiring.

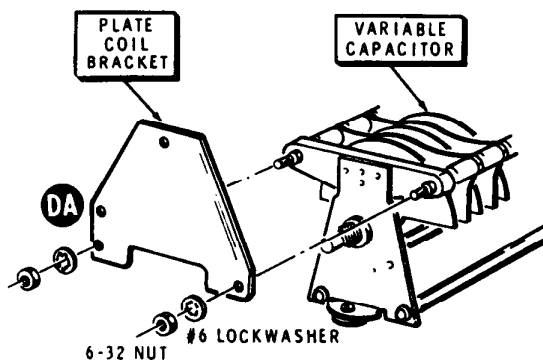


Detail 4-5G



Detail 4-5J

- ( ) Refer to Detail 4-5J and mount variable capacitor #26-131 at holes BA. Use 6-32 x 3/8" hardware.
- ( ) Refer to Detail 4-5K and install the plate coil bracket (#204-2102) on the rear of variable capacitor BA. Use the two extra nuts and lockwashers supplied with the capacitor. Be sure to position the bracket with hole DA as shown.



Detail 4-5K

Refer to Detail 4-5L for the following steps.

- ( ) Position the 15/10 plate coil (#40-968) with the silver plated strip located as shown.

- ( ) Place the open end of the coil tubing over the wire projecting from lug 1 of the 80/20 plate coil. Form the solder lug so the coil tubing will butt snugly against it.
- ( ) Connect the tab on the coil to hole DA in the plate coil bracket. Use 6-32 x 1/4" hardware.
- ( ) Solder the coil tubing and the wire lead from the switch wafer to lug 1 of the 80/20 plate coil. Make sure the end of the tubing is against the solder lug and that this connection is well soldered.
- ( ) Connect the free end of the silver plated strip to lug 2 of wafer 2 of switch CZ. Flex the end of the strip and place it between the switch lugs as shown in the inset drawing of the Detail (S-2).

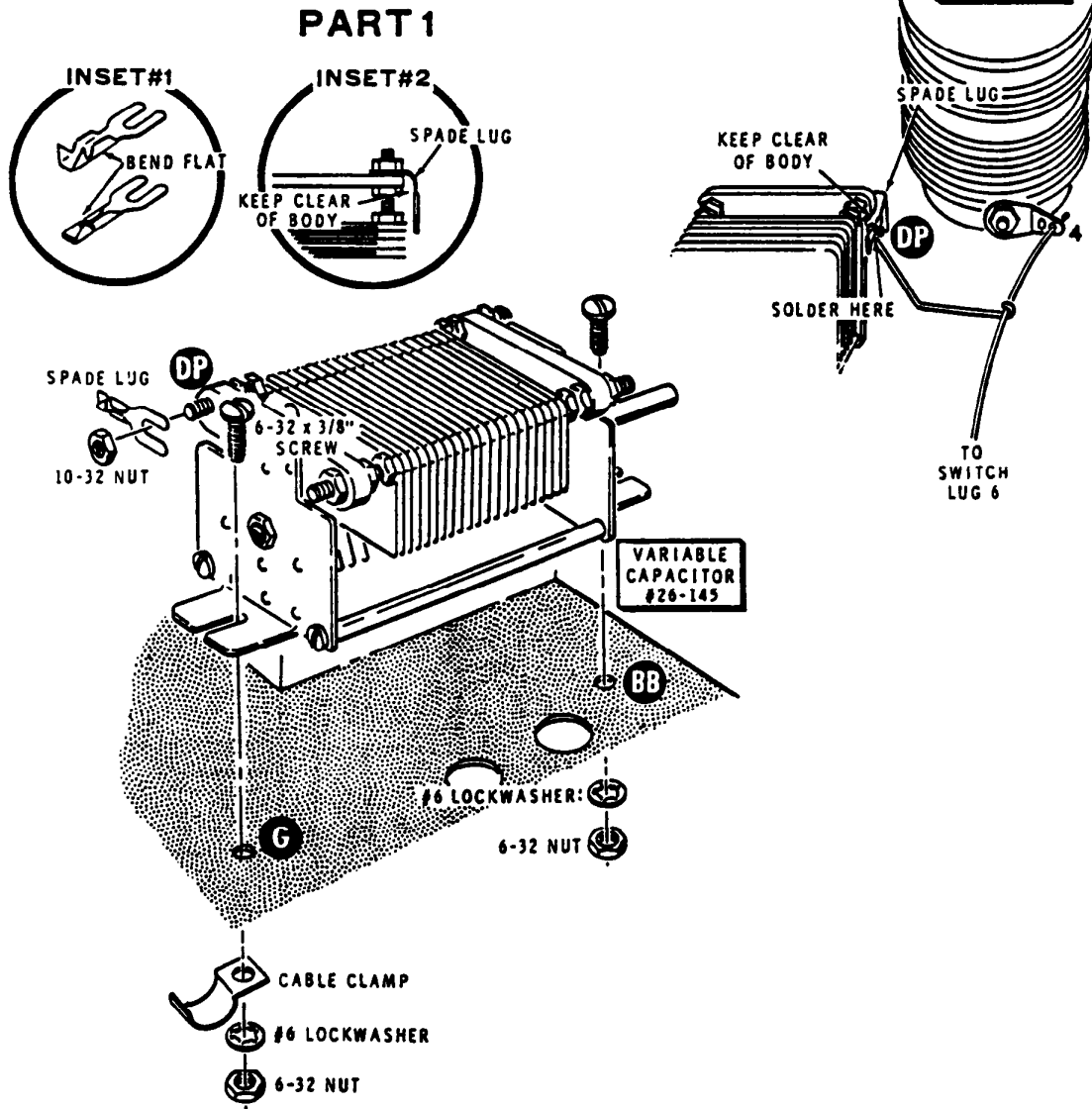
Refer to Detail 4-5M for the following steps.

- ( ) Install a #6 solder lug on one end of a .001  $\mu$ F capacitor (#21-165). Use a 6-32 x 3/16" screw.
- ( ) Mount this capacitor at DB on the plate coil bracket. Use a 6-32 x 3/16" screw and a #6 lockwasher. Before tightening the screw, position the solder lug as shown.
- ( ) Refer to Detail 4-5N and mount an RF choke (#45-61) at CA on the RF shield. Use a 1-3/8" spacer (8-32), two 1/2" flat washers, a #6 lockwasher, a #6 fiber flat washer, and 6-32 x 2" flat head screw. Do not overtighten the screw as the threads in the ceramic choke form can be damaged. Position the choke so solder lug DC points toward spacer DD.

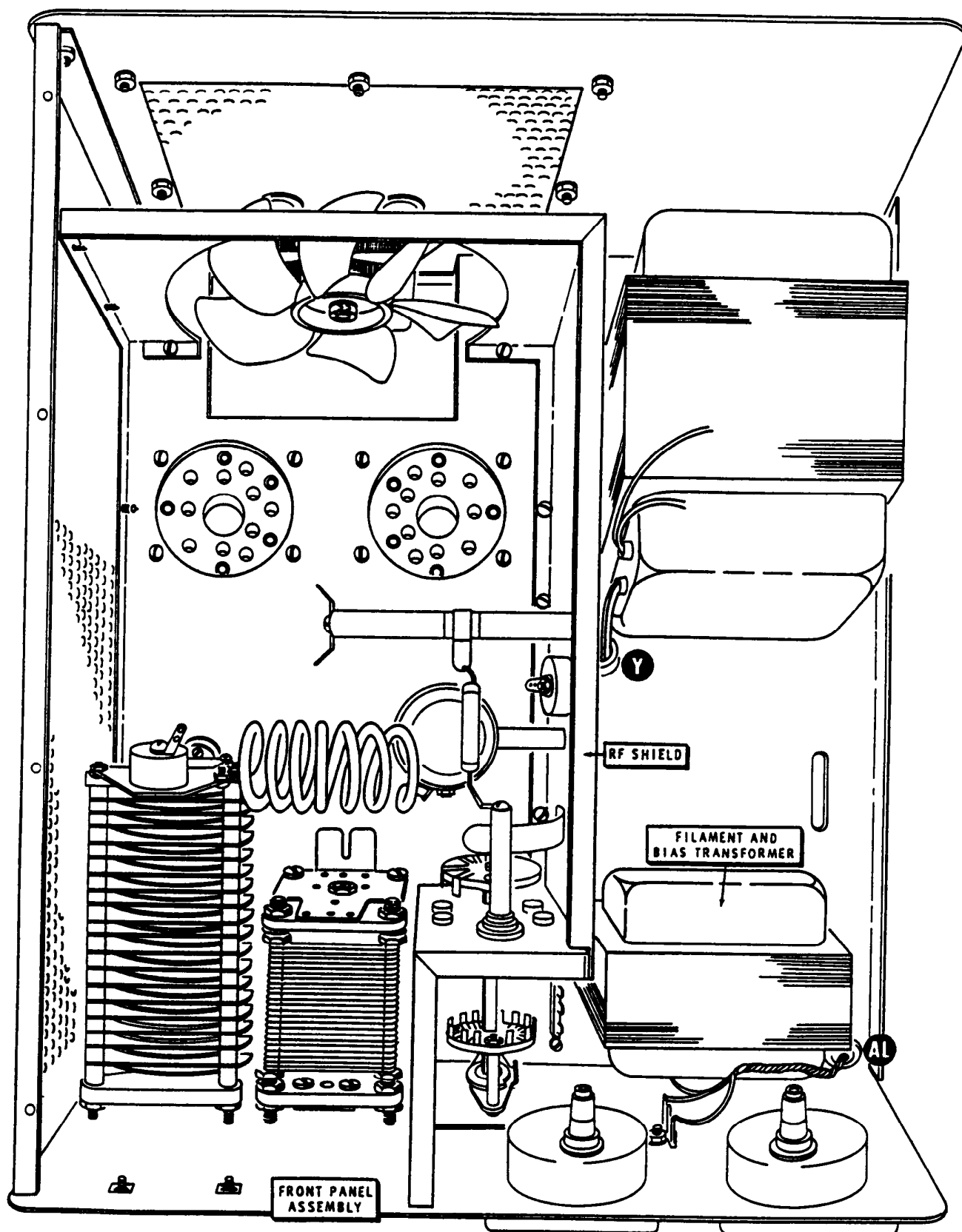
Refer to the Pictorial for the next two steps.

- ( ) Connect a 1-1/2" small bare wire from the solder lug on capacitor CM (S-1) to RF choke solder lug DC (NS).
- ( ) Cut each lead of RF choke #45-6 to a length of 3/8". Connect one lead to choke lug DC (S-2) and the other lead to solder lug DD (S-1).

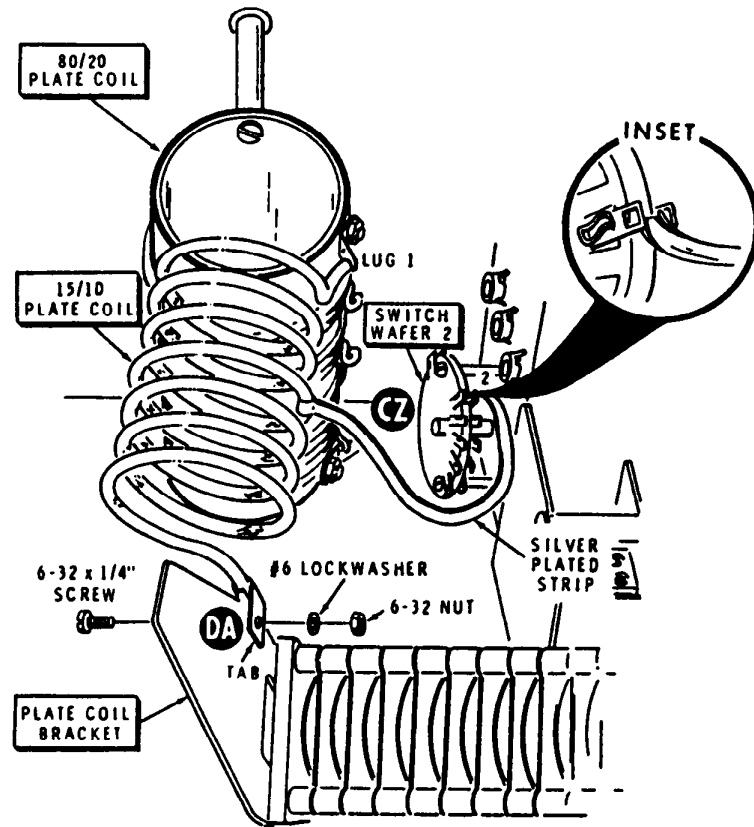
## PART 2



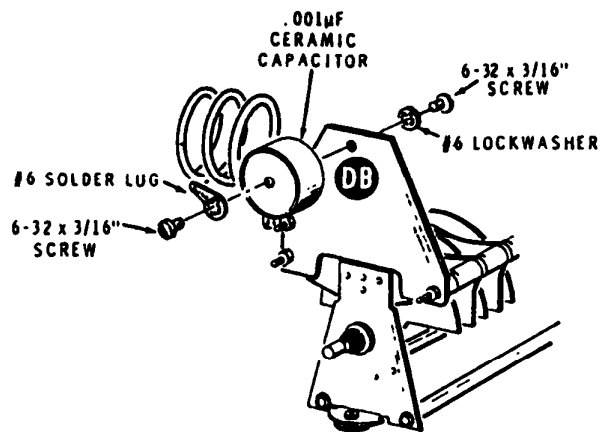
Detail 4-5H



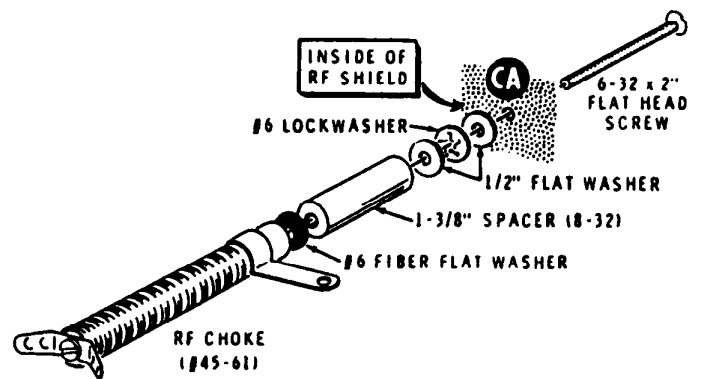
**PICTORIAL 4-6**



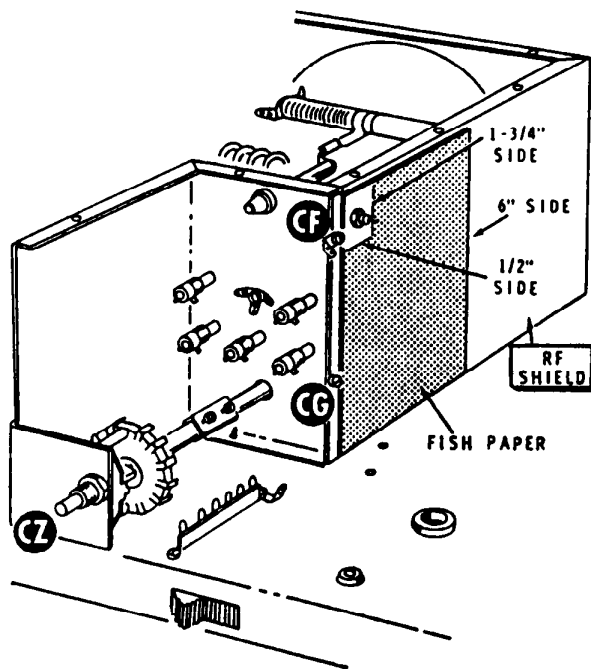
Detail 4-5L



Detail 4-5M



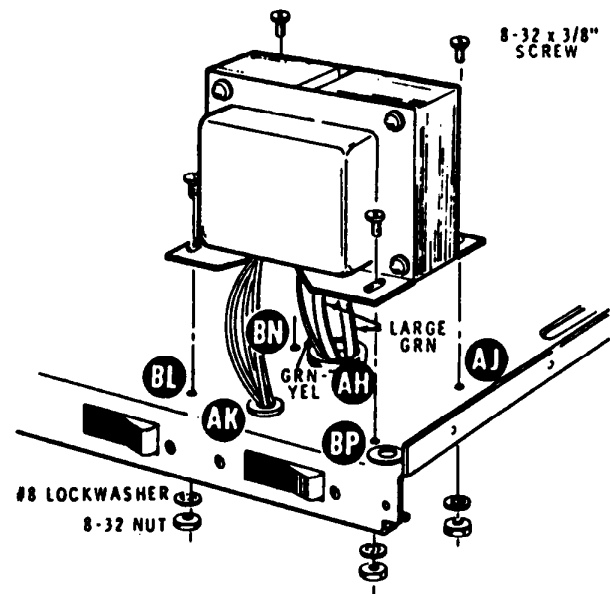
Detail 4-5N



Detail 4-6A

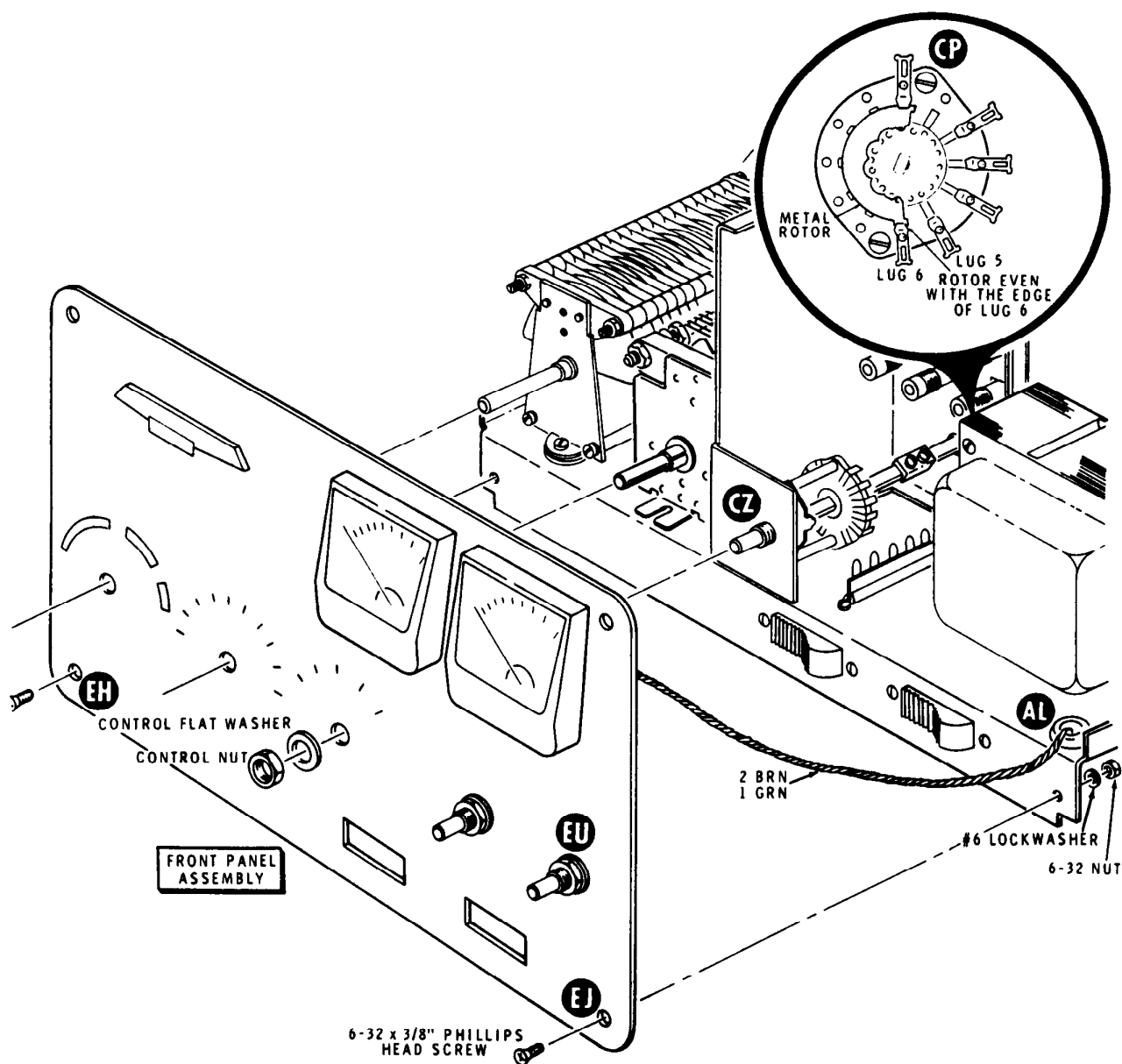
Refer to Pictorial 4-6 (fold-out from Page 36) for the following steps.

- ( ) Refer to Detail 4-6A and notch out one corner of the 4-1/2" x 6" fish paper insulator as shown. Make sure the 1-3/4" side of the notch is along the 6" side of the fish paper.
- ( ) Position the fish paper with the 6" side vertical and with the adhesive side against the RF shield. Make sure the fish paper clears the zener diode and the sheet metal screw at CG. Rub the paper firmly into place.



Detail 4-6B

- ( ) Refer to Detail 4-6B and mount the filament and bias transformer (#54-238) on the top of the chassis. As you position the transformer, insert the two large green leads and the green-yellow lead down through grommet AH. Insert the other leads through grommet AK. Use 8-32 x 3/8" hardware at AJ, BL, BN, and BP. Push the transformer toward the front of the chassis as far as possible before you tighten the hardware.
- ( ) Temporarily remove the control nut and the control flat washer from rotary switch CZ. (Detail 4-6A).

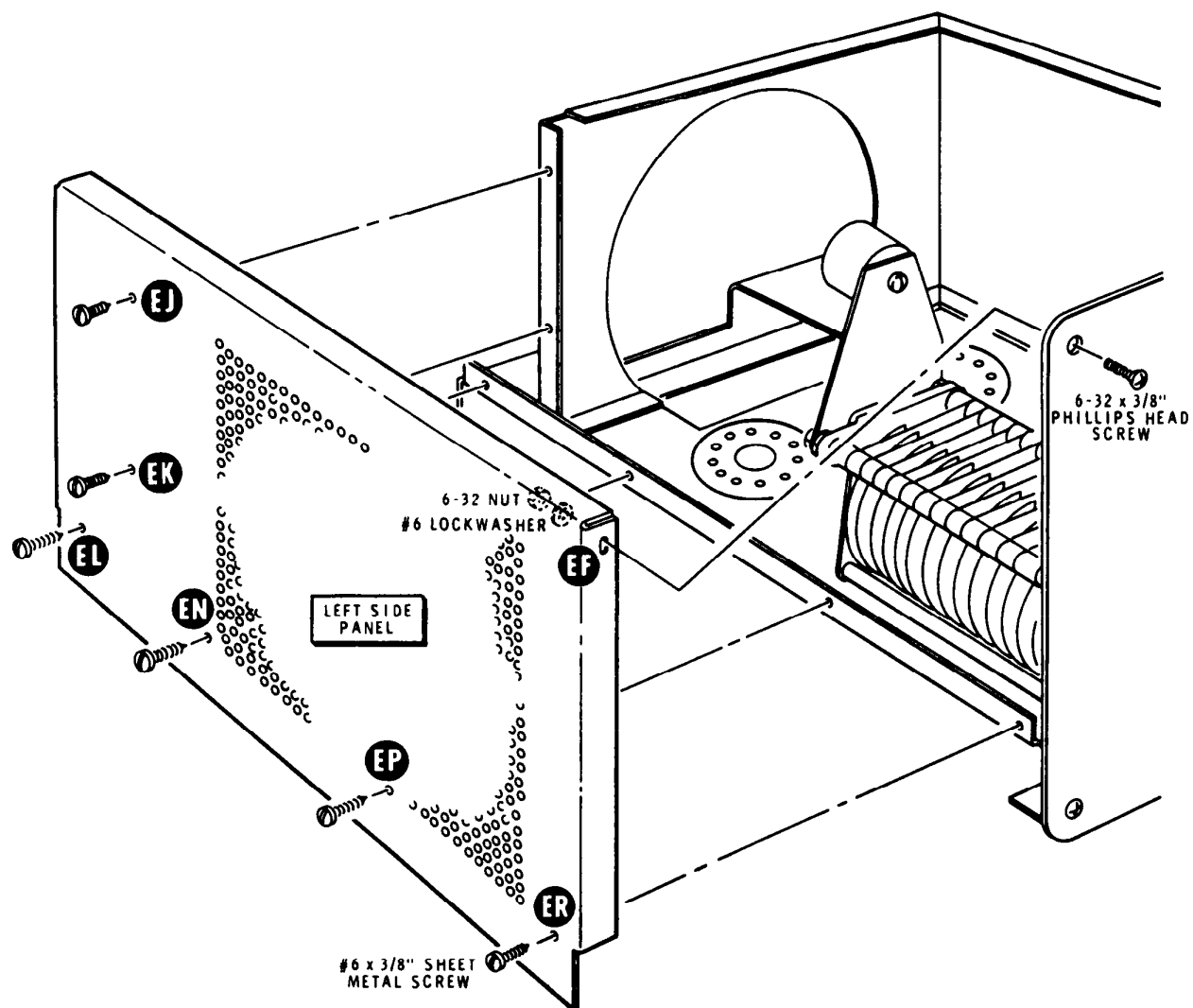


Detail 4-6C

( ) Refer to Detail 4-6C and mount the front panel assembly on the front of the chassis. Insert the twisted hookup wires (two brown and one green) down through grommet AL. Use 6-32 x 3/8" phillips head hardware at EH and EJ.

( ) Replace the control flat washer and the control nut on switch CZ. Refer to the inset drawing and check the metal rotor of switch wafer CP again. If the metal rotor extends past lug 6, arcing can occur between the rotor and lug 5.

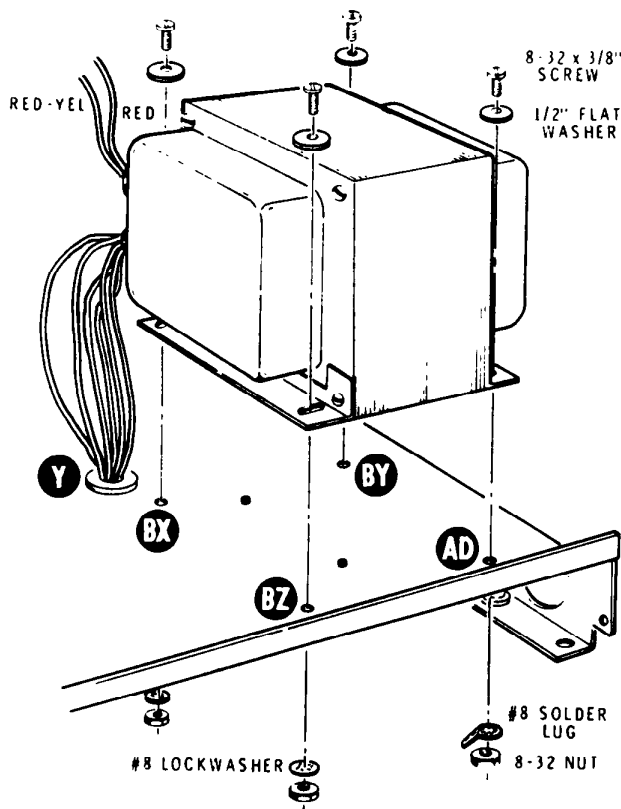




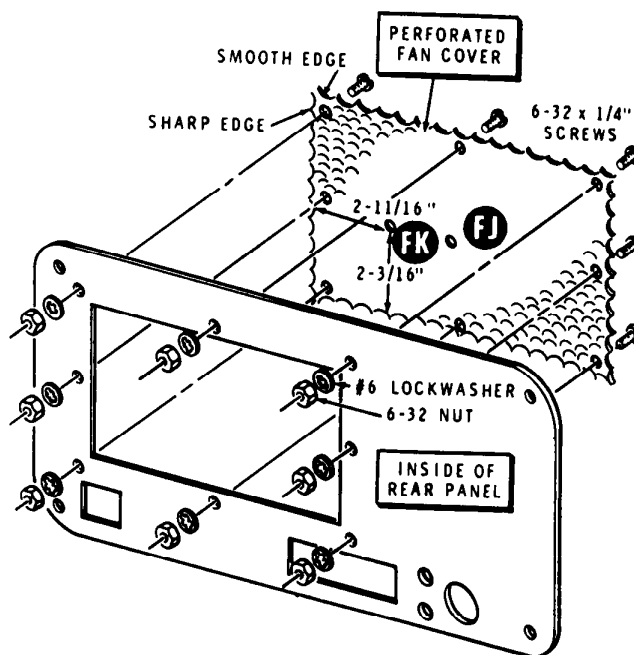
Detail 4-6D

( ) Adjust the position of the filament and bias transformer to insure approximately 1/16" clearance between the transformer end bell and any connections to the lugs of switch EU.

( ) Refer to Detail 4-6D and install the left side panel (#203-646). Use 6-32 x 3/8" phillips hardware at EF. Use #6 x 3/8" sheet metal screws at EJ, EK, EL, EN, EP, and ER.



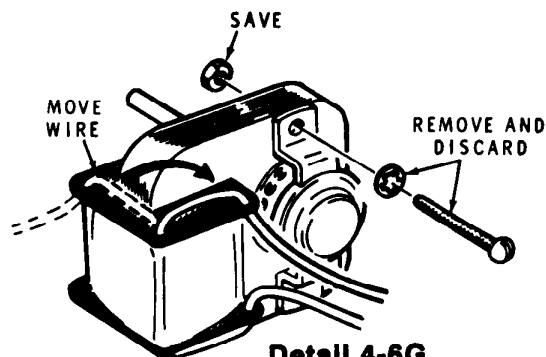
Detail 4-6E



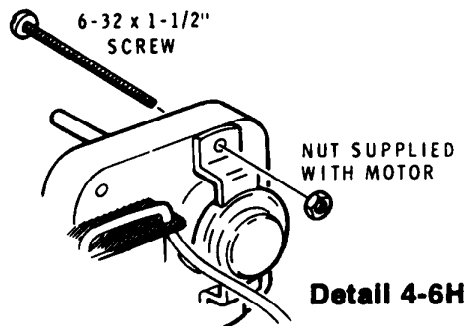
Detail 4-6F

Refer to Detail 4-6G for the following steps.

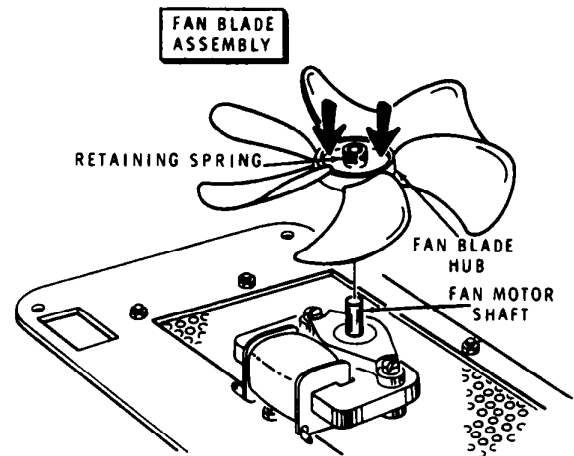
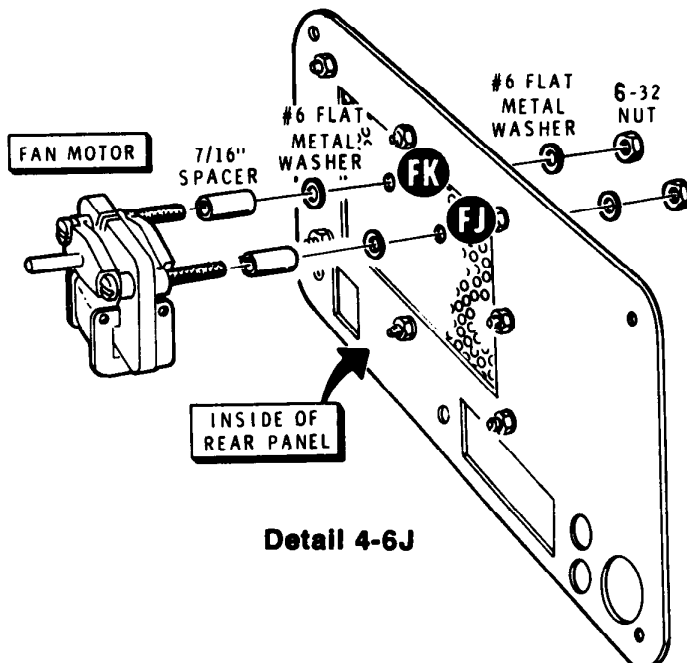
- ( ) Refer to Detail 4-6E and mount the HV transformer. Position the wires from the end bell so they are above grommet Y. Insert all leads except the red and the red/yellow leads down through grommet Y. Use an 8-32 x 3/8" screw, a 1/2" flat washer, a #8 solder lug and an 8-32 nut at AD. At BX, BY and BZ, use 8-32 x 3/8" hardware with a 1/2" flat washer at each location. Before you tighten the hardware, make sure the transformer end bell does not protrude beyond the chassis rear apron.
- ( ) Refer to Detail 4-6F and locate the perforated fan cover (#205-874) and the rear panel (#203-644). The edges of the fan cover are smooth on one side and sharp on the other. Before placing the sharp edge against the rear panel, check the two off-center holes (FK and FJ) which, if viewed as shown in the Detail, must be closest to the bottom left-hand corner.
- ( ) Fasten the perforated fan cover to the rear panel with 6-32 hardware. The sharp edge of the fan cover should be turned toward the rear panel.
- ( ) 1. Position the motor as shown. Then move one of the motor leads to the indicated hole in the plastic frame (away from the motor shaft).
- ( ) 2. Similarly, move the other motor lead to the indicated hole in the plastic frame.
- ( ) 3. Carefully remove the mounting hardware from one side of the motor as shown. Discard the screw and the lockwasher.



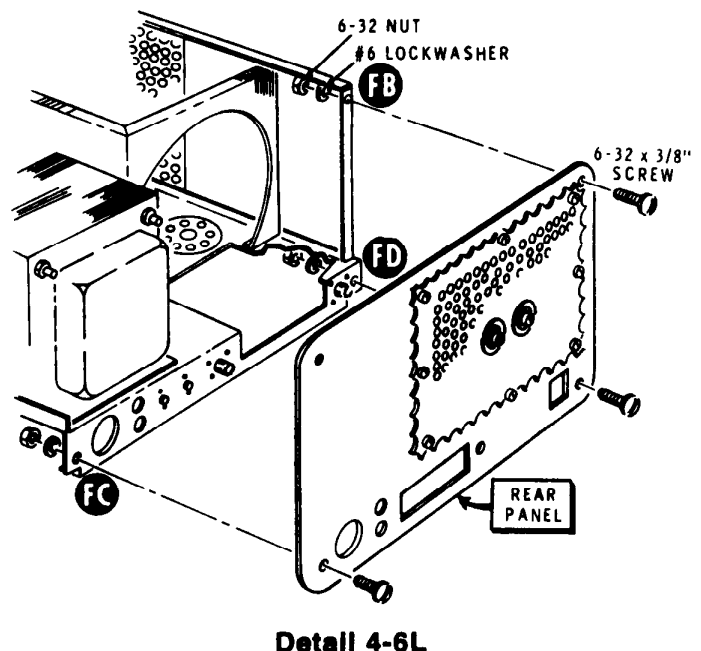
Detail 4-6G

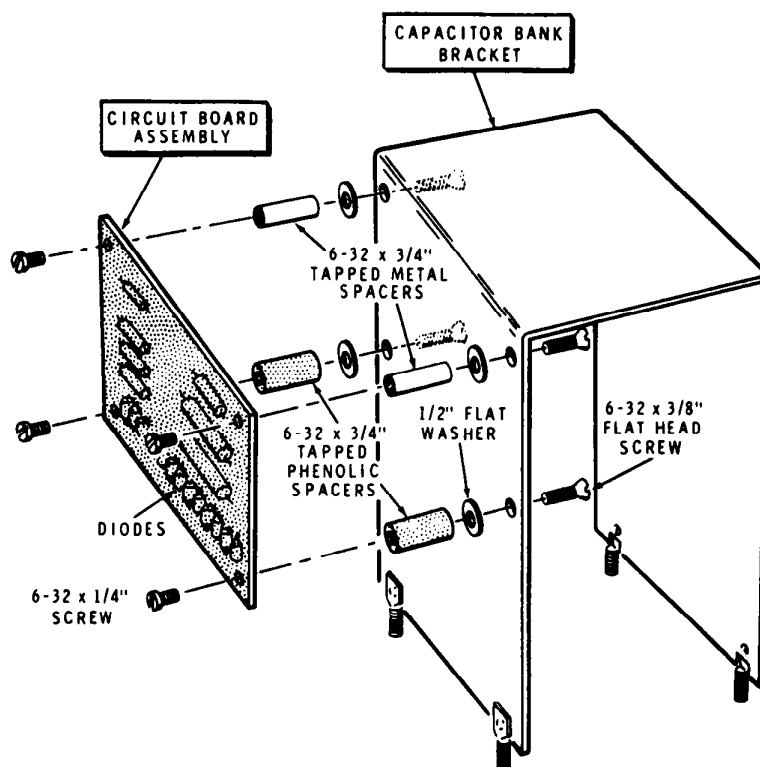


- ( ) Refer to Detail 4-6H and, from the shaft side of the motor, insert the 6-32 x 1-1/2" screw (supplied with the motor assembly) through the mounting hole. Then secure the screw with the nut you removed in step 3 above.
- ( ) Similarly modify the hardware on the other side of the motor. Be sure to install the new screw from the shaft side of the motor.
- ( ) Refer to Detail 4-6J and mount the fan motor on the perforated fan cover at holes FJ and FK. Use two 7/16" spacers, four #6 flat metal washers, and two 6-32 nuts as shown.



- ( ) Refer to Detail 4-6K and install the fan blade assembly (#266-296) on the fan motor shaft. Position the fan motor and the blade assembly as shown, and apply firm downward pressure with both thumbs on the fan blade hub. A slight rocking motion will help. Push the fan blades onto the motor shaft until there is 1/16" to 1/32" clearance between the fan blade hub and the motor frame.
- ( ) Refer to Detail 4-6L and mount the rear panel to the chassis rear apron at FC and FD, and to the left side panel at FB. Use 6-32 x 3/8" hardware.

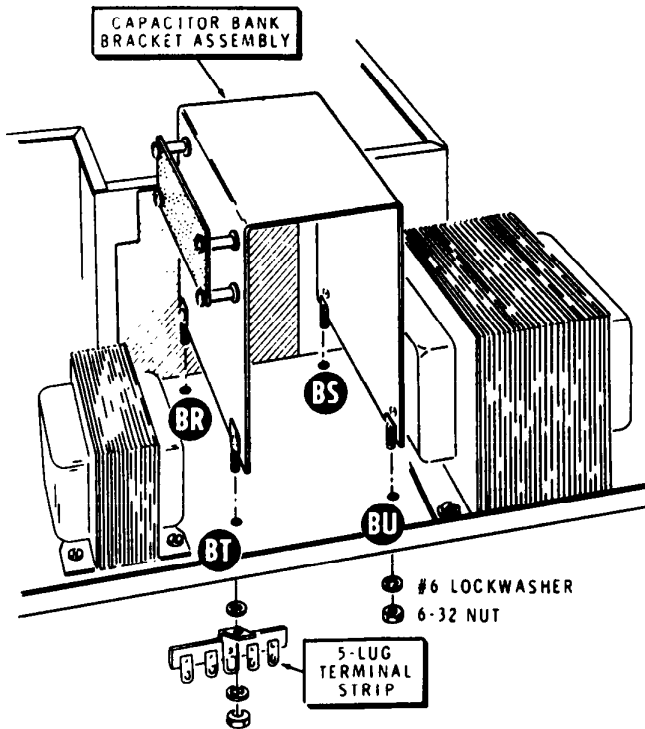




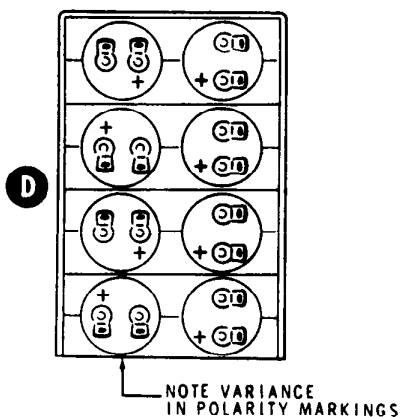
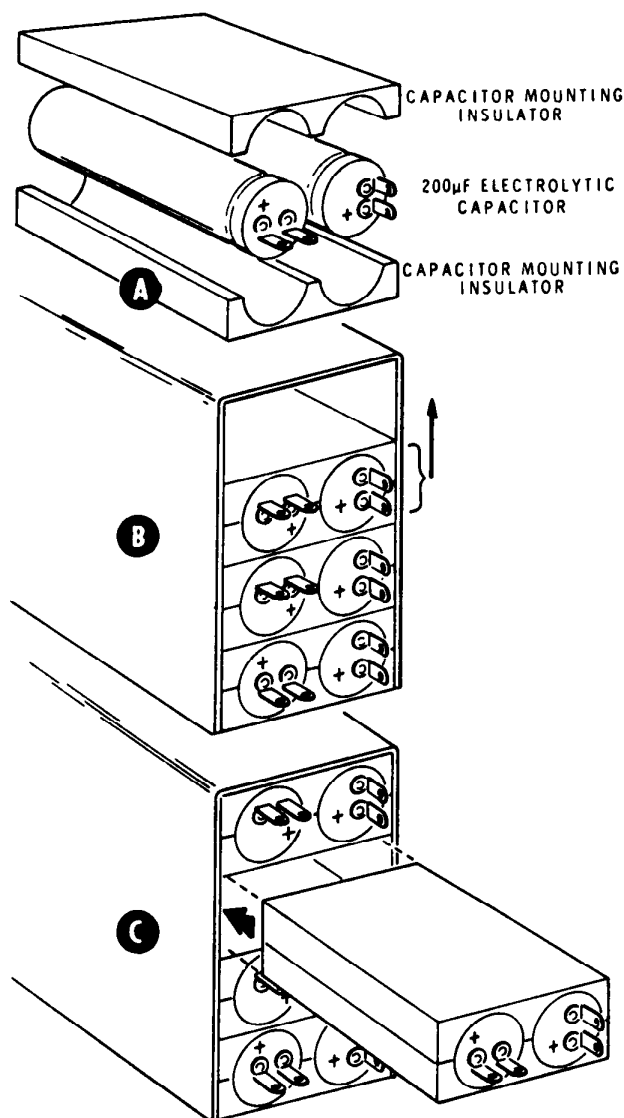
Detail 4-7A

Refer to Pictorial 4-7 (fold-out from Page 43) for the following steps.

- ( ) Refer to Detail 4-7A and mount the circuit board assembly on the capacitor bank bracket. Use 6-32 x 1/4" screws, 6-32 x 3/4" tapped metal spacers, 6-32 x 3/4" tapped phenolic spacers, 1/2" flat washers, and 6-32 x 3/8" flat head screws. Note that the diodes, and the phenolic spacers, are along the lower edge of the circuit board.
- ( ) Refer to Detail 4-7B and mount the capacitor bank bracket with one spade bolt entering each of holes BR, BS, BT, and BU. Use #6 lockwashers and 6-32 nuts only on spade bolts BR, BS, and BU. Leave the nuts flush with the ends of the spade bolts.
- ( ) Mount a 5-lug terminal strip (#431-42) on spade bolt BT. Use two #6 lockwashers and a 6-32 nut. Leave the face of the nut flush with the end of the spade bolt.



Detail 4-7B



Detail 4-7C

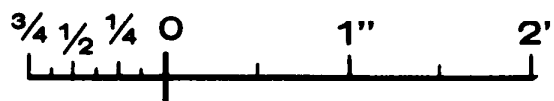
Refer to Detail 4-7C for the steps covering the capacitor bank assembly.

- ( ) **Part A:** Assemble four capacitor sections, each composed of two capacitor mounting insulators (#75-125) and two 200  $\mu$ F electrolytic capacitors (#25-224).
- ( ) **Part B:** Stack three capacitor sections in the capacitor bank bracket. Then lift up the top section to the top of the bracket.
- ( ) **Part C:** Insert the fourth capacitor section into the vacated space in the bracket.
- ( ) **Part D:** Align the capacitor lugs and the positive (+ or red dot) polarity markings as shown. Then push the capacitors snugly against the fish paper and tighten the spade bolt nuts on the bottom of the chassis just to the point where you can no longer rotate the capacitors with your fingers. Do not overtighten. Note the position of the terminal strip mounting foot in Detail 4-7B.



Detail 4-7D

- ( ) Refer to Detail 4-7D and cut four pieces of small bare wire 1-5/8" long and one piece 1-3/8" long. Bend down 1/8" at one end of each. These wires will be used in the capacitor bank wiring.
- ( ) Cut four pieces of small black sleeving 3/4" long for use in wiring the capacitor bank.



NOTE: When you connect resistors in the following steps, align them as shown in the Pictorial. Space the resistors 1/2" from the capacitors as shown in the inset drawing. After fitting and soldering the resistors, cut off and discard any excess lead lengths. No resistor should be closer than 1/4" to any metallic object to which it is not intentionally connected.

- ( ) Refer to the Pictorial and place one of the 3/4" lengths of sleeving on one lead of a 30 k $\Omega$  resistor. Connect this lead to the positive (+ or red dot) lug of capacitor 1 (NS). Pass the other resistor lead through the positive lug of capacitor 2 (S-2) to the negative lug of capacitor 4 (NS).
- ( ) Place one of the 3/4" lengths of sleeving on one lead of a 30 k $\Omega$  resistor and connect this lead to the positive lug of capacitor 5 (NS). Pass the other lead through the positive lug of capacitor 6 (S-2) to the negative lug of capacitor 8 (NS).
- ( ) Pass the straight end of one of the 1-5/8" bare wires through the negative lug of capacitor 2 (NS). Place the bent end of the wire into the positive lug of capacitor 1 (S-2).
- ( ) Connect the black hookup wire coming from hole B on the circuit board to the negative lug of capacitor 1 (NS).
- ( ) Connect a 30 k $\Omega$  resistor from the negative lug of capacitor 1 (S-2) to the negative lug of capacitor 2 (S-2).
- ( ) Connect the bent end of one of the 1-5/8" bare wires to the negative lug of capacitor 3 (NS) and the straight end to the positive lug of capacitor 4 (NS).
- ( ) Place a 3/4" length of sleeving on one lead of a 30 k $\Omega$  resistor and connect this lead to the negative lug of capacitor 3 (S-2). Connect the other lead to the negative lug of capacitor 4 (S-2).
- ( ) Place the bent end of a 1-5/8" bare wire in the positive lug of capacitor 5 (S-2), and the straight end in the negative lug of capacitor 6 (NS).
- ( ) Connect a 30 k $\Omega$  resistor from the negative lug of capacitor 5 (NS) to the negative lug of capacitor 6 (S-2).
- ( ) Place the bent end of a 1-5/8" bare wire in the negative lug of capacitor 7 (NS) and the straight end in the positive lead of capacitor 8 (NS).
- ( ) Place a 3/4" length of sleeving on one lead of a 30 k $\Omega$  resistor and connect this lead to the negative lug of capacitor 7 (S-2). Connect the other lead to the negative lug of capacitor 8 (S-2).
- ( ) Connect the blue wire from hole H of the circuit board to the positive lug of capacitor 7 (NS).
- ( ) Connect one lead of a 30 k $\Omega$  resistor to the positive lug of capacitor 7 (S-2). Connect the other lead to the positive lug of capacitor 8 (S-2).
- ( ) Connect one lead of a 30 k $\Omega$  resistor to the positive lug of capacitor 3 (NS). Connect the other lead to the positive lug of capacitor 4 (S-2).
- ( ) Connect the bent end of the 1-3/8" length of bare wire to the positive lug of capacitor 3 (NS) and the straight end to the negative lug of capacitor 5 (S-2).
- ( ) Pass a 7-1/4" length of clear sleeving over the red and the red-yellow wires coming from the HV transformer. Slide the sleeving on the wires as far as it will go.
- ( ) Cut off the red-yellow wire 1/2" beyond the end of the sleeving. Remove 1/4" of insulation.
- ( ) Connect the red-yellow wire to the positive lug of capacitor 3 (S-3).
- ( ) Carefully compare your work in the foregoing steps to the Pictorial (and the Details) for wiring errors and for proper capacitor polarity. Incorrect connections in this high-voltage circuit area can cause serious damage.

Refer to Pictorial 4-8 for the following steps.

NOTE: In the following step, if solder on the bare end of the red wire prevents its entry into hole D, carefully cut off just enough of the soldered wire end to allow it to fit into the hole. Be careful not to cut the wire too short.

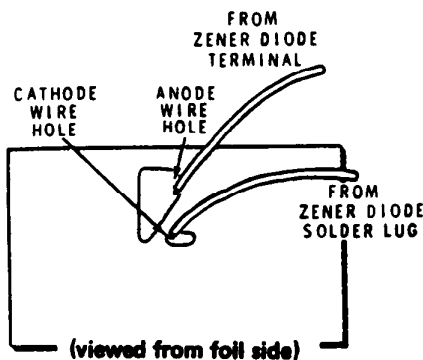
- ( ) Connect the red wire coming from the HV transformer to hole D on the circuit board (S-1). Reach in between the circuit board and the capacitor bracket to solder this connection. Make sure this connection is well soldered.
- ( ) Pass one lead of a .001  $\mu$ F, 6 kV, capacitor through solder lug CF (S-2) to hole K in the circuit board (S-1). Connect the other lead of this capacitor to solder lug CK (NS).

Refer to the inset drawing of Pictorial 4-8 and Detail 4-8A for the next two steps.

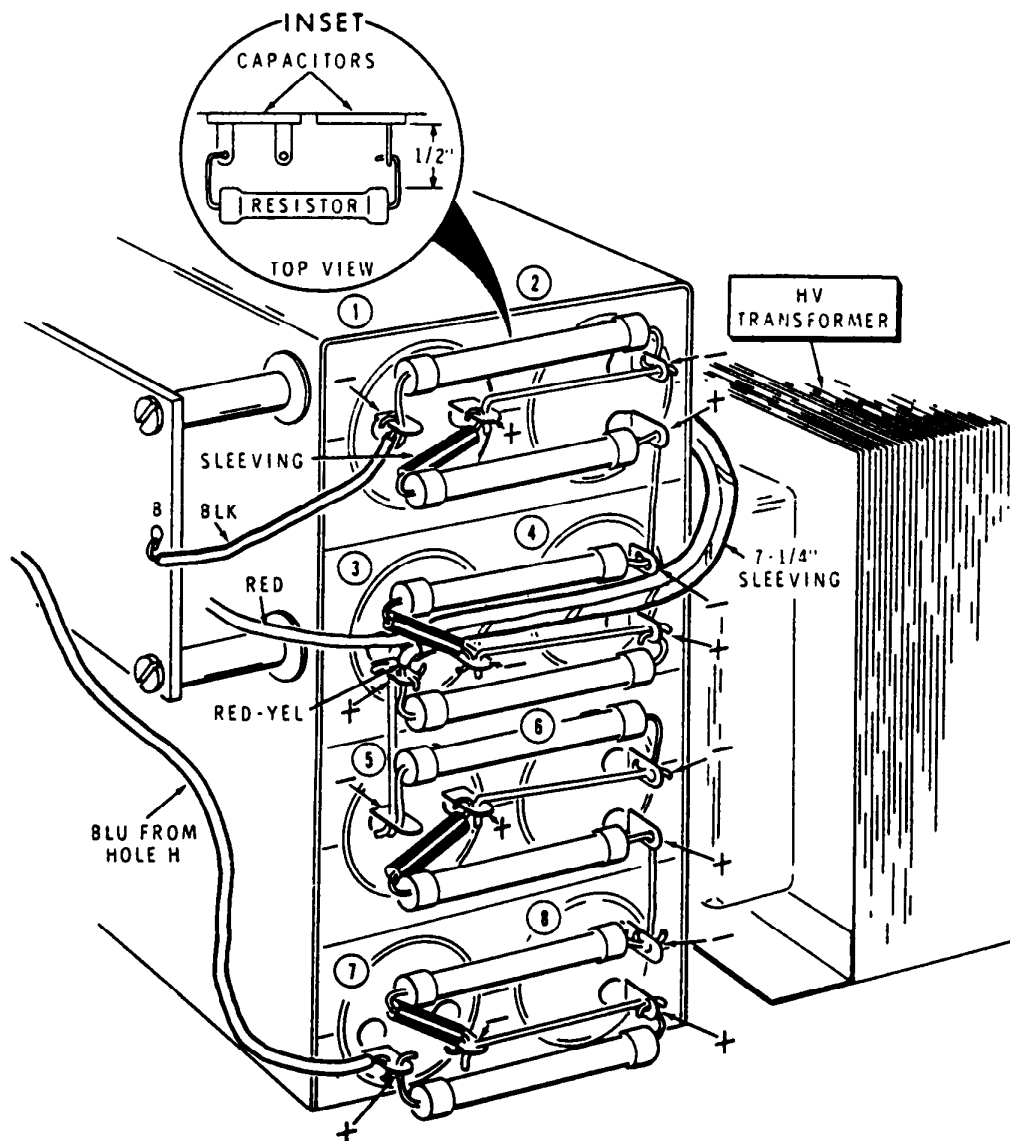
- ( ) Connect the black cathode wire, coming from the solder lug of zener diode CW, to the foil side of the circuit board (S-1). Detail 4-8A shows the foil pattern.
- ( ) Connect the other black wire, coming from the anode of zener diode CW, to the foil side of the circuit board (S-1). Refer to Detail 4-8A for the foil configuration.

Connect the wires coming from the component side of the circuit board as follows:

Wire Color	From Hole	Connect to
( ) HVY Blue	J	Solder lug CK (S-2).
( ) Yellow	F	Lug 3 of meter switch (S-1).
( ) Orange	G	Lug 1 of meter switch (S-1).
( ) Black	C	Lug 2 of plate meter (S-2).
( ) Red	A	Lug 1 of plate meter (S-2).
( ) Insert the black stranded wire coming from hole E in the circuit board down through grommet AL.		
( ) Peel off the backing paper from the DANGER label and press it into place on the top of the capacitor bank bracket.		



Detail 4-8A

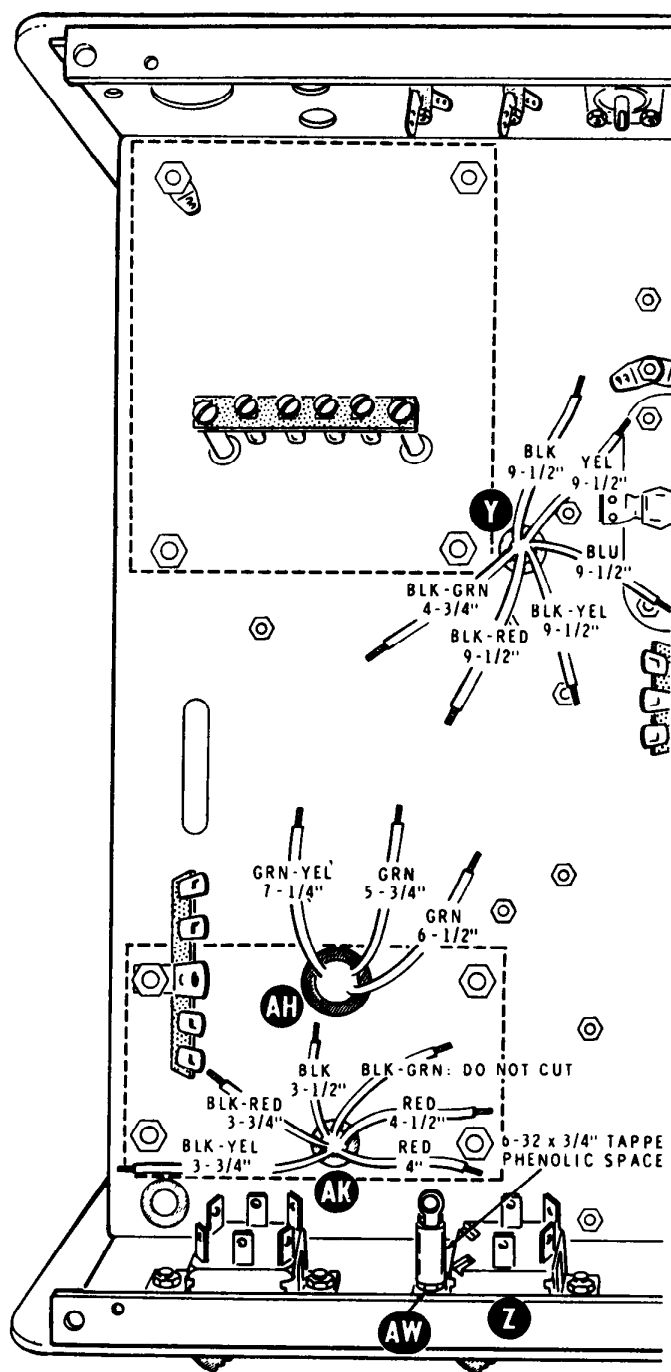


**PICTORIAL 4-7**





### PICTORIAL 4-8



PICTORIAL 4-9

**UNDER-CHASSIS WIRING**

Refer to Pictorial 4-9 and cut the transformer leads coming through the chassis at Y, AH and AK to the indicated lengths. Be sure you have selected the proper location before you cut. Measure the length of each lead from the chassis.

( ) At grommet Y, cut the transformer leads as follows:

Blue	9-1/2"
Yellow	9-1/2"
Black	9-1/2"
Black-red	9-1/2"
Black-Yellow	9-1/2"
Black-Green	4-3/4"

( ) At grommet AH, cut the transformer leads as follows:

Green	6-1/2"
Green-Yellow	7-1/4"
Green	5-3/4"

( ) At grommet AK, cut the transformer leads as follows:

One red	4-1/2"
Other red	4"
Black-Red	3-3/4"
Black-Yellow	3-3/4"
Black	3-1/2"
Black-Green	Do not cut

**NOTE:** When you remove insulation from transformer leads in the following steps, grasp the wires where they emerge from the chassis so no strain will be placed on the connections at the transformer end of the leads.

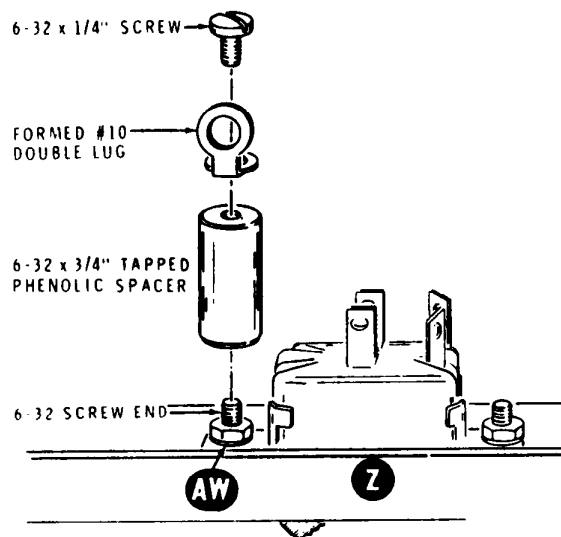
( ) Remove 1/4" of insulation from the cut ends of the two heavy green leads coming from AH. Melt a small amount of solder on the bared wire ends.

( ) Remove 1/4" of insulation from the end of each remaining transformer lead. Twist the fine wire strands together and melt a small amount of solder on each bared end.



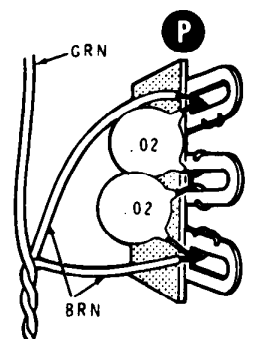
Detail 4-9A

- ( ) Refer to Detail 4-9A and form a #10 double lug (#259-25) as shown.
- ( ) Refer to Detail 4-9B and screw a 6-32 x 3/4" tapped phenolic spacer onto screw AW. Then install the formed lug on the inner end of the phenolic spacer with a 6-32 x 1/4" screw. Position the lug as shown.



Detail 4-9B

**NOTE:** Before starting the wiring in the following steps, look ahead to the under-chassis photograph on Page 86. Observe how wires are routed down the center of the chassis and are then bound together by ties to form a cable. As an aid in forming a neat cable, you can mark the main wiring guide lines on the under side of the chassis with a magic marker or china marking pencil. Then follow these guide lines when routing the individual wires.



Detail 4-10A

Refer to Pictorial 4-10 (fold-out from Page 49) for the following steps.

- ( ) Route the twisted green and brown wires from grommet AL between grommet AH and grommet AK. Refer to Detail 4-10A and connect one of the brown wires to lug 1 (NS) and the other brown wire to lug 3 (NS) of terminal strip P.
- ( ) Connect a .02  $\mu$ F disc capacitor from lug 1 (NS) to lug 2 (NS) of terminal strip P.
- ( ) Connect a .02  $\mu$ F disc capacitor from lug 3 (NS) to lug 2 (S-2) of terminal strip P.
- ( ) Connect the green wire from grommet AL to lug 1 of terminal strip B (NS).

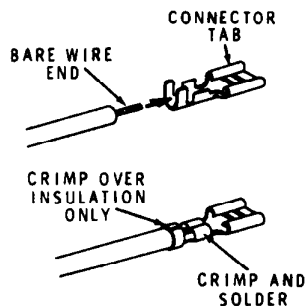
Connect the transformer leads from grommet AK as follows:

Lead	Connect to
( ) 4-1/2" Red	Terminal strip BT, lug 3 (NS).
( ) 4" Red	Terminal strip BT, lug 4 (NS).
( ) Black-green	Terminal strip AE, lug 3 (NS).



Connect the following transformer leads coming from grommet Y to switch AN:

- | Lead             | Lug of Switch AN |
|------------------|------------------|
| ( ) Black-yellow | 1 (S-1).         |
| ( ) Yellow       | 5 (S-1).         |
| ( ) Blue         | 6 (S-1).         |
| ( ) Black-red    | 2 (S-1).         |
- ( ) Connect a 2" black hookup wire from lug 3 (S-2) to lug 1 (NS) of terminal strip BT.
  - ( ) Connect the yellow hookup wire from grommet T to lug 1 of phono socket U (NS).
  - ( ) Connect the orange wire from grommet T to lug 2 of terminal strip BT (NS).
  - ( ) Prepare a 4-1/4" length of large black stranded wire.



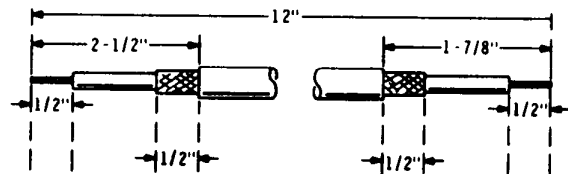
**Detail 4-10B**

Refer to Detail 4-10B for the next two steps.

- ( ) Locate the large connector tabs (#432-137). If these tabs are connected to one another, cut the strip of tabs into six individual tabs as shown.
- ( ) Install one of these large connector tabs (#432-137) on one end of the 4-1/4" wire (S-1).

Refer to the Pictorial for the following steps.

- ( ) Push the connector tab from the preceding step onto lug 3 of switch Z. Connect the other end of this wire to double lug AW (NS).
- ( ) Connect the black lead from grommet AK to double lug AW (NS).
- ( ) Connect the black lead from grommet Y to double lug AW (NS).
- ( ) Connect the center conductor of the coaxial cable coming from lug 7 of switch CZ to lug 1 (NS) and the shield wires to lug 2 (S-1) of terminal strip AG.



**Detail 4-10D**

- ( ) Refer to Detail 4-10D and prepare a 12" length of RG-8/U coaxial cable. Tin the exposed braid at each end, being careful not to melt the inner insulation.
- ( ) Loosen the cable clamp at G, place the shield braid at the 2-1/2" end under the clamp, and connect the center conductor to lug 8 of relay F (S-1).
- ( ) Similarly, place the shield braid at the other end of the cable under cable clamp B and connect the center conductor to coaxial fitting A (S-1).
- ( ) Tighten both cable clamps and solder the shield braid at each end of its cable clamp. Be careful not to melt the inner insulation.

Refer to Pictorial 4-11 for the following steps.

- ( ) Prepare the following lengths of large black stranded wire:

4-1/2"

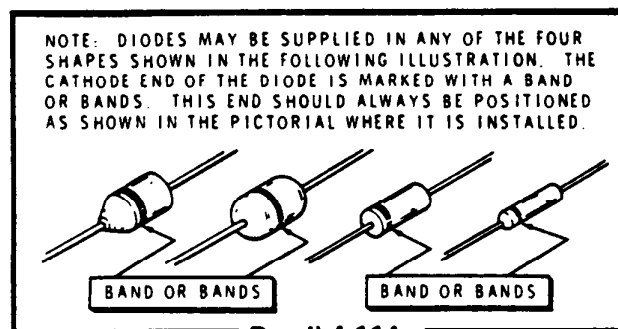
13-1/2"

13-1/2"

- ( ) Install a large connector tab (#432-137) on one end of each of the three wires.
- ( ) Push the tab on the 4-1/2" wire onto lug 4 of switch AN.
- ( ) Push the connector tab on one of the 13-1/2" wires onto lug 1 of switch Z, and the connector tab on the other 13-1/2" wire onto lug 2.
- ( ) Prepare a 12-1/2" length of large black stranded wire.
- ( ) Connect the free end of the black-yellow wire coming from grommet AK and one end of the 12-1/2" wire in the preceding step to one large tab connector (S-2). Then push this connector tab onto lug 3 of switch AN.
- ( ) Connect the free end of the black-red lead coming from grommet AK and the free end of the black wire coming from lug 4 of switch AN to one large tab connector (S-2). Push this tab onto lug 4 of switch Z.

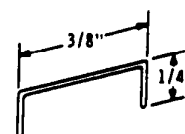
The free ends of the "tabbed" wires in the preceding steps will be connected later.

- ( ) Refer to Detail 4-11A and connect the cathode lead of a silicon diode (#57-27) to lug 5 (NS) and the anode lead to lug 4 (S-2) of terminal strip BT.



Detail 4-11A

- ( ) Connect a 33 k $\Omega$  (orange-orange-orange) resistor from lug 1 (NS) to lug 2 (NS) of terminal strip BT.
- ( ) Connect a 22 k $\Omega$  (red-red-orange) resistor from lug 2 (S-3) to lug 5 (NS) of terminal strip BT.
- ( ) Connect the positive lead (marked +) of a 20  $\mu$ F electrolytic capacitor to lug 5 (NS) and the other lead to lug 1 (S-3) of terminal strip BT.
- ( ) Connect the black stranded wire coming from grommet AL to lug 6 of relay F (S-1).
- ( ) Connect a 2" red hookup wire from lug 3 (NS) to lug 11 (S-1) of the relay.
- ( ) Connect a 9-1/2" length of red hookup wire from lug 5 of terminal strip BT (S-4) to lug 3 of the relay (NS).



Detail 4-11B

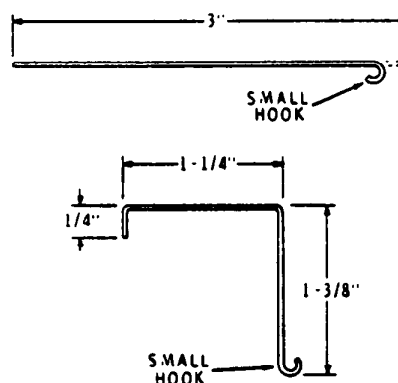
- ( ) Refer to Detail 4-11B and form a 7/8" length of bare wire as shown.
- ( ) Connect the bare wire from lug 1 (S-1) to lug 2 (S-1) of relay F.
- ( ) Connect the black-green transformer lead from grommet Y to lug 3 of terminal strip AE (S-2).

Refer to Pictorial 4-12 (fold-out from this page) for the following steps.

- ( ) Connect the green-yellow transformer lead from grommet AH to lug 9 of relay F (NS).
- ( ) Connect a 13" blue hookup wire from lug 10 of relay F (S-1) to lug 1 of phono socket X (NS).
- ( ) Connect a .02  $\mu$ F disc capacitor from lug 1 (S-2) to lug 2 of phono socket X (NS).
- ( ) Connect a .02  $\mu$ F disc capacitor from lug 1 of phono socket U (S-2) to lug 2 of phono socket X (S-2).
- ( ) Connect one lead of a 1000  $\Omega$  (brown-black-red) resistor to lug 2 (S-2) and the other lead to lug 3 (NS) of terminal strip B.
- ( ) Connect the cathode (banded) end of a germanium diode (brown-white-brown) to lug 1 (S-3) and the other lead to lug 3 (NS) of terminal strip B.
- ( ) Connect one lead of a 68 k $\Omega$  (blue-gray-orange) 1 watt resistor to lug 3 of terminal strip B (S-3). Hook the other lead of this resistor around coaxial connector A as shown in inset drawing 1 of the Pictorial (S-1).

Connect 200 pF molded mica capacitors (#20-3) to tube socket lugs as follows:

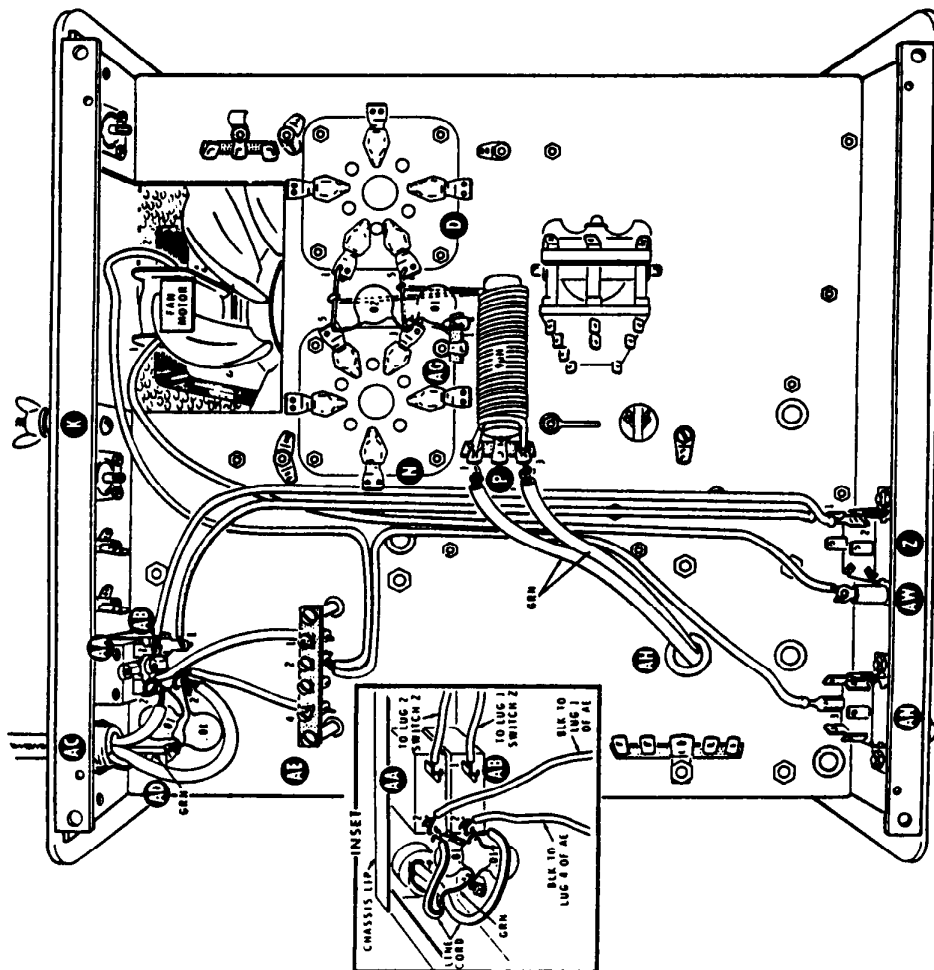
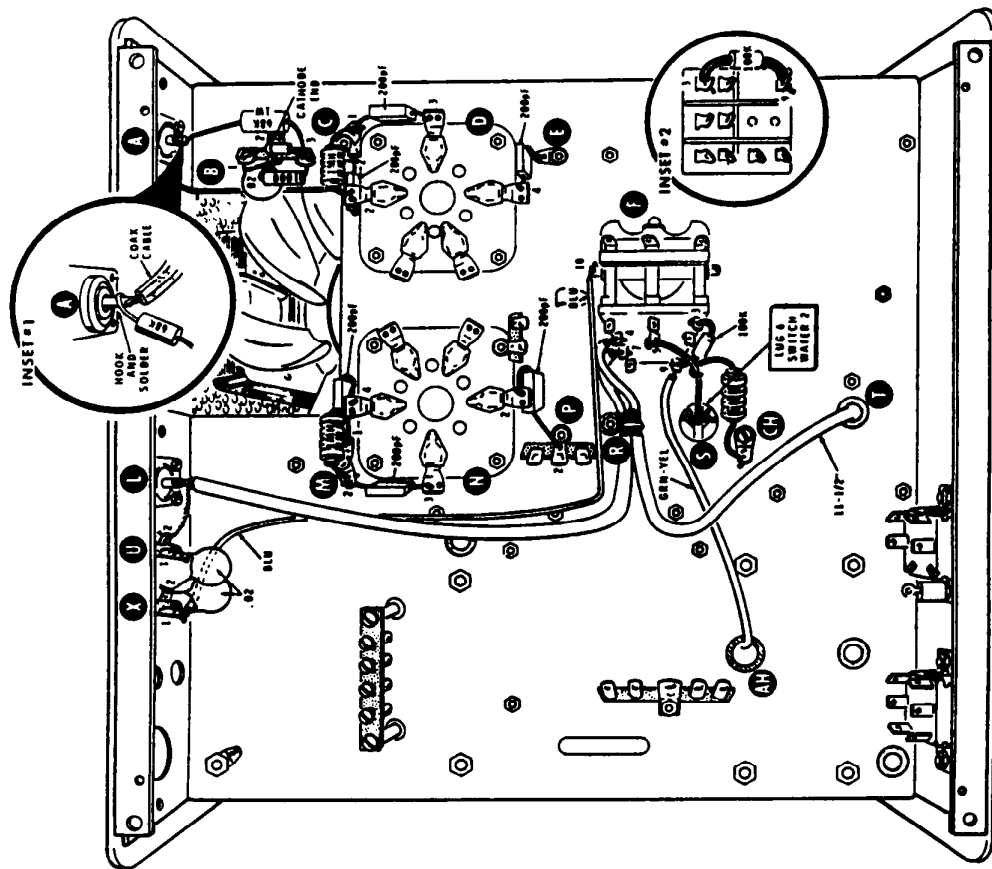
Tube Socket and Lug	Connect to
( ) Socket D, lug 4 (S-1)	Solder lug E (S-1).
( ) Socket D, lug 3 (S-1)	Solder lug C1 (NS).
( ) Socket D, lug 2 (NS)	Solder lug C2 (S-1).
( ) Socket N, lug 3 (S-1)	Solder lug M2 (NS).
( ) Socket N, lug 4 (NS)	Solder lug M1 (S-1).
( ) Socket N, lug 2 (S-1)	Terminal strip P, <u>eyelet</u> of lug 2 (S-1).
( ) Connect a 1 mH RF choke (#45-4) from lug 2 of tube socket D (S-2) to solder lug C1 (S-2).	
( ) Connect a 1 mH RF choke from lug 4 of tube socket N (S-2) to solder lug M2 (S-2).	
( ) Connect a .02 $\mu$ F disc capacitor from lug 1 (NS) to lug 2 (NS) of terminal strip B.	



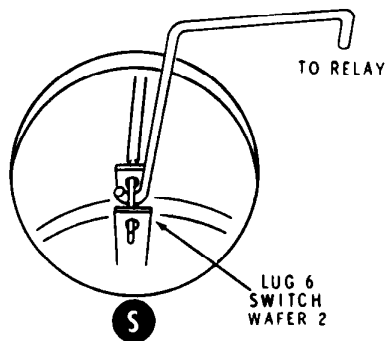
Detail 4-12A

- ( ) Refer to Detail 4-12A and form a 3" length of bare wire as shown. The hook should be just large enough to fit around another piece of the same size of bare wire.

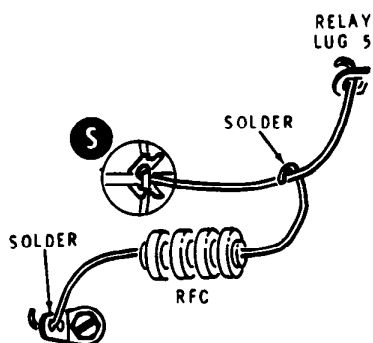






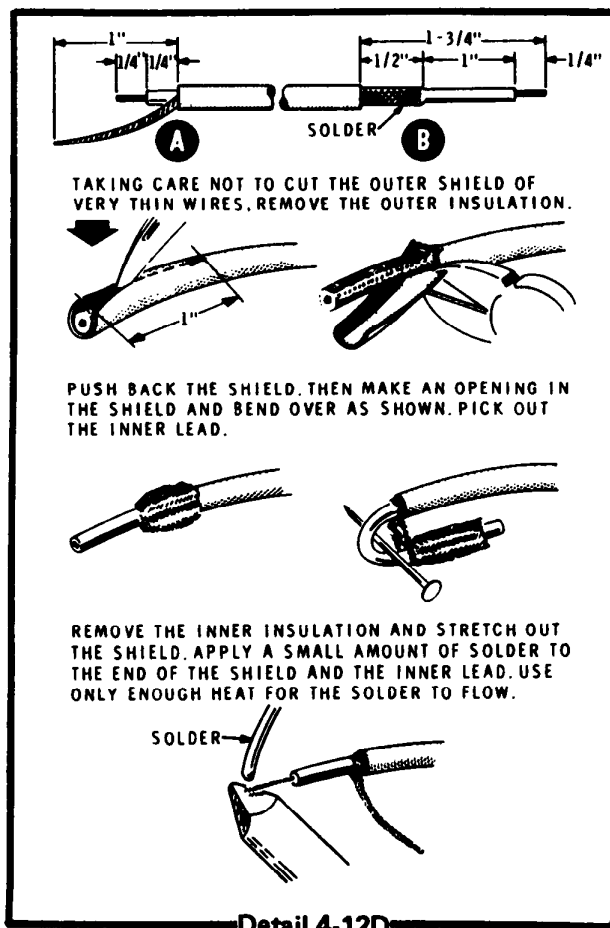


Detail 4-12B



Detail 4-12C

- ( ) Refer to Detail 4-12B and connect the hook on the end of the formed wire through hole S to lug 6 of wafer 2 of switch CZ (S-4). Connect the other end of this wire to lug 5 of relay F (S-1) as shown in the Pictorial.
- ( ) Refer to Detail 4-12C and connect one lead of a 1 MH RF choke to solder lug CH (S-1). Wind the other lead around the bare wire coming from relay lug 5 (S-1). Position the choke parallel to the chassis with a clearance of approximately 1/2".

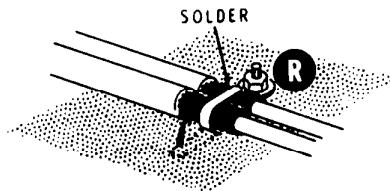


Detail 4-12D

- ( ) Refer to Detail 4-12D and prepare an 11-1/2" length of RG-58A/U coaxial cable. Note that 1" of outer insulation is first removed from end A, and that the center conductor and inner insulation are then cut back as shown.

- ( ) Tin the shield braid on end B. Use a minimum amount of heat and avoid melting the inner insulation.
- ( ) Connect the coaxial cable center conductor at end B to lug 7 of relay F (S-1).
- ( ) Connect the center conductor of the remaining coaxial cable coming from grommet T to lug 4 of relay F (S-1). Be sure this lead does not touch any other lug of the relay.

Detail 4-12E

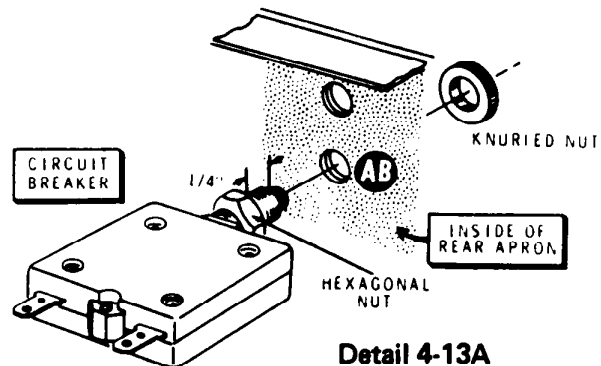


- ( ) Refer to Detail 4-12E and position the exposed shields of the coaxial cables connected in the two preceding steps, over the long solder lug at R. Bend the solder lug back over both shield braids and solder. Use a minimum, but adequate, amount of heat.
- ( ) Connect the center conductor at the free end of the coaxial cable to the center conductor of the coaxial fitting at L (S-1). Connect the shield wires to lug 2 of phono socket U (S-1).
- ( ) Cut each lead of a 100 k $\Omega$  resistor (brown-black-yellow) to 1/2".
- ( ) Connect the 100 k $\Omega$  resistor from lug 9 (S-2) to lug 3 (S-3) of relay F as shown in inset drawing 2 of the Pictorial.

Refer to Pictorial 4-13 (fold-out from Page 50) for the following steps.

Refer to Detail 4-13A for the following three steps.

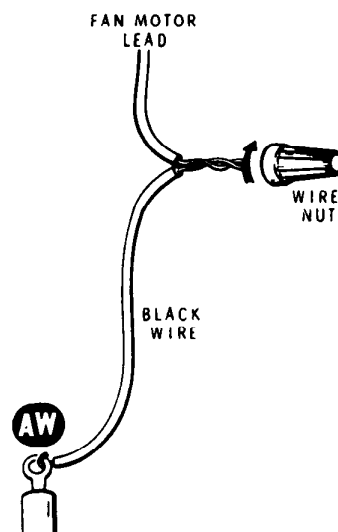
- ( ) Remove a knurled nut from each of the two circuit breakers (#65-28).
- ( ) Position the face of each hexagonal nut 1/4" from the end of the mounting bushing.
- ( ) Mount a circuit breaker on the chassis rear apron at AB. Use the knurled nut provided. NOTE: For convenience in wiring, position the solder lugs to provide the maximum distance between the chassis and the lugs.
- ( ) Similarly, mount the other circuit breaker at AA.



NOTE: In the following steps, you will connect the fan motor. Be careful not to tear the motor leads out of their plastic frame.

- ( ) Route one of the fan motor leads to terminal strip AE as shown. Cut off the excess lead lengths.
- ( ) Connect the prepared lead to lug 2 of terminal strip AE (NS).
- ( ) Remove 1/4" of insulation from the end of the other fan motor lead.
- ( ) Locate the remaining small black stranded wire, and remove 1/4" of insulation from one end.

- ( ) Twist together (clockwise) the bare end of the black wire and the bare end of the fan motor lead. Then twist the wire nut clockwise onto the wire ends until it is tight. Make sure there are no bare wires exposed around the wire nut.

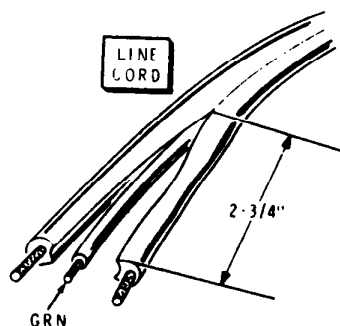


- ( ) Route the black wire to lug AW (refer to Pictorial 4-13) then cut the wire to the proper length. Remove 1/4" of insulation from the end of the wire, and connect it to double lug AW (S-4).

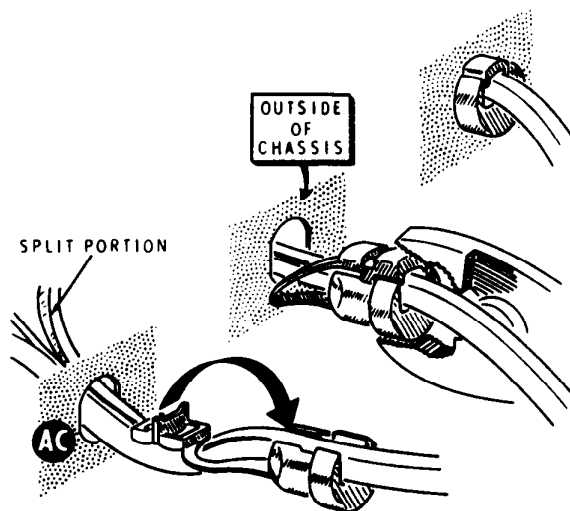
Connect the wires from switches AN and Z as follows:

Wire Coming from	Connect to
Lug 3, switch AN	Lug 2, terminal strip AE (S-2).
Lug 1, switch Z	Lug 1, circuit breaker AB (S-1).
Lug 2, switch Z	Lug 1, circuit breaker AA (S-1).

- ( ) Prepare a 3" and 3-1/2" large black stranded wire by cutting to length and removing 1/4" of insulation from each end of each wire.
- ( ) Connect one end of the 3" wire to lug 4 of terminal strip AE (S-1). Connect the other end of this wire to lug 2 of circuit breaker AB (NS). Use the hole next to the circuit breaker body.
- ( ) Similarly, connect the 3-1/2" wire from lug 1 of terminal strip AE (S-1) to lug 2 of circuit breaker AA (NS).
- ( ) Connect a .01  $\mu$ F, 1.4 kV, disc capacitor from solder lug AD (NS) to lug 2 of circuit breaker AB (NS).
- ( ) Connect a .01  $\mu$ F, 1.4 kV, disc capacitor from solder lug AD (NS) to lug 2 of circuit breaker AA (NS).
- ( ) Refer to Detail 4-13B and prepare the end of the line cord as shown. Remove 3/8" of insulation from the end of each of the three conductors. Melt a small amount of solder on the end of each.

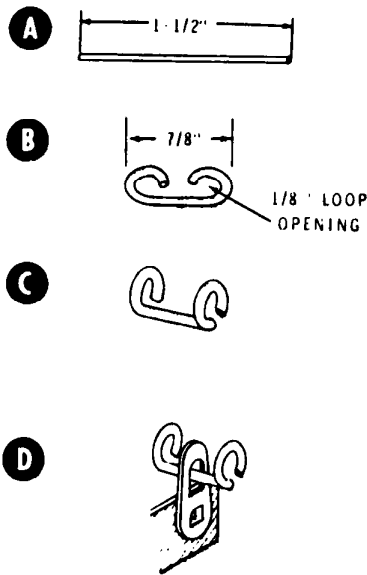


Detail 4-13B



Detail 4-13C

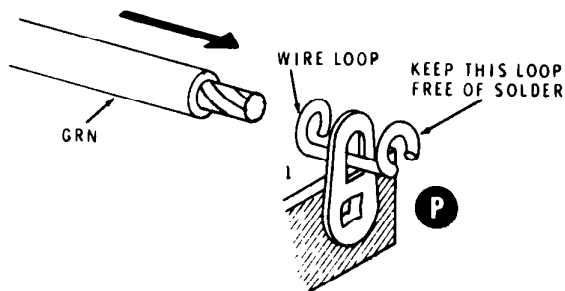
- ( ) Refer to Detail 4-13C and place the strain relief on the line cord just beyond the split portion of the cord, as shown. Use a pair of gas pliers to compress the strain relief, and then insert it into hole AC from the outside of the chassis.
- ( ) Connect the green line cord wire to solder lug AD (S-3).
- ( ) Connect one line cord conductor to lug 2 of circuit breaker AB (S-3).
- ( ) Connect the other line cord conductor to lug 2 of circuit breaker AA (S-3).



Detail 4-13D

Refer to Detail 4-13D for the following steps.

- ( ) **Part A.** Cut a 1-1/2" length of bare wire.
- ( ) **Part B.** On each end of the bare wire, form a loop having an inside diameter of approximately 1/8". Adjust the size of the loops so they will just slide onto the tinned end of one of the large green transformer leads from hole AH.
- ( ) **Part C.** Bend the two wire loops up as shown.
- ( ) **Part D.** Pass the formed wire through lug 1 of terminal strip P.
- ( ) Form another bare wire in the same manner, except pass this wire through lug 3 of terminal strip P.

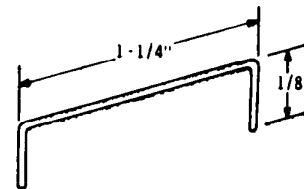


Detail 4-13E

- ( ) Refer to Detail 4-13E and position the wire loops at lug 1 of the terminal strip so they point up away from the chassis. Then insert the end of the 6-1/2" green

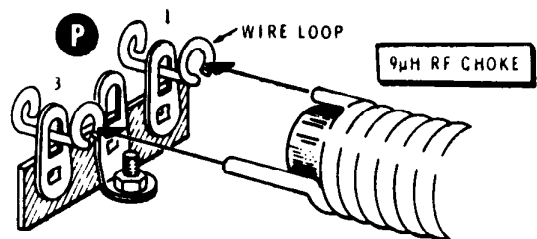
lead from hole AH all the way into the wire loop. Be careful to keep the two wire loops equally distant from the terminal strip solder lug. Then use pliers to compress the wire loop on the green wire. Solder the green lead to the wire loop and the wire loop to the solder lug, but be sure to keep the other wire loop free of solder. Also solder the lead from the .02  $\mu$ F disc capacitor and the brown wire to lug 1 at this time.

- ( ) Repeat the preceding step at lug 3 of terminal strip P for the 5-3/4" green lead.



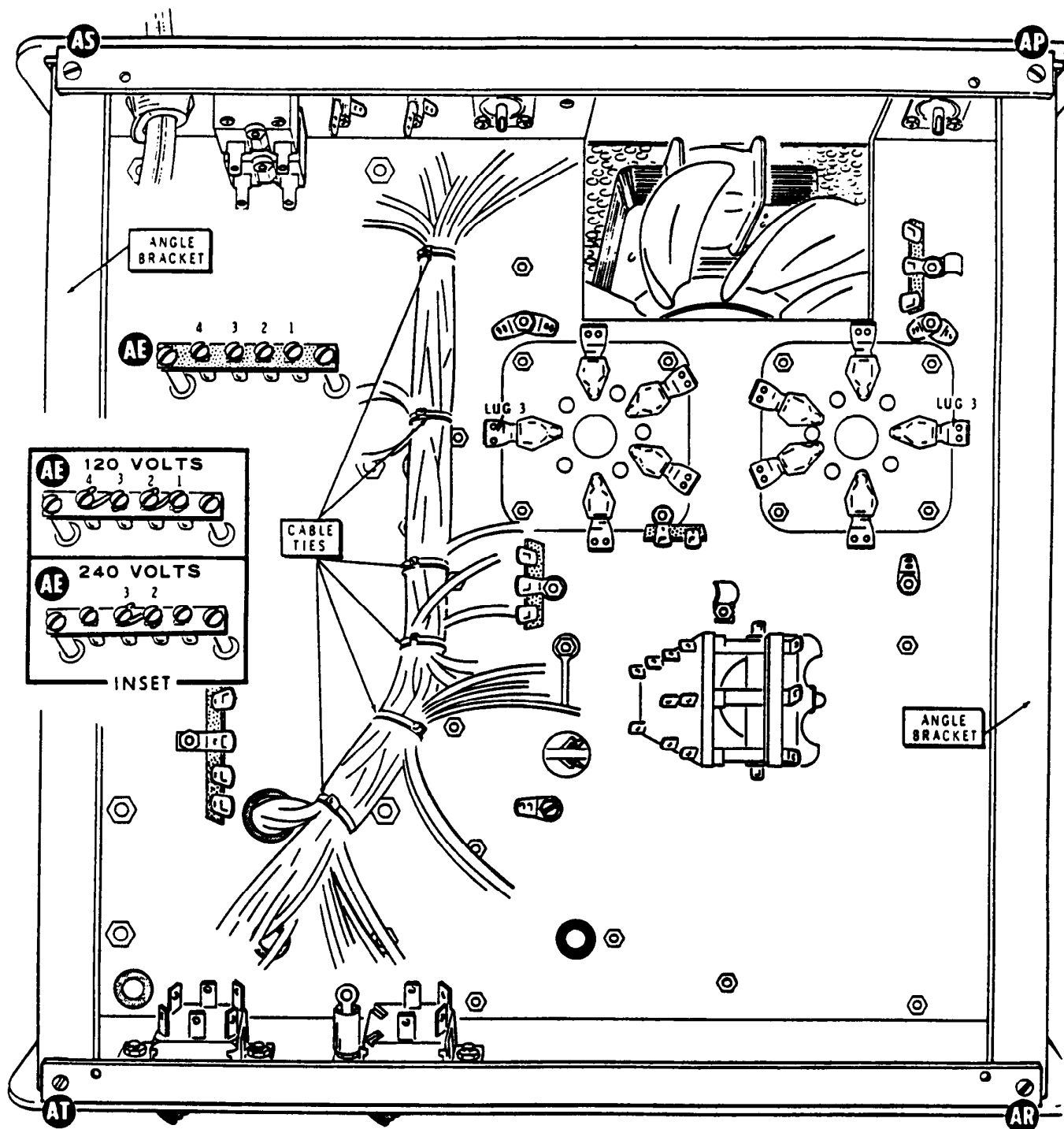
Detail 4-13F

- ( ) Refer to Detail 4-13F and form two 1-1/2" lengths of bare wire. Then, fit one wire from lug 1 of tube socket D (S-1) to lug 5 of tube socket N (NS).
- ( ) Fit the other 1-1/2" wire from lug 5 of tube socket D (S-1) to lug 1 of tube socket N (NS).
- ( ) Connect a .02  $\mu$ F disc capacitor from lug 5 (S-2) to lug 1 (NS) of tube socket N.
- ( ) Connect a .01  $\mu$ F, 1.4 kV, disc capacitor from lug 1 of tube socket N (S-3) to lug 1 of terminal strip AG (S-2).

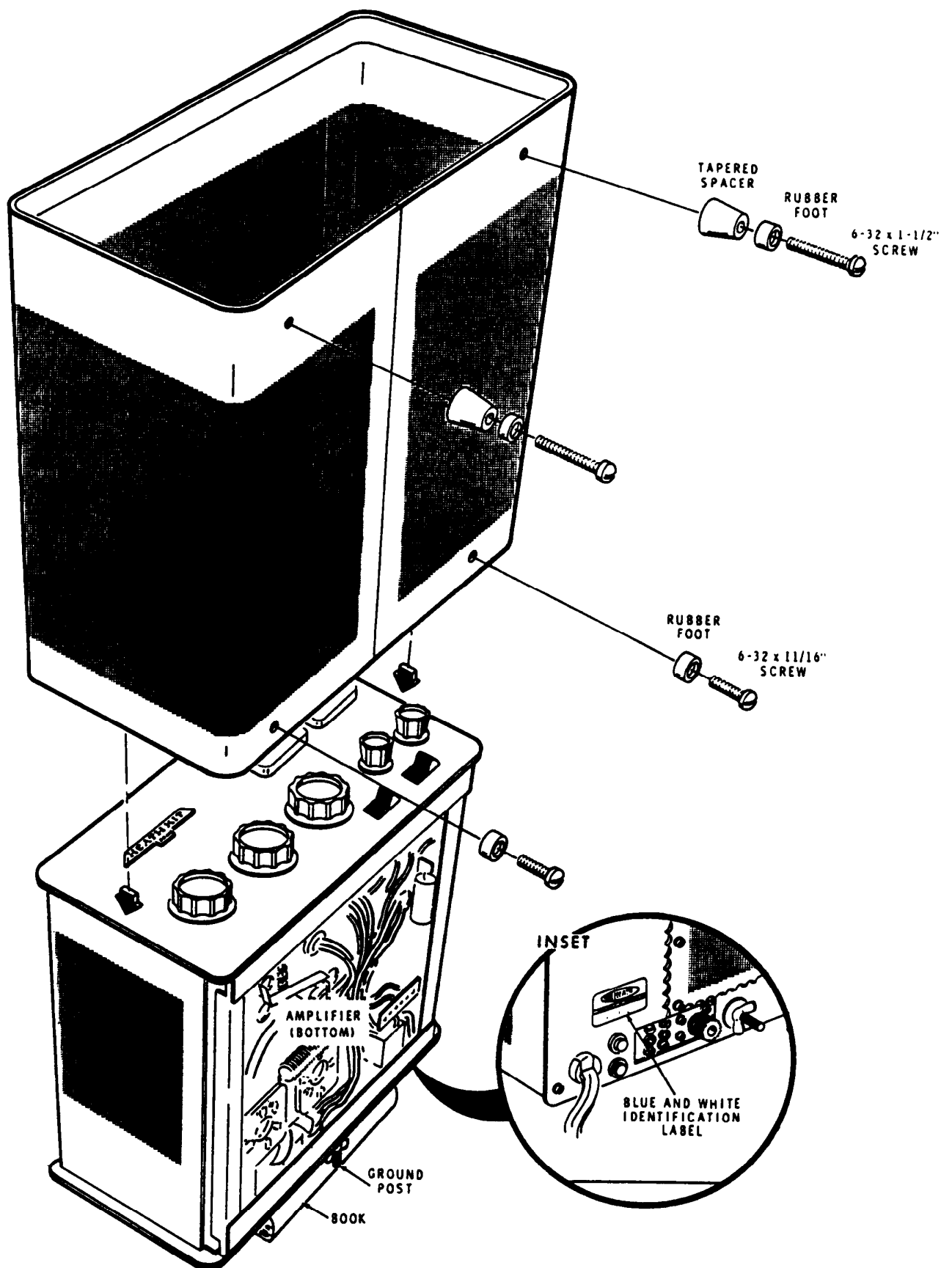


Detail 4-13G

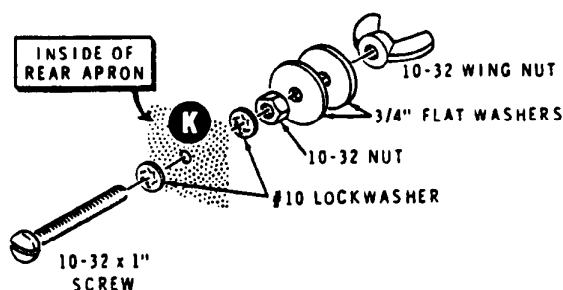
- ( ) Refer to Detail 4-13G and fit the 9  $\mu$ H RF choke (#45-78) so the two short leads at one end fit into the two wire loops on terminal strip P. At the other end of the choke, form the two leads so they loop around the bare wire filament leads between the two tubes as shown. Make sure the RF choke leads clear the chassis by at least 1/8". Solder the four RF choke leads carefully as these leads carry heavy current.



PICTORIAL 4-14

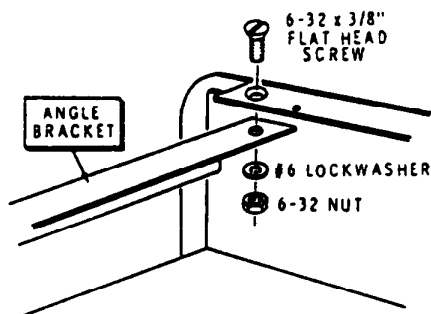


**PICTORIAL 4-20**



Detail 4-13H

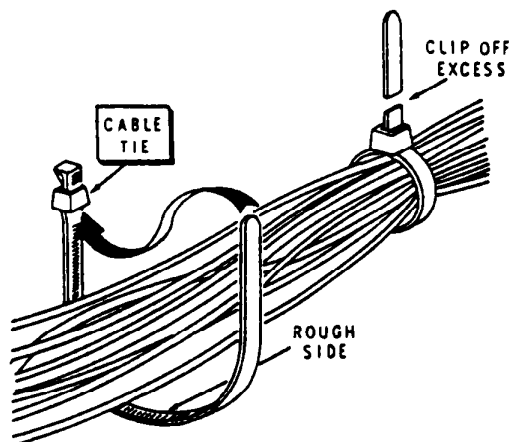
- ( ) Refer to Detail 4-13H and install the ground post at K on the chassis rear apron. Use a 10-32 x 1" screw, two #10 lockwashers, a 10-32 nut, two 3/4" flat washers, and a 10-32 wing nut.



Detail 4-14A

Refer to Pictorial 4-14 for the following steps.

- ( ) Refer to Detail 4-14A and install an angle bracket (#204-1041) on the chassis at AS and AT. Use 6-32 x 3/8" flat head hardware.
- ( ) Similarly, install the other angle bracket between AP and AR.



Detail 4-14B

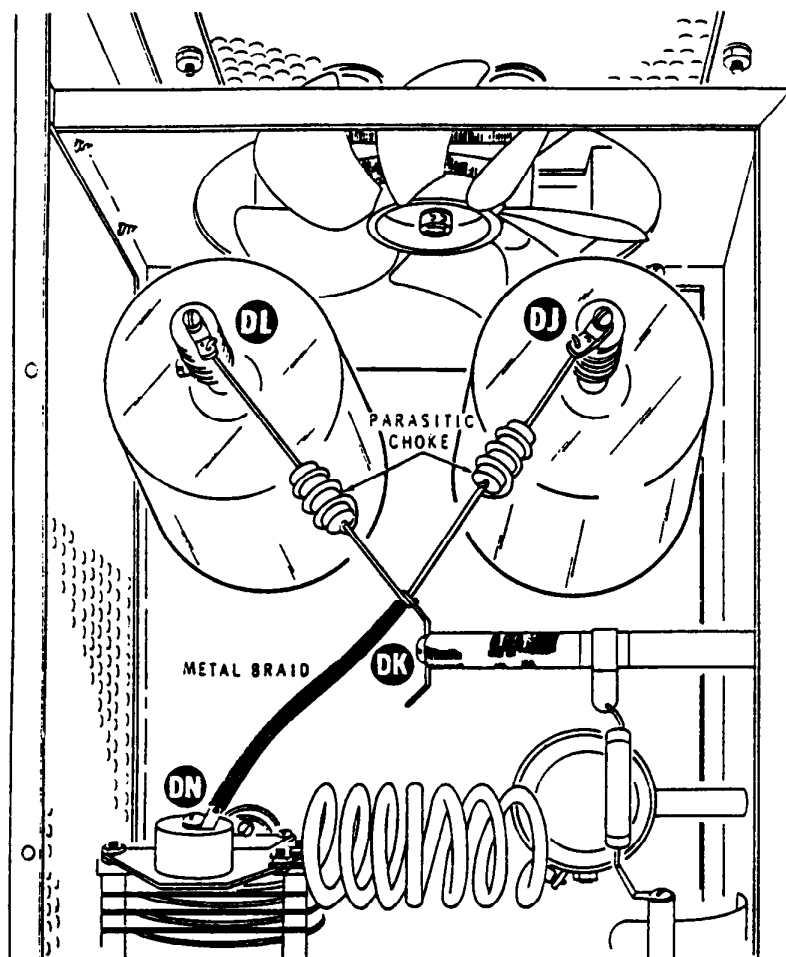
- ( ) Refer to Detail 4-14B and pass a cable tie (#354-5) around all of the wires at each of the six points shown in the Pictorial to form a neat cable. Equalize any slack in each wire between the ends of the wire. Then pull each cable tie snug and clip off the excess length of the tie.

## 120-240 VOLT WIRING

This amplifier can be operated from 120 or 240 volts, 50/60 Hertz, alternating current.

Make the proper connections on terminal strip AE for the supply voltage you will use. Refer to the inset drawing of Pictorial 4-14 and perform one of the following steps, depending on the line voltage to be used.

- ( ) For 120 VAC operation, connect a bare wire between terminals 1 and 2 and another bare wire between terminals 3 and 4 of terminal strip AE.
- ( ) For 240 VAC operation, connect a bare wire between terminals 2 and 3 of terminal strip AE.



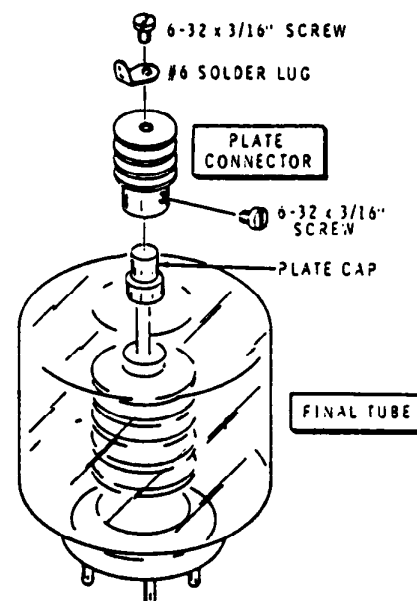
PICTORIAL 4-15

### FINAL TOP-CHASSIS WIRING

Refer to Pictorial 4-15 for the following steps.

Refer to Detail 4-15A for the following three steps.

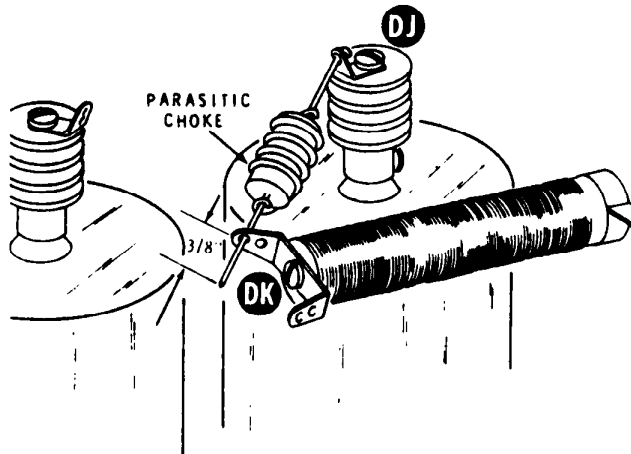
- ( ) Install a #6 solder lug on the top end of each plate connector (#260-12). Use a 6-32 x 3/16" screw, but leave it loose.
- ( ) Start a 6-32 x 3/16" screw into the side of each plate connector.



Detail 4-15A

- ( ) Place each plate connector on the plate cap of a final tube (3-500Z) and tighten the screw on the side of each connector.
- ( ) Place a final tube in each tube socket. **CAUTION:** Use extreme care when you install a final tube (3-500Z). Without rocking, gently push the tube into its socket. Too much pressure or lateral force (from rocking) may crack the glass beads around the socket pins, and damage the tube. Heath Company cannot be held responsible for any damage sustained through improper installation.



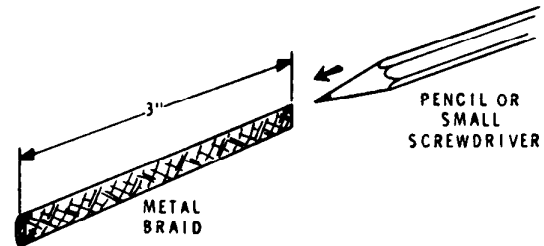


Detail 4-15B

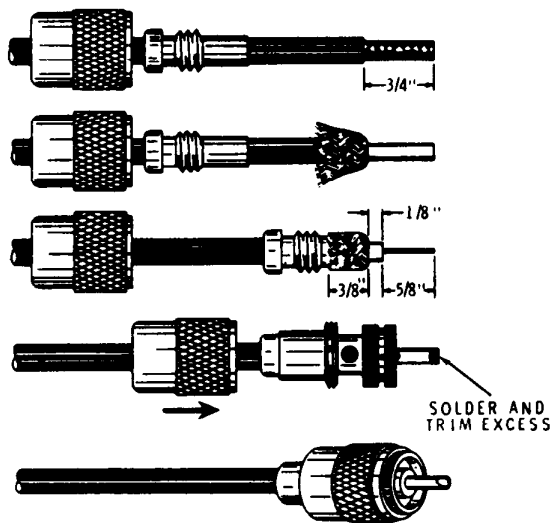
NOTE: When you install parasitic chokes in the following steps, center the chokes between the solder lugs.

- ( ) Cut each lead of the two parasitic chokes (#45-53) to a length of 7/8".
- ( ) Refer to Detail 4-15B and install a parasitic choke from solder lug DJ (S-1) to solder lug DK (NS). Note that the lead of the parasitic choke extends through solder lug DK for approximately 3/8". Leave this lead straight as shown in the Detail.

- ( ) Install the other parasitic choke from solder lug DL (S-1) to solder lug DK (NS).
- ( ) Tighten the screws in the tops of the two plate connectors.
- ( ) Refer to Detail 4-15C and open up the ends of a 3" length of metal braid with a pencil. (Note that the metal braid is actually flattened tubular braid.) Push one end onto the 3/8" projecting end of the parasitic choke at DK (S-3). Push the other end over the solder lug on the capacitor at DN (S-1).



Detail 4-15C

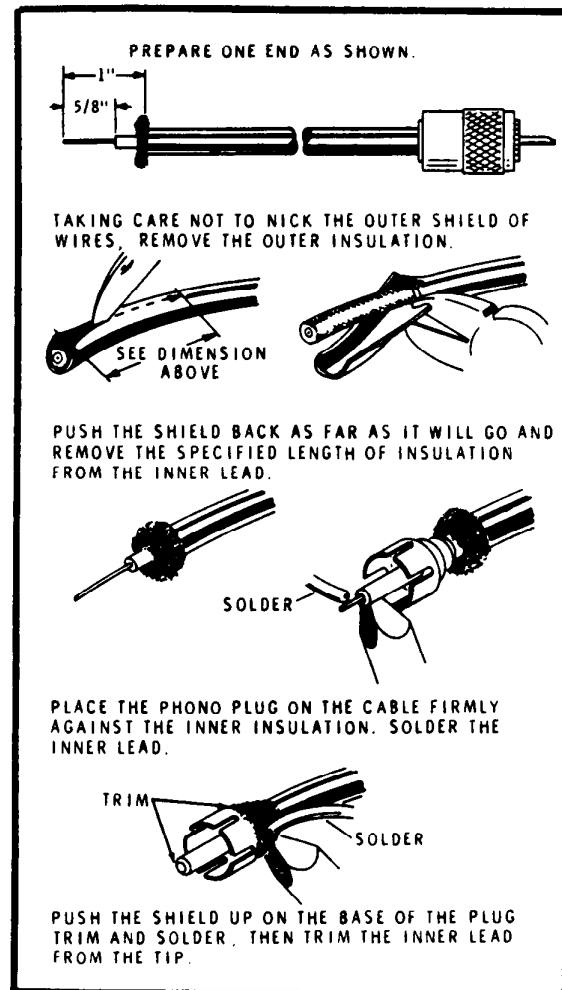


PICTORIAL 4-16

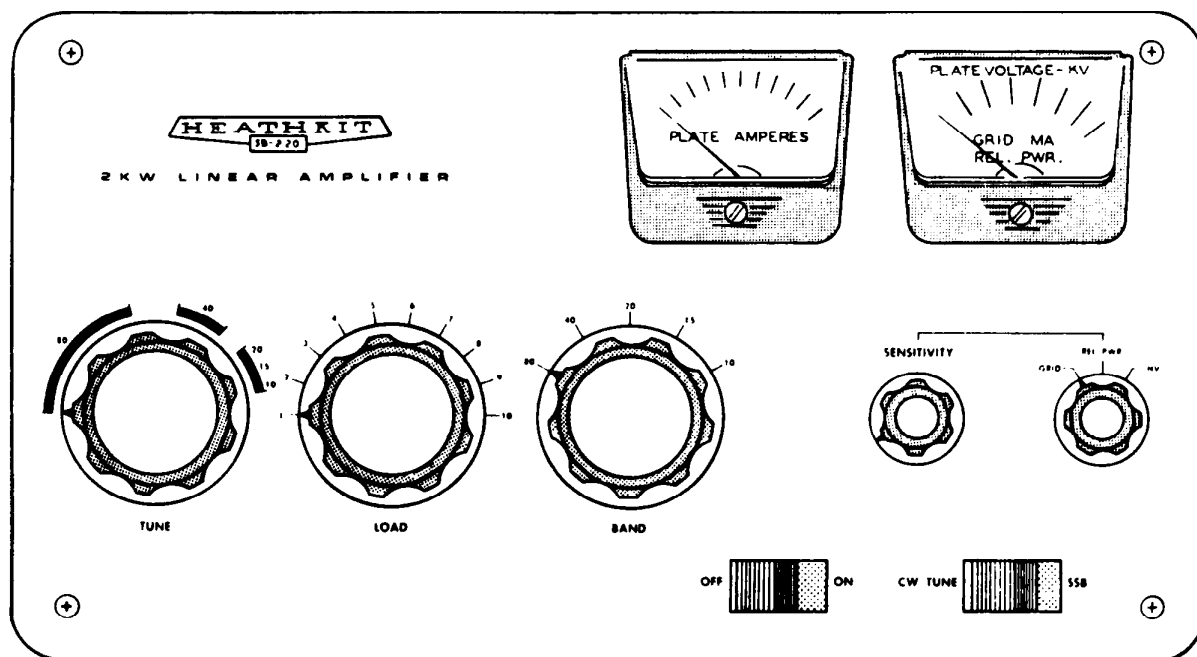
## CABLE PREPARATION

- ( ) Cut a length of RG-58A/U coaxial cable which will conveniently reach from the output of your exciter to the RF Input connector on the rear panel of the Amplifier (4' maximum recommended).
- ( ) Refer to Pictorial 4-16 and install a coaxial plug (#438-9) and a coaxial plug insert (#438-12) on one end of the coaxial cable.
- ( ) On the other end of the coaxial cable, install a connector (not furnished) which will mate with the output connector of your exciter. Refer to Pictorial 4-16 or Pictorial 4-17, as appropriate.

Lay the cable aside for use later.



PICTORIAL 4-17

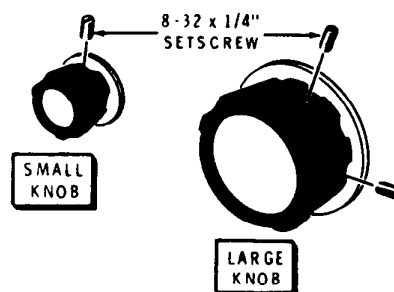

**PICTORIAL 4-18**

## KNOB INSTALLATION

Refer to Pictorial 4-18 for the following steps.

- ( ) Refer to Detail 4-18A and start two 8-32 x 1/4" setscrews into each of the three large knobs. Start a single setscrew into each of the two small knobs.
- ( ) Turn the shafts of the Tune and Load capacitors so the plates of each are fully meshed.
- ( ) Turn the three other shafts fully counterclockwise.
- ( ) Install the knobs on the shafts so the index marks are positioned as shown in the Pictorial, and tighten the setscrews.

Proceed to "Test and Final Assembly."


**Detail 4-18A**



# TEST AND FINAL ASSEMBLY

The input coils are factory adjusted and do not require any further alignment.

The brass spring and the metal spacer form a safety "interlock" which grounds the high voltage power supply and removes the high voltage from points which are exposed when the perforated cover is removed.

Refer to the chassis photographs for the location of the interlock and the resistance test points.

## RESISTANCE CHECK

- ( ) **IMPORTANT:** Refer to Figure 1, push down the brass spring of the interlock, and temporarily insert a rubber foot between the brass spring and the metal spacer. If you fail to do this, the high voltage circuit will be short-circuited, you will be unable to obtain a plate connector resistance reading, and damage will result if power is applied.
- ( ) The resistance between the plate connectors and the chassis should measure approximately  $200\text{ k}\Omega$  after the meter stabilizes.
- ( ) The resistance between lug 3 of each tube socket and the chassis (Pictorial 4-14) should measure approximately  $20\ \Omega$ .

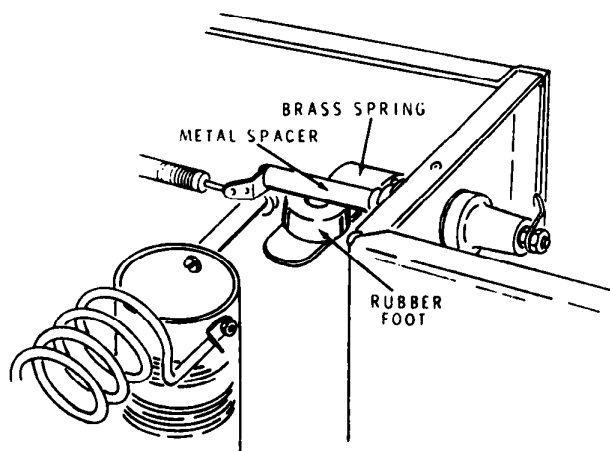
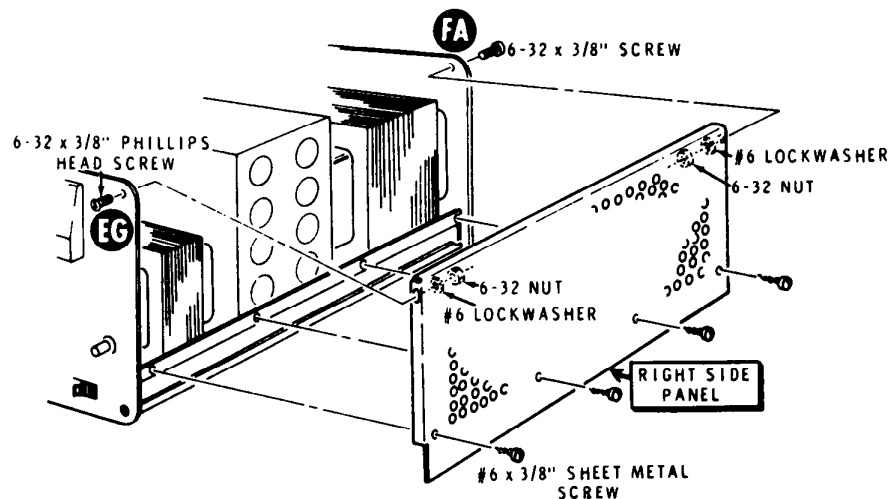


Figure 1

If any difficulty is encountered in obtaining either of these resistance readings, refer to the "In Case of Difficulty" section of the Manual on Page 75.

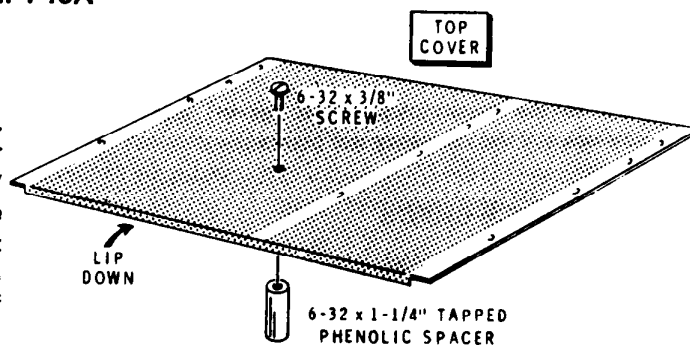
- ( ) Remove the rubber foot from the interlock.



Detail 4-19A

Refer to Pictorial 4-19 for the following steps.

- ( ) Refer to Detail 4-19A and install the right side panel. Use #6 x 3/8" sheet metal screws along the lower edge, 6-32 x 3/8" hardware at FA, and 6-32 x 3/8" phillips head hardware at EG. CAUTION: After the panel is installed, check to make sure there is at least 1/4" clearance between the point of the sheet metal screw and any connections to the positive (+) lug of filter capacitor #7. (See Pictorial 4-7, fold-out from Page 43.)



Detail 4-19B

- ( ) As shown in the Pictorial, place the perforated top cover (#205-724) on the top of the Amplifier with the lip against the front panel pointing down. Align the mounting screw holes. Then mark the hole in the cover which is directly over that portion of the brass spring which protrudes beyond the metal spacer.

- ( ) If necessary, adjust each meter pointer to "0" with the meter adjusting screw (see Figure 3-1 fold-out from Page 68).

NOTE: If at any time during the testing and operation the Linear Amplifier does not perform as described, unplug the Linear Amplifier line cord and refer to the "In Case of Difficulty" section of the Manual.

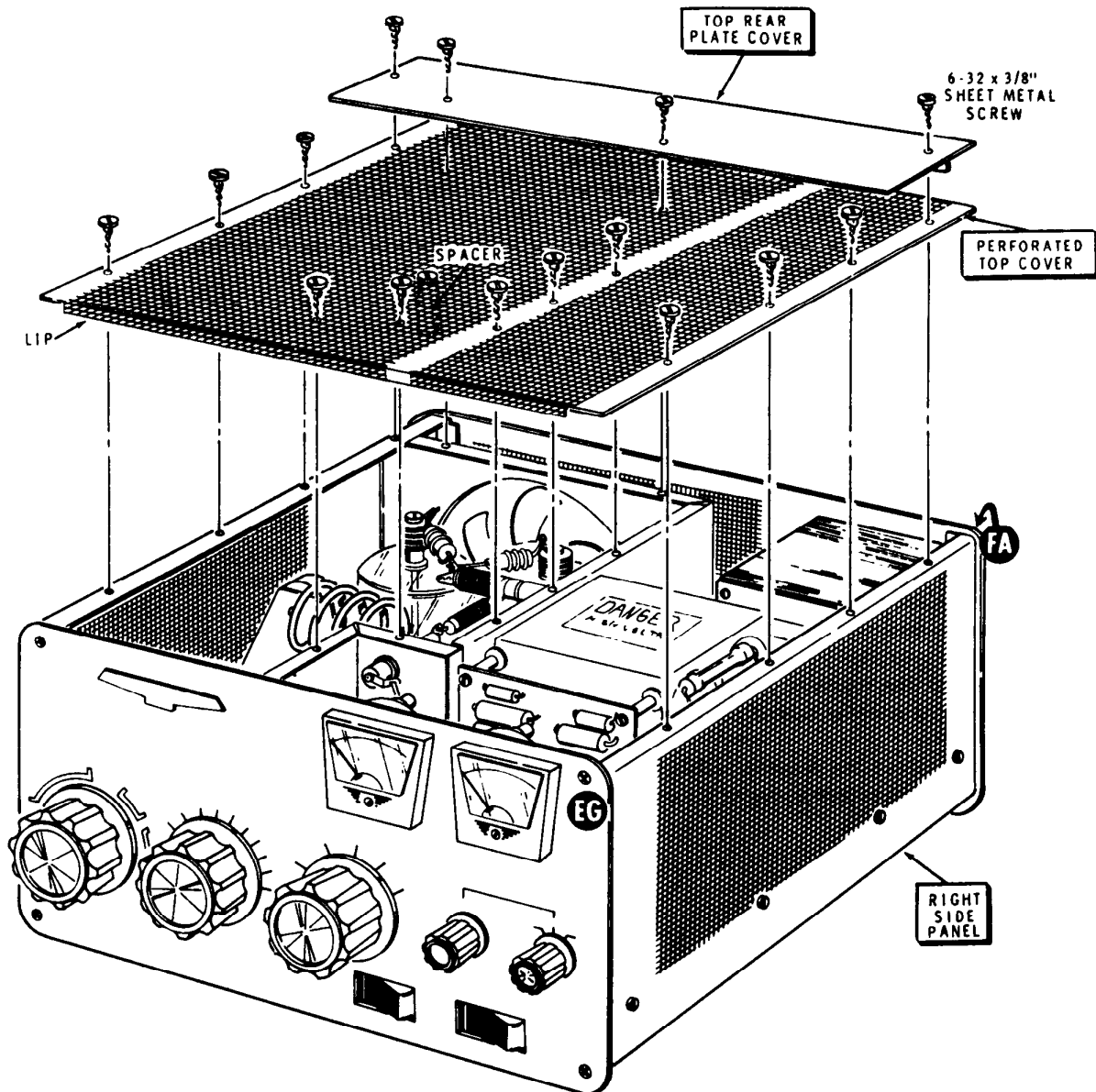
- ( ) Refer to Detail 4-19B and install a 6-32 x 1-1/4" tapped phenolic spacer (#255-39) on the underside of the perforated cover at the marked hole. Use a 6-32 x 3/8" screw.

- ( ) Install the perforated top cover and the top rear plate cover (#205-723) on the top of the amplifier. Use #6 x 3/8" sheet metal screws. First, install a screw near each corner of the top cover and then check visually to make sure that the phenolic spacer on the underside of the top cover pushes the interlock spring down away from the metal spacer mounted on the feedthrough insulator. Any required repositioning of the phenolic spacer should be accomplished before completing the top cover installation. Then install the rest of the sheet metal screws.

Position the switches and controls as follows:

TUNE	9 o'clock
LOAD	9 o'clock
BAND	Any
SENSITIVITY	12 o'clock
METER SWITCH	HV
POWER SWITCH	OFF
MODE SWITCH	CW/TUNE

- ( ) Plug the line cord into the power source for which the unit is wired, either 120 volts or 240 volts AC.



PICTORIAL 4-19

**CAUTION: LETHAL VOLTAGES ARE PRESENT IN THIS UNIT. USE EXTREME CARE WHEN MAKING ANY TESTS.**

( ) Push the POWER switch to ON.

( ) Check to see that the tube filaments and meter pilot lamps light, and that the fan operates. The right-hand meter should read approximately 2500 volts.

( ) Push the MODE switch to SSB. The meter should read approximately 3000 volts.

**NOTE:** There should be no indication on either panel meter except when the METER SWITCH is at the HV position.

( ) Push the POWER switch to OFF and unplug the line cord.



NOTE: Read through the following steps and decide whether you want your amplifier to sit level, or whether you wish the front of the chassis elevated. Then select the feet and mounting hardware so the parts will be immediately available as you install the cabinet. The screws for the mounting feet will be inserted through the four holes in the cabinet bottom and screwed into the captive nuts in the flange of the chassis.

Refer to Pictorial 4-20 (fold-out from Page 56) for the following steps.

- ( ) Place a book on a flat surface and balance the amplifier chassis on the book, front panel uppermost.
- ( ) Lower the cabinet onto the chassis so the captive nuts in the chassis bottom flange are aligned with the four holes in the cabinet.

Perform only one of the following two steps, depending upon how you wish the amplifier cabinet positioned.

- ( ) If you wish to have the amplifier cabinet sit level, install a rubber foot at each corner of the cabinet. Use 6-32 x 11/16" screws.

- ( ) If you wish the front of the cabinet to be elevated, install a rubber foot on each rear corner with 6-32 x 11/16" screws. Then, install a tapered spacer and a rubber foot at each front corner of the cabinet with 6-32 x 1-1/2" screws.

NOTE: The blue and white identification label shows the Model Number of your kit. Refer to these numbers in any communications with the Heath Company.

- ( ) Install the identification label in the following manner.

1. Select a location for the label where it can easily be seen when needed, but will not show when the unit is in operation, such as on the rear panel (see the inset drawing in Pictorial 4-20).
2. Carefully peel away the backing paper. Then press the label into position. You will avoid smearing the numbers on the label if you will put the piece of waxed backing paper on top of the label and then rub on it instead of directly on the label.

This completes the assembly of your Linear Amplifier. Proceed to "Installation."