CHASSIS

PARTS LIST

Open the pack marked #4 and check these and the remaining parts in the final pack against the following list. The key numbers corresponding to the numbers on the Chassis and Final Pack Parts Pictorial (Illustration Booklet, Pages 9 and 10).

To order a replacement part, see "Replacement Parts" inside the rear cover. For prices, refer to the separate "Heath Parts Price List."

CIRCUIT COMPONENTS

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
A1	6-473	1	47 kΩ, 1/2-watt (Yel-Viol-Org) resistor	R13
A1	6-104	1	100 kΩ,1/2-watt (Brn-Blk-Yel) resistor	R16
A2	1-31-1	1	330 kΩ,1-watt,10% (Org-Org-Yel) resistor	R17
A3	5-2-3	1	270 Ω, 3-watt,10% resistor	R15
A4	3-12-10	1	500 Ω, 10-watt, 10% resistor	R14
A5	10-1118	3	1000 Ω (1k) control	R5, R7, R8
A5	10-1119	1	1 MΩ control	R6
A6	25-228	1	100-100-300 μF electrolytic capacitor	C3 A, B ,C,
A7	54-953	1	Power transformer	T1
A8	60-2	1	DPDT 2-position slide switch	SW9
A9	60-4	2	SPDT 2-position slide switch	SW7, SW8
A10	60-54	1	DPDT 120V-240V slide switch	SW10
A11	60-73	1	DP3T 3-position slide switch	SW6
A12	60-624	1	DP4T 4-position slide switch	SW4
	411-815	1	5DEP31F cathode ray tube (CRT)	V1

Circuit Components (Cont'd.)

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
A13	412-15	1	NE2H pilot lamp	PL1
A14	421-20	1	1/2-ampere, 3AG, slow-blow fuse	F1

HARDWARE

NOTE: The hardware may be packed in more than one envelope (stamped HDW). Open all the hardware envelopes according to size before you check the hardware against the Parts List.

#4 Hardware

B1	250-375	2	4-40 × 5/16" flat head screw
B2	252-15	2	4-40 nut
B3	254-9	2	#4 lockwasher

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
#6 Hardware				
C1	250-1282	9	6-32 × 1/8″ black setscrew	
C2	250-1164	6	6-32 × 3/16″ flat head screw	
C3	250-138	17	6-32 × 3/16″ screw	
C4	250-365	2	#6 × 1/4″ hex washer head screw	
C5	250-1157	12	6-32 × 1/4″ hex stud	
C6	250-32	2	6-32 × 3/8″ flat head screw	
C7	250-89	12	6-32 × 3/8″ screw	
C8	250-1101	1	6-32 × 3/8″ T-bolt	
C9	250-591	5	#6 × 1/2″ screw	
C10	250-1203	1	#6 × 9/16″ screw	
C11	250-29	2	6-32 × 3/4″ screw	
C12	252-3	25	6-32 nut	
C13	252-22	2	6-32 push-on nut	
C14	254-1	26	#6 lockwasher	
C15	255-63	3	6-32 × 2″ threaded spacer	
C16	259-1	3	#6 solder lug	
#8 Hardware				
D1	250-1138	8	#8 × 5/8″ hex washer head screw	
D2	254-4	4	8-32 nut	
D3	252-68	8	8-32 push-on nut	
D4	254-2	4	#8 lockwasher	
Other Hardware				
E1	252-5	2	10-32 nut	
E2	254-37	2	#10 lockwasher	
E3	252-73	1	5/16″ push-on nut	
E4	252-7	5	3/8″ nut	
E5	253-10	7	3/8″ flat washer	
E6	254-4	4	3/8″ lockwasher	
LINE CORD — HARNESS — CABLE				
	89-54	1	Line cord	
	134-237	1	Cable with connector	
	134-1021	1	Harness	

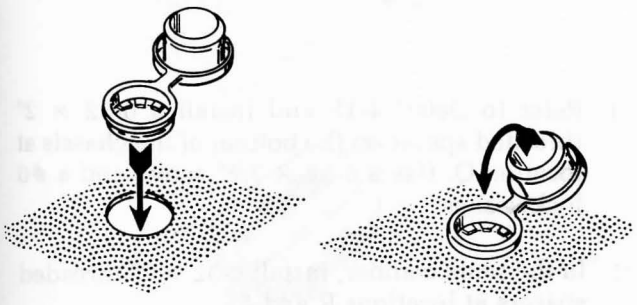
KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
METAL PARTS				
F1	200-1348	1	Chassis	
F2	204-2141	1	Front panel bracket	
F3	204-2313	2	CRT bracket	
F4	204-2314	1	Circuit board bracket	
F5	206-1216	1	CRT shield	
F6	206-1274	1	Input shield	
F7	207-1	2	CRT clamp	
MISCELLANEOUS				
G1	73-5	1	3/4″ × 5″ rubber strip	
G2	73-34	2	Red alligator clip insulator	
G3	73-45	7	Plastic grommet	
G4	75-52	1	Slide switch insulator	
G5	75-754	1	Line cord strain relief	
G6	75-771	4	Slide switch cover (2-1/2″)	
	92-609	1	Cabinet shell	
G7	92-679	1	Cabinet front	
	211-49	1	Handle	
G8	260-16	2	Alligator clip	
G9	261-1	3	Foot	
G10	266-991	4	Plastic spacer	
	300-18	1	Felt strip	
	351-9	1	Epoxy glue packet	
G11	354-5	2	Cable tie	
G12	413-10	1	Red lens	
G13	414-36	1	Graticule	
G14	422-1	1	Fuse block	
G15	431-82	1	Terminal collar	
G16	434-41	1	CRT socket	
G17	436-11	3	Red socket	J3, J4, J6
G17	436-22	1	Black socket	J5
G18	462-1049	2	Red knob	
G19	462-1055	2	Large black knob	
G20	462-1059	4	Small black knob with skirt	
G21	490-14	1	Allen wrench	
G22	205-778	1	Alignment tool blade	

STEP-BY-STEP ASSEMBLY

Refer to Pictorial 4-1 (Illustration Booklet, Page 11) for the following steps.

( ) Position the chassis as shown. This is the top side of the chassis. The front of the chassis is to your left.

( ) Refer to Detail 4-1A and install a plastic grommet in hole BA from the top of the chassis.

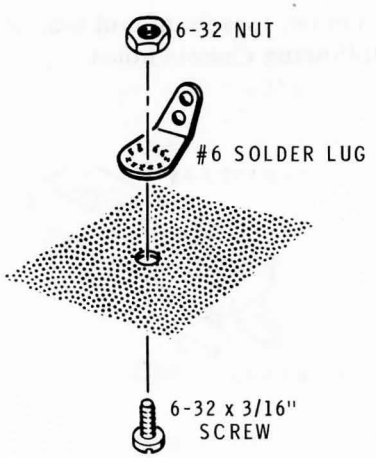


Detail 4-1A

In the same manner, install plastic grommets in the following chassis holes.

( ) BB
( ) BC
( ) BD
( ) BE
( ) BF
( ) BG

NOTE: Use the **flat head** screws only when **flat head** hardware is specifically called for in a step.

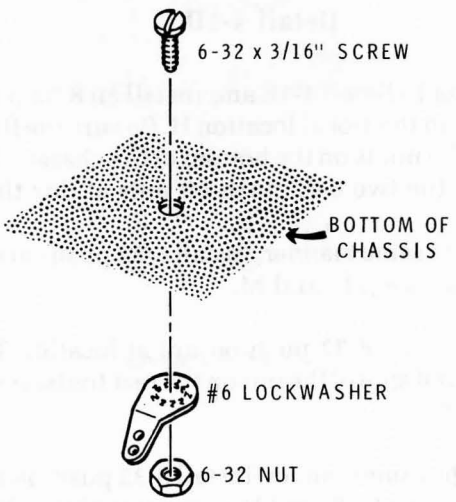


Detail 4-1B

( ) Refer to Detail 4-1B and mount a #6 solder lug on top of the chassis at location K with a 6-32 × 3/16″ screw and a 6-32 nut. Position the solder lug as shown.

( ) Refer to Detail 4-1C and mount a #6 solder lug on the bottom of the chassis at location N with a 6-32 × 3/16″ screw and a 6-32 nut. Position the solder lug as shown.

( ) In the same manner, install a #6 solder lug at location P.

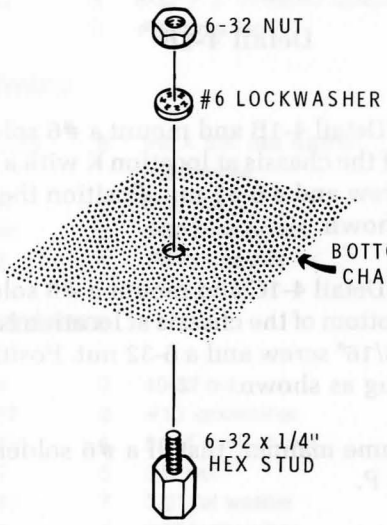


Detail 4-1C

( ) Refer to Detail 4-1D and **loosely** mount a 6-32 × 1/4" hex stud on the bottom of the chassis at location CA with a #6 lockwasher and a 6-32 nut. This stud will be tightened later.

In the same manner, **loosely** mount 6-32 × 1/4" hex studs at the following chassis holes.

( ) CB
( ) CC
( ) CD
( ) CE
( ) CF
( ) CG
( ) CH
( ) CJ
( ) CK
( ) CL
( ) CM



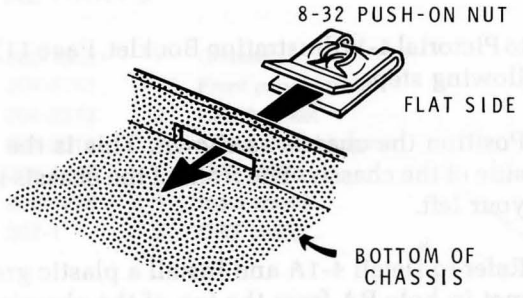
Detail 4-1D

( ) Refer to Detail 4-1E and install an 8-32 push-on nut in the slot at location H. Be sure the flat side of the nut is on the bottom of the chassis. Do not use the two 6-32 push-on nuts at this time.

( ) In the same manner, install 8-32 push-on nuts at locations J, L, and M.

( ) Install an 8-32 push-on nut at location T with the flat side of the nut on the rear (outside) of the chassis.

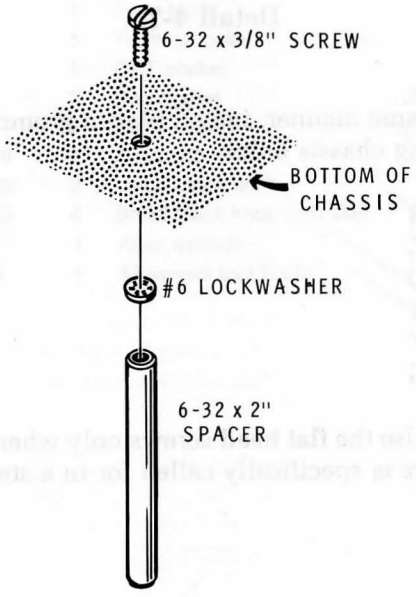
( ) In the same manner, install 8-32 push-on nuts at locations U, X, and Y on the rear of the chassis.



Detail 4-1E

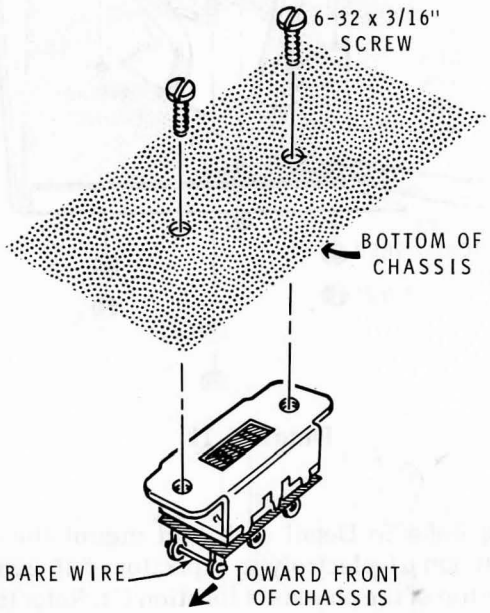
( ) Refer to Detail 4-1F and install a 6-32 × 2" threaded spacer on the bottom of the chassis at location Q. Use a 6-32 × 3/8" screw and a #6 lockwasher.

( ) In the same manner, install 6-32 × 2" threaded spacers at locations R and S.



Detail 4-1F

( ) SW10: Refer to Detail 4-1G and mount the DPDT 120V-240V slide switch on the bottom of the chassis at location SW10 with 6-32 × 3/16" screws. Be sure the switch is positioned so the lugs with the bare wire between them is toward the front of the chassis.



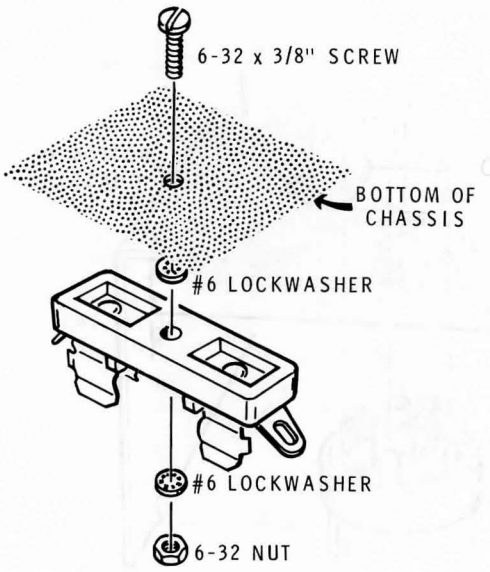
Detail 4-1G

( ) Refer to Detail 4-1H and mount the fuse block on the bottom of the chassis at location F1 with 6-32 × 3/8" hardware.

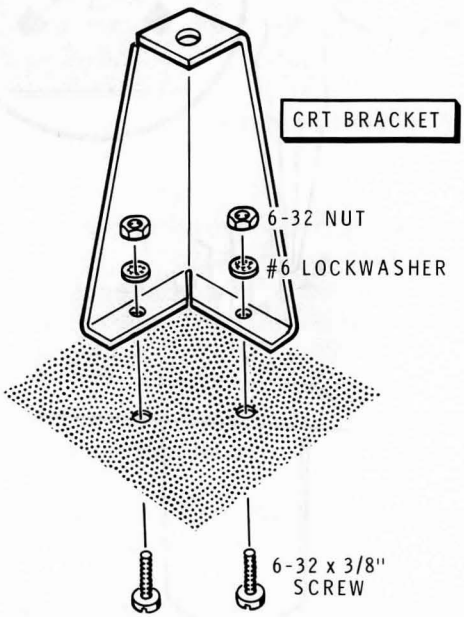
( ) Refer to Detail 4-1J and mount a CRT (cathode ray tube) bracket on the top of the chassis at either of the V1 locations. Use 6-32 × 3/8" hardware.

( ) In the same manner, install the other CRT bracket at the remaining V1 location.

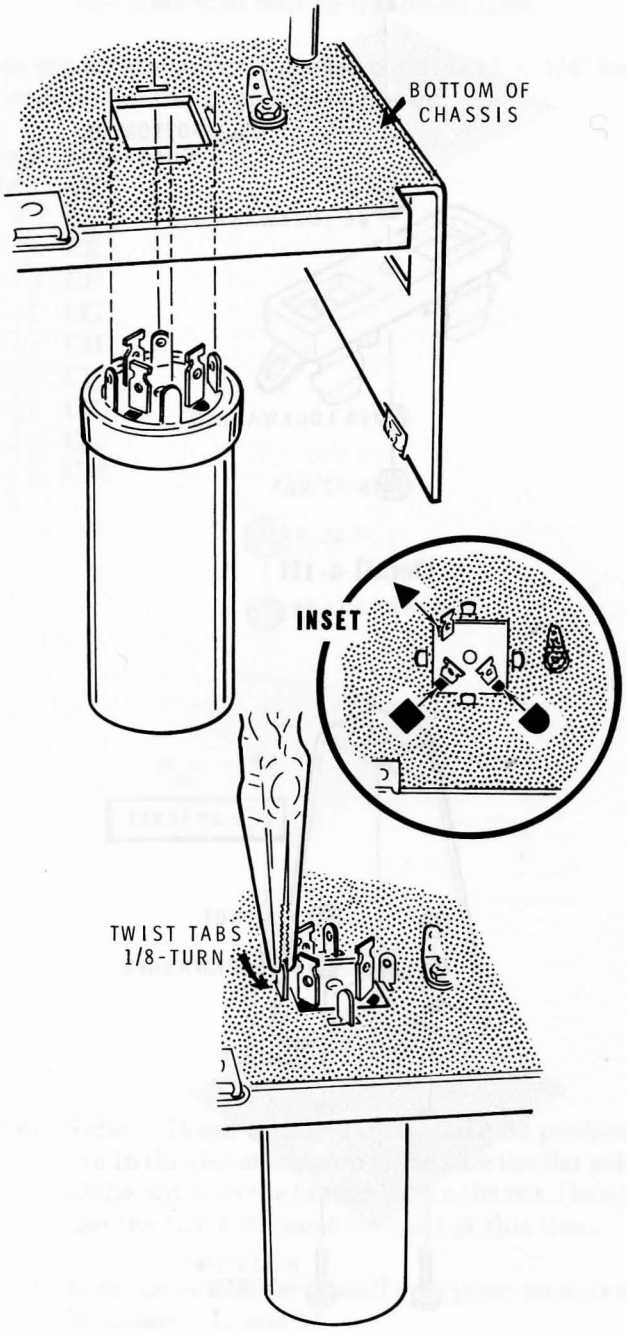
( ) Install a 6-32 push-on nut on the top of each CRT bracket. Be sure that the flat side of each nut is up and that each nut is positioned as shown on Pictorial 4-1.



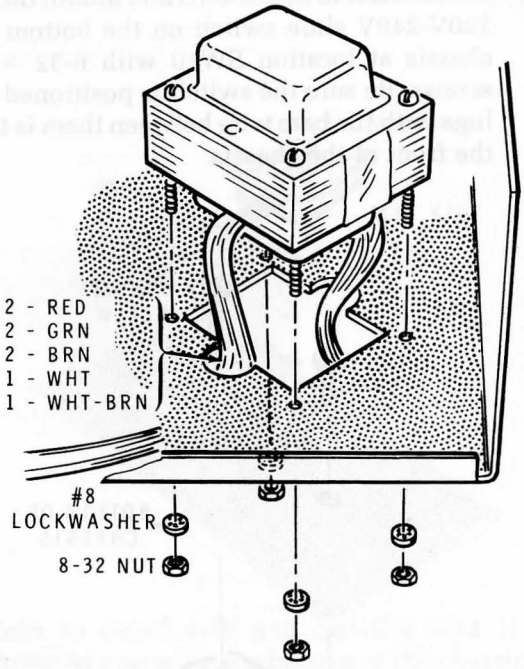
Detail 4-1H



Detail 4-1J



Detail 4-1K



Detail 4-1L

( ) C3: Refer to Detail 4-1K and mount the 100-100-300 μF electrolytic capacitor (#25-228) on the top of the chassis at location C3. Refer to the inset drawing which shows the capacitor lug positions from the bottom of the chassis.

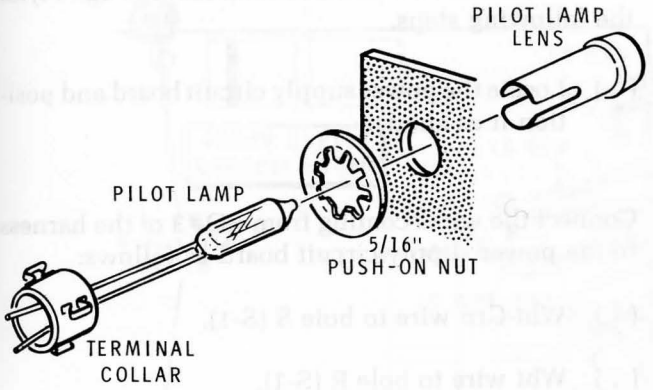
( ) T1: Refer to Detail 4-1L and mount the power transformer (#54-953) at location T1 with #8 lockwashers and 8-32 nuts. Be sure to position the transformer so the proper color wires are located as shown.

Refer to Pictorial 4-2 (Illustration Booklet, Page 12) for the following steps.

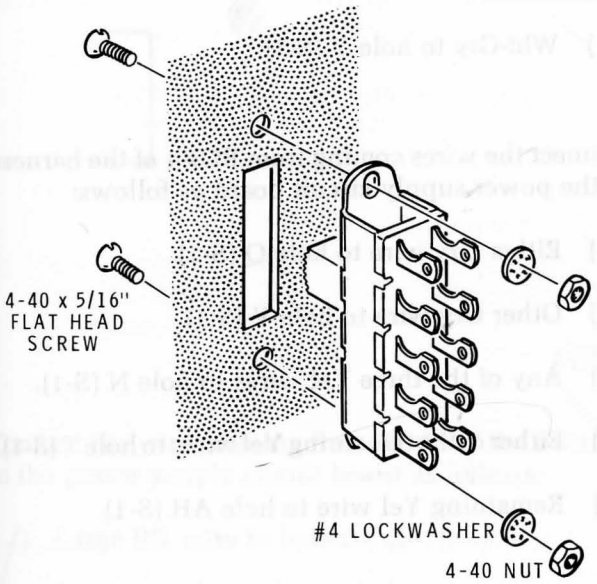
( ) Refer to Detail 4-2A and install the pilot lamp lens in hole PL1 in the chassis with a 5/16" push-on nut. Be sure the slot in the lens is positioned as shown before you push the nut tight against the chassis.

( ) PL1: Push the pilot lamp all the way into the pilot lamp lens.

( ) Refer to Detail 4-2A and push the terminal collar onto the pilot lamp lens until the collar is even with the end of the lens. Position the terminal collar so its lugs are located as shown.



Detail 4-2A



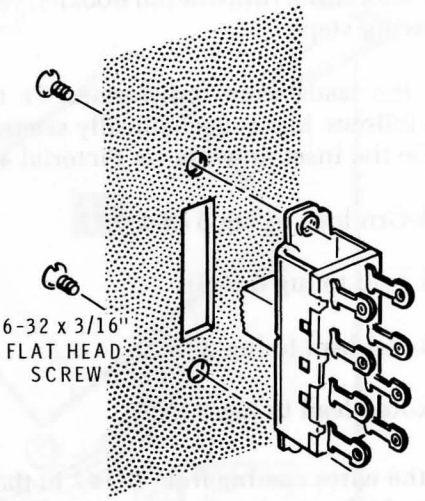
Detail 4-2B

( ) SW4: Refer to Detail 4-2B and mount the DP4T 4-position slide switch at location SW4 with 4-40 × 5/16" **flat head** hardware. The switch can be mounted either way.

( ) SW6: Refer to Detail 4-2C and install a DP3T 3-position slide switch at location SW6 with 6-32× 3/16" **flat head** screws.

( ) SW7: In the same manner, install an SPDT 2-position slide switch at location SW7. Position the switch so its lugs are located as shown.

( ) SW8: In the same manner, install another SPDT 2-position slide switch at location SW8.



Detail 4-2C

( ) Refer to the inset drawing on Pictorial 4-2 and install a split bearing (furnished with the vertical circuit board parts) in hole R4A. The wide side of the bearing must be on the inside of the chassis.

( ) In the same manner, install a split bearing in hole R4B.

Refer to Pictorial 4-3 (Illustration Booklet, Page 13) for the following steps.

( ) Turn the chassis over and position it as shown.

( ) Locate the harness and position it on the chassis with the wires from the various breakouts (BO) as shown.

( ) Pass the wires from BO#1 through grommet BA for connection later.

( ) Pass the wires from BO#8 through grommet BF for connection later.

( ) Pass the large Brn, large Red, large Org, and the small Gry-Wht wires from BO#9 through grommet BE for connection later.

( ) Twist together the two green leads coming from transformer T1. Pass these leads under the harness and through grommet BE for connection later.

Refer to Pictorial 4-4 (Illustration Booklet, Page 14) for the following steps.

Connect the leads from transformer T1 to switch SW10 as follows. Make mechanically secure connections. (See the inset drawing on Pictorial 4-4.

( ) Blk-Grn lead to lug 5 (S-1).

( ) Blk lead to lug 6 (NS).

( ) Blk-Yel lead to lug 2 (S-1).

( ) Blk-Red lead to lug 3 (NS).

Connect the wires coming from BO#7 in the harness as follows. Make mechanically secure connections.

( ) Either large Brn wire to fuse block F1 lug 2 (S-1).

( ) Other large Brn wire to switch SW10 lug 3 (S-2).

( ) Connect a 1" bare wire (remove all the insulation from a 1" length of brown wire) from capacitor C3 lug 4 (S-1) to solder lug N (NS).

Connect the wires coming from BO#9 in the harness as follows:

( ) All five Blk wires to solder lug N (S-6). Be sure all wires, especially the lower ones, get soldered.

( ) Both Viol wires to capacitor C3 lug 1 (NS).

( ) Both Wht-Red wires to capacitor C3 lug 2 (NS).

( ) Red wire to capacitor C3 lug 3 (NS).

( ) Place a 1" length of sleeving on each lead of a 500 Ω, 10-watt resistor.

( ) R14: Connect this resistor to capacitor C3 between lugs 1 (S-3) and 2 (NS). Position this resistor directly above the capacitor lugs.

( ) Place a 5/8" length of sleeving on each lead of a 270 Ω, 3-watt resistor.

( ) R15: Connect this resistor to capacitor C3 between lugs 2 (S-4) and 3 (S-2). Position this resistor 1/2" above the chassis.

Refer to Pictorial 4-5 (Illustration Booklet, Page 14) for the following steps.

( ) Locate the power supply circuit board and position it as shown.

Connect the wires coming from BO#3 of the harness to the power supply circuit board as follows:

( ) Wht-Grn wire to hole S (S-1).

( ) Wht wire to hole R (S-1).

( ) Grn wire to hole AA (S-1).

( ) Viol wire to hole AD (S-1).

( ) Wht-Gry to hole Y (S-1).

Connect the wires coming from BO#4 of the harness to the power supply circuit board as follows:

( ) Either Gry wire to hole Q (S-1).

( ) Other Gry wire to hole V (S-1).

( ) Any of the three Yel wires to hole N (S-1).

( ) Either of the remaining Yel wires to hole T (S-1).

( ) Remaining Yel wire to hole AH (S-1).

Connect the wires coming from BO#5 of the harness to the power supply circuit board as follows:

( ) Blk wire to hole D (S-1).

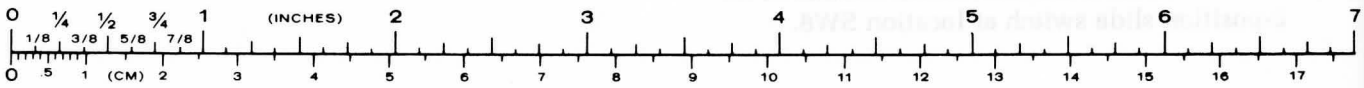
( ) Either Org wire to hole P (S-1).

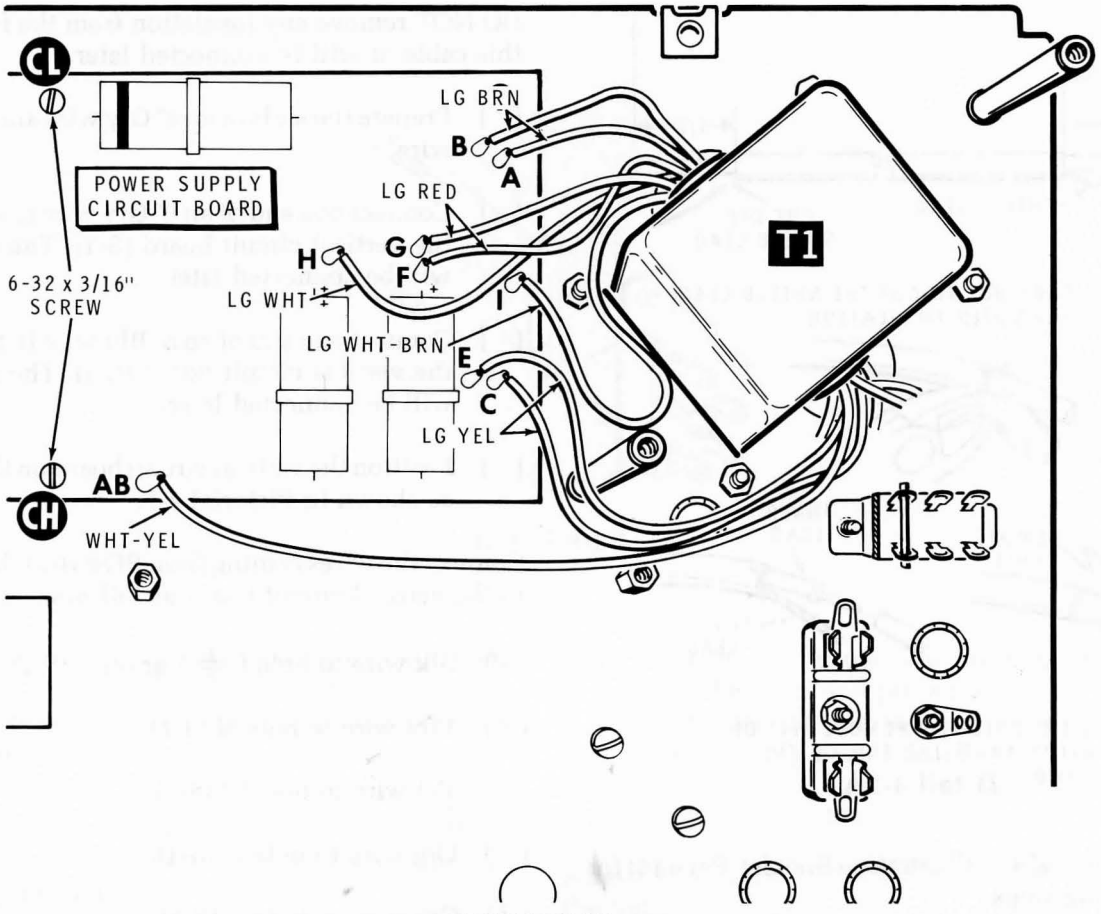
( ) Other Org wire to hole U (S-1).

( ) Wht-Red wire to hole J (S-1).

( ) Wht-Yel wire to hole L (S-1).

( ) Wht-Brn wire to hole K (S-1).





PICTORIAL 4-6

Connect the wires coming from BO#6 of the harness to the power supply circuit board as follows:

( ) Large Blk wire to hole AE (S-1).

( ) Large Org wire to hole X (S-1).

( ) Large Red wire to hole W (S-1).

( ) Large Yel wire to hole AF (S-1).

Refer to Pictorial 4-6 for the following steps.

Connect the leads coming from the transformer T1 to the power supply circuit board as follows:

( ) Large Wht-Yel lead to hole AB (S-1).

( ) Either large Yel lead to hole E (S-1).

( ) Other large Yel lead to hole C (S-1).

( ) Large Wht-Brn lead to hole I (S-1).

( ) Large Wht lead to hole H (S-1).

( ) Either large Red lead to hole F (S-1).

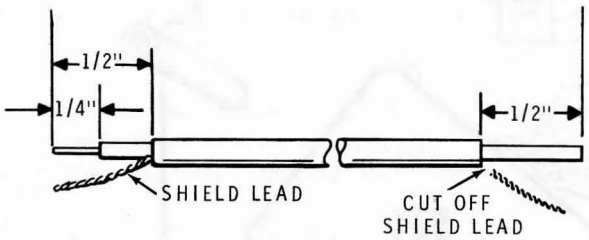
( ) Other large Red lead to hole G (S-1).

( ) Either large Brn lead to hole A (S-1).

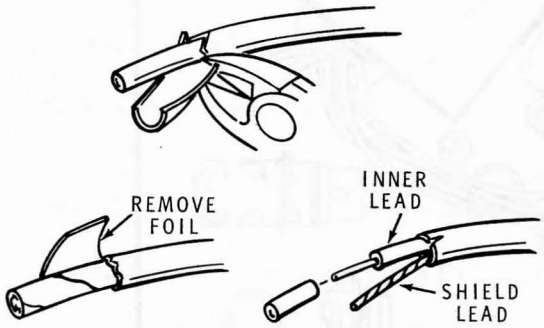
( ) Other large Brn lead to hole B (S-1).

This completes the wiring to the power supply circuit board. Be sure all connections are soldered, and cut off all excess lead lengths as close to the foil as possible.

( ) Temporarily mount the power supply circuit board at hex studs CL and CH with 6-32 × 3/16" screws.



TAKING CARE NOT TO CUT THE SHIELD LEAD, REMOVE THE OUTER INSULATION.



REMOVE THE FOIL AND REMOVE 1/4" OF INSULATION FROM THE END OF THE INNER LEAD. **Detail 4-7A**

Refer to Pictorial 4-7 (Illustration Booklet, Page 15) for the following steps.

( ) Refer to Detail 4-7A and prepare both ends of a 20" length of shielded cable (furnished with the vertical circuit board parts).

Connect the end of this cable with the bared inner lead to the vertical circuit board as follows:

( ) Inner lead to hole HH (S-1).

( ) Shield lead to hole KK (S-1).

( ) At the other end of this cable, remove 1/4" of insulation from the inner lead. This will be used to identify this cable when it is connected later.

( ) Refer to Detail 4-7A and prepare both ends of a 26" length of shielded cable.

Connect the end of this cable with the bared inner lead to the vertical circuit board as follows:

( ) Inner lead in hole H (S-1).

( ) Shield lead in hole K (S-1).

DO NOT remove any insulation from the free end of this cable; it will be connected later.

( ) Prepare the ends of an 8" Gry wire and an 8" Blu wire.

( ) Connect one end of an 8" Gry wire in hole Y2 in the vertical circuit board (S-1). The other end will be connected later.

( ) Connect one end of an 8" Blu wire in hole Y1 in the vertical circuit board (S-1). The other end will be connected later.

( ) Position the vertical circuit board on the chassis as shown in Pictorial 4-7.

Connect the wires coming from BO#10 of the harness to the vertical circuit board as follows:

( ) Blk wire to hole (⏚) ground (S-1).

( ) Viol wire to hole N (S-1).

( ) Yel wire to hole W (S-1).

( ) Org wire to hole U (S-1).

( ) Gry wire to hole V (S-1).

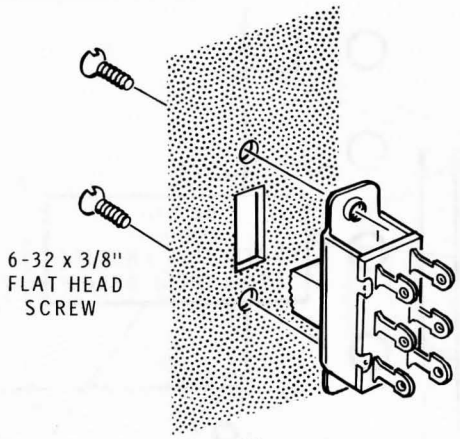
( ) Wht-Grn wire to hole C (S-1).

( ) Grn wire to hole D (S-1).

This completes the wiring of the vertical circuit board. Check to see that all connections are soldered, and cut off all excess lead lengths as close to the foil as possible.

Refer to Pictorial 4-8 (Illustration Booklet, Page 16) for the following steps.

( ) Secure the vertical circuit board to the chassis with two #6 × 1/4" hex washer head screws through the switch bracket and into chassis holes B and C and 6-32 × 3/16" screws through the circuit board and into hex studs CA, CB, CC, CD, CE, and CF. Then tighten the nuts on the hex studs.



Detail 4-9A

( ) Position the free ends of the two shielded cables coming from the vertical circuit board under the harness and then through grommet BF for connection later.

( ) Pass the free end of the Blu wire coming from the vertical circuit board through grommet BC for connection later.

( ) Pass the free end of the Gry wire coming from the vertical circuit board through grommet BD for connection later.

NOTE: Position the harness away from these blue and gray wires.

( ) Position the indicated leads coming from power transformer T1 on top of the harness near the corner of the vertical circuit board and install a cable tie around all these wires. See the inset drawing on Pictorial 4-8. Pull the cable tie tight and cut off its excess.

( ) Remove the protective backing from the DANGER label and press the label in place on the chassis at the location shown near the power supply circuit board.

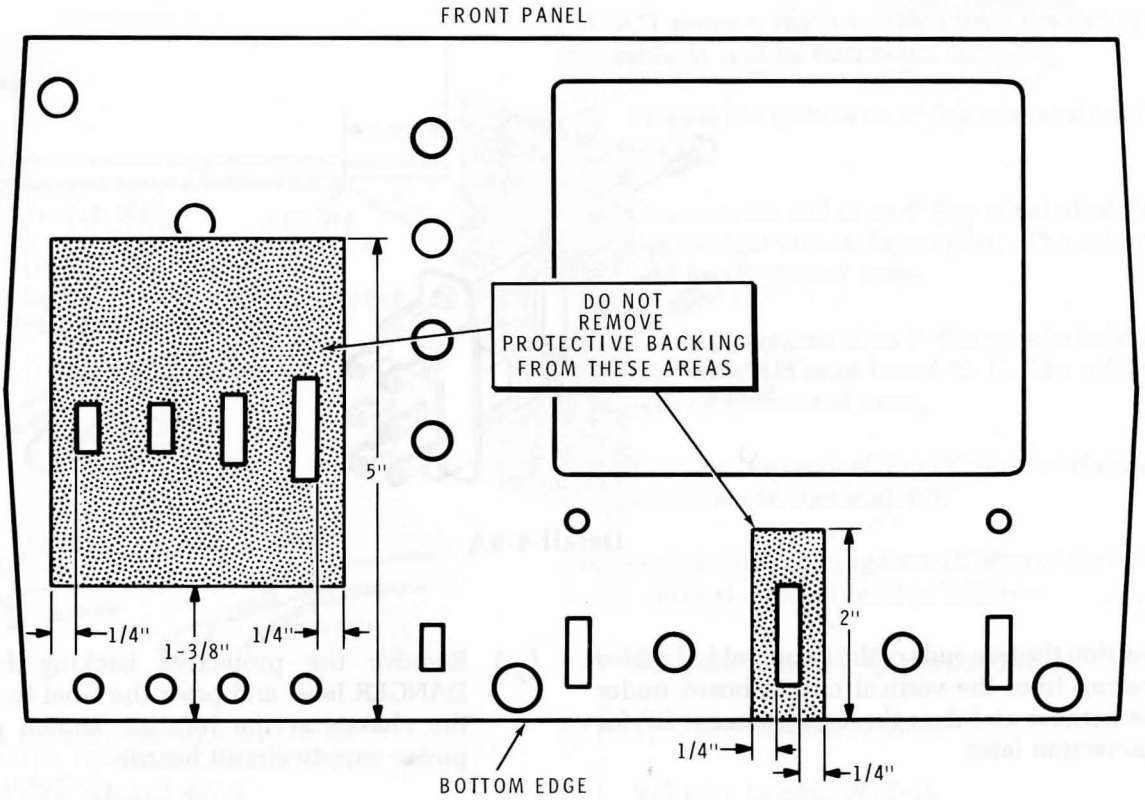
Set the chassis aside temporarily.

Refer to Pictorial 4-9 (Illustration Booklet, Page 17) for the following steps.

CAUTION: Place a large soft cloth on your work area to protect the cabinet front from being scratched as you work with the Oscilloscope.

( ) SW9: Refer to Detail 4-9A and mount the DPDT 2-position slide switch at location SW9 on the cabinet front. Use 6-32 × 3/8″ **flat head** screws.

Set the cabinet front aside temporarily.



Detail 4-9B

NOTE: In the next step, you will be instructed to remove the protective backing from the back (unprinted) side of the front panel. The protective backing **must not** be removed from the two shaded areas; otherwise, the switch covers, positioned in the five recessed areas of the cabinet front, will stick to the adhesive back of the front panel, and prevent these five switches from operating. Cut through the protective backing around these two shaded areas with a sharp knife. Then, when you remove the protective backing, be sure these shaded areas remain in place on the front panel.

( ) Refer to Detail 4-9B and remove the protective backing from the back of the front panel except for the two shaded areas mentioned in the previous note.

( ) Temporarily lay the front panel **adhesive side up** on your work area.

( ) Position the cabinet front as shown in Pictorial 4-9.

( ) Fit the 6-32 × 3/8″ T-bolt into the indicated square recess in the cabinet front.

( ) Place a 2-1/2″ slide switch cover in each of the recessed areas at switch locations SW4, SW6, SW7, and SW8 in the cabinet front.

Locate the three slide switch covers (two fiber and one metal) supplied with the vertical circuit board parts. Install these covers in the recessed area at switch location SW3 in the following order.

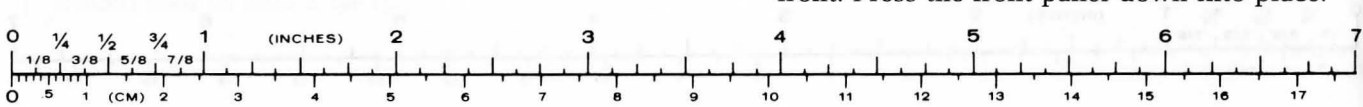
( ) 1. 1-7/16″ switch cover.

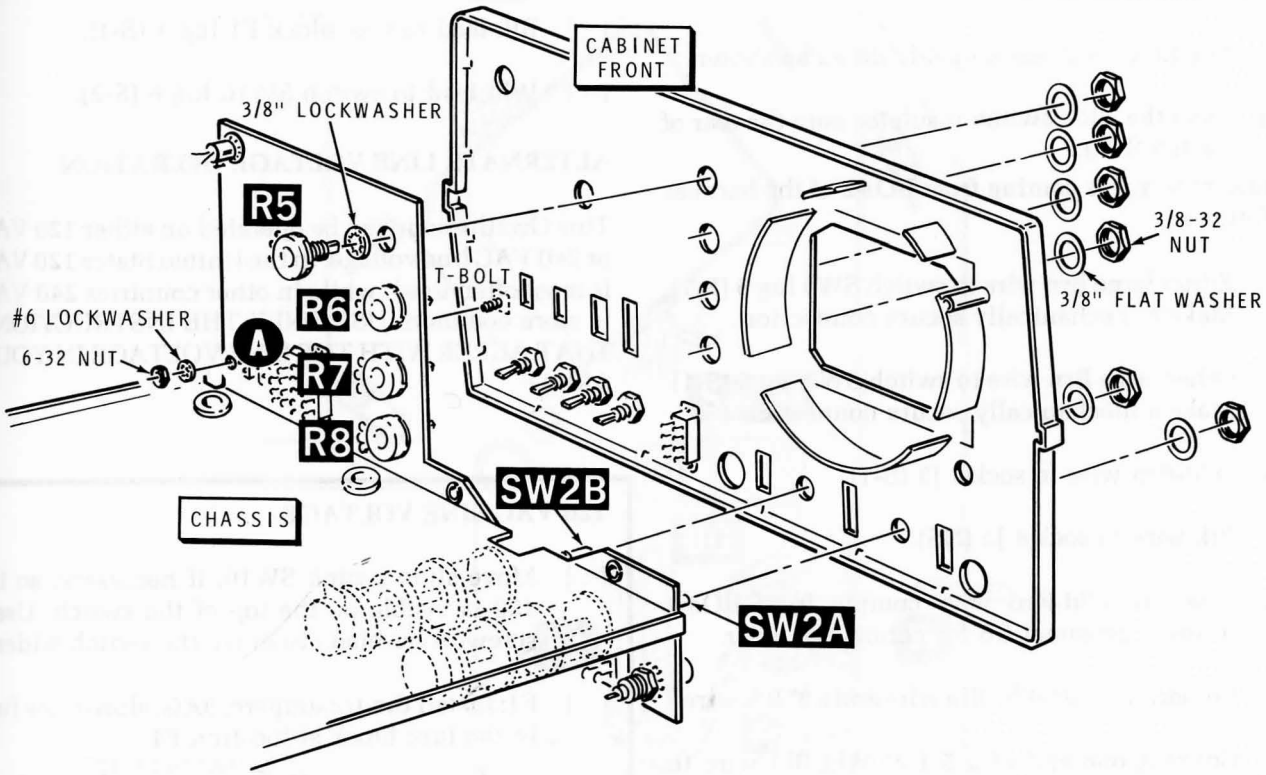
( ) 2. 1-3/16″ metal switch cover. Be sure its tabs fit down into the cutout in the 1-7/16″ cover.

( ) 3. 29/32″ switch cover.

NOTE: Be sure the switch covers and T-bolt remain in their recessed areas when you perform the next step.

( ) Carefully fit the front panel (adhesive side down) into the recessed area of the cabinet front. Press the front panel down into place.





PICTORIAL 4-10

( ) J3: Install a red socket at location J3 in the front panel. Use the nut furnished with the socket.

( ) J4: In the same manner, install a red socket at location J4.

( ) J5: Install a **black** socket at location J5.

( ) J6: Install the remaining red socket at location J6.

Refer to Pictorial 4-10 for the following steps.

( ) Temporarily remove the 3/8-32 nuts from rotary switches SW2A and SW2B.

NOTE: If necessary, slide the switch covers so they line up with the slide switches when you mount the cabinet front in the following steps.

( ) Fit the cabinet front onto the front of the chassis. Be sure all the switches and the T-bolt fit properly into their slots and holes.

( ) Install 3/8" flat washers and 3/8-32 nuts on rotary switches SW2A and SW2B.

( ) Install a #6 lockwasher and a 6-32 nut on the T-bolt at hole A in the chassis front.

( ) R8: Mount a 1000 Ω(1k) control (#10-1118) at location R8 with a 3/8" lockwasher, 3/8" flat washer, and a 3/8"-32 nut. Position the control so its lugs are located as shown.

( ) R7: In the same manner, install a 1000 Ω (1k) control (#10-1118) at location R7.

( ) R6: Install a 1 MΩ control (#10-1119) at location R6. Cut the control locating tab off the control so it does not touch the inside of the chassis.

( ) R5: Install a 1000 Ω (1k) control (#10-1118) at location R5.

Refer to Pictorial 4-11 (Illustration Booklet, Page 17) for the following steps.

( ) Position the chassis upside down as shown.

( ) Push the slide switch insulator onto the rear of switch SW9.

Connect the wires coming from BO#2 of the harness as follows:

( ) Either large Brn wire to switch SW9 lug 6 (S-1). Make a mechanically secure connection.

( ) Other large Brn wire to switch SW9 lug 5 (S-1). Make a mechanically secure connection.

( ) Wht-Brn wire to socket J3 (S-1).

( ) Blk wire to socket J5 (NS).

( ) Pass the Wht-Red wire coming from BO#2 through grommet BB for connection later.

( ) Prepare a 5-1/2" Wht-Blu wire and a 3" Blk wire.

( ) Connect one end of a 5-1/2" Wht-Blu wire to socket J4 (S-1). Pass the other end of this wire through grommet BA for connection later.

( ) Connect one end of a 3" Blk wire to socket J5 (S-2). Pass the other end of this wire through grommet BB for connection later.

Refer to Pictorial 4-12 for the following steps.

( ) Refer to Detail 4-12A and prepare the end of the line cord.

( ) Refer to Detail 4-12B and pass the prepared end of the line cord through hole W in the rear of the chassis.

( ) Refer to Detail 4-12B and install the line cord in the line cord strain relief. Install the line cord strain relief at location W with a #6 × 9/16" screw.

Pass the end of the line cord through grommet BG and connect its leads as follows. All three connections must be mechanically secure.

( ) Grn to solder lug P (S-1).

( ) Blk lead to fuse block F1 lug 1 (S-1).

( ) Wht lead to switch SW10 lug 6 (S-2).

ALTERNATE LINE VOLTAGE OPERATION

This Oscilloscope can be operated on either 120 VAC or 240 VAC line voltage. In the United States 120 VAC is most often used, while in other countries 240 VAC is more common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.

120 VAC LINE VOLTAGE

( ) Move slide switch SW10, if necessary, so the **120** is visible on the top of the switch. Use a screwdriver blade to move the switch slider.

( ) F1: Install the 1/2-ampere, 3AG, slow-blow fuse in the fuse block at location F1.

( ) Remove the protective backing from the fuse label and press the label onto the bottom of the chassis at the indicated location.

( ) Write "1/2-ampere, 3AG, Slow-blow" on the line on the fuse label.

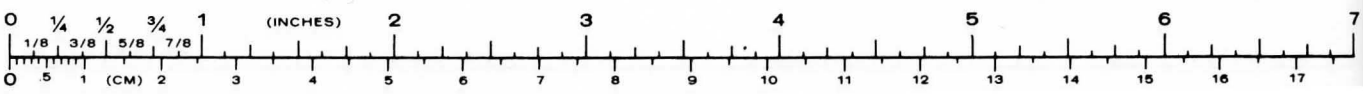
240 VAC LINE VOLTAGE

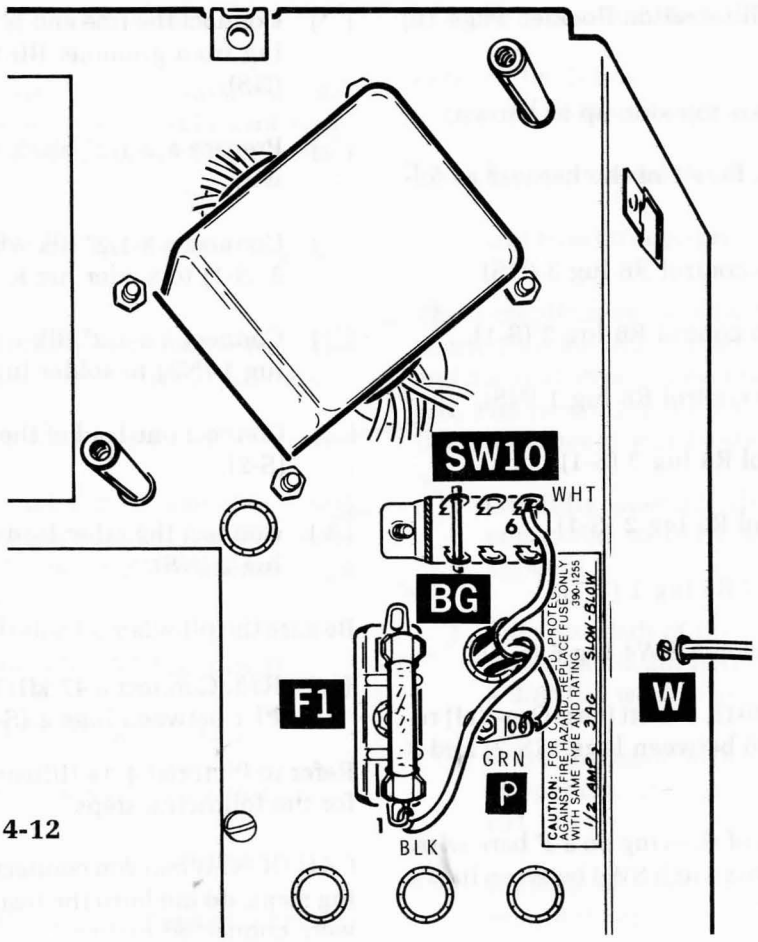
( ) **Move slide switch SW10, if necessary, so the 240** is visible on the top of the switch. Use a screwdriver blade to move the switch slider.

( ) F1: Install a 1/4-ampere, 3 AG, slow blow fuse (not supplied) in the fuse block at location F1.

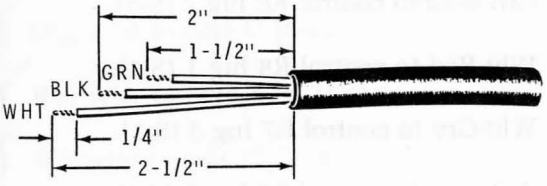
( ) Remove the protective backing from the fuse label and press the label onto the bottom of the chassis at the indicated location.

( ) Write "1/4-ampere, 3AG, Slow-blow" on the line on the fuse label.

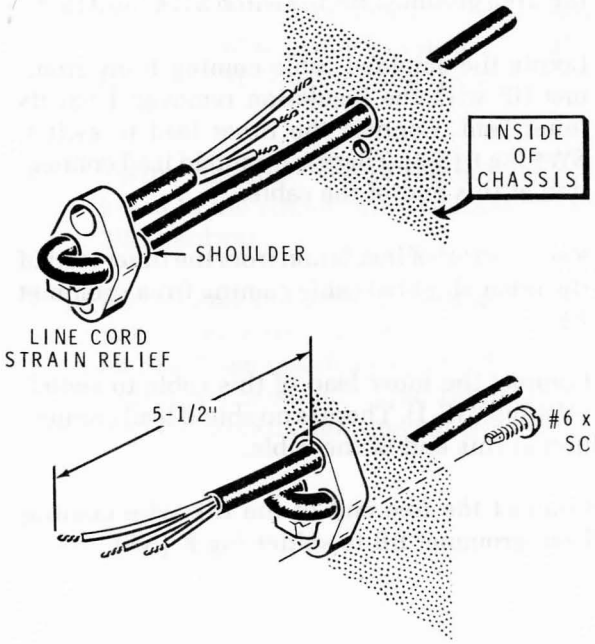




PICTORIAL 4-12



Detail 4-12A



Detail 4-12B

Refer to Pictorial 4-13 (Illustration Booklet, Page 18) for the following steps.

( ) Position the chassis top side up as shown.

Connect the wires from BO#1 of the harness as follows:

( ) **Large** Yel wire to control R6 lug 3 (NS).

( ) **Large** Brn wire to control R6 lug 2 (S-1).

( ) **Large** Blk wire to control R6 lug 1 (NS).

( ) Yel wire to control R5 lug 3 (S-1).

( ) Grn wire to control R5 lug 2 (S-1).

( ) Blk wire to control R5 lug 1 (S-1).

( ) Wht-Yel wire to switch SW4 lug 5 (S-1).

( ) R17: Connect a 330kΩ, 1-watt (Org-Org-Yel) resistor to control R6 between lugs 1 (S-2) and 3 (S-2).

( ) Place a 1/2" length of sleeving on a 1" bare wire. Connect this wire to switch SW4 between lugs 4 (NS) and 7 (S-1).

( ) Connect the free end of the Wht-Blu wire coming from grommet BA to switch SW4 lug 3 (S-1).

( ) Locate the shielded cable coming from grommet BF with the insulation removed from its inner lead. Connect the inner lead to switch SW4 lug 8 (S-1). There is no shield lead connection at this end of the cable.

( ) Remove 1/4" of insulation from the inner lead of the other shielded cable coming from grommet BF.

( ) Connect the inner lead of this cable to switch SW4 lug 6 (S-1). There is no shield lead connection at this end of the cable.

( ) Connect the free end of the Blk wire coming from grommet BB to solder lug K (NS).

( ) Connect the free end of the Wht-Red wire coming from grommet BB to pilot lamp PL1 lug 3 (NS).

( ) Prepare a 2-1/2" black wire and a 6-1/2" black wire.

( ) Connect a 2-1/2" Blk wire from switch SW8 lug 3 (S-1) to solder lug K (NS).

( ) Connect a 6-1/2" Blk wire from pilot lamp PL1 lug 1 (NS) to solder lug K (NS).

( ) Connect one lead of the pilot lamp to PL1 lug 1 (S-2).

( ) Connect the other lead of the pilot lamp to PL1 lug 2 (NS).

Be sure the pilot lamp leads do not touch each other.

( ) R13: Connect a 47 kΩ (Yel-Viol-Org) resistor to PL1 between lugs 2 (S-2) and 3 (S-2).

Refer to Pictorial 4-14 (Illustration Booklet, Page 19) for the following steps.

CAUTION: When you connect the wires in the following steps, **do not** burn the insulation on the wires that were connected earlier.

Connect the free ends of the wires coming from the horizontal circuit board to the chassis as follows. Position the following six wires under the shielded cables connected to switch SW4.

( ) Wht-Org wire to control R8 lug 3 (S-1).

( ) Grn wire to control R8 lug 2 (S-1).

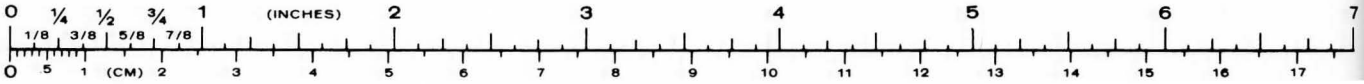
( ) Wht-Red to control R8 lug 1 (S-1).

( ) Wht-Gry to control R7 lug 3 (S-1).

( ) Red wire to control R7 lug 2 (S-1).

( ) Wht-Yel to control R7 lug 1 (S-1).

( ) Remove an additional 3/4" of insulation (total 1") from the free end of the Org wire. Pass the end of this wire through switch SW4 lug 4 (S-3) to switch SW6 lug 6 (S-1).



( ) Wht-Blu wire to switch SW6 lug 8 (S-1).

( ) Remove an additional 1/2" of insulation (total 3/4") from the free end of the Wht-Viol wire. Connect the free end of this wire to switch SW6 through lug 7 (S-2) to lug 1 (S-1).

Refer to Pictorial 4-15 (Illustration Booklet, Page 20) for the following steps.

Connect the free ends of the wires coming from the horizontal circuit board to the chassis as follows:

( ) Viol wire to switch SW6 lug 4 (S-1).

( ) Remove an additional 1/4" of insulation (total 1/2") from the free end of the Wht-Blk wire. Connect this wire to switch SW6 through lug 3 (S-2) to lug 2 (S-1).

( ) Wht-Grn wire to switch SW7 lug 3 (S-1).

( ) Yel wire to switch SW7 lug 2 (S-1).

( ) Wht-Brn wire to switch SW7 lug 1 (S-1).

( ) Wht wire to switch SW8 lug 2 (S-1).

Refer to Pictorial 4-16 (Illustration Booklet, Page 21) for the following steps.

Connect the wires from BO#8 coming from grommet BF to the horizontal circuit board as follows:

( ) Yel wire to hole W (S-1).

( ) Gry wire to hole V (S-1).

( ) Org wire to hole U (S-1).

( ) Red wire to hole X (S-1).

( ) Blk wire to hole H (S-1).

( ) Wht wire to hole S (S-1).

( ) Grn wire to hole T (S-1).

Connect the following wires from the horizontal circuit board to the chassis as follows:

( ) Blk wire to solder lug K (S-4).

( ) Brn wire through grommet BB to socket J6 (S-1).

This completes the wiring to the horizontal circuit board. Check to see that all connections are soldered and then cut off all the excess wire lengths close to the foil. The remaining Blu and Gry wires connected to the circuit board will be connected later.

( ) Carefully position all the wires and harness connected to the horizontal circuit board as shown.

( ) Pass the shaft of the rotary switch through the chassis at location SW5. Secure the switch with a 3/8" flat washer and a 3/8-32 nut.

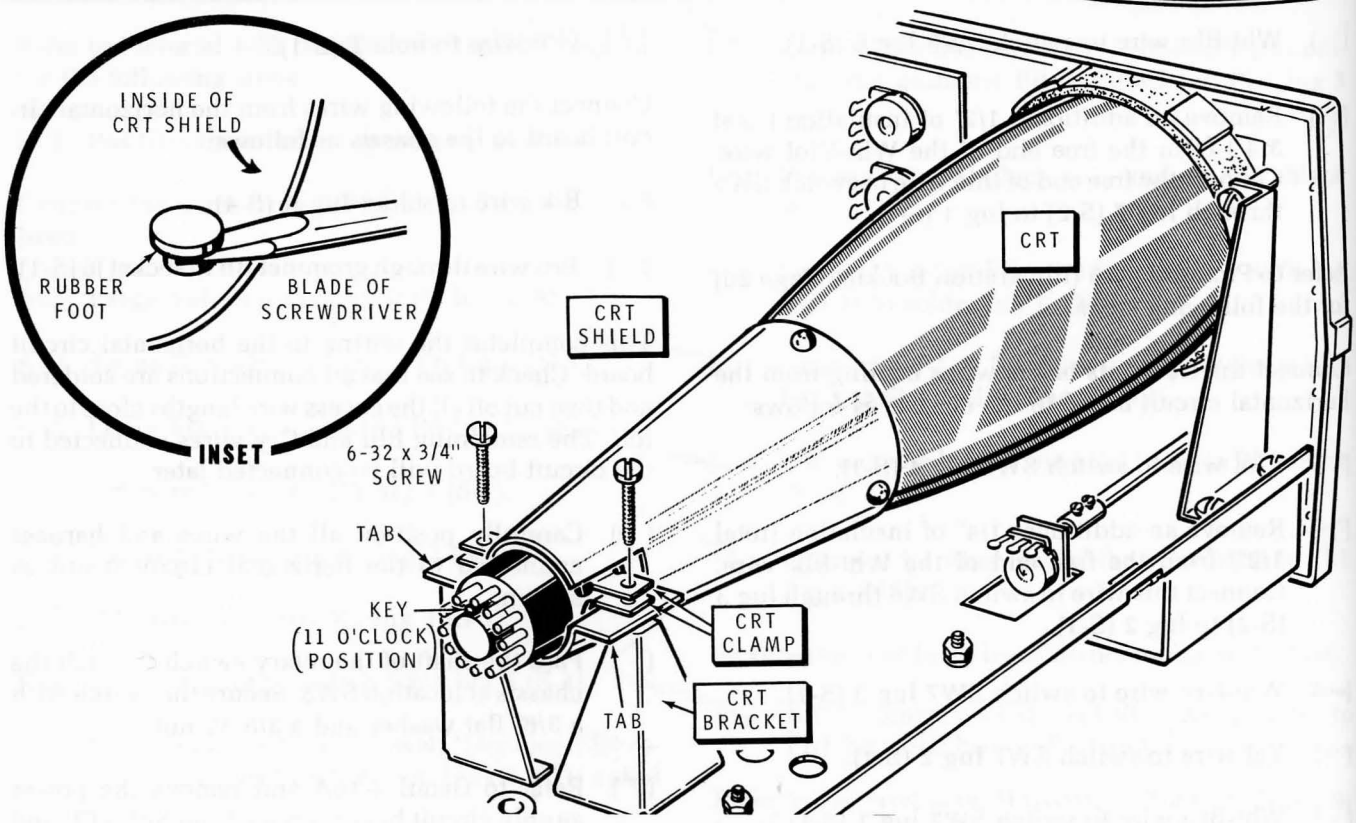
( ) Refer to Detail 4-16A and remove the power supply circuit board screws from holes CL and CH.

( ) Refer to the inset drawing on Pictorial 4-16 and mount the circuit board bracket at location Z on the chassis with 6-32 × 3/8" hardware.

( ) Remount the power supply circuit board with 6-32 × 3/16" screws at hex studs CG, CH, CJ, CK, CL, and CM. Then tighten the nuts on the hex studs.

( ) Secure the other end of the horizontal circuit board to the circuit board bracket with 6-32 × 3/8" hardware.

( ) Position all the wires connected between the horizontal circuit board and the chassis as shown. Then install a cable tie through the two indicated chassis holes and around these wires. Pull the cable tie tight and cut off its excess end.



PICTORIAL 4-18

Refer to Pictorial 4-17 (Illustration Booklet, Page 22) for the following steps.

Reposition the chassis as shown.

( ) Locate the two shaft couplings, two 5″ extension shafts, and four #6 × 1/8″ setscrews furnished with the vertical circuit board parts.

( ) Start two 6-32 × 1/8″ setscrews in each shaft coupling.

( ) Install a shaft coupling 5/16″ onto the shaft of control R4B. Tighten the proper setscrew.

( ) In the same manner, install the other shaft coupling on the shaft of control R4A.

NOTE: It may be necessary to temporarily loosen the control bracket mounting hardware (when you perform the next two steps) to get proper extension shaft alignment with the front panel holes.

( ) Pass a 5″ extension shaft through the appropriate hole in the front panel and into the shaft coupling on control R4B so the shaft extends 5/16″ outside the front panel. Tighten the setscrew in the shaft coupling.

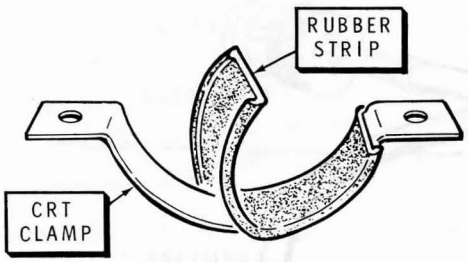
( ) In the same manner, install a 5″ extension shaft through the proper hole in the front panel and into the shaft coupling on control R4A.

( ) Locate the graticule and remove the protective backing. (There may also be a protective film on the face of the graticule which must be removed at this time.)

( ) Place the graticule in the large rectangular opening in the cabinet front from the inside. Position the printed side of the graticule to the outside.

NOTE: When you install the felt strip in the next step, its edge must be against the graticule to hold the graticule in place in its opening in the cabinet front.

( ) Remove the protective backing from the felt strip. Then press the felt strip inside the CRT ring, starting on the side nearest the edge of the cabinet front. The adhesive side must be "out" against the plastic cabinet front. DO NOT allow the ends to overlap. Cut off any excess.



Detail 4-18A

CAUTION: When you install the input shield in the next step, be sure the shield is up tight against the bottom of the chassis between the circuit boards before you tighten the screws, or you may break one of the circuit boards.

( ) Install the input shield with #6 × 1/2" screws in chassis holes F and G. Be sure not to pinch any wires between the shield and the chassis.

( ) Install the front panel bracket with #6 × 1/2" screws into chassis holes D and E and into the input shield. Do not tighten the screws.

( ) Install another #6 × 1/2" screw through the top slot in the front panel bracket and into the cabinet front.

( ) If necesary, reposition the front panel bracket so the front panel is perpendicular to the top of the chassis. Then tighten the screws at holes D and E.

Refer to Pictorial 4-18 for the following steps.

( ) Refer to the inset drawing on Pictorial 4-18 and install a rubber foot in each of the three indicated holes in the CRT shield. Use a small screwdriver to force the feet into the holes.

( ) Cut the 3/4" × 5" rubber strip into two equal lengths.

( ) Refer to Detail 4-18A and place a length of rubber strip onto each CRT clamp.

WARNING: Handle the CRT very carefully. Because of its high vacuum, do not strike, scratch, or subject the CRT to more than moderate pressure at any time. A fracture of the glass could result in an implosion of considerable violence capable of causing personal injury.

( ) Carefully unpack the CRT.

( ) Slide the CRT shield over the neck of the CRT. Note the position of the tabs on the CRT shield with reference to the key on the CRT plug.

( ) Push the face of the CRT into the ring in the cabinet front. Note the position of the key on the CRT plug.

( ) Install the two CRT clamps around the neck of the CRT but inside the CRT shield.

( ) Secure the CRT clamps and the CRT shield to the tops of the CRT brackets with two 6-32 × 3/4" screws. Tighten these screws only enough to hold the CRT in place. The CRT may have to be repositioned later.

Refer to Pictorial 4-19 (Illustration Booklet, Page 22) for the following steps.

( ) Align the keyway of the CRT socket with the key on the CRT plug and push the socket onto the CRT plug.

( ) Connect the Blu wire coming from grommet BC to the CRT socket lug 6 (S-1).

( ) Connect the Gry wire coming from grommet BD to the CRT socket lug 7 (S-1).

Connect the wires coming from grommet BE to the CRT socket as follows:

( ) Wht-Gry wire to lug 8 (S-1).

( ) Large Brn wire to lug 4 (S-1).

( ) Large Red wire to lug 3 (NS).

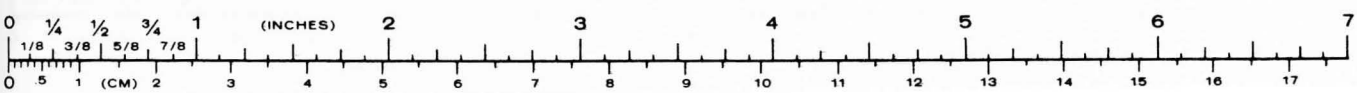
( ) Large Org wire to lug 2 (S-1).

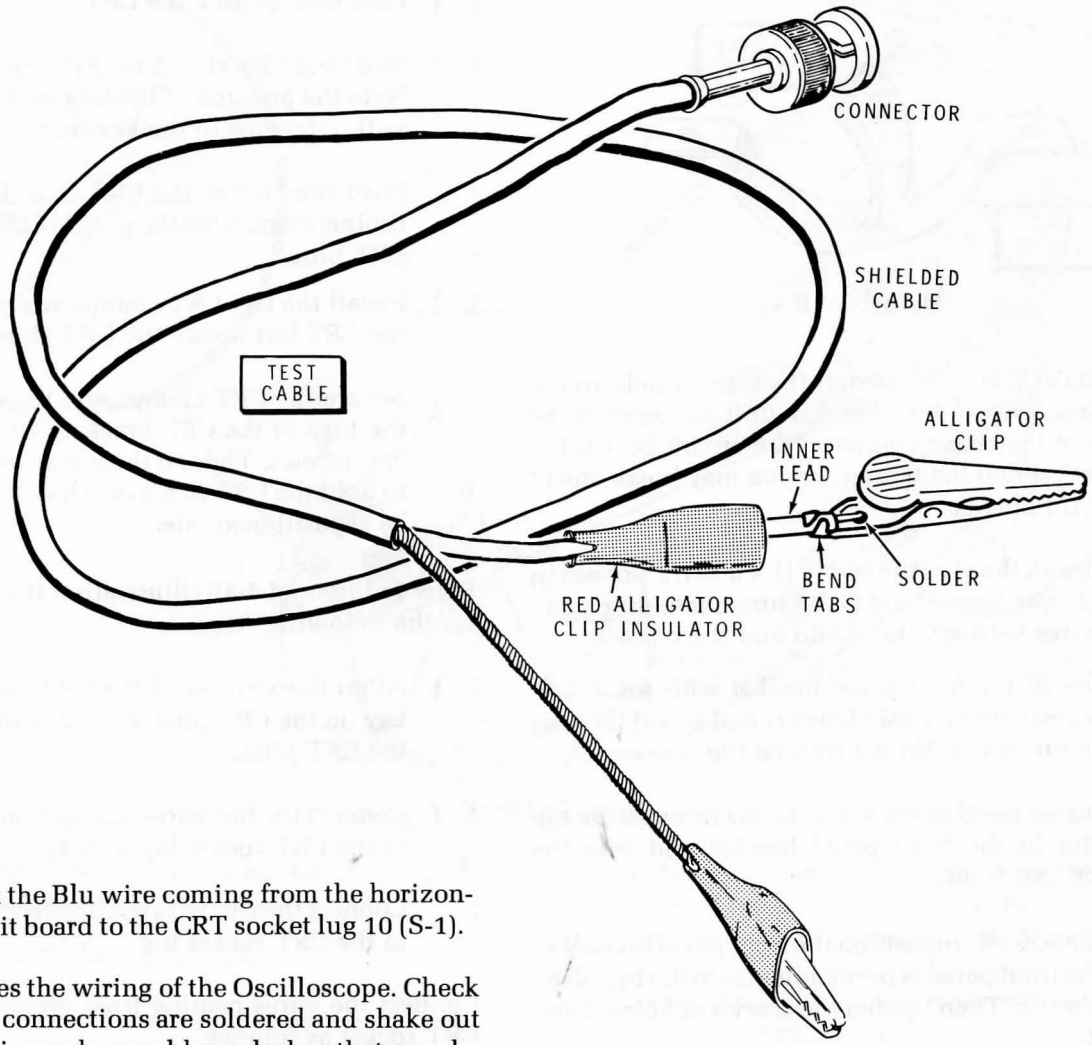
( ) Either large Grn wire to lug 1 (NS).

( ) Other large Grn wire to lug 12 (S-1).

( ) R16: Connect a 100 kΩ (Brn-Blk-Yel) resistor to the CRT socket between lugs 1 (S-2) and 3 (S-2).

( ) Connect the Gry wire coming from the horizontal circuit board to the CRT socket lug 9 (S-1).





PICTORIAL 4-21

( ) Connect the Blu wire coming from the horizontal circuit board to the CRT socket lug 10 (S-1).

This completes the wiring of the Oscilloscope. Check to see that all connections are soldered and shake out any cut-off wire ends or solder splashes that may be lodged in the wiring or on the circuit boards.

Refer to Pictorial 4-20 (Illustration Booklet, Page 22) for the following steps.

( ) Start a 6-32 × 1/8″ black setscrew in each of the 12 knobs. Use the allen wrench furnished with the kit. NOTE: Four of the knobs and three of the setscrews were packed with the vertical circuit board parts.

( ) Turn the Y1 POS and Y2 POS control shafts fully counterclockwise. Then install a small black knob on each of these shafts with each knob pointer positioned as shown.

( ) Install a small black knob with skirt on each of the INTENSITY, FOCUS, TRIG LEVEL, and HORIZ POS control shafts.

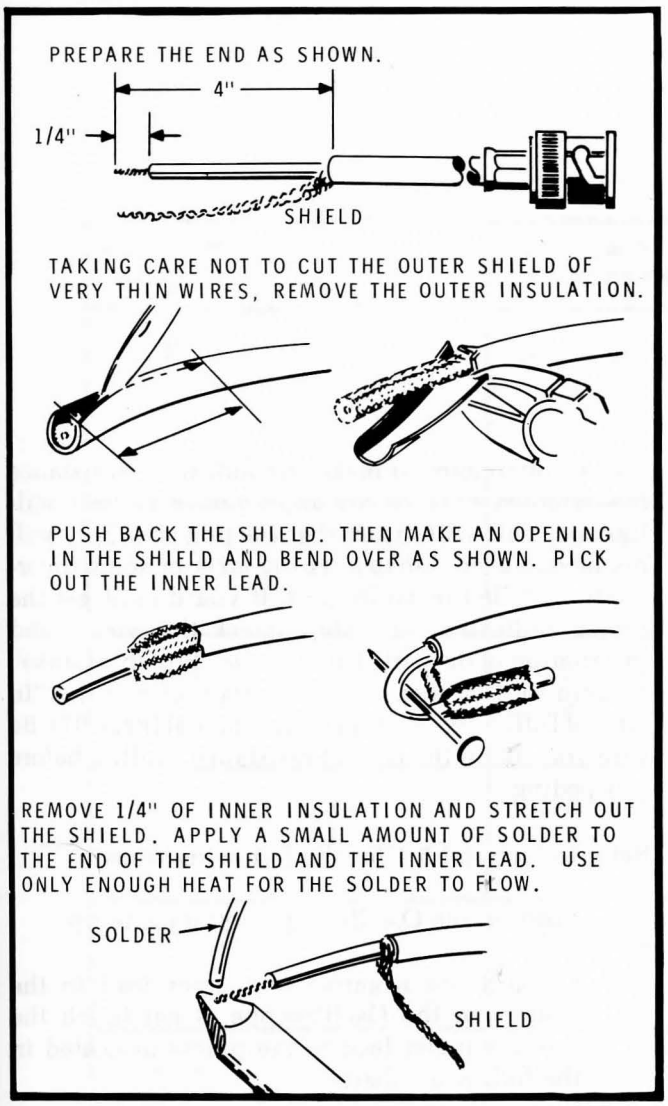
( ) Turn the three rotary switches (large outer shafts) fully counterclockwise.

( ) Install a large black knob on the two VOLTS/CM switch shafts with their pointers at the "20" positions.

( ) Install a large black knob on the TIME/CM switch shaft with its pointer at the "200" position.

( ) Turn the remaining three small inner control shafts to their fully **clockwise** positions.

( ) Install a red knob on each of these control shafts with each knob pointer at the CAL position.

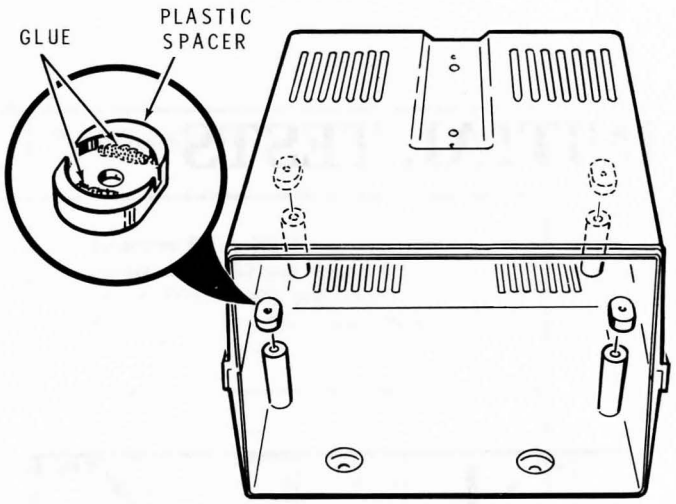


Detail 4-21A

Refer to Pictorial 4-21 for the following steps.

( ) Locate one of the shielded cables with a connector on one end. Refer to Detail 4-21A and prepare the free end of this cable.

( ) Slide a red alligator clip insulator over the end of the inner lead.



PICTORIAL 4-22

( ) Solder an alligator clip to the end of the inner lead. After the connection has cooled, push the insulator over the alligator clip.

( ) In the same manner, install an alligator clip and insulator on the end of the shield lead.

( ) Repeat the four previous steps and prepare the other shielded cable with connector.

Refer to Pictorial 4-22 for the following steps.

CAUTION: When you install the plastic spacers in the next step, carefully follow the instructions and observe the cautions on the epoxy glue packet. Also, be sure you do not get epoxy in the holes in plastic spacers or bosses in the cabinet.

( ) Glue a plastic spacer on each of the four bosses in the cabinet. DO NOT attempt to install any screws in these holes for at least 30 minutes after the spacers are installed.

This completes the assembly of your Oscilloscope. Proceed to the "Initial Tests" section of this Manual.

0205 ≈ 33 hrs