

HEATHKIT® MANUAL

for the

VIDEO TERMINAL

Model H19

ASSEMBLY

595-2191-07



HEATH COMPANY • BENTON HARBOR, MICHIGAN

HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

Kit orders and delivery information	(616) 982-3411
Credit	(616) 982-3561
Replacement Parts	(616) 982-3571

Technical Assistance Phone Numbers

8:00 A.M. to 12 P.M. and 1:00 P.M. to 4:30 P.M., EST, Weekdays Only	
R/C, Audio, and Electronic Organs	(616) 982-3310
Amateur Radio	(616) 982-3296
Test Equipment, Weather Instruments and Home Clocks	(616) 982-3315
Television	(616) 982-3307
Aircraft, Marine, Security, Scanners, Automotive, Appliances and General Products	(616) 982-3496
Computers	(616) 982-3309

YOUR HEATHKIT 90-DAY FULL WARRANTY

If you are not satisfied with our service - warranty or otherwise - or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

Our attorney, who happens to be quite a kitbuilder himself, insists that we describe our warranty using all the necessary legal phrases in order to comply with the new warranty regulations. Fine. Here they are:

For a period of ninety (90) days after purchase, Heath Company will replace or repair free of charge any parts that are defective either in materials or workmanship. You can obtain parts directly from Heath Company by writing us at the address below or by telephoning us at (616) 982-3571. And we'll pay shipping charges to get those parts to you — anywhere in the world.

We warrant that during the first ninety (90) days after purchase, our products, when correctly assembled, calibrated, adjusted and used in accordance with our printed instructions, will meet published specifications.

If a defective part or error in design has caused your Heathkit product to malfunction during the warranty period through no fault of yours, we will service it free upon proof of purchase and delivery at your expense to the Heath factory, any Heathkit Electronic Center (units of Schlumberger Products Corporation), or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by the use of corrosive solder, defective tools, incorrect assembly, misuse, fire, or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for customer assembly or set-up time.

This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. We are not responsible for incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH COMPANY
BENTON HARBOR, MI. 49022

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**HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022**

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INTRODUCTION

The Heath Model H19 Video Terminal is a professional, 24-line, video terminal. Not only does it have the features commonly found in other high-quality video terminals, but it also has many exclusive features. The terminal will connect to other equipment that uses an EIA RS-232C serial interface, and the high-quality keyboard, video display, and state-of-the-art logic circuitry make this Video Terminal an outstanding peripheral for your computer or MODEM.

The information is displayed on a 12" (diagonal), high-quality, cathode ray tube (CRT) that is capable of displaying 1,920 characters at one time (24 rows of 80 characters). The P4 phosphor used in the CRT provides excellent character definition. Upper case characters are formed by a 5×7 dot matrix. Lower case characters, which have descenders, use a 5×9 dot matrix. The Terminal can also display 33 special graphic characters that can be arranged and grouped to form any number of graphic displays and effects. The graphic symbols are formed on an 8×10 dot matrix.

Special local and software controllable escape sequences allow you to select and use thirty-two special functions. These include:

- Using either Heath or ANSI escape sequences.
- Eight user-defined special function keys.
- Alternate keypad output (for sending more user-defined special codes to your computer).
- Shifted keypad (so you can obtain the shifted keypad functions without using the SHIFT key).

- Keyboard enable/disable.
- Keypress enable/disable.
- Cursor type select (underline or block).
- Auto LF, auto CR.
- Hold screen mode (for scrolling lines and pages).
- Cursor control (left, right, up, down, home).
- Direct cursor addressing.

and you can also:

- Transmit page.
- Transmit 25th line.
- Insert and delete characters and lines.
- Enter and exit the graphics and reverse video modes.
- Erase lines or page of text.
- Modify baud rates.

The highly reliable standard-size electronic keyboard uses a universally accepted, standard typewriter format. Each key stroke is affirmed by an audible key click.

A 12-key keypad duplicates the numeric keys in a calculator format. This lets you rapidly enter data in programs that call for just numbers. In addition, the shifted keypad functions allow you to insert and delete lines and characters, and move the cursor.

These features, along with the stylish molded cabinet, make the Video Terminal a versatile peripheral for your computer system.



UNPACKING INSTRUCTIONS

This kit is packed in two cartons. The smaller one contains the CRT (Cathode Ray Tube). Do not open this carton until you are instructed to do so.

The large carton contains some loose parts and an "Electronics Pack." Open the electronics pack and remove Packs #1 and #2. (If they are not marked as such, mark them so you will be able to identify them later.) Place the electronics pack (minus packs #1 and #2) back into the large carton.

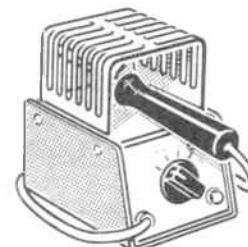
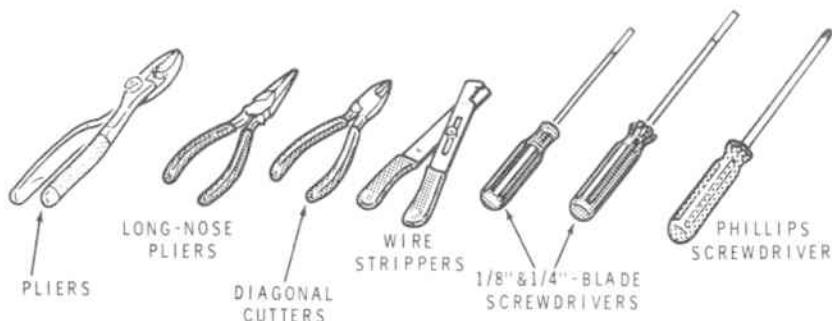
Also locate one prewired circuit board and unassembled circuit board in the large carton. Set these aside with Packs #1 and #2. The parts that now remain in the large shipping carton are all part of the main pack. You will work from the main pack first.



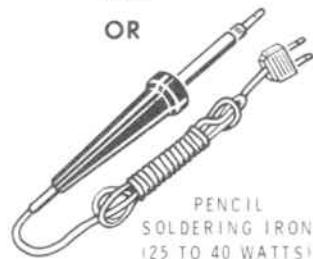
ASSEMBLY NOTES

TOOLS

You will need these tools to assemble your kit.



HEATHKIT
SOLDERING
IRON

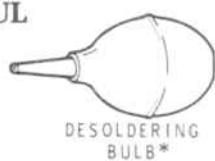


PENCIL
SOLDERING IRON
(25 TO 40 WATTS)

OTHER HELPFUL TOOLS



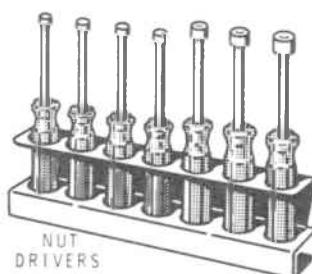
NUT STARTER
(MAY BE SUPPLIED
WITH KIT)



DESOFTENING
BULB*



DESOFTENING
BRAID*



NUT
DRIVERS

*TO REMOVE SOLDER FROM CIRCUIT CONNECTIONS.

ASSEMBLY

1. Follow the instructions carefully. Read the entire step before you perform each operation.
2. The illustrations in the Manual are called Pictorials and Details. Pictorials show the overall operation for a group of assembly steps; Details generally illustrate a single step. When you are directed to refer to a certain Pictorial "for the following steps," continue using that Pictorial until you are referred to another Pictorial for another group of steps.
3. Most kits use a separate "Illustration Booklet" that contains illustrations (Pictorials, Details, etc.) that are too large for the Assembly Manual. Keep the "Illustration Booklet" with the Assembly Manual. The illustrations in it are arranged in Pictorial number sequence.
4. Position all parts as shown in the Pictorials.
5. Solder a part or a group of parts only when you are instructed to do so.



6. Each circuit part in an electronic kit has its own component number (R2, C4, etc.). Use these numbers when you want to identify the same part in the various sections of the Manual. These numbers, which are especially useful if a part has to be replaced, appear:
 - In the Parts List,
 - At the beginning of each step where a component is installed,
 - In some illustrations,
 - In the Schematic,
 - In the section at the rear of the Manual.
7. When you are instructed to cut something to a particular length, use the scales (rulers) provided at the bottom of the Manual pages.

SAFETY WARNING: Avoid eye injury when you cut off excess lead lengths. Hold the leads so they cannot fly toward your eyes.

SOLDERING

Soldering is one of the most important operations you will perform while assembling your kit. A good solder connection will form an electrical connection between two parts, such as a component lead and a circuit board foil. A bad solder connection could prevent an otherwise well-assembled kit from operating properly.

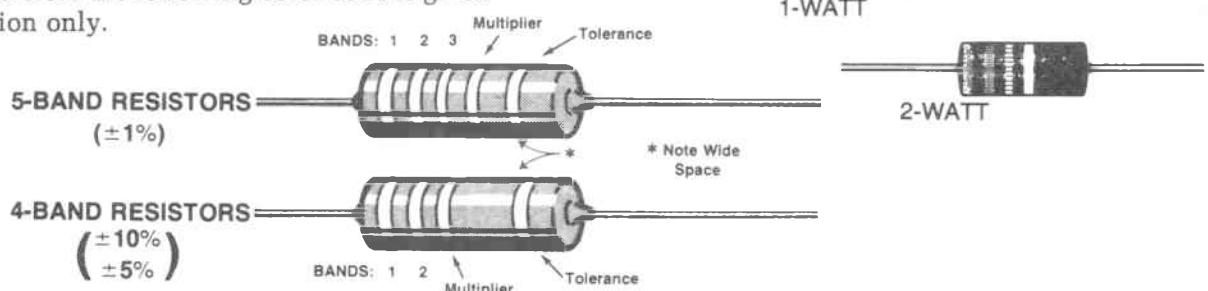
It is easy to make a good solder connection if you follow a few simple rules:

1. Use the right type of soldering iron. A 25 to 40-watt pencil soldering iron with a 1/8" or 3/16" chisel or pyramid tip works best.
2. Keep the soldering iron tip clean. Wipe it often on a wet sponge or cloth; then apply solder to the tip to give the entire tip a wet look. This process is called tinning, and it will protect the tip and enable you to make good connections. When solder tends to "ball" or does not stick to the tip, the tip needs to be cleaned and retinned.



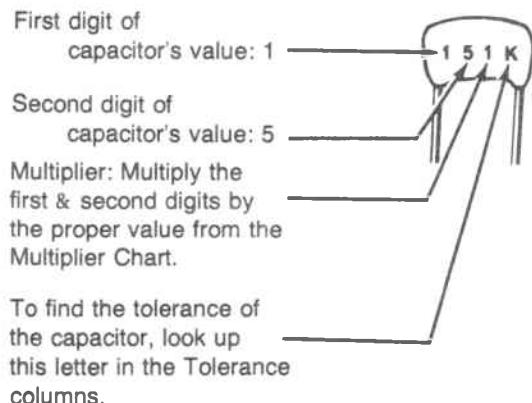
PARTS

Resistors will be called out by their resistance value in Ω (ohms), $k\Omega$ (kilohms), or $M\Omega$ (megohms). Certain types of resistors will have the value printed on the body, while others will be identified by a color code. The colors of the bands and the value will be given in the steps, therefore the following color code is given for information only.



Band 1 1st Digit		Band 2 2nd Digit		Band 3 (if used) 3rd Digit		Multiplier		Resistance Tolerance	
Color	Digit	Color	Digit	Color	Digit	Color	Multiplier	Color	Tolerance
Black	0	Black	0	Black	0	Black	1	Silver	$\pm 10\%$
Brown	1	Brown	1	Brown	1	Brown	10	Gold	$\pm 5\%$
Red	2	Red	2	Red	2	Red	100	Brown	$\pm 1\%$
Orange	3	Orange	3	Orange	3	Orange	1,000		
Yellow	4	Yellow	4	Yellow	4	Yellow	10,000		
Green	5	Green	5	Green	5	Green	100,000		
Blue	6	Blue	6	Blue	6	Blue	1,000,000		
Violet	7	Violet	7	Violet	7	Silver	0.01		
Gray	8	Gray	8	Gray	8	Gold	0.1		
White	9	White	9						

Capacitors will be called out by their capacitance value in μF (microfarads) or pF (picofarads) and type: ceramic, Mylar*, electrolytic, etc. Some capacitors may have their value printed in the following manner:



EXAMPLES:

$$151K = 15 \times 10 = 150 \text{ pF}$$

$$759 = 75 \times 0.1 = 7.5 \text{ pF}$$

NOTE: The letter "R" may be used at times to signify a decimal point: as in: $2R2 = 2.2$ (μF or μF).

MULTIPLIER		TOLERANCE OF CAPACITOR		
FOR THE NUMBER:	MULTIPLY BY:	10 pF OR LESS	LETTER	OVER 10 pF
0	1	$\pm 0.1 \text{ pF}$	B	
1	10	$\pm 0.25 \text{ pF}$	C	
2	100	$\pm 0.5 \text{ pF}$	D	
3	1000	$\pm 1.0 \text{ pF}$	F	$\pm 1\%$
4	10,000	$\pm 2.0 \text{ pF}$	G	$\pm 2\%$
5	100,000		H	$\pm 3\%$
			J	$\pm 5\%$
8	0.01		K	$\pm 10\%$
9	0.1		M	$\pm 20\%$

*DuPont Registered Trademark



MAIN PACK

PARTS LIST

Check the parts in the main pack against this Parts List and the Parts Pictorial (Illustration Booklet, Page 1). Any part that is packed in an individual envelope with a part number on it should not be removed from its envelope until it is called for in a step. Do not discard any packing materials until all parts are accounted for.

To order a replacement part, always include the Part Number and use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, use one of the "Expedited Parts Order Forms" at the rear of the Manual, or refer to "Replacement Parts" inside the rear cover. Your Warranty is inside the front cover. For prices, refer to the separate "Heath Parts Price List."

KEY No.	HEATH Part No.	QTY.	DESCRIPTION
------------	-------------------	------	-------------

ELECTRICAL COMPONENTS

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
A1	25-857	1	1500 μ F electrolytic capacitor	C1
C1	54-965	1	Power transformer	T1
C2	58-19	1	Yoke	T2
C3	60-54	1	120/240 slide switch	SW1
C4	60-608	1	NOR/LOW slide switch	SW2
C5	60-619	1	Rocker switch	SW3
C6	423-11	1	Fuseholder	
C7	401-163	1	Speaker	
C8	51-200	1	Flyback transformer	T202
C9	51-197	1	Driver transformer	T201
C10	11-53	1	500 Ω control (located in Pack #2)	R216

HARNESS—CABLES—WIRE

89-54	1	Line cord	
D1	134-1070	1	Interconnect cable
D2	134-1066	1	Flat cable
D3	134-1067	1	Harness
	134-1076	1	10' extension cable
340-8	48"	Bare wire	
344-33	36"	Black wire	

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
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Wires (cont'd.)

344-126	48"	Brown wire
344-155	30"	Green wire
346-35	1"	Heat shrinkable sleeving

ASSEMBLIES

E1	64-864	1	12-key keypad
E2	64-865	1	4-key keypad (Off Line, f ₁ , f ₂ , f ₃)
E2	64-866	1	4-key keypad (f ₄ , f ₅ , Erase, Blue)
E2	64-872	1	4-key keypad (Red, Gray, Reset, Break)
E3	181-3051-1	1	Keyboard consisting of:
	64-863	1	60-key-keypad
	85-2239-1	1	Circuit board
	250-1299	5	#4 x 3/8" self-tapping screw



KEY	HEATH No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
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HARDWARE

NOTES:

1. The hardware may be in more than one packet. Open all the hardware packets, according to their size, before you check the hardware.
2. Hardware is shown actual size. To identify a piece of hardware, place it over the illustration.

#4 Hardware

F1	250-186	10	#4 × 3/8" self-tapping screw
F2	252-15	2	4-40 nut
F3	254-9	2	#4 lockwasher
F4	255-757	2	#4 threaded stud (located in Pack #1)
F5	259-30	1	#4 solder lug

#6 Hardware

G1	250-56	4	6-32 × 1/4" screw
G2	250-1264	37	6-32 × 3/8" hex head screw
G3	250-1280	11	6-32 × 3/8" black phillips head screw
G4	250-162	1	6-32 × 1/2" screw
G5	250-1305	1	#6 × 5/8" black hex head, self-tapping screw
G6	262-50	2	Latch pin
H1	252-3	5	6-32 nut
H2	254-1	7	#6 lockwasher
H3	252-725	41	Brass insert
H4	255-767	4	3/32" spacers
H5	259-1	2	#6 solder lug

#8 Hardware

J1	250-92	6	8-32 × 5/8" screw
J2	250-72	8	8-32 × 3/4" screw
J3	252-4	8	8-32 nut
J4	253-45	10	#8 flat washer
J5	254-2	7	#8 lockwasher
J6	259-2	2	#8 solder lug

KEY	HEATH No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
-----	--------------	------	-------------	----------------------

#10 Hardware

K1	250-331	4	10-32 × 1" screw
K2	250-1318	4	#10 × 1-1/2" self-tapping screw
K3	253-98	8	#10 flat washer
K4	259-5	3	#10 solder lug
K5	255-753	8	Beveled spacer
K6	432-1077	1	Ground connector
K7	258-132	2	Short spring
K8	258-33	2	Long spring

Other Hardware

L1	252-7	1	Control nut
L2	254-4	1	Control lockwasher

BRACKET — PLATE — CLAMP

M1	204-2362	3	Keyboard bracket
M2	204-2457	2	Circuit board mounting bracket
M3	204-2361	1	Bezel mounting plate
M4	204-2395-1	1	AC chassis
M5	205-1839-1	1	Left locking plate
M6	205-1840-1	1	Right locking plate
M7	205-1841	1	Left guide plate
M8	205-1842	1	Right guide plate
M9	205-1777	2	Front panel mounting plate
M10	205-1821-2	1	Rear panel
M11	207-86	1	Capacitor mounting clamp
M12	215-647	1	Video circuit board heat sink
M13	204-2454	1	Brace

CABINET PARTS

N1	90-1262-1	1	Terminal base
N2	90-1263-1	1	Cabinet shell
N3	90-1239-1	1	Front panel
N4	90-1238-1	1	Keyboard cover
N5	90-1244-1	1	Bezel cover
N6	261-6	4	Foot

CONNECTORS—PLUG

P1	432-753	13	Large spring connector
P2	432-866	3	Small spring connector
P3	432-954	2	4-hole connector shell
P4	432-865	1	3-hole connector shell
P5	432-1022	1	8-hole connector shell
P6	432-1053	1	34-pin plug





KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.	KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
TOOLS									
Q1	205-778	1	Alignment tool blade		R4	265-39	2	Hinge	
Q2	490-1	1	Alignment tool		R5	266-944	6	Nylon guide (maybe located in pack #1).	
Q3	490-5	1	Nut starter		R6	352-33	2	Vibratite**	
Q4	490-185	1	Soder Wick*		R7	354-5	2	Small cable tie	
Q5	490-189	1	IC puller		R8	354-7	2	Large cable tie	
MISCELLANEOUS									
411-838 1 CRT (packed in separate carton) NOTE: Do not open this carton until you are instructed to do so									
R1 73-169 35" Long foam gasket									
R1	73-92	1	3/4" x 5" foam gasket		R9	440-24	1	Insulator cap	
R2	75-754	1	Line cord strain relief		R10	438-55	3	Small polarizing plug (1 extra)	
R3	75-785	1	Clear switch cover		R11	438-48	7	Large polarizing plug (1 extra)	
R3 181-3043-4 1 Assembled terminal logic circuit board NOTE: Do Not install an IC at location U423.									
597-260 1 Parts Order Form									
597-260 1 Assembly Manual (see Page 1 for the part number)									
597-260 1 Operation Manual (see Page 1 for the part number)									
Solder									

STEP-BY-STEP ASSEMBLY

TERMINAL BASE ASSEMBLY

Refer to Pictorial 1-1 (Illustration Booklet, Page 3) for the following steps.

- () Position the terminal base on your work surface as shown.
- () Refer to inset drawing #1 on Pictorial 1-1 and mount a rubber foot to the underside of the cabinet base at DA with an 8-32 x 3/4" screw, a #8 lockwasher and an 8-32 nut.
- () In a similar manner mount rubber feet at DB, DC and DD.

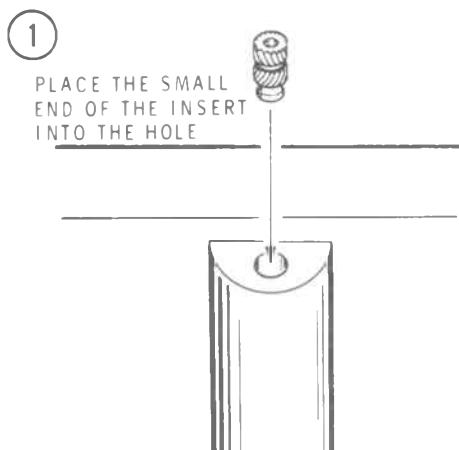
NOTE: When you install brass inserts as in the following steps, first make sure your soldering iron is clear of solder or solder may flow down into the insert. Then refer to Detail 1-1A and use your soldering iron to install the inserts.

- () Locate the 18 brass inserts. Then install the inserts in the locations listed below.

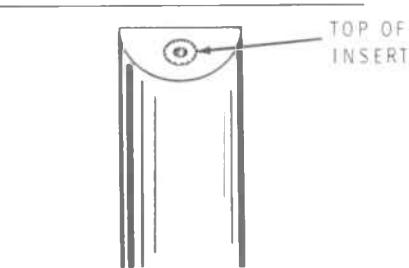
() AA	() AG	() AS
() AB	() AH	() AT
() AC	() AJ	() AU
() AD	() AK	() AV
() AE	() AL	() AW
() AF	() AM	() AX

*Registered Trademark, Solder Removal Co.

**Registered Trademark, Oakland Corp.



APPLY HEAT TO THE TOP
OF THE INSERT WITH YOUR
SOLDERING IRON, USING
A SLIGHT DOWNWARD PRES-
SURE. SEAT THE INSERT
FLUSH WITH THE TOP OF
THE HOLE.

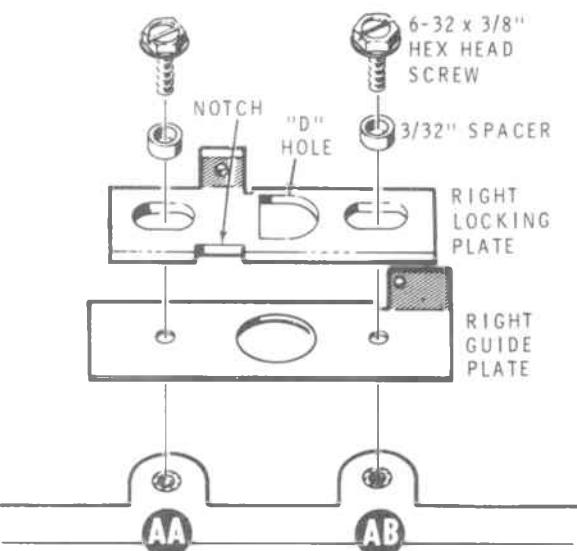


Detail 1-1A

- () Mount the plates to the terminal base with two 6-32 × 3/8" hex head screws and two 3/32" spacers. Be sure the locking plate can slide freely.
- () Hook a short spring onto the tabs of the locking plate and the guide plate as shown in the Pictorial.

NOTE: The Vibratite that you will use in the next step will stain anything it gets on. Be careful that you do not get it on your clothes or on the outside of the terminal base.

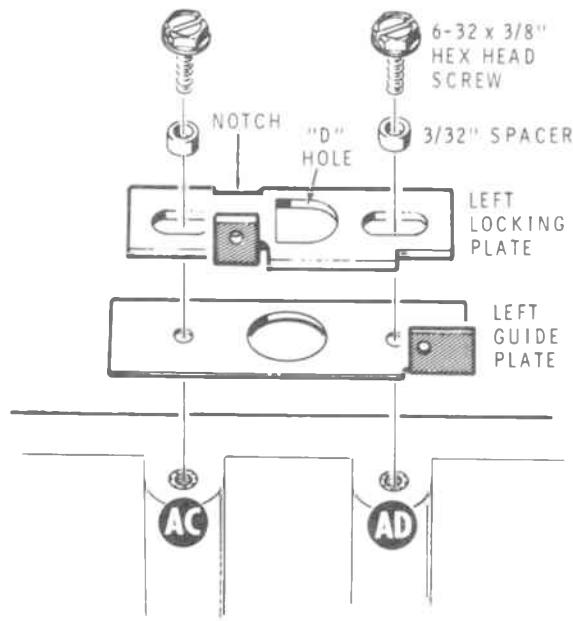
- () Locate a vial of Vibratite and cut off the tip. Then apply a liberal amount of Vibratite to the inner threads of the inserts at AA, AB, AC, and AD.
- () Refer to Detail 1-1B and locate the right guide plate. Place this plate on the terminal base edge at AA and AB. Be sure the plate is positioned as shown.
- () Refer again to Detail 1-1B and locate the right locking plate. Place this plate on top of the guide plate with the notch facing the edge and the round part of the "D" hole toward the rear of the terminal base.



Detail 1-1B

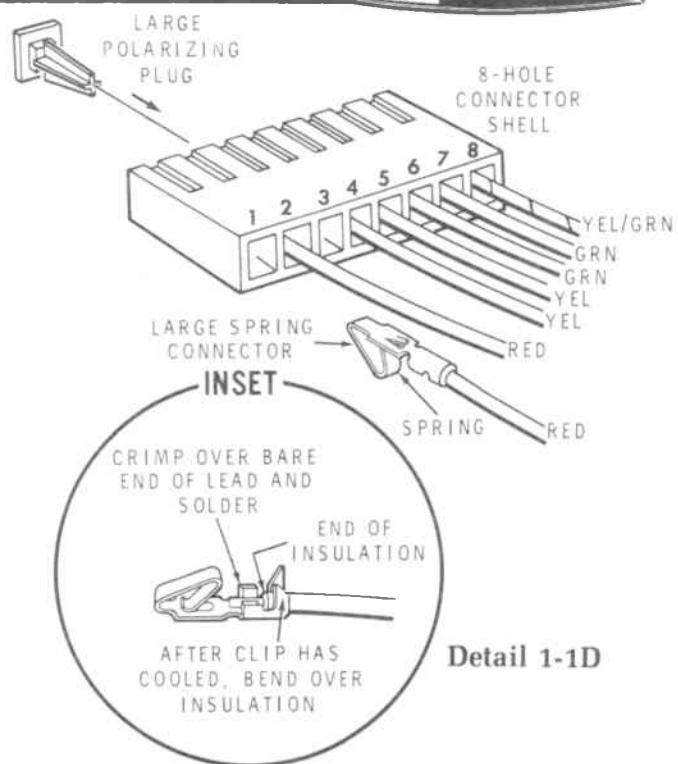


- () Refer to Detail 1-1C and locate the left guide plate. Place this plate on the terminal base edge at AC and AD. Be sure the plate is positioned as shown.
- () Refer again to Detail 1-1C and locate the left locking plate. Place this plate on top of the guide plate with the notch facing the edge and the round part of the "D" hole toward the rear of the terminal base.
- () Mount the plates onto the terminal base with two 6-32 x 3/8" hex head screws and two 3/32" spacers. Be sure the locking plate can slide freely.
- () Hook a short spring onto the tabs of the locking plate and the guide plate as shown in the Pictorial.



- () Locate the power transformer and cut the bare lead ends to 1/8" on the following leads.

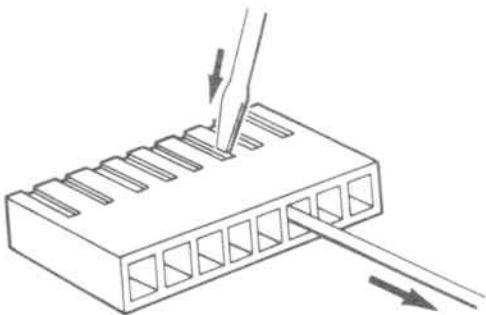
Both red leads
Both yellow leads
Both green leads
Green-yellow lead



- () Refer to the inset drawing on Detail 1-1D and crimp and solder a large spring connector onto one of the red transformer leads. Be sure that you do not solder the spring part of the connector so that it can not move.
- () Check your solder connection to make sure it is solid. It should have a smooth shiny appearance. If it is dull or grainy, reheat the connection.
- () In the same manner, crimp and solder large spring connectors onto the following transformer leads.

Other red lead
Either green lead
Other green lead
Either yellow
Other yellow
Green-yellow lead

- () Refer to Detail 1-1D and position the 8-hole connector shell as shown. Make sure the slotted side is up.



Detail 1-1E

NOTE: If it is ever necessary to remove a spring connector from the connector shell, use a small screwdriver to depress the tab on the connector through the slot in the connector shell while you pull on the wire. See Detail 1-1E.

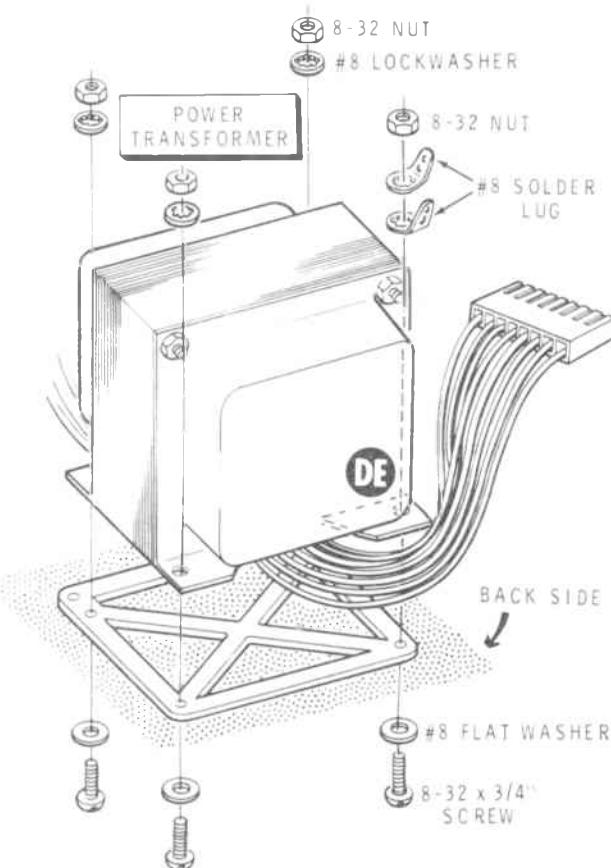
Refer again to Detail 1-1D and insert the spring connectors into the 8-hole connector shell as follows. Insert each connector until it locks in place.

- () Either red lead into hole 1.
- () Other red lead into hole 2.
- () No lead in hole 3.
- () Either yellow lead into hole 4.
- () Other yellow lead into hole 5.
- () Either green lead into hole 6.
- () Other green lead into hole 7.
- () Green-yellow lead into hole 8.

- () Gently pull on each wire in the connector shell to make sure the spring connectors are securely locked in place.

- () Refer again to Detail 1-1D and insert a large polarizing plug in hole 3 of the connector shell. Insert the plug in the hole as shown, with its head square to the shell, and press the pin into the shell until it snaps into place.

- () Refer to Detail 1-1F and mount the power transformer in the cabinet base at T1 with four 8-32 x 3/4" screws, four #8 flat washers, three #8 lockwashers, two #8 solder lugs, and four 8-32 nuts. Be sure to mount the solder lugs at DE.



Detail 1-1F

- () Bend the solder lugs at DE up at a 45° angle.

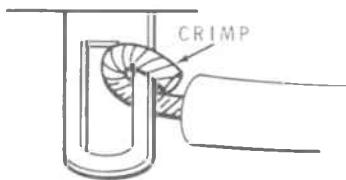
NOTE: When you are instructed to prepare a wire, as in the next step, cut it to the indicated length and remove 1/4" of insulation from each end. For stranded wire, twist together the fine wire strands and apply a very small amount of solder to the bare wire end to hold the strands in place.

- () Prepare a 15" and a 13" green stranded wire.





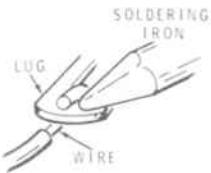
NOTE: When you are instructed to make a connection mechanically secure, as in the next step, first form a hook in the end of the wire. Then insert the hook through the lug and crimp it securely. See Detail 1-1G.



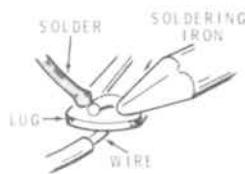
Detail 1-1G

- () Connect one end of the 13" green wire to the indicated solder lug at DE. Make this connection mechanically secure. Then refer to the following instructions.

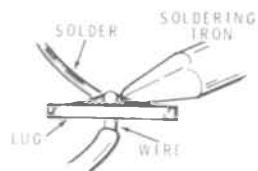
1. Push the soldering iron tip against the wire **and** the lug. Heat both the wire and the lug for two or three seconds.



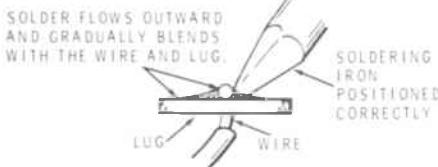
2. Apply solder to the wire and the lug, **not** to the soldering iron. **IMPORTANT:** Let the heat of the wire and lug melt the solder.



3. As the solder begins to melt, allow it to flow around the connection. Then remove the solder and the iron and let the connection cool.



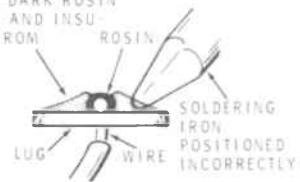
A GOOD SOLDER CONNECTION



When both the wire and the lug are heated at the same time, the solder will flow onto the wire and the lug evenly. The solder will make a good electrical connection between the wire and the lug.

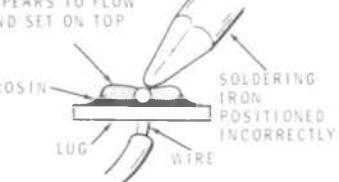
POOR SOLDER CONNECTIONS

SOLDER DOES NOT FLOW ONTO THE LUG AND WIRE. A DARK ROSIN BEAD SURROUNDS AND INSULATES THE WIRE FROM THE CONNECTION.



When the wire is not heated sufficiently, the solder will not flow onto the wire as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.

SOLDER APPEARS TO FLOW INWARD AND SET ON TOP OF LUG.



When the lug is not heated sufficiently, the solder will blob on the lug as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.



- () Solder one end of the 15" green wire to the other solder lug at DE. Then route this wire as shown.
- () Refer to inset drawing #2 on Pictorial 1-1 and install a small cable tie around the power transformer leads and the 15" green wire. Position the wires as shown and pull the cable tie tight. Cut off the excess cable tie.
- () Route the transformer leads (not connected to the 8-hole connector shell) and the 15" green wire through the hole in the back of the AC housing.

NOTES:

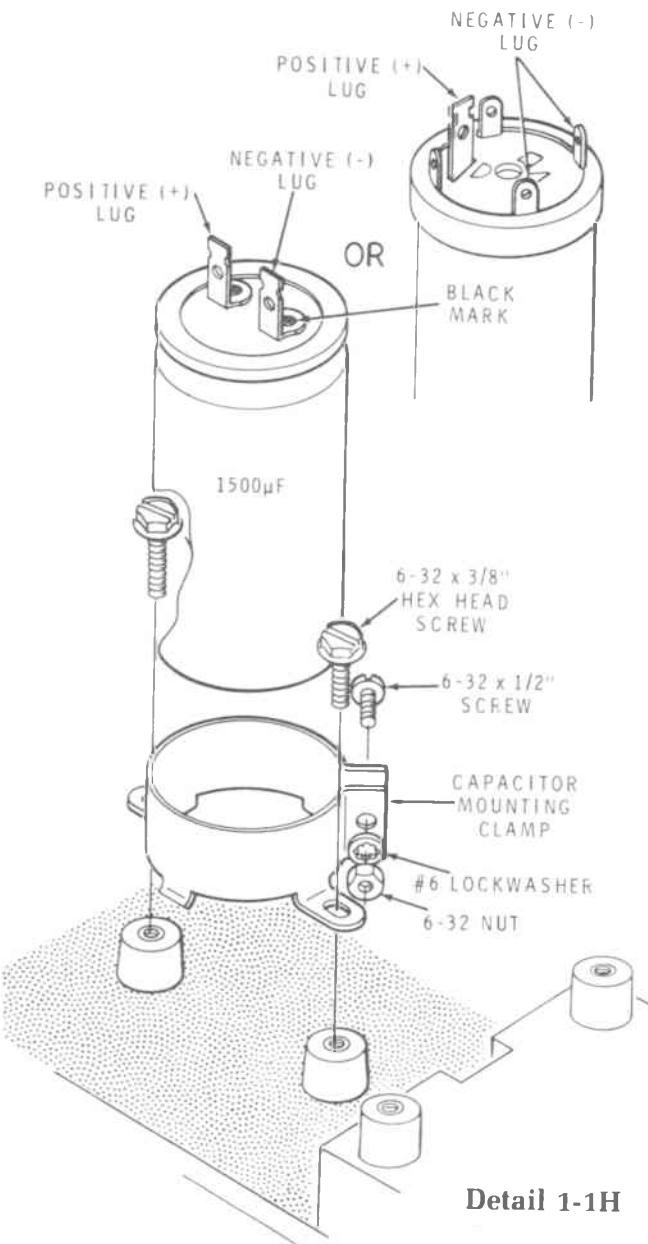
1. In the next step, be sure to position the negative (-) marked lug of the capacitor as shown. This capacitor may look like either style shown.
 2. Use the nut starter to hold and start 6-32 and 4-40 nuts on screws.
- () Refer to Detail 1-1H and install the capacitor mounting clamp on the 1500 μ F electrolytic capacitor. Use a 6-32 \times 1/2" screw, a #6 lockwasher, and a 6-32 nut. Position the clamp around the bottom of the capacitor. Do not tighten the hardware.
 - () Refer again to Detail 1-1H and mount the capacitor mounting clamp at C1 with two 6-32 \times 3/8" hex head screws.
 - () Push the capacitor down as far as it will go and position the marked lug as shown. Then tighten the clamp hardware.

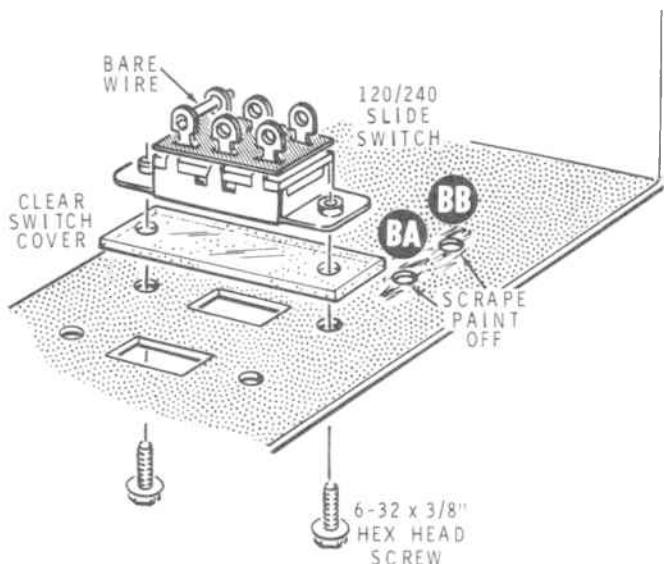
Refer to Pictorial 1-2 (Illustration Booklet, Page 4) for the following steps.

- () Position the terminal base on your work surface as shown.

- () Locate 7 brass inserts. Then install the inserts in the locations listed below. Use the same procedure as you did before.
- | | |
|--------|--------|
| () DG | () DL |
| () DH | () DN |
| () DJ | () DP |
| () DK | |

Set the terminal base aside temporarily.





Detail 1-3A

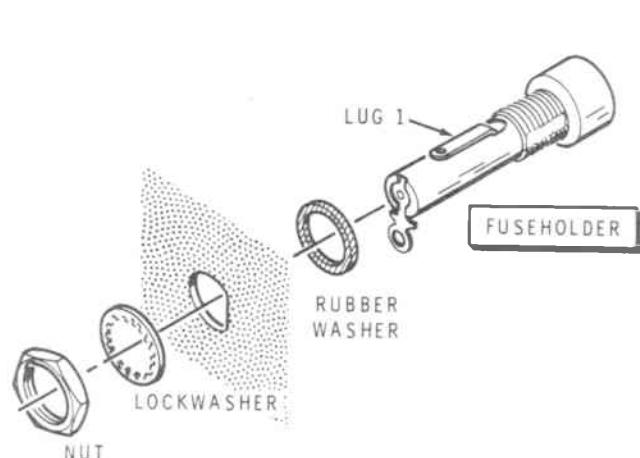
AC CHASSIS ASSEMBLY AND WIRING

Refer to Pictorial 1-3 (Illustration Booklet, Page 4) for the following steps.

- () Locate the AC chassis and position it as shown.
- () Refer to Detail 1-3A and scrape the paint off the AC chassis around holes BA and BB.

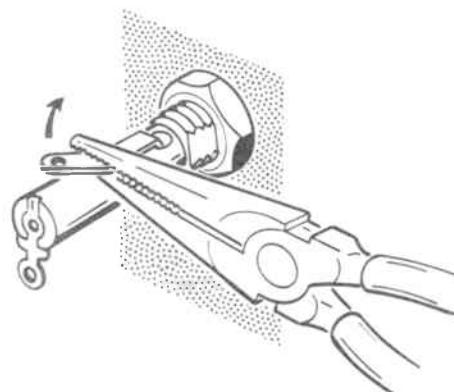
NOTE: If your supply voltage (line voltage) is 120 VAC, set the 120/240 slide switch in the next step so that 120 appears on the slider. If your supply voltage is 240 VAC, set the slider to show 240.

- () Locate the 120/240 slide switch and set the slider to the appropriate voltage setting for your area.
- () Refer again to Detail 1-3A and mount the "120/240" slide switch and the clear switch cover at SW1 with the bare wire positioned as shown. Use two 6-32 x 3/8" hex head screws.
- () In the same manner, except without the clear switch cover, mount the NOR/LOW (Normal/Low) slide switch at SW2. Set the switch slider so that "NOR" is showing. Refer to the inset drawing on Pictorial 1-3 for switch lug orientation.



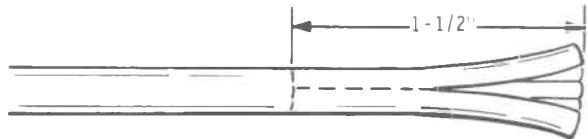
Detail 1-3B

- () Mount a #6 solder lug at BA with a 6-32 x 3/8" hex head screw and a 6-32 nut. Position the lug as shown.
- () In the same manner, mount a #6 solder lug at BB.
- () Refer to Detail 1-3B and install the fuseholder at F1. Use the hardware supplied with the fuseholder. Be sure to position the lugs as shown. NOTE: Do not overtighten the hardware or the fuseholder may crack.
- () Refer to Detail 1-3C and bend lug 1 of the fuseholder out slightly. Be careful that you do not apply pressure to the lug where it comes out of the fuseholder.

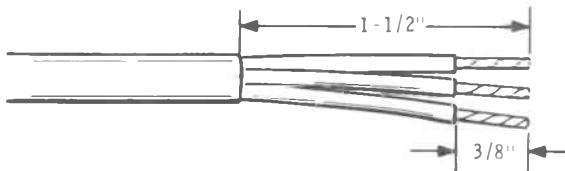


Detail 1-3C





1. REMOVE 1-1/2" OF OUTER INSULATION. BE CAREFUL THAT YOU DO NOT CUT THE INSULATION OF THE INNER LEADS.



2. CUT THE LEADS TO THE INDICATED LENGTHS AND REMOVE 3/8" INSULATION FROM THE END OF EACH LEAD.

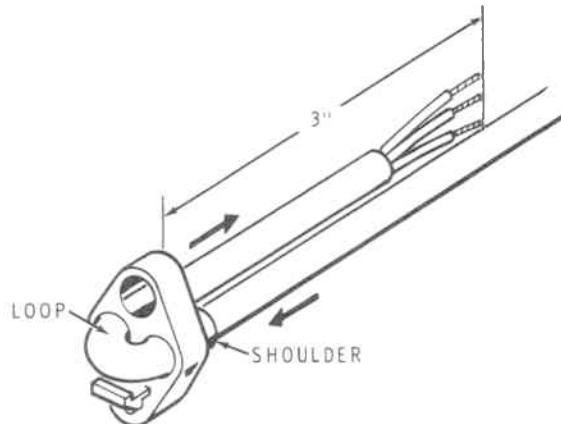


3. TWIST THE FINE WIRE STRANDS AT THE END OF EACH LEAD AND MELT A VERY SMALL AMOUNT OF SOLDER TO THE STRANDS TO HOLD THEM TOGETHER.

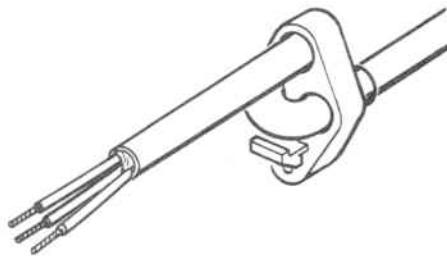
Detail 1-3D

- () Refer to Detail 1-3D and prepare the end of the line cord as shown.
- () Insert the prepared end of the line cord through hole BC from the outside of the AC chassis. Then refer to Detail 1-3E and install the line cord strain relief on the line cord.
- () Mount the strain relief to the inside of the chassis with a black #6 × 5/8" hex head self-tapping screw. Position the shoulder of the strain relief into the hole in the chassis.
- () Refer to Detail 1-3F and install the rocker switch in the AC shield at SW3 from the outside. Make sure the lugs are positioned as shown.
- () Connect the black line cord lead to fuseholder F1 lug 2. Make this connection mechanically secure and then solder the connection.
- () Connect the green line cord to solder lug BB. Make this connection mechanically secure and then solder the connection.

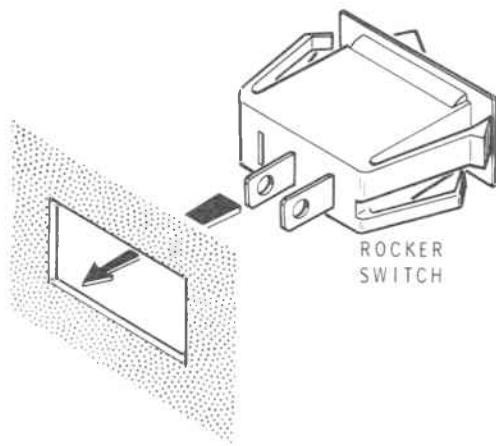
1. INSERT THE PREPARED END OF THE CABLE THROUGH THE SHOULDER ON THE STRAIN RELIEF AND BACK THROUGH THE SIDE HOLE.



2. ROUTE THE PREPARED END OF THE CABLE BACK THROUGH THE UPPER HOLE IN THE STRAIN RELIEF AND PULL IT TIGHT.



Detail 1-3E



Detail 1-3F



- () Connect the white line cord lead to switch SW1 lug 6. Make this connection mechanically secure but do not solder the connection.
- () Prepare the following lengths of black solid wire:

1-1/2"
1-1/2"
3"
2"

NOTE: In the following steps, (NS) means not to solder the connection because other wires or leads will be added later. (S-) with a number such as (S-3) means to solder the connection. The number following the "S" tells how many wires or leads are in the connection.

Make the connections in the next four steps mechanically secure.

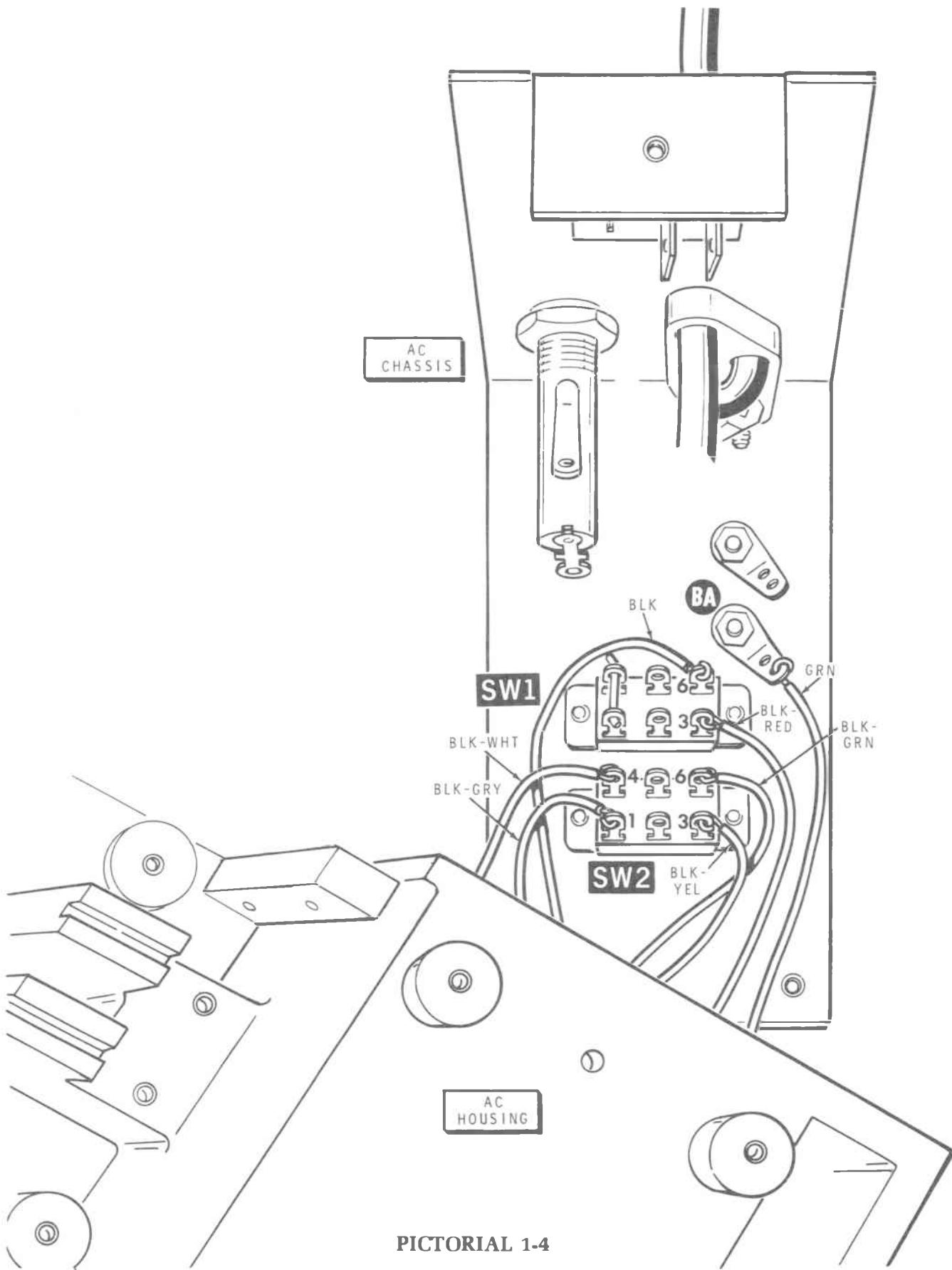
- () Connect a 1-1/2" black wire between SW2 lug 2 (S-1) and SW1 lug 2 (S-1).
- () Connect a 1-1/2" black wire between SW2 lug 5 (S-1) and SW1 lug 5 (S-1).
- () Connect a 3" black wire between SW1 lug 3 (NS) and SW3 lug 3 (S-1).
- () Connect a 2" black wire between SW3 lug 2 (S-1) and fuseholder F1 lug 1 (S-1).

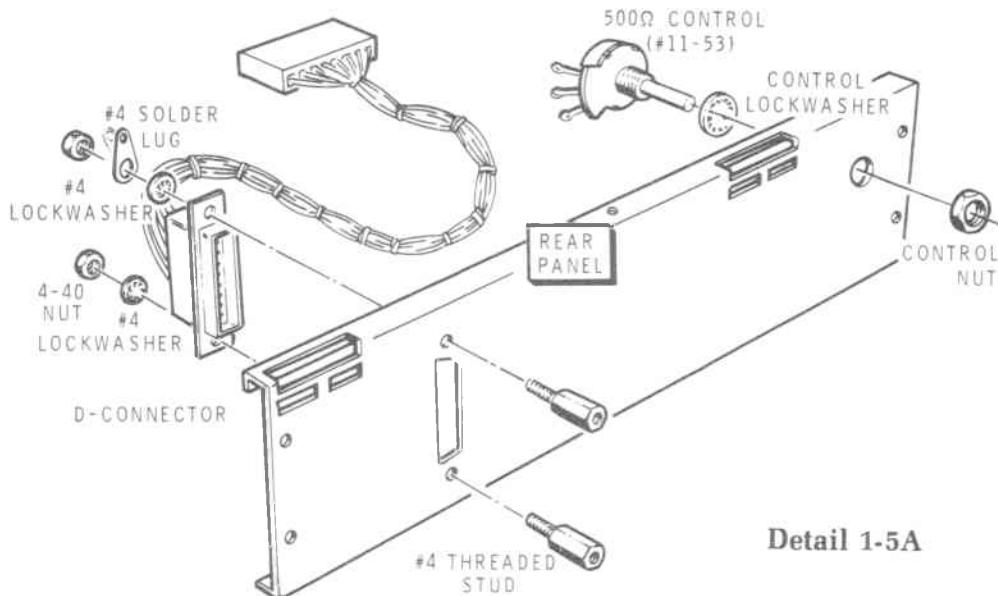
Refer to Pictorial 1-4 for the following steps.

Position the AC chassis under the right rear corner of the cabinet base and connect the power transformer leads as follows. Make these connections mechanically secure.

- () Black-gray lead to SW2 lug 1 (S-1). NOTE: Do not use the black-white lead by mistake.
- () Black-yellow lead to SW2 lug 3 (S-1).
- () Black-white lead to SW2 lug 4 (S-1).
- () Black-green lead to SW2 lug 6 (S-1).
- () Black-red lead to SW1 lug 3 (S-2).
- () Black lead to SW1 lug 6 (S-2).
- () Connect the green wire to solder lug BA (S-1). Make this connection mechanically secure.







Detail 1-5A

- () Refer to Pictorial 1-5 and mount the AC chassis into the AC housing with three 6-32 × 3/8" hex head screws. Be careful that you do not pinch any wires between the AC chassis and the housing.
- () R216: Refer to Detail 1-5A and mount a 500 Ω control (#11-53) to the rear panel with a control lockwasher and a control nut. Be sure to mount the control so the lugs are positioned as shown in the Pictorial.
- () Refer again to Detail 1-5A and mount the D-connector to the unpainted side of the rear panel with two #4 threaded studs, two #4 lockwashers, one #4 solder lug, and two 4-40 nuts. Position the solder lug toward the top of the plate.
- () Bend the solder lug on the D-connector away from the rear panel.
- () Route the green wire (coming from the solder lug on the power transformer) as shown and connect it to the solder lug on the D-connector (NS).
- () Connect the short black wire coming from the D-connector to the solder lug on the D-connector (S-2).
- () Mount the rear panel to the rear of the terminal base with four 6-32 × 3/8" black phillips head screws. Also use three 6-32 × 3/8" black phillips head screws to secure the rear panel to the bottom of the terminal base.

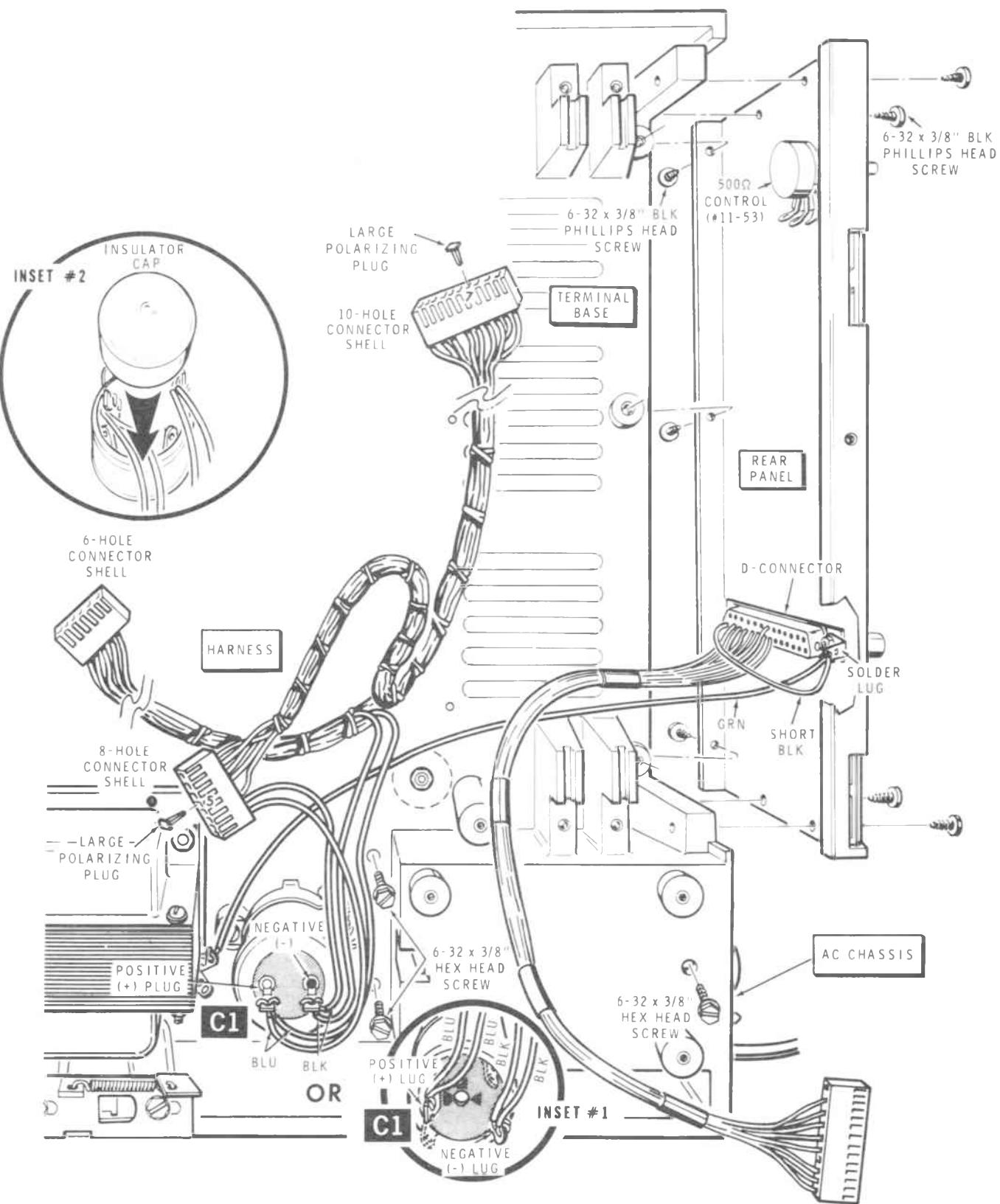
- () Locate the harness and place it in the terminal base with the two blue and two black wires positioned near capacitor C1.

NOTE: Since capacitor C1 may be one of two different styles, refer to Pictorial 1-5 or inset drawing #1 in the next two steps for the style you received.

- () Connect both black wires to the negative lug of capacitor C1 (S-2).
- () Connect both blue wires to the positive lug of capacitor C1 (S-2).
- () Refer to inset drawing #2 on Pictorial 1-5 and push the insulator cap down over capacitor C1.
- () Locate the 8-hole harness connector shell. Then insert a large polarizing plug (#438-48) into hole 5 of the shell.
- () Locate the 10-hole harness connector shell. Then insert a large polarizing plug (#438-48) into hole 7 of the shell.

Set the remaining parts aside temporarily; you will use them later. If you need hardware, parts, or wire later to complete a circuit board assembly, remove the needed parts from the main pack.

Proceed to the "Power Supply Circuit Board."



PICTORIAL 1-5



POWER SUPPLY CIRCUIT BOARD (Pack #1)

PARTS LIST

Locate Pack #1 and check each part against the following list. Any part that is packed in an individual envelope with the part number on it should not be removed from its envelope until it is called for in a step. Do not discard any packing materials until all parts are accounted for.

To order a replacement part, always include the Part Number and use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, use one of the "Expedited Parts Order Forms" at the rear of this Manual, or refer to "Replacement Parts" inside the rear cover. Your Warranty is inside the front cover. For prices, refer to the separate "Heath Parts Price List."

KEY	HEATH	QTY.	DESCRIPTION	CIRCUIT
No.	Part No.			Comp. No.

CAPACITORS

A1	25-891	2	470 μ F electrolytic	C102, C104
A1	25-902	1	10,000 μ F electrolytic	C101

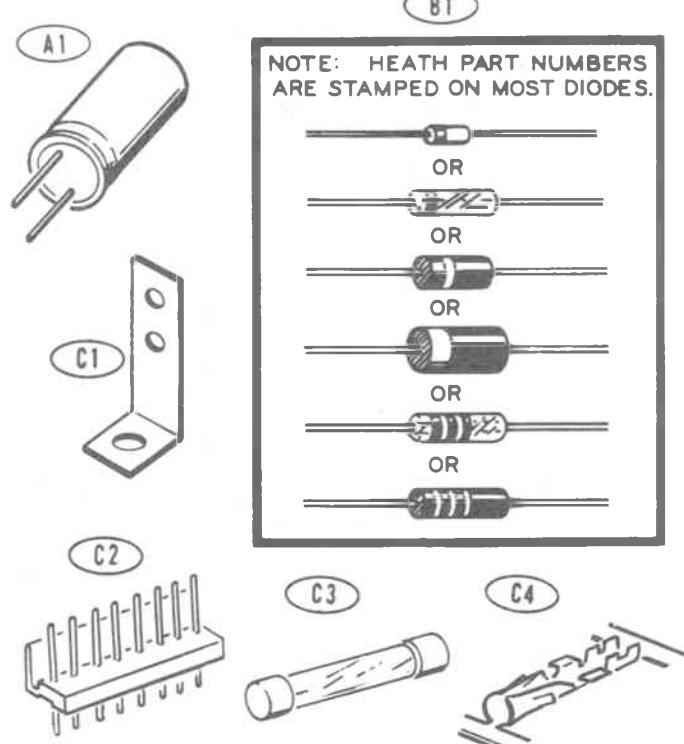
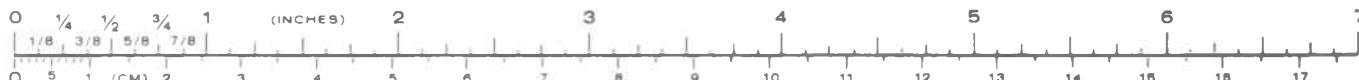
DIODES

B1	57-42	4	3A1 diode	D105, D106, D107, D108
B1	57-65	4	1N4002 diode	D101, D102, D103, D104
B1	57-27	4	1N2071 diode	D109, D110, D111, D112

MISCELLANEOUS

C1	204-182	1	Capacitor support bracket	
	85-2384-2	1	Power supply circuit board	
	346-21	6"	Teflon* sleeving	
C2	432-876	2	8-pin connector	P101, P102
C3	421-23	1	1-ampere fuse	
C4	432-855	1	Female connector pin (located in main pack)	

*DuPont Registered Trademark





ASSEMBLY NOTES

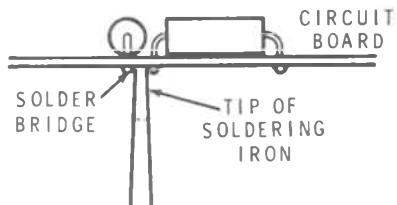
ASSEMBLY

1. Position all parts as shown in the Pictorials.
2. Solder a part or a group of parts only when you are instructed to do so.

SOLDERING

1. Keep the soldering iron tip clean. Wipe it often on a wet sponge or cloth; then apply solder to the tip to give the entire tip a wet look. This process is called tinning, and it will protect the tip and enable you to make good connections. When solder tends to "ball" or does not stick to the tip, the tip needs to be cleaned and retinned.
2. Do not create solder bridges between adjacent circuit board foils. A solder bridge usually occurs when you use too much solder and then drag the soldering iron across the board when you remove it from the connection. Always use

just enough solder to make a good connection, and lift the soldering iron straight up from the circuit board. If a solder bridge should develop, turn the circuit board foil side down and heat the solder between connections. The excess solder will run onto the tip of the soldering iron, and this will remove the solder bridge. See the drawing below. You can also place the desoldering wick (braid) on a solder bridge. Then heat the wick with the soldering iron and the wick will soak up the excess solder. If you suspect a solder bridge exists, but are not sure, compare the foil side of the circuit board with the "X-Ray View" of that circuit board.



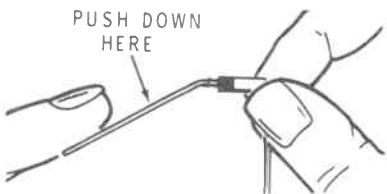
STEP-BY-STEP ASSEMBLY

START →

In the following steps, you will be given detailed instructions on how to install and solder the first part on the circuit board. Read and perform each step carefully. Then use the same procedure whenever you install parts on a circuit board.

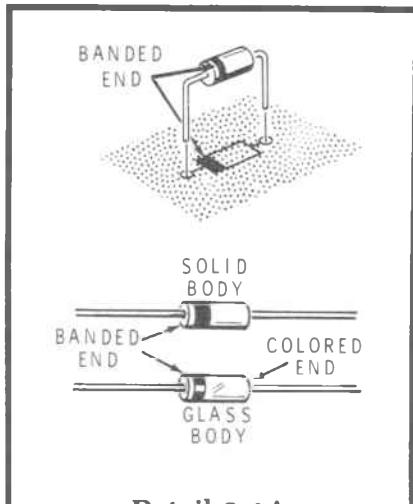
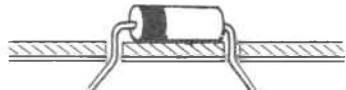
() Position the circuit board as shown with the printed side (not the foil side) up.

() D101: Hold a 1N4002 diode (#57-65) by the body as shown and bend the leads straight down.

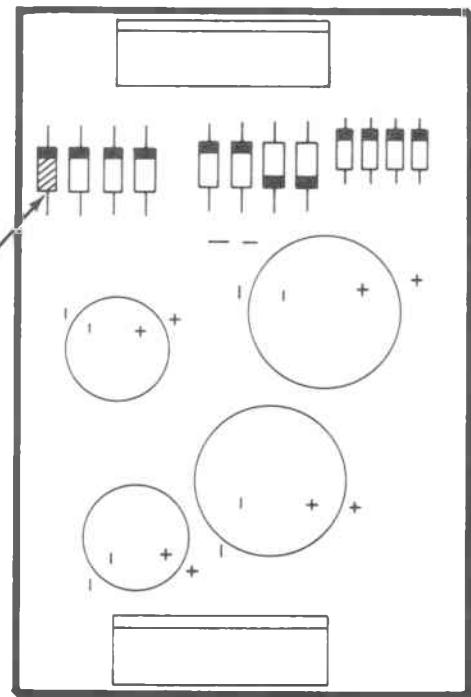


() Push the leads through the holes at the indicated location on the circuit board. Match the band on the diode with the band mark on the circuit board. See Detail 2-1A. THE CIRCUITRY WILL NOT WORK PROPERLY IF A DIODE IS INSTALLED BACKWARDS.

() Press the diode against the circuit board. Then bend the leads outward slightly to hold the diode in place.



Detail 2-1A

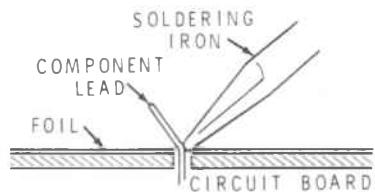


PICTORIAL 2-1

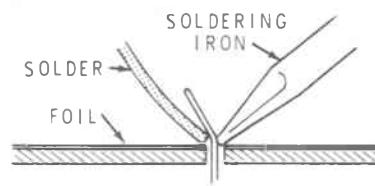
CONTINUE →

() Solder the diode leads to the circuit board as follows:

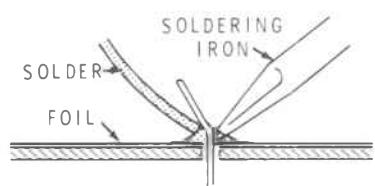
- Push the soldering iron tip against both the lead and the circuit board foil. Heat both for two or three seconds.



- Then apply solder to the other side of the connection. **IMPORTANT:** Let the heated lead and the circuit board foil melt the solder.



- As the solder begins to melt, allow it to flow around the connection. Then remove the solder and the iron and let the connection cool.

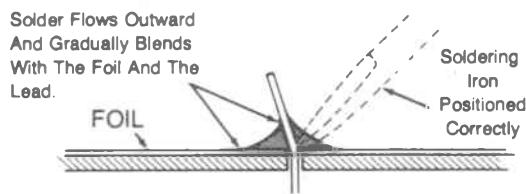


- Cut off the excess lead lengths close to the connection. **WARNING:** Clip the leads so the ends will not fly toward your eyes.

- Check each connection. Compare it to the illustrations on Page 25. After you have checked the solder connections, proceed with the assembly on Page 26. Use the same soldering procedure for each connection.

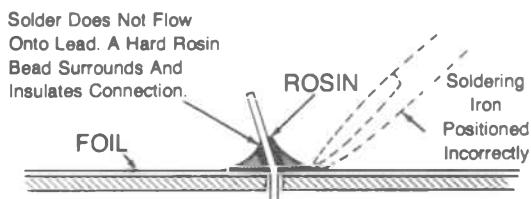


A GOOD SOLDER CONNECTION

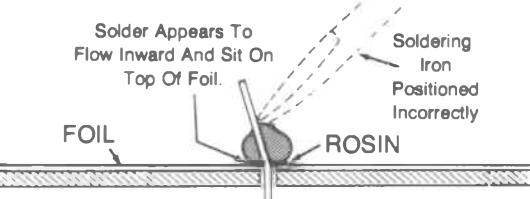


When you heat the lead and the circuit board foil at the same time, the solder will flow evenly onto the lead and the foil. The solder will make a good electrical connection between the lead and the foil.

POOR SOLDER CONNECTIONS



When the lead is not heated sufficiently, the solder will not flow onto the lead as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.

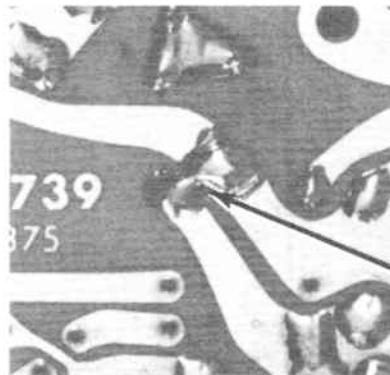


When the foil is not heated sufficiently the solder will blob on the circuit board as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.

SOLDER BRIDGES

A solder bridge between two adjacent foils is shown in photograph A. Photograph B shows how the connection should appear. A solder bridge may occur if you accidentally touch an adjacent previously soldered connection, if you use too much solder, or if you "drag" the soldering iron across other foils as you remove it from the connection. A good rule to follow is: always take a good look at the foil area around each lead before you solder it. Then, when you solder the connection, make sure the solder remains in this area and does not bridge to another foil. This is especially important when the foils are small and close together. NOTE: It is all right for solder to bridge two connections on the same foil.

Use only enough solder to make a good connection, and lift the soldering iron straight up from the circuit board. If a solder bridge should develop, turn the circuit board foil-side-down and heat the solder between connections. The excess solder will run onto the tip of the soldering iron, and this will remove the solder bridge. NOTE: The foil side of most circuit boards has a coating on it called "solder resist." This is a protective insulation to help prevent solder bridges.



START

NOTE: Make sure you have installed the first diode in Pictorial 2-1.

Install 1N2071 diodes (#57-27) in the following four locations.

- () D109
- () D110
- () D111
- () D112

Install 1N4002 diodes (#57-65) in the following three locations.

- () D102
- () D103
- () D104

() Solder the leads to the foil and cut off the excess lead lengths.

() Cut eight 3/8" pieces of sleeving.

() Slide a 3/8" piece of sleeving over the leads of four 3A1 diodes (#57-42, see Detail 2-2A) and install the diodes at the following locations.

- () D105
- () D106
- () D107
- () D108

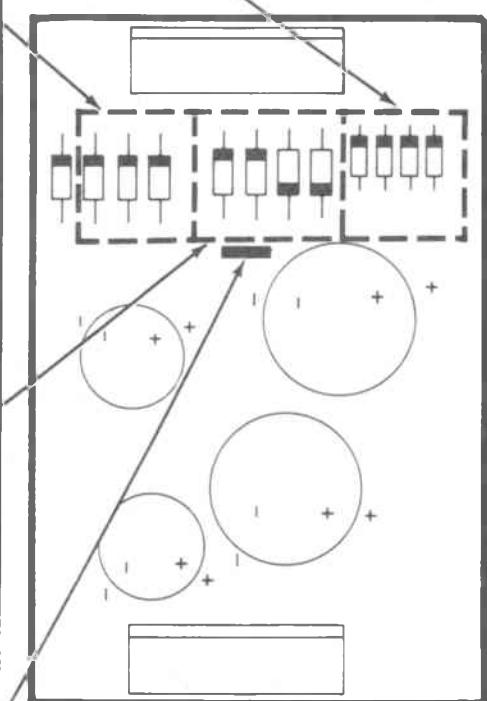
() Solder the leads to the foil and cut off the excess lead lengths.

() Cut a 3/4" bare wire.

() 3/4" bare wire. Solder the wire ends to the foil and cut off the excess.



Detail 2-2A



PICTORIAL 2-2

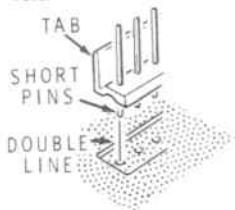




START

Install the plug as follows:

1. Match the tab side of the plug with the double line of the outline on the board.
2. Insert the short pins in the holes and solder them to the foil.



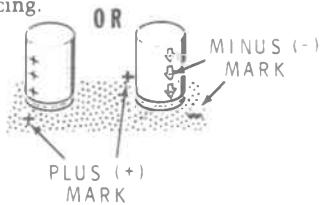
P101: 8-pin plug.

After you have soldered the plug in place, use wire cutters to cut off pin number 3 (numbers printed on the circuit board show how the pins are numbered).

P102: 8-pin plug.

After you have soldered the plug in place, use wire cutters to cut off pin number 5 (numbers printed on the circuit board show how the pins are numbered).

NOTE: When you install electrolytic capacitors, always position the plus (+) or minus (-) marking on the capacitor toward the corresponding mark on the circuit board. Use the holes that best fit the capacitor lead spacing.



C102: 470 μ F electrolytic.

C104: 470 μ F electrolytic.

Solder the leads to the foil and cut off the excess lead lengths.

CONTINUE

Do not install a part at this location.

C103: 10,000 μ F electrolytic. Use the plus (+) marked hole that best fits the lead spacing. Solder the leads to the foil and cut off the excess lead lengths.

CIRCUIT BOARD CHECKOUT

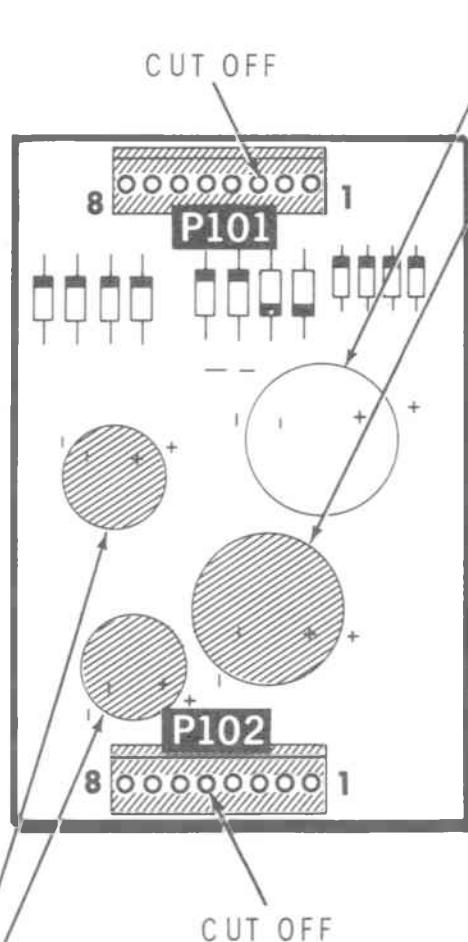
Carefully inspect the circuit board for the following conditions.

- Unsoldered connections.
- Poor solder connections.
- Solder bridges between foils.
- Protruding leads which could touch together.
- Electrolytic capacitors for the correct position of the positive (+) end.
- Diodes for the correct position of the banded end.

This completes the power supply circuit board assembly. Proceed to "Power Supply Installation and Checkout."

FINISH

PICTORIAL 2-3





INSTALLATION AND CHECKOUT

NOTE: The following test will require a high input impedance normal type volt/ohm meter. If you do not have a meter we suggest that you borrow one as these measurements are very important to insure that your unit will not be damaged when power is applied.

Perform each of the following measurements. If you do not obtain the correct meter reading, refer to the "Possible Area of Trouble" chart that follows the section. Correct any problem that you may encounter before you continue.

POWER OFF TEST

NOTE: If your supply voltage (line voltage) is 120 VAC, install the 1-ampere fuse in the next step. If your supply voltage is 240 VAC, install a 1/2-ampere fuse (not supplied).

- () Remove the fuseholder cap and install the appropriate fuse. Then reinstall the fuseholder cap. Do not overtighten the cap.

Refer to Pictorial 3-1 (Illustration Booklet, Page 4) for the following steps.

- () Set your ohmmeter range switch to the X1 position.

- () Connect your negative ohmmeter lead to the solder lug on the power transformer.
- () Set the POWER switch to OFF (ON side of switch out).
- () Touch the positive ohmmeter lead to first one and then the other flat prong on the line cord plug. The meter should read INFINITE.
- () Touch the positive ohmmeter lead to the round prong on the line cord plug. The meter should read "0" resistance.
- () Connect the negative ohmmeter lead to one flat prong and the positive ohmmeter lead to the other flat prong of the line cord plug. The meter should read INFINITE.
- () With the ohmmeter leads still connected as in the previous step, set the POWER switch to ON. The ohmmeter should read approximately five ohms.
- () Disconnect the ohmmeter leads and place the POWER switch in the OFF position.
- () Set your ohmmeter range switch to the ×1000 position.


POSSIBLE AREA OF TROUBLE

1. Fuseholder (fuse not installed).
2. Faulty wiring between switches and fuseholder.
3. Ohmmeter is connected to the round prong in place of the flat prong on the line cord plug.

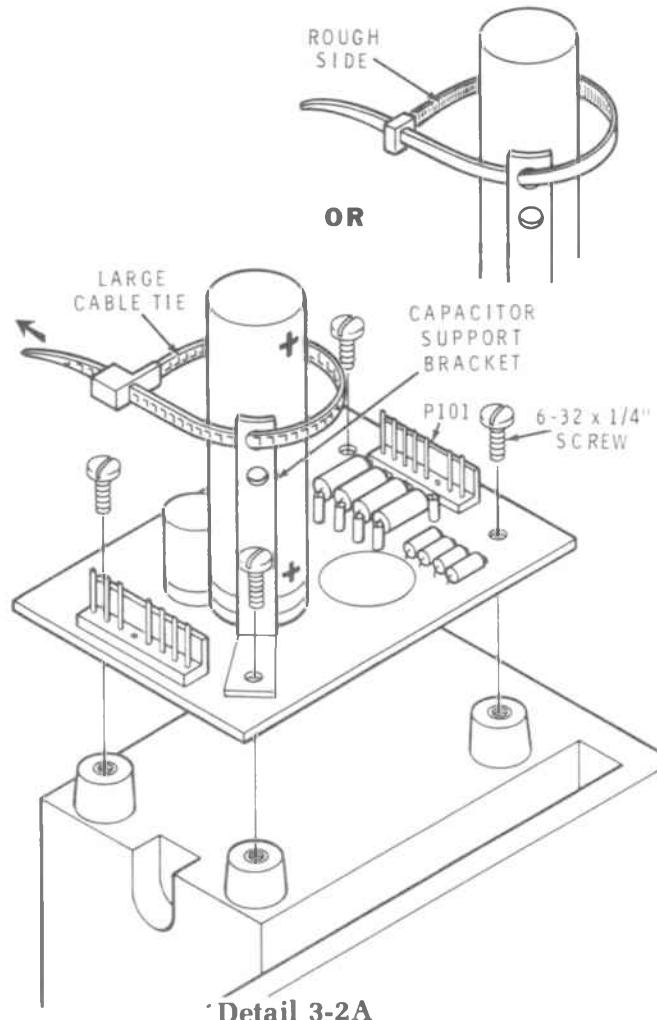
Refer to Pictorial 3-2 (Illustration Booklet, Page 4) for the following steps.

NOTE: The internal wiring of most ohmmeters is such that the positive terminal of the meter battery is connected to the positive (red) test lead and the negative battery terminal is connected to the negative (black) test lead. In some ohmmeters this wiring is reversed, and this could give the wrong readings below. Therefore, if you do not obtain the correct results in the following tests, reverse your ohmmeter leads and measure again. If the readings are now correct, change the first line of the chart below as follows:

Change the word "negative" to "positive."
 Change the word "positive" to "negative."

Make the following ohmmeter readings on plug 101 on the power supply circuit board. Permit the meter needle time to stop moving before you read it.

	NEGATIVE OHMMETER LEAD	POSITIVE OHMMETER LEAD	OHMMETER READING
()	P101, pin 1	P101, pin 2	INFINITE
()	P101, pin 4	P101, pin 5	Greater than 10 kΩ.
()	P101, pin 8	P101, pin 6	Greater than 10 kΩ.
()	P101, pin 8	P101, pin 7	Greater than 10 kΩ.
()	P101, pin 8	P101, pins 1, 2, 4, and 5 (one at a time).	INFINITE at each pin.

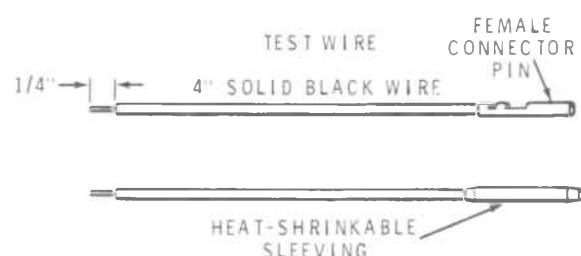


POWER ON TESTS

Refer to Pictorial 3-2 (Illustration Booklet, Page 4) for the following steps.

- () Refer to Detail 3-2A and mount the power supply circuit board to the top of the AC housing with four $6-32 \times 1/4"$ screws and a capacitor support bracket. Make sure the circuit board is positioned with plug P101 toward the rear of the unit.
- () Insert a large cable tie through the top hole in the bracket and around the capacitor. Pull the cable tie tight and cut off the excess length.
- () Connect the 8-hole connector on the power transformer leads to plug P101 on the power supply circuit board.

- () Refer to Detail 3-2B and prepare a 4" test wire as shown. First crimp and solder a female connector pin onto a 4" solid black wire. Then slide the length of heat-shrinkable sleeving over the connector pin. Use the heat from your soldering iron or a flame to shrink the sleeving.



Detail 3-2B



WARNING: When the line cord is connected to an AC outlet, dangerous AC voltage is present inside the AC housing. Do not operate the unit with the AC chassis removed from the AC housing. To do so could result in a hazardous electrical shock.

- () Set the POWER switch to ON.
- () Set your voltmeter to read approximately 150 volts DC.

Make the following tests on the pins of P102 on the power supply circuit board and check for the indicated meter reading. Connect the test wire to the plug pin under "Negative Lead To," and connect your negative meter lead to the other end of this wire.

NEGATIVE LEAD TO:	POSITIVE LEAD TO:	APPROXIMATE METER READING:
() P102, pin 2	P102, pin 1	50 to 60 VDC
() P102, pin 4	P102, pin 3	11 VDC
() P102, pin 8	P102, pin 6	36 VDC
() P102, pin 8	P102, pin 7	18 VDC

- () Set the POWER switch to OFF and disconnect the line cord.

POSSIBLE AREA OF TROUBLE

1. Diodes D101 thru D112 installed backward or faulty.
2. Solder bridge on the foil side of the circuit board.
3. Fuse open. Check for a short somewhere else in the circuit.
4. Electrolytic capacitor C1, C101, C102, or C104.

- () Momentarily touch the blade of a screwdriver between the following pins of plug P102 to discharge the capacitors in the power supply. Sparks may occur.

Between pins 3 and 4.

Across pins 6, 7 and 8.

- () Push the 8-hole connector on the harness onto plug P102 on the power supply circuit board.
- () Refer to the inset drawing on Pictorial 3-2 and secure the section of harness to the top of capacitor C1. Use a large cable tie and cut off the excess.

This completes the power supply checkout. Proceed to the "Video Circuit Board."





VIDEO CIRCUIT BOARD (Pack #2)

PARTS LIST

Locate Pack #2 and check each part against the following list and the Video Circuit Board Parts Pictorial (Illustration Booklet, Page 5). Any part that is packed in an individual envelope with the part number on it should not be removed from its envelope until it is called for in a step. Do not discard any packing materials until all parts are accounted for.

To order a replacement part, always include the Part Number and use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, use one of the "Expedited Parts Order Forms" at the rear of this Manual, or refer to "Replacement Parts" inside the rear cover. Your Warranty is inside the front cover. For prices, refer to the separate "Heath Parts Price List."

KEY	HEATH No.	QTY.	DESCRIPTION
	Part No.		

RESISTORS

NOTE: These resistors may be packed in more than one envelope. Open all the resistor envelopes in this pack before you check them against the Parts List. All resistors are 5%, 1/2-watt unless otherwise specified. 5% resistors have a gold fourth color band. 10% resistors have a silver fourth color band.

A1	6-279	2	2.7 Ω (red-viol-gld)	R246, R247
A1	6-479	1	4.7 Ω (yel-viol-gld)	R248
A1	6-150	1	15 Ω (brn-grn-blk)	R244
A1	6-220	1	22 Ω (red-red-blk)	R219
A1	6-330	1	33 Ω (org-org-blk)	R218
A1	6-470	2	47 Ω (yel-viol-blk)	R213, R258
A1	6-750	1	75 Ω (viol-grn-blk)	R217
A1	6-101	3	100 Ω (brn-blk-brn)	R206, R237, R262
A1	6-201	1	200 Ω (red-blk-brn)	R257
A1	6-331	1	330 Ω (org-org-brn)	R266
A1	6-471	2	470 Ω (yel-viol-brn)	R221, R245
A1	6-102	5	1000 Ω (brn-blk-red)	R203, R209, R214, R249, R273
A1	6-122	1	1200 Ω (brn-red-red)	R236
A1	6-152	1	1500 Ω (brn-grn-red)	R222

CIRCUIT Comp. No.

KEY	HEATH No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
	Part No.			

Resistors (cont'd.)

A1	6-182	1	1800 Ω (brn-gry-red)	R241
A1	6-222	1	2200 Ω (red-red-red)	R243
A1	6-332	1	3300 Ω (org-org-red)	R223
A1	6-392	2	3900 Ω (org-wht-red)	R256, R259
A1	6-472	2	4700 Ω (yel-viol-red)	R202, R205
A1	6-6491	1	6490 Ω, 1% (blu-yel-wht-brn)	R207
A1	6-682	1	6800 Ω (blu-gry-red)	R204
A1	6-822	2	8200 Ω (gry-red-red)	R231, R254
A1	6-103	3	10 kΩ (brn-blk-org)	R232, R235, R239
A1	6-223	3	22 kΩ (red-red-org)	R225, R242, R251
A1	6-273	3	27 kΩ (red-viol-org)	R229, R252, R255
A1	6-473	2	47 kΩ (yel-viol-org)	R234, R267
A1	6-623	1	62 kΩ (blu-red-org)	R233
A1	6-823	1	82 kΩ (gry-red-org)	R269
A1	6-104	2	100 kΩ (brn-blk-yel)	R224, R265
A1	6-224	1	220 kΩ (red-red-yel)	R227
A1	6-394	1	390 kΩ (org-wht-yel)	R272
A1	6-105	2	1 MΩ (brn-blk-grn)	R201, R238
A1	6-335	2	3.3 MΩ (org-org-grn)	R275, R276



KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
esistors (cont'd.)				

A2	6-1871-12	1	1870 Ω, 1/4-watt, 1% (brn-gry-viol-brn)	R208
A3	3-6-2	1	.51 Ω, 2-watt (grn-brn-silv-gld)	R211
A3	3-22-2	3	1.2 Ω, 2-watt, 10% (brn-red-gld-silv)	R261, R263, R264
A4	1-50-2	1	820 Ω, 2-watt (gry-red-brn)	R215
A5	3-57-5	1	1500 Ω, 5-watt, 10%	R212

CAPACITORS

Mica

B1	20-106	1	390 pF	C207
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Ceramic

B2	21-75	2	100 pF	C218, C222
B2	21-140	2	.001 μF	C201, C216
B2	21-176	6	.01 μF	C203, C206, C208, C219, C223, C243
B2	21-122	3	.02 μF	C236, C237, C238
I3	21-193	1	.005 μF spark gap	C234

Tantalum

B4	25-220	3	10 μF	C204, C205
B4	25-841	1	4.7 μF	C227 C213

Electrolytic

B5	25-299	1	1.5 μF	C231
B5	25-865	3	10 μF	C202, C215, C241
B6	25-911	1	22 μF, 25V or 35V	C239
B6	25-882	2	22 μF, 100V	C226, C228
B6	25-883	1	47 μF (35V)	C209
B6	25-913	1	47 μF (160V or 200V)	C242
B7	25-890	1	330 μF	C217

Mylar*

B8	27-73	1	.047 μF	C225
B8	27-145	2	.22 μF	C211, C212

Polycarbonate

B9	27-206	1	1 μF	C233
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KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
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Polypropylene

B9	29-56	1	.006 μF	C229
B9	29-57	1	.22 μF	C232

Polystyrene

B10	29-22	2	4700 pF	C221, C224
B10	29-32	1	6800 pF	C214

DIODES—TRANSISTORS— INTEGRATED CIRCUITS (IC's)

C1	56-56	3	1N4149 diode	D201, D204, D207
C1	56-58	1	6.2 V zener diode	D205
C1	56-73	1	MZ2360 diode	D202
C1	56-93	1	FD333 diode	D206
C1	56-94	1	12.8 V zener diode	D203
C1	57-27	4	1N2071 diode	D209, D212, D214, D215
C1	57-64	1	DRS110 diode	D211
C1	57-614	1	MR508 diode	D208

NOTE: Transistors (and integrated circuits) are marked for identification in one of the following four ways:

1. Part Number.
2. Type number. (On integrated circuits, use only those numbers and letters in **BOLD** print. Disregard any others numbers or letters.)
3. Part number and type number.
4. Part number with a type number other than the one shown.

C2	417-811	1	MPSL01 transistor	Q209
C2	417-821	1	MPSA06 transistor	Q204
C2	417-822	1	MPSA56 transistor	Q203
C2	417-823	1	MPU131 transistor	Q201
C2	417-874	1	2N3906 transistor	Q212
C2	417-875	1	2N3904 transistor	Q215
C2	417-885	1	MPSA65 transistor	Q202
C3	417-195	1	MJE340 transistor	Q216
C3	417-924	2	MJE172 transistor	Q208, Q211
C3	417-932	1	MJE182 transistor	Q207
C4	417-834	1	MPSU10 transistor	Q214
C4	417-926	2	MPSU06, or NSDU06, or RCP70IC transistor	Q205, Q206
C5	417-282	1	MJ2841 transistor	Q213
C5	417-923	1	BU500 transistor	Q217
C6	442-53	2	NE555 integrated circuit	U201, U202

*DuPont Registered Trademark



KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
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INDUCTORS—CHOKES—TRANSFORMERS

D1	40-1947	1	19 μ H inductor	L204
D2	40-1948	1	52 μ H inductor	L205
D3	40-581	1	620 μ H inductor (blu-red-brn)	L202
D4	45-39	1	4.65 μ H choke	L201
D5	45-42	1	8.75 μ H choke	L203

CONTROLS

E1	10-311	1	5000 Ω	R253
E1	10-390	2	20 k Ω	R226, R228
E1	10-941	1	100 k Ω	R268
E1	10-1049	1	2 M Ω	R271

HARDWARE

NOTES:

1. The hardware may be in more than one packet. Open all the hardware packets, according to their size, before you check the hardware.
2. Hardware is shown actual size. To identify a piece of hardware, place it over the illustration.

F1	250-175	3	2-56 \times 3/8" screw
F2	250-34	5	4-40 \times 1/2" screw
F3	250-323	4	4-40 \times 5/8" screw
F4	250-587	2	6-32 \times 5/16" screw
F5	252-51	3	2-56 nut
F6	252-2	9	4-40 nut
F7	252-135	2	4-40 locknut
F8	252-3	2	6-32 nut
F9	75-792	4	Black shoulder washer

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
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Hardware (cont'd.)

F10	253-94	6	#3 flat washer
F11	253-80	1	#4 flat washer
F12	253-21	2	#6 flat washer
F13	254-9	10	#4 lockwasher
F14	254-1	2	#6 lockwasher
F15	255-1	1	1/8" spacer
F16	259-1	1	#6 solder lug
F17	259-9	1	#4 solder lug

INSULATORS

G1	75-60	2	Large transistor insulator
G2	75-204	3	Small transistor insulator
G3	75-142	2	Transistor cover

CONNECTORS—SOCKETS

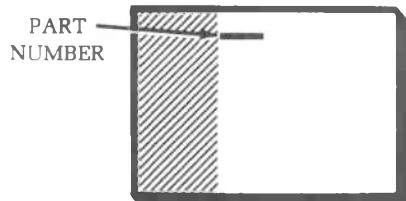
H1	432-753	8	Spring connector (one extra)
H2	432-66	1	Push-on connector
H3	432-827	2	4-pin plug
H4	432-825	1	6-pin plug
H5	432-876	1	8-pin plug
H6	432-1022	1	8-hole connector shell
H7	434-230	2	8-pin IC socket
H8	434-326	1	CRT socket with leads

MISCELLANEOUS

J1	73-1	2	3/8" rubber grommet
	85-2453-1	1	Video circuit board
J2	352-31	1	Thermal compound
	390-147	1	DANGER label
	343-15	3'	Shielded cable
	344-15	12"	Black stranded wire
	346-4	1"	Fiber sleeving
J3	354-5	7"	Clear tape



STEP-BY-STEP ASSEMBLY



START ▶

() Position the video circuit board printed side up as shown. Due to its large size, only part of the circuit board will be shown in each Pictorial. Refer to the shaded area in the identification drawing at the top of each page to see what area you are working in.

() R223: 3300 Ω (org-org-red).

() R224: 100 k Ω (brn-blk-yel).

() R227: 220 k Ω (red-red-yel).

() R229: 27 k Ω (red-viol-org).

() R234: 47 k Ω (yel-viol-org).

() Solder the leads to the foil and cut off the excess lead lengths.

() R235: 10 k Ω (brn-blk-org).

() R241: 1800 Ω (brn-gry-red).

() R238: 1 M Ω (brn-blk-grn).

() R243: 2200 Ω (red-red-red).

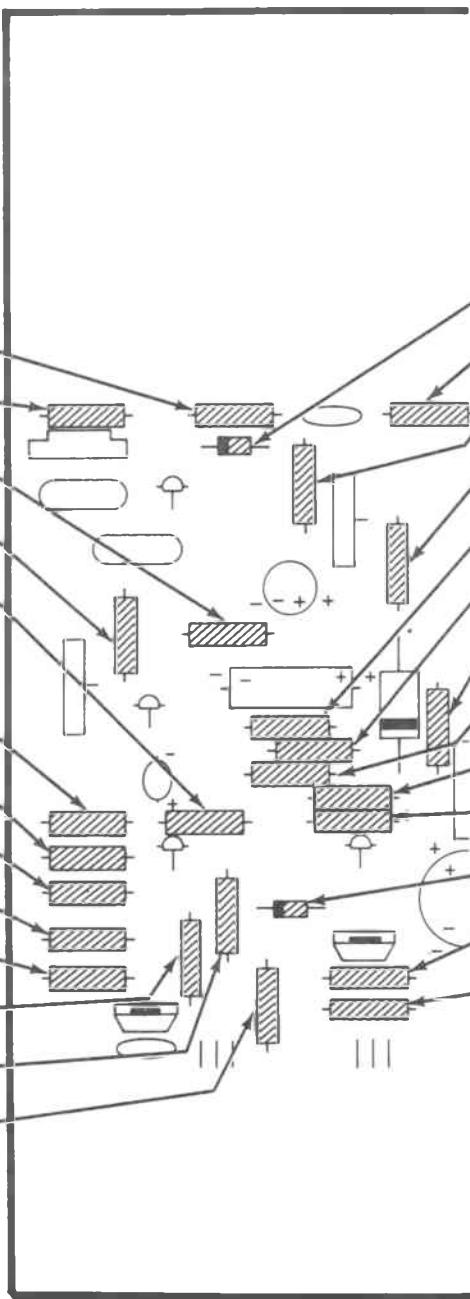
() R245: 470 Ω (yel-viol-brn).

() R244: 15 Ω (brn-grn-blk).

() R239: 10 k Ω (brn-blk-org).

() R247: 2.7 Ω (red-viol-gold).

() Solder the leads to the foil and cut off the excess lead lengths.



CONTINUE ➔

NOTE: When you install a diode, always match the band on the diode with the band mark on the circuit board. A DIODE WILL NOT WORK IF IT IS INSTALLED BACKWARDS.



() D201: 1N4149 diode (#56-56).

() R221: 470 Ω (yel-viol-brn).

() R222: 1500 Ω (brn-grn-red).

() R225: 22 k Ω (red-red-orange).

() R231: 8200 Ω (gry-red-red).

() R232: 10 k Ω (brn-blk-org).

() R248: 4.7 Ω (yel-viol-gold).

() R233: 62 k Ω (blu-red-org).

() R237: 100 Ω (brn-blk-brn).

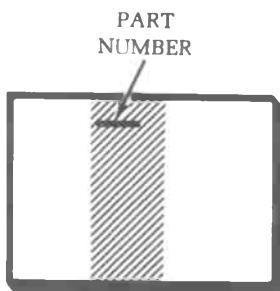
() R236: 1200 Ω (brn-red-red).

() D202: MZ2360 diode (#56-73).

() R242: 22 k Ω (red-red-org).

() R246: 2.7 Ω (red-viol-gold).

() Solder the leads to the foil and cut off the excess lead lengths.

**START** ↗

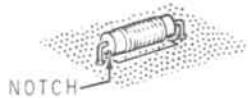
() R214: 1000 Ω (brn-blk-red).

() R217: 75 Ω (viol-grn-blk).

() R219: 22 Ω (red-red-blk).

() R218: 33 Ω (org-org-blk).

() L201: 4.65 μ H choke (#45-39). Be sure to bend the leads toward the notch in the choke body. NOTE: The board is marked 4.7.



() R202: 4700 Ω (yel-viol-red).

NOTE: Do not use the stranded wire unless stranded wire is specifically called for.

() 1-7/8" black solid wire.

() R203: 1000 Ω (brn-blk-red).

() R208: 1870 Ω , 1% (brn-gry-viol-brn-brn).

() R207: 6490 Ω , 1% (blu-yel-wht-brn-brn).

() Solder the leads to the foil and cut off the excess lead lengths.

CONTINUE ↗

NOTE: Be sure to install the following diodes with the banded end as shown on the circuit board.

() D205: 6.2 V zener diode (#56-58).

() D206: FD333 diode (#56-93).

() D214: 1N2071 diode (#57-27).

() R213: 47 Ω (yel-viol-blk).

() R201: 1 M Ω (brn-blk-grn).

() D204: 1N4149 diode (#56-56).

() D203: 12.8V zener diode (#56-94).

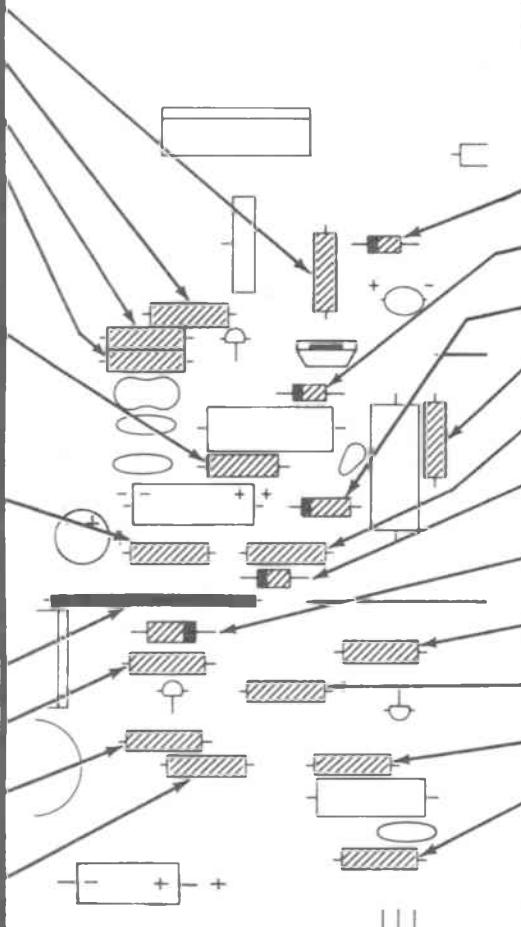
() R204: 6800 Ω (blu-gry-red).

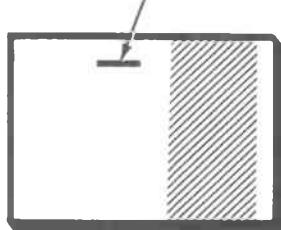
() R205: 4700 Ω (yel-viol-red).

() R209: 1000 Ω (brn-blk-red).

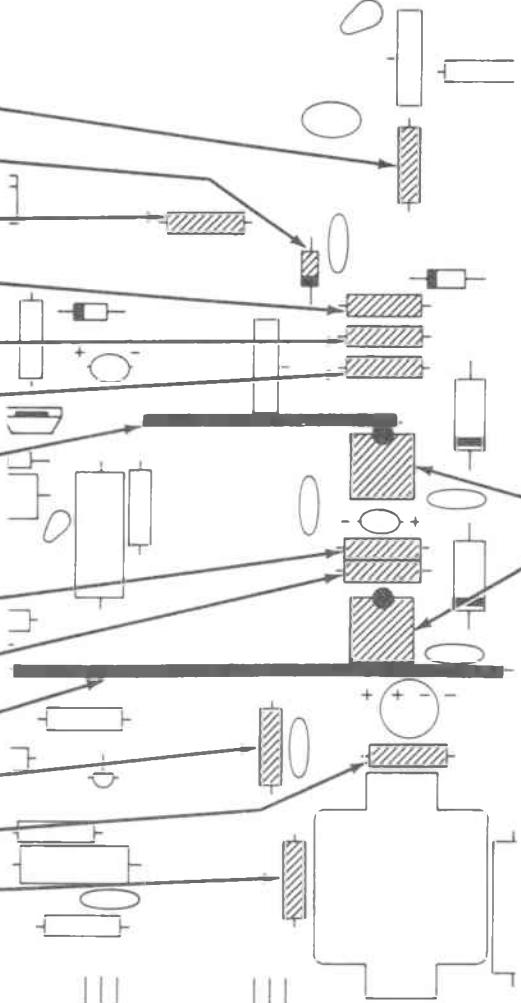
() R206: 100 Ω (brn-blk-brn).

() Solder the leads to the foil and cut off the excess lead lengths.

**PICTORIAL 4-2**

PART
NUMBER

START

- () R267: 47 kΩ (yel-viol-org).
- () D207: 1N4149 diode (#56-56).
- () R249: 1000 Ω (brn-blk-red).
- () R251: 22 kΩ (red-red-orange).
- () R252: 27 kΩ (red-viol-org).
- () R254: 8200 Ω (gry-red-red).
- () 2-1/4" black solid wire.
- () Solder the leads to the foil and cut off the excess lead lengths.
- () R255: 27 kΩ (red-viol-org).
- () R256: 3900 Ω (org-wht-red).
- () 3-3/4" black solid wire.
- () R257: 200 Ω (red-blk-brn).
- () R258: 47 Ω (yel-viol-blk).
- () R259: 3900 Ω (org-wht-red).
- () Solder the leads to the foil and cut off the excess lead lengths.


CONTINUE

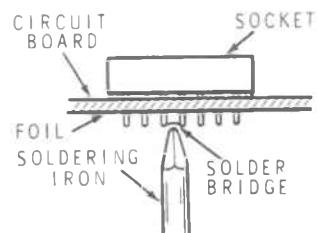
NOTE: When you install IC sockets, position the socket so that the index mark on the circuit is visible after the socket is installed. Be sure all of the pins go through the circuit board. Solder each pin to the foil.



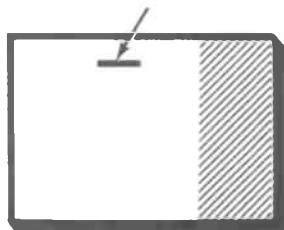
() U201: 8-pin IC socket.

() U202: 8-pin IC socket.

Carefully check each socket for solder bridges between pins. If a solder bridge has occurred, hold the circuit board foil-side-down as shown, and hold the soldering iron tip between the two points that are bridged. The solder will flow down the soldering iron tip, or use the de-solder wick (braid) as explained in the Assembly Notes on Page 23.



PART
NUMBER

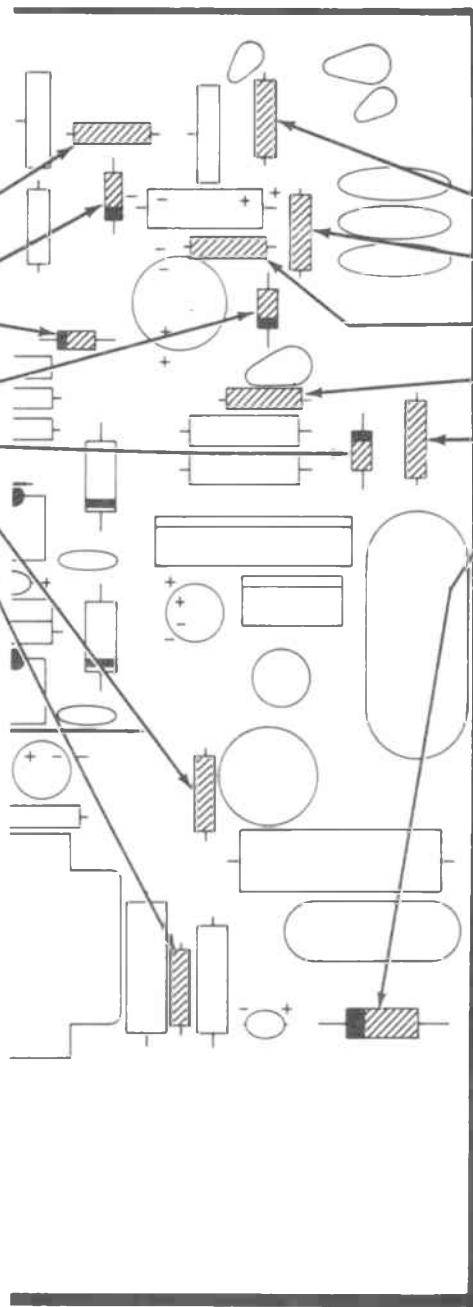


START ➔

- () R269: 82 kΩ (gry-red-org).
- () D215: 1N2071 diode (#57-27).
- () D212: 1N2071 diode (#57-27).
- () D209: 1N2071 diode (#57-27).
- () D211: DRS-110 diode (#57-64).
- () R273: 1000 Ω (brn-blk-red).
- () R262: 100 Ω (brn-blk-brn).
- () Solder the leads to the foil and cut off the excess lead lengths.

CONTINUE ➔

- () R275: 3.3 MΩ (org-org-grn).
- () R272: 390 kΩ (org-wht-yel).
- () R266: 330 Ω (org-org-brn).
- () R265: 100 kΩ (brn-blk-yel).
- () R276: 3.3 MΩ (org-org-grn).
- () D208: MR508 diode (#57-614).
- () Solder the leads to the foil and cut off the excess lead lengths.

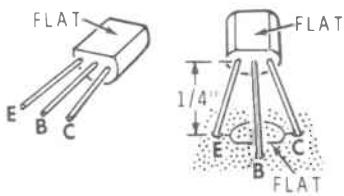


PICTORIAL 4-4

START

NOTE: In the following steps, install each of the transistors as follows:

1. Refer to the illustration example below and identify the E, B, and C leads of the transistor.
2. Bend the B lead of each transistor toward the flat.
3. Insert the transistor leads into the corresponding E, B, and C holes in the circuit board.
4. Position the transistor approximately $1/4"$ above the circuit board.
5. Turn the circuit board over, solder the leads to the foil, and cut off the excess lead lengths.

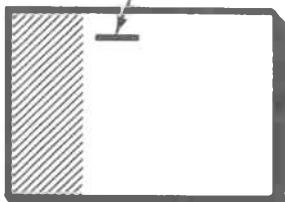


Q202: MPSA65 transistor (#417-885).

Q203: MPSA56 transistor (#417-822).

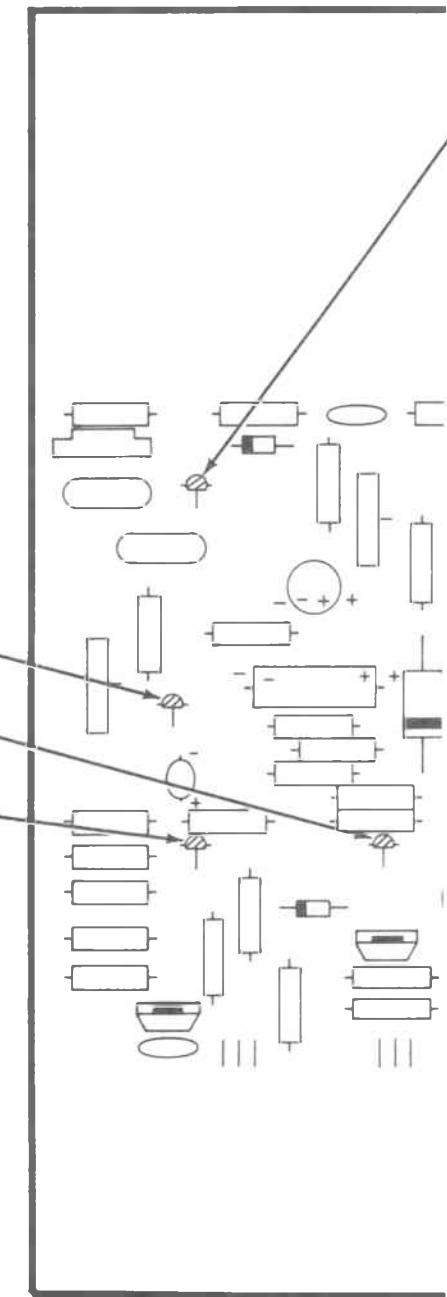
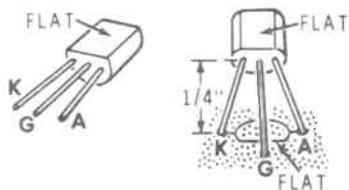
Q204: MPSA06 transistor (#417-821).

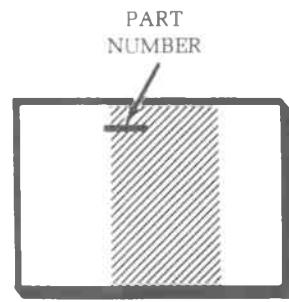
PART NUMBER


CONTINUE

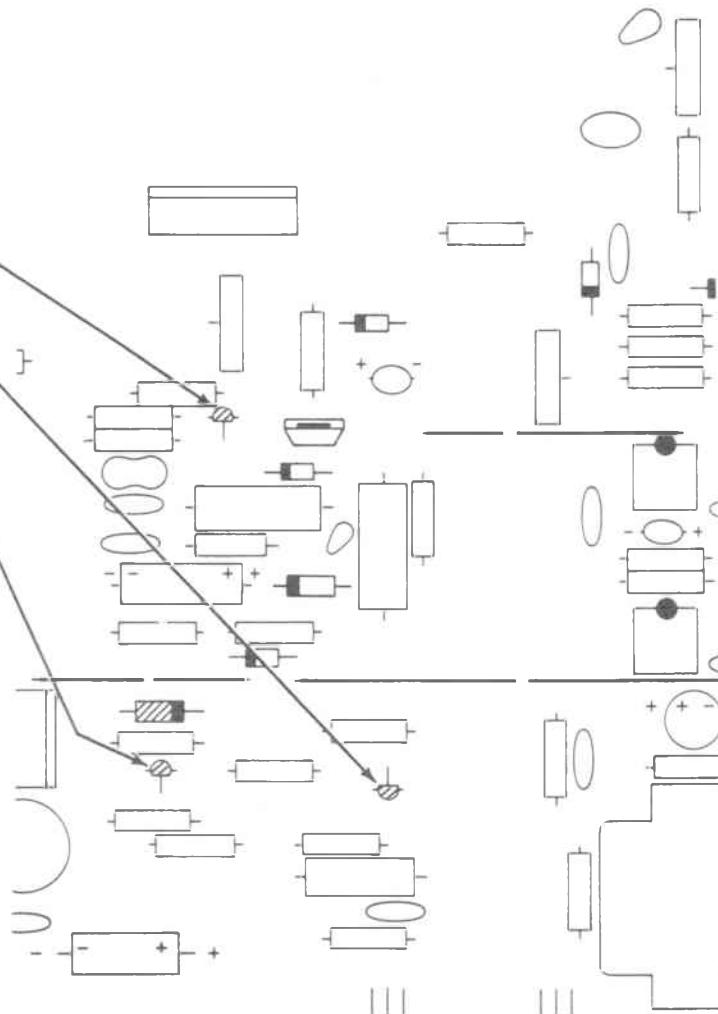
Q201: MPU131 (#417-823). Install this transistor as follows:

1. Refer to the illustration and identify the K, G, and A leads of the transistor.
2. Match the flat on the transistor with the outline of the flat on the circuit board. Insert the leads into the corresponding K, G, and A holes in the circuit board.
3. Position the transistor approximately $1/4"$ above the circuit board. Then turn the board over, solder the leads to the foil, and cut off the excess lead lengths.


PICTORIAL 4-5

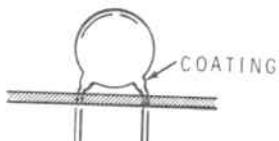

**START** ▶

- () Q215: 2N3904 transistor (#417-875).
- () Q212: 2N3906 transistor (#417-874).
- () Q209: MPSL01 transistor (#417-811).



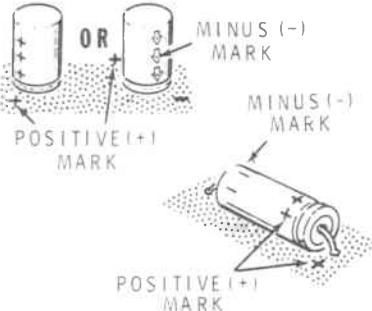
START

NOTE: When you install ceramic capacitors, space the capacitor about 1/8" above the circuit board. This will prevent the coating on the leads from protruding through the circuit board and making soldering difficult.



C208: .01 μF ceramic.

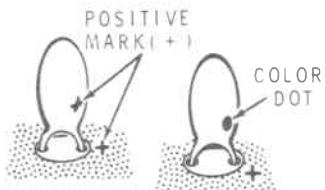
NOTE: When you install electrolytic capacitors, be sure to position the positive (+) lead of the capacitor toward the positive mark on the circuit board.



C209: 47 μF electrolytic. Be sure to use the smaller 47 μF capacitor at this location.

C215: 10 μF electrolytic.

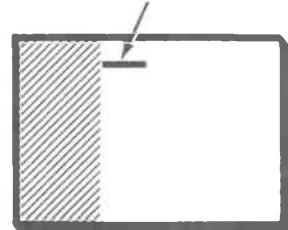
NOTE: When you install the tantalum electrolytic capacitor, be sure to position the plus (+) marked or dot (•) marked lead in the plus (+) marked hole.



C213: 4.7 μF tantalum.

Solder the leads to the foil and cut off the excess lead lengths.

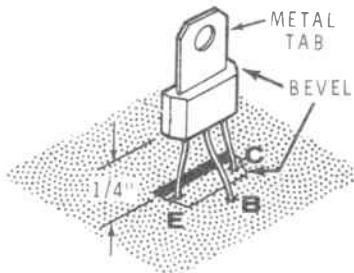
PART NUMBER


CONTINUE

C214: 6800 pF polystyrene. Position the marked end of the capacitor towards the banded end on the circuit board.

Install the next two transistors as follows:

1. Position the transistor so the metal tab, which is closer to one side of the transistor, is toward the wide line of the circuit board outline. Also note the bevel, as shown.
2. Insert the transistor leads in holes E, B, and C.
3. Position the transistor approximately 1/4" above the board. Solder the leads to the foil and cut off the excess lead lengths.



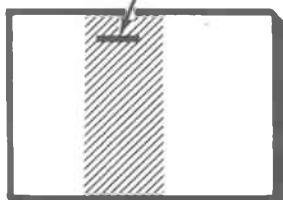
Q205: MPSU06 transistor (#417-926).

Q206: MPSU06 transistor (#417-926).

C216: .001 μF ceramic.

Solder the leads to the foil and cut off the excess lead lengths.

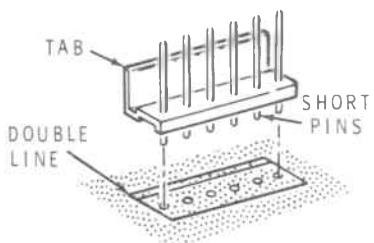
PART
NUMBER



START ▶

Install the plugs as follows:

1. Match the tab side of the plug with the double line of the outline on the board.
2. Insert the short pins in the holes and solder them to the foil.



P202: 6-pin plug.

C207: 390 pF mica.

C206: .01 μ F ceramic.

C203: .01 μ F ceramic.

P201: 4-pin plug.

After you have soldered the plug in place, use wire cutters to cut off pin number 2 (numbers printed on the circuit board show how the pins are numbered).

C243: .01 μ F ceramic.

C202: 10 μ F electrolytic.

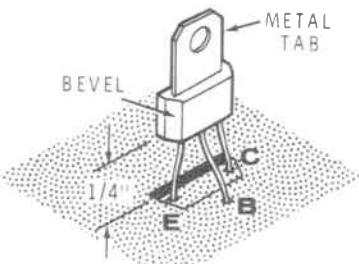
R215: 820 Ω , 2-watt, 10% (gry-red-brn).

Solder the leads to the foil and cut off the excess lead lengths.

CONTINUE ▶

Install the next transistor as follows:

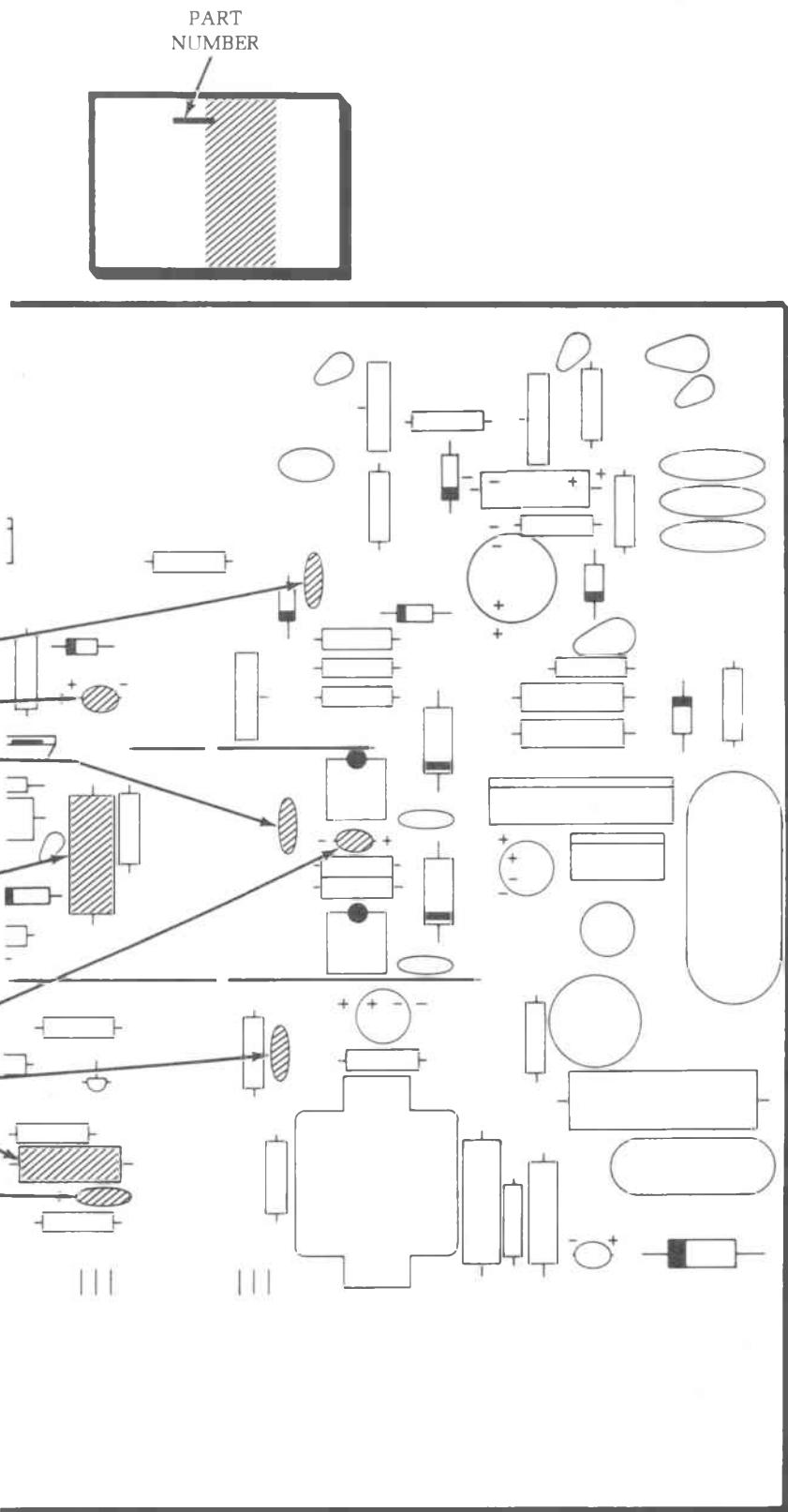
1. Position the transistor so the metal tab, which is closer to one side of the transistor, is **toward** the wide line of the circuit board outline.
2. Insert the transistor leads in holes E, B, and C.
3. Position the transistor approximately 1/4" above the board. Solder the leads to the foil and cut off the excess lead lengths.



Q214: MPSU10 transistor (#417-834).

PICTORIAL 4-8

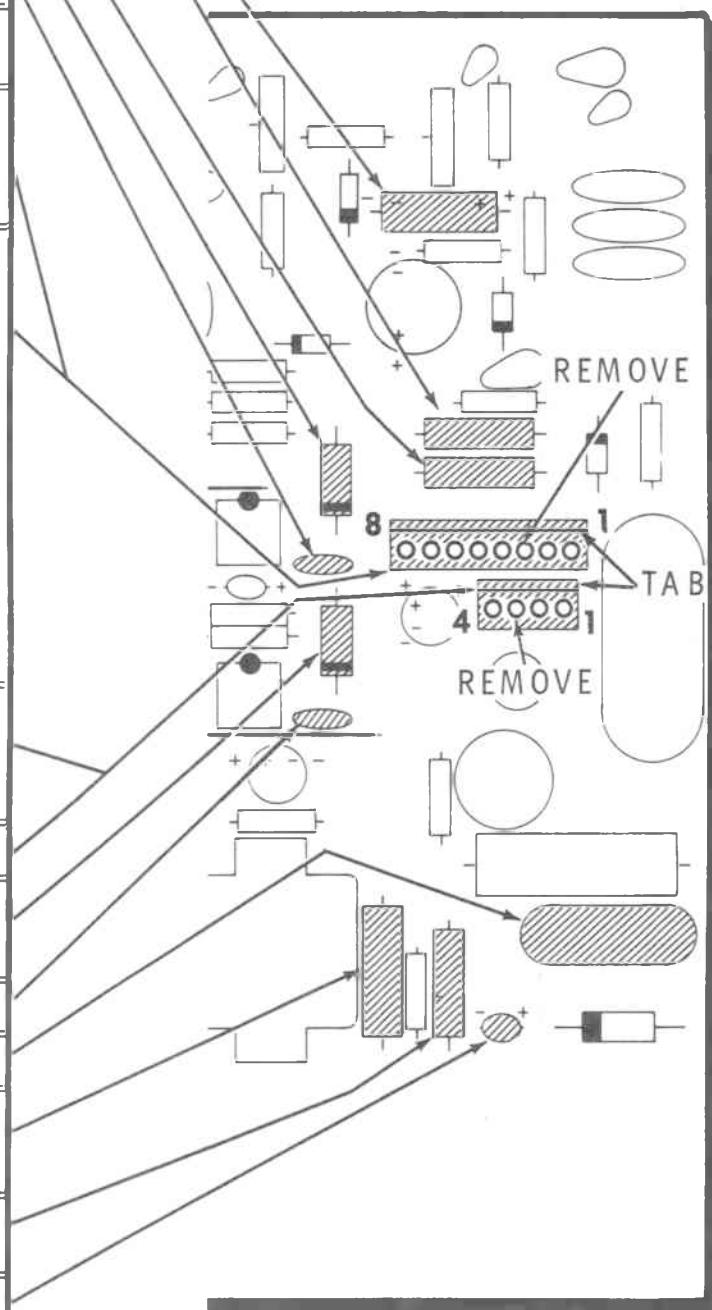
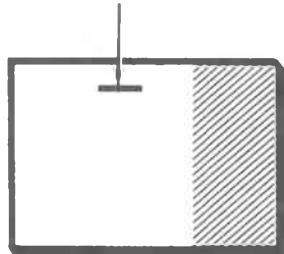




START ▶

- () C231: $1.5 \mu\text{F}$ electrolytic.
- Install 1.2Ω , 2-watt, 10% (brn-red-gld) resistors at the following locations.
 () R264
 () R263
- () C221: 4700 pF polystyrene. Position the banded end as shown on the circuit board.
- () C219: $.01 \mu\text{F}$ ceramic.
- () Solder the leads to the foil and cut off the excess lead lengths.
- () Use long-nose pliers to remove pin number 3 from an 8-pin plug. Note the position of the tab on this Pictorial before you remove pin 3.
- () P203: 8-pin plug.
Install the plug as follows:
 1. Match the tab side of the plug with the double line of the outline on the board.
 2. Insert the short pins in the holes and solder them to the foil.
- () Use long-nose pliers to remove pin number 3 from a 4-pin plug. Note the position of the tab on this Pictorial before you remove pin 3.
- () P204: 4-pin plug.
- () C224: 4700 pF polystyrene. Position the banded end as shown on the circuit board.
- () C223: $.01 \mu\text{F}$ ceramic.
- () C229: $.006 \mu\text{F}$ polypropylene.
- () L203: $8.8 \mu\text{H}$ choke (#45-42). Bend the leads toward the slots in the coil form.
- () R263: 1.2Ω , 2-watt, 10% (brn-red-gld).
- () C227: $10 \mu\text{F}$ tantalum.
- () Solder the leads to the foil and cut off the excess lead lengths.

PART NUMBER

**PICTORIAL 4-10**

START

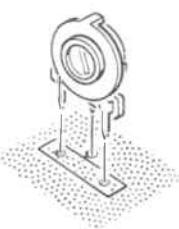
- () L202: 620 μH (blu-red-brn) coil.
Solder the lugs to the foil.



- () C212: .22 μF Mylar.

- () C211: .22 μF Mylar.

Install each of the following controls as shown, and solder the lugs to the foil.



- () R226: 20 k Ω control.

- () R228: 20 k Ω control.

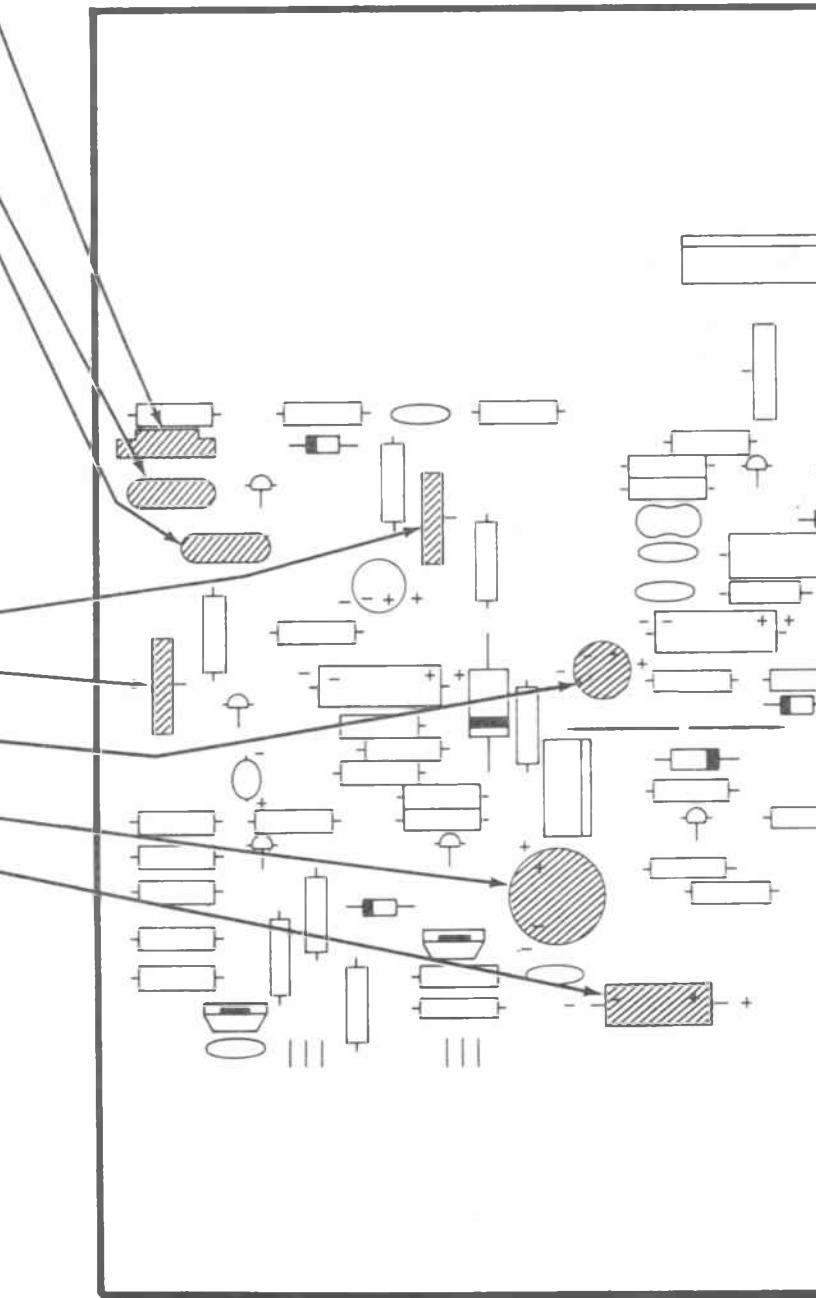
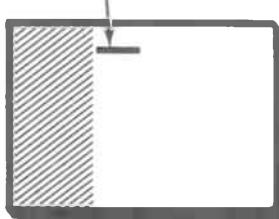
- () C239: 22 μF electrolytic. Be sure to use the 25 V or 35 V capacitor.

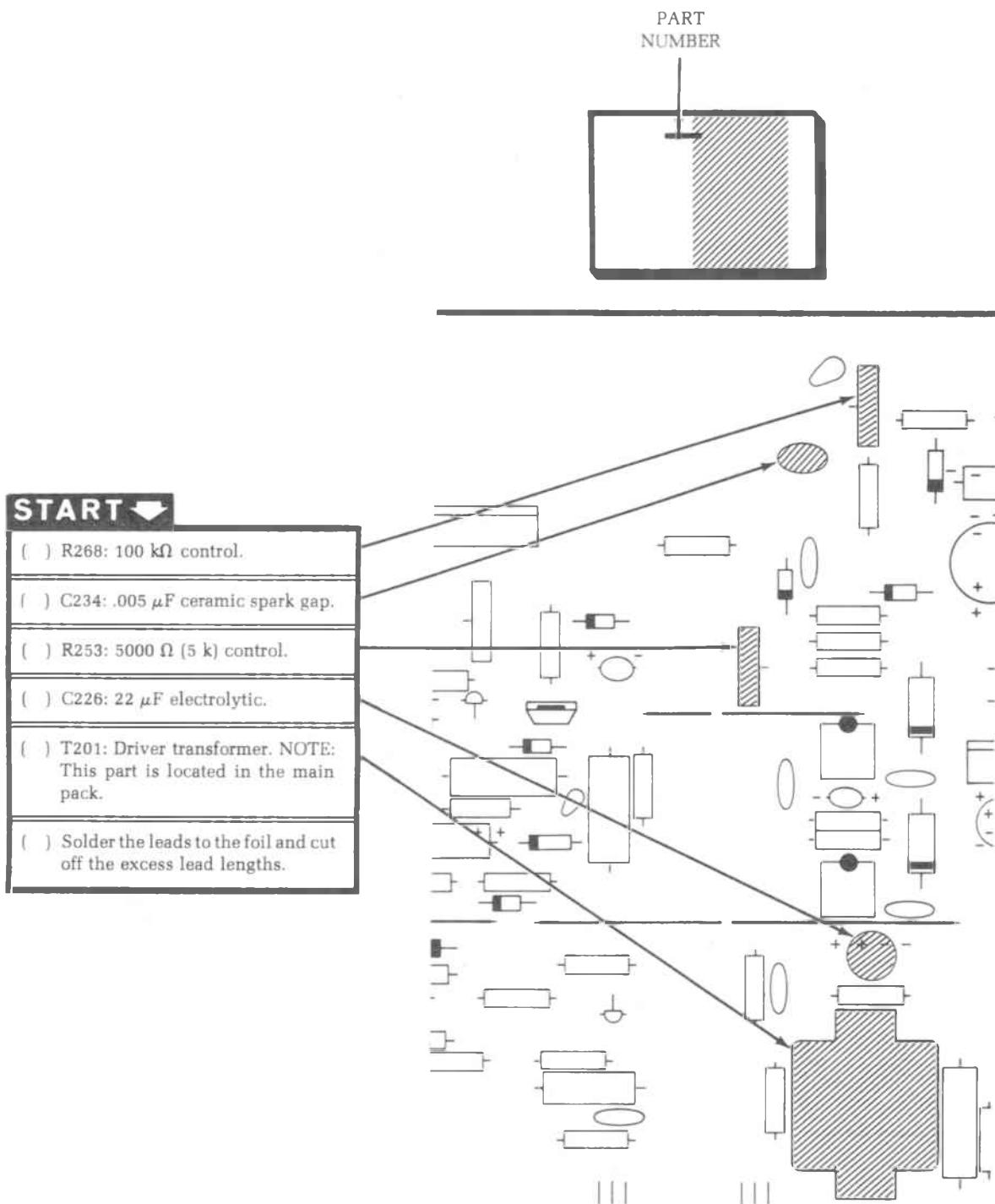
- () C217: 330 μF electrolytic.

- () C241: 10 μF electrolytic.

- () Solder the leads to the foil and cut off the excess lead lengths.

PART
NUMBER





START

() R271: 2 M Ω control.

Install .02 μ F ceramic capacitors at the following three locations.

() C236
() C237
() C238

() C242: 47 μ F electrolytic. Be sure to use the larger 47 μ F capacitor at this location.

() C232: .22 μ F polypropylene.

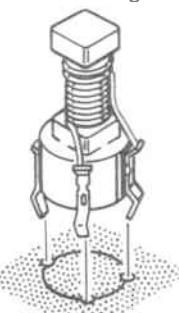
() C228: 22 μ F electrolytic.

() Solder the leads to the foil and cut off the excess lead lengths.

() L204: 19 μ H coil (#40-1947). Solder the pins to the foil and cut off the excess pin lengths.

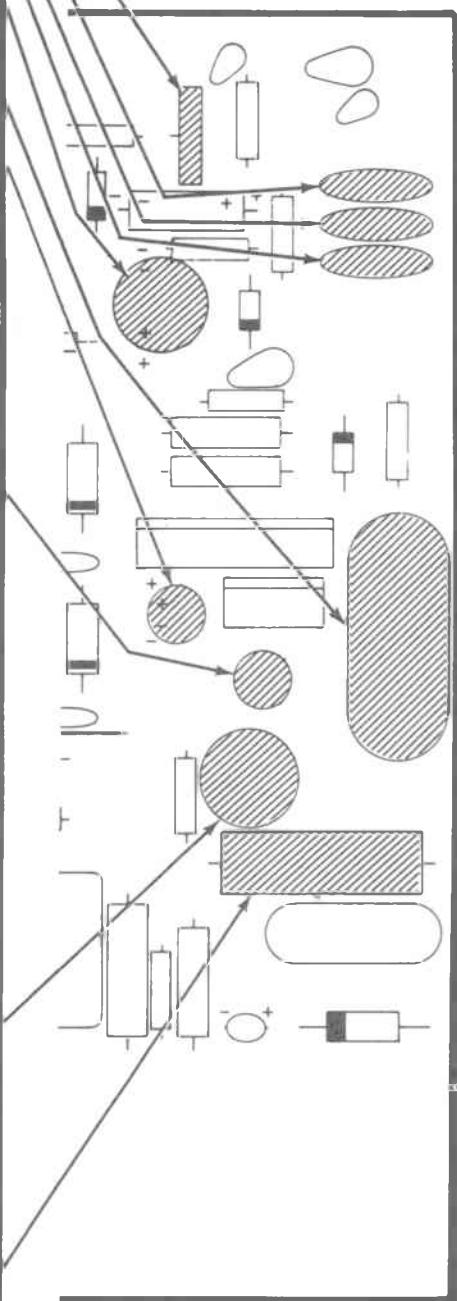
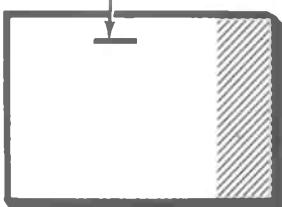


() L205: 52 μ H coil (#40-1948). Solder the leads to the foil and cut off the excess lead lengths.

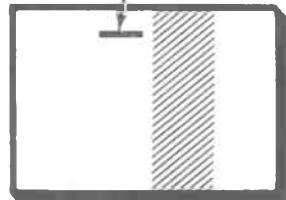


() C233: 1 μ F polycarbonate. Solder the leads to the foil and cut off the excess lead lengths.

PART NUMBER

**PICTORIAL 4-13**

PART
NUMBER

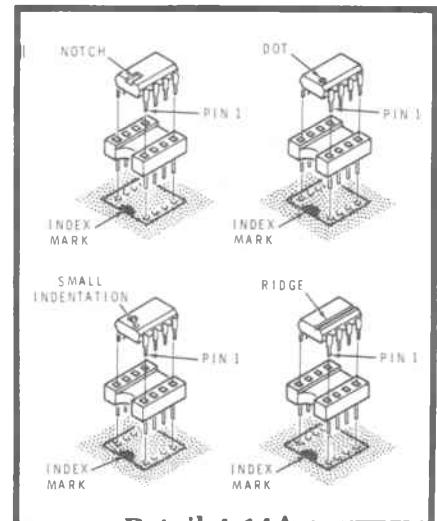
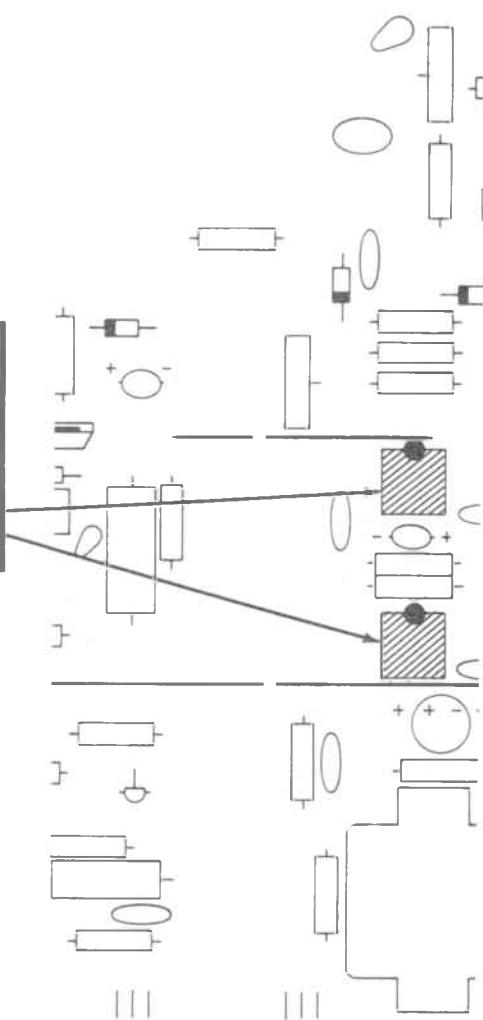


START

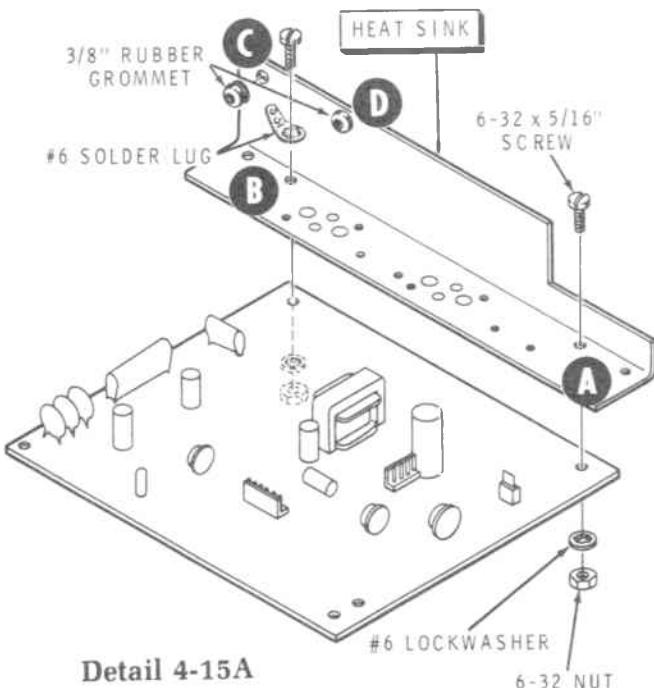
Install NE555V integrated circuits (#442-53) at the two following locations. Refer to Detail 4-14A and identify pin 1. Then position pin 1 at the index mark on the circuit board.

- () U201
() U202

FINISH



Detail 4-14A



Detail 4-15A

Refer to Pictorial 4-15 (Illustration Booklet, Page 6) for the following steps.

- () Position the video circuit board as shown.
- () Refer to Detail 4-15A and install 3/8" rubber grommets in holes C and D in the large heat sink.
- () Refer again to Detail 4-15A and mount the large heat sink to the circuit board. Use a 6-32 × 5/16" screw, a #6 lockwasher, and a 6-32 nut at A and a 6-32 × 5/16" screw, a #6 solder lug, a #6 lockwasher, and a 6-32 nut at B. Do not tighten the screws at this time.

WARNING: You will be using Dow Corning 340 thermal compound in the following steps. Although this compound is not caustic, it may cause temporary discomfort if it gets into your eyes. If this should happen, rinse your eyes with warm water. If the compound gets on your clothing, the clothing may require professional cleaning, so handle the compound carefully. This compound contains zinc oxides, SiO₂ and slight traces of CO₂.

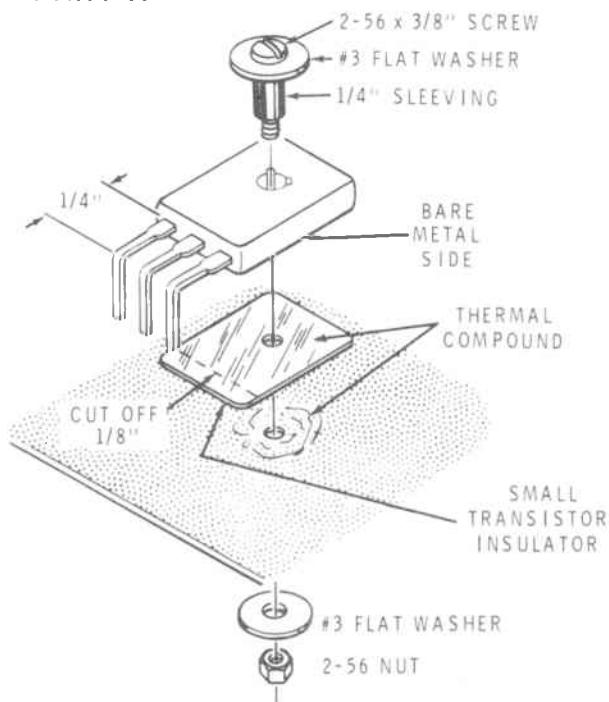
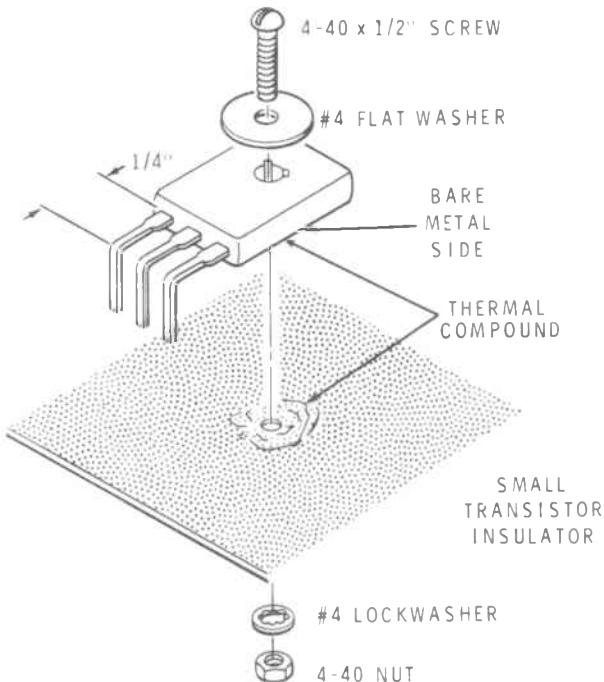
- () Locate the thermal compound pod and make a small slit in one side. Squeeze the pod to remove the compound.

- () Q213: Refer to Detail 4-15B (Illustration Booklet, Page 6) and mount an MJ2841 transistor (#417-282) at Q213 as follows:

1. Place a black shoulder washer into each mounting hole with the larger part toward the circuit board.
2. Apply a small amount of thermal compound on the heat sink at Q213.

NOTE: The transistor pins are farther from one end of the transistor than from the other end. Refer to this wide space in the next two steps to properly position the mica insulator and transistor. These will properly mount only one way.

3. Position the transistor insulator on the heat sink at Q213. Apply more thermal compound to the top of the insulator.
4. Insert the transistor leads through the circuit board and mount the transistor with two 4-40 × 1/2" screws, #4 lockwashers, and 4-40 nuts.
5. Solder both of the transistor leads to the circuit board foil and cut off the excess lead lengths.
6. Solder the nut of the transistor mounting hardware to the square foil. The other nut does not have foil around it.
- () Q217: In the same manner, mount a BU500 transistor (#417-923) at Q217.
- () Tighten the two heat sink mounting screws. Be sure the solder lug at B is positioned toward the nearby end of the heat sink.
- () Mount a transistor cover over transistor Q213 with two 4-40 × 5/8" screws, #4 lockwashers, and 4-40 nuts.
- () In the same manner, mount a transistor cover over transistor Q217.

PART A**PART B****Detail 4-15C**

- () Cut three 1/4" lengths of fiber sleeving. Use this sleeving in the next three steps.
- () Q207: Refer to Detail 4-15C Part A and mount an MJE182 transistor (#417-932) as follows:
 1. Apply a small amount of thermal compound on the heat sink at Q207.
 2. Locate a small transistor insulator and cut 1/8" off the lower edge. Then place this insulator onto the heat sink at Q207.
 3. Apply more thermal compound to the top of the insulator.
 4. Bend the leads of the transistor 90° toward the bare metal side. The bend should be 1/4" from the bottom of the transistor.
 5. Insert the transistor leads into the B, C, and E holes in the circuit board. Then mount the transistor with a 2-56 × 3/8" screw, two #3 flat washers, a 1/4" length of fiber sleeving, and a 2-56 nut. Do not overtighten this hardware.
 6. Solder the transistor leads to the foil and cut off the excess lead lengths.
- () Q211: In the same manner, mount an MJE172 transistor (#417-924) at heat sink location Q211.
- () Q216: In the same manner, mount an MJE340 transistor (#417-195) at Q216.
- () Q208: Refer to Detail 4-15C Part B and mount an MJE172 transistor (#417-924) at Q208. Do not use an insulator with this transistor. Apply thermal compound to the transistor. Use a 4-40 × 1/2" screw, a #4 flat washer, a #4 lockwasher, and a 4-40 nut. Do not overtighten this hardware.
- () Locate the CRT socket with leads and cut 2" off the end of the yellow lead. Prepare the end of the yellow lead.

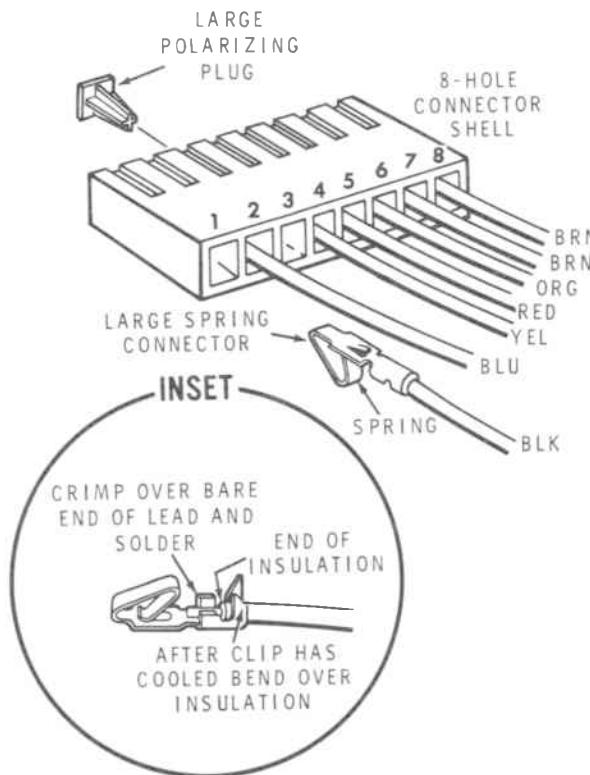


Solder the CRT leads to the circuit board holes as follows:

- () Black wire to GND.
- () Red wire to G2.
- () White wire to G4.
- () Green wire to hole G1.
- () Both brown wires to FIL.
- () Yellow wire to K.
- () Cut off any excess lead length on the foil side of the circuit board.
- () Install a small cable tie around all of the wires coming from the CRT socket, except the yellow wire, approximately 4" from the socket. Leave the yellow wire loose.
- () Prepare a 7-1/4" black stranded wire. Then crimp and solder a push-on connector on one end of the black wire.
- () Solder the other end of the 7-1/4" black wire to hole GND on the circuit board.
- () Locate the flyback transformer in the main pack. Cut the bare end of each lead to 1/8", if this has not already been done.
- () Refer to the inset drawing on Detail 4-15D and crimp and solder a large spring connector onto each flyback transformer lead.

Refer to Detail 4-15D and insert the flyback transformer leads into an 8-hole connector shell as follows. Be sure to position the slotted side of the shell as shown.

- () Black wire in hole 1.
- () Blue wire in hole 2.
- () No wire in hole 3.
- () Yellow wire in hole 4.
- () Red wire in hole 5.



Detail 4-15D

- () Orange wire in hole 6.
- () Either brown wire in hole 7.
- () Other brown wire in hole 8.
- () Insert a large polarizing plug in hole 3 of the 8-hole connector.
- () Install a cable tie around the flyback transformer leads approximately 2" from the transformer.
- () Remove the backing paper from the "DANGER" label and press the label to the front of the heat sink behind the flyback transformer.
- () Remove the rubber band (if there is one) from the flyback transformer. Then mount the transformer to the heat sink. Use a 1/8" spacer, a #6 flat washer, a #4 solder lug, and a 4-40 locknut at C; and a #6 flat washer, a #4 lockwasher, and a 4-40 locknut at D. Be sure to position the 1/8" spacer inside the grommet and the solder lug toward the nearby end of the heat sink.



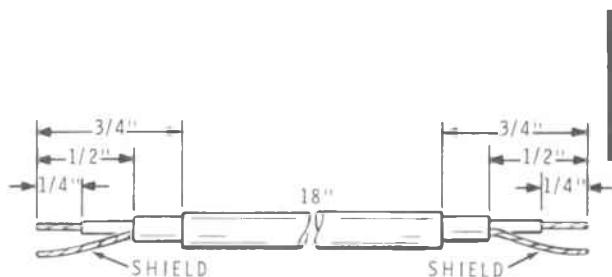


- () Prepare a 5" black stranded wire. Then connect the wire between solder lug B (S-1) and solder lug C (S-1).
- () Cut two 18" lengths of shielded cable. Then refer to Detail 4-15E and prepare both ends of each cable as shown.

NOTE: The holes called out in the next three steps are not labeled on your circuit board. Refer to the Pictorial for these hole locations.

- () Connect the inner wire at one end of a shielded cable to circuit board hole 1 (S-1). Do not connect the shield wires yet.
- () Connect the inner wire at one end of the remaining shielded cable to circuit board hole 2 (S-1). Do not connect the shield wires yet.
- () Connect the shield wires from both shielded cables to circuit board hole 3 (S-2).

NOTE: The free ends of the shielded cables will be connected later.



Detail 4-15E

CIRCUIT BOARD VISUAL CHECK

It is important that the following checkout procedure be done after the circuit board is completed.

Carefully inspect the foil side of the circuit board for the following most commonly made errors.

- () Unsoldered connections.
- () Poor solder connections.
- () Solder bridges between foil patterns. NOTE: If you suspect a solder bridge, check the foil on the circuit board against the foil pattern shown in the X-Ray View section of the Operation Manual.
- () Protruding leads which could touch together.

When you make the following visual checks, refer to the Pictorial where the part was installed and check it against the installation instructions.

- () Check the diodes for proper installation.
- () Check the transistors for proper installation.
- () Check the integrated circuits for proper installation.
- () Check the electrolytic and tantalum capacitors for the correct position of the positive (+) end.
- () Check the plugs for proper installation.
- () Set the circuit board aside temporarily.





INSTALLATION AND CHECKOUT

POWER OFF TESTS

Refer to Pictorial 4-16 (Illustration Booklet, Page 7) for the following steps.

- () Set your ohmmeter to the $\times 1000$ range.
- () Connect the negative meter lead to the video circuit board heat sink. Leave the lead at this location for the following tests.

Perform the following resistance measurements on the video circuit board. If you obtain the correct meter reading, proceed to the next test. If you do not obtain the correct reading, refer to the "Possible Area of Trouble" column.

POSITIVE METER LEAD TO:	APPROXIMATE METER READING	POSSIBLE AREA OF TROUBLE (Refer to "Possible Circuit Board Problems" on Page 66.)
() TP2	Greater than 5000 Ω .	1. Transistors Q211, Q212, Q213.
() TP3	INFINITE	1. Solder bridge on foil.
() TP4	INFINITE	1. Solder bridge on foil.
() TP5	100 k Ω	1. Solder bridge on foil.
() TP6	INFINITE	1. Solder bridge on foil.
() TP7	Greater than 2000 Ω	1. Capacitor C228.
() TP8	Greater than 2000 Ω	1. Transistors Q205, Q207.
() TP9 (collector of Q211).	Greater than 2000 Ω	1. Transistors Q211, Q212.
() TP10 (collector of Q216)	Greater than 2000 Ω	1. Transistor Q216. 2. T201.
() TP11 (nut on foil side).	INFINITE	1. Your ohmmeter. Reverse the test leads. 2. Transistor Q217. 3. Diode D208.

NOTE: In the following steps, remove the necessary parts and hardware from the final pack.

Refer to Pictorial 4-17 (Illustration Booklet, Page 7) for the following steps.

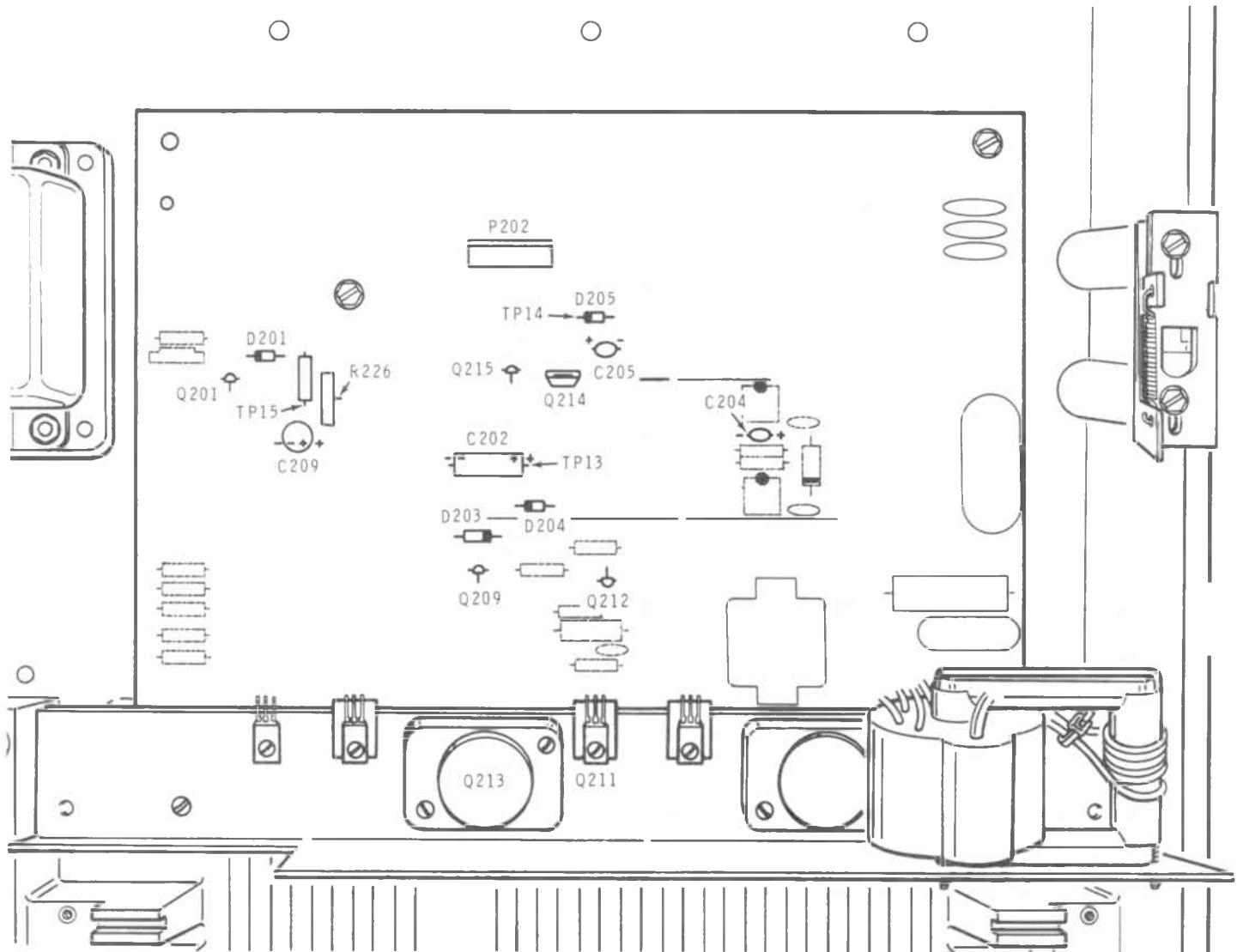
- () Position the video circuit board inside the terminal base as shown.

Locate the shielded cable coming from the video circuit board that has the inner lead connected to hole 1 (the hole closest to plug P202). Then connect the free end of this cable to control R216 on the rear panel as follows:

- () Inner lead to lug 3 (S-1).
- () Shield wires to lug 1 (NS).

Connect the free end of the remaining shielded cable to control R216 as follows:

- () Inner lead to lug 2 (S-1).
- () Shield wires to lug 1 (S-2).
- () Mount the video circuit board to the terminal base with four 6-32 \times 3/8" hex head screws. Be sure to position the harness and all other wires except the green wire on top of the circuit board.
- () Connect the negative lead of your meter to the heat sink. Set your meter to read DC volts.
- () Push the 6-hole connector on the harness onto plug P202 on the video circuit board.



PICTORIAL 4-18



POWER ON TESTS

Refer to Pictorial 4-18 for the following tests.

WARNING: MAKE SURE THAT THE FLYBACK CONNECTOR IS NOT CONNECTED TO THE CIRCUIT BOARD PLUG.

- () Connect the line cord plug to an AC outlet and set the POWER switch to ON.
- () Make the following voltage measurements on the video circuit board. If you obtain the correct meter reading, proceed to the next test. If you do not obtain the correct reading, refer to the "Possible Area of Trouble" column.

POSITIVE METER LEAD TO:	APPROXIMATE METER READING	POSSIBLE AREA OF TROUBLE (Refer to "Possible Circuit Board Problems" on Page 66.)
() TP13	53 VDC	1. 6-hole connector (one pin off on plug P202). 2. Diode D203, D204, or D205. 3. Capacitor C202. 4. Transistors Q209, Q211, Q212, Q213.
() TP14	6.2 VDC	1. Diodes D205 or D206. 2. Capacitors C202, C204, or C205. 3. Transistors Q214, Q215.
() TP15	Approximately 7 V. Vary control R226; meter reading should change (approximately 5 to 9 volts).	1. Diode D201. 2. Capacitor C209. 3. SCR Q201.

- () Set the POWER switch to OFF and disconnect the line cord.
- () Disconnect the harness connector from plug P202 on the video circuit board.

This completes the video circuit board checkout. Proceed to "Front Panel and CRT Installation."



TERMINAL BASE ASSEMBLY (Cont'd.)

FRONT PANEL AND CRT INSTALLATION

Refer to Pictorial 5-1 (Illustration Booklet, Page 8) for the following steps.

- () Locate the front panel and place it on your work surface on a soft cloth.
- () Install brass inserts in the front panel at CA, CB, CC, and CD.
- () Mount the bezel cover to the front of the front panel with the bezel mounting plate and six 6-32 × 3/8" hex head screws.

WARNING

Use extreme caution when you handle the CRT. Do not strike, scratch, or subject the picture tube to more than moderate pressure at any time. Due to its high vacuum and large glass surface, a fracture of the glass could result in an implosion of considerable violence.

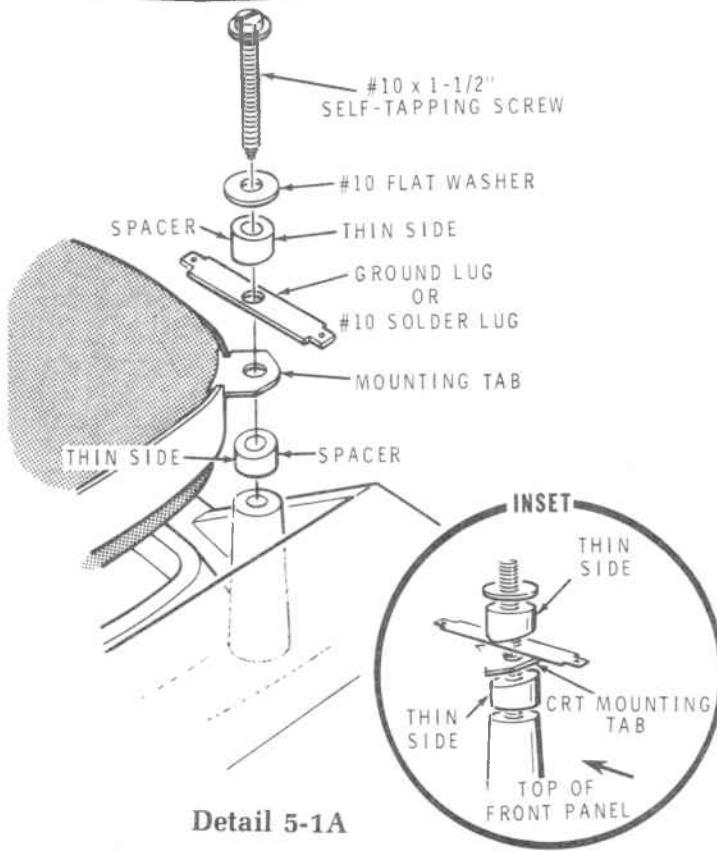
NEVER LIFT THE CRT BY ITS NECK. Always lift it by the edges around the face of the tube. When you handle the CRT, do not touch the anode socket, as you can receive an electrical shock even though the CRT has not been used.

- () Open the CRT so the face of the tube (not the neck) is positioned up. Then hold the CRT in the box and turn the box bottom-side-up on a padded surface.

- () Lift the box slowly, allowing the CRT to slide out onto the padded surface.
- () If there is a plastic film over the face of the CRT, remove it.
- () Place the CRT face down in the front panel as shown. Note the position of the anode socket.
- () Locate two beveled spacers, a ground connector, a #10 flat washer, and a #10 × 1-1/2" self-tapping screw. Use these parts in the next step.

NOTE: When you install the beveled spacers in the next step, be sure to position their beveled sides toward each other.

- () Refer to Detail 5-1A and loosely mount the CRT mounting tab to the front panel at CE with the hardware from the previous step. Do not tighten this hardware.
- () In the same manner, loosely mount the CRT mounting tabs at the other three corners of the CRT, except use a #10 solder lug at each location in place of the ground lug.
- () Refer to the inset drawing on Detail 5-1A and position the bevel of the spacers at CE as shown. Also refer to Pictorial 5-1 and position the ground lug as shown. Then tighten the hardware.
- () In the same manner, position the spacers and solder lugs at the other three corners of the CRT and tighten the hardware.



Detail 5-1A

- () Connect the hooked end of a long spring to solder lug CF and connect another long spring to CG.
- () Insert one end of the bare wire through the upper hole in the ground connector at CE for a length of 1-1/2" and wrap it back around itself to secure it. Then solder the wire to the lug.
- () Route the other end of this wire through the springs at CF and CG and through solder lug CH. Pull on the wire until both springs are stretched slightly. Then securely fasten the wire back on itself at CH. Cut off the excess bare wire.
- () Bend the lower half of ground lug CE up at a 90° angle.
- () Locate the yoke and trim the bare wire ends to 1/8".
- () Crimp and solder a large spring connector to the end of each yoke lead.
- () Insert the spring connector on the blue yoke lead into hole 4 of a 4-hole connector shell.
- () In the same manner, insert the red yoke lead into hole 2 of the same connector shell.

- () Insert a large polarizing plug in hole 3 of the same connector shell.
- () Insert the spring connector on the yellow yoke lead into hole 1 of another 4-hole connector shell.
- () In the same manner, insert the brown yoke lead into hole 3 of the same connector.
- () Insert a large polarizing plug in hole 2 of the same connector shell.
- () Slide the yoke over the neck of the CRT with the leads coming from the yoke as shown. Push the yoke firmly against the flared part of the CRT.
- () Tighten the yoke clamp screw only enough to keep the yoke from moving freely on the neck of the CRT.

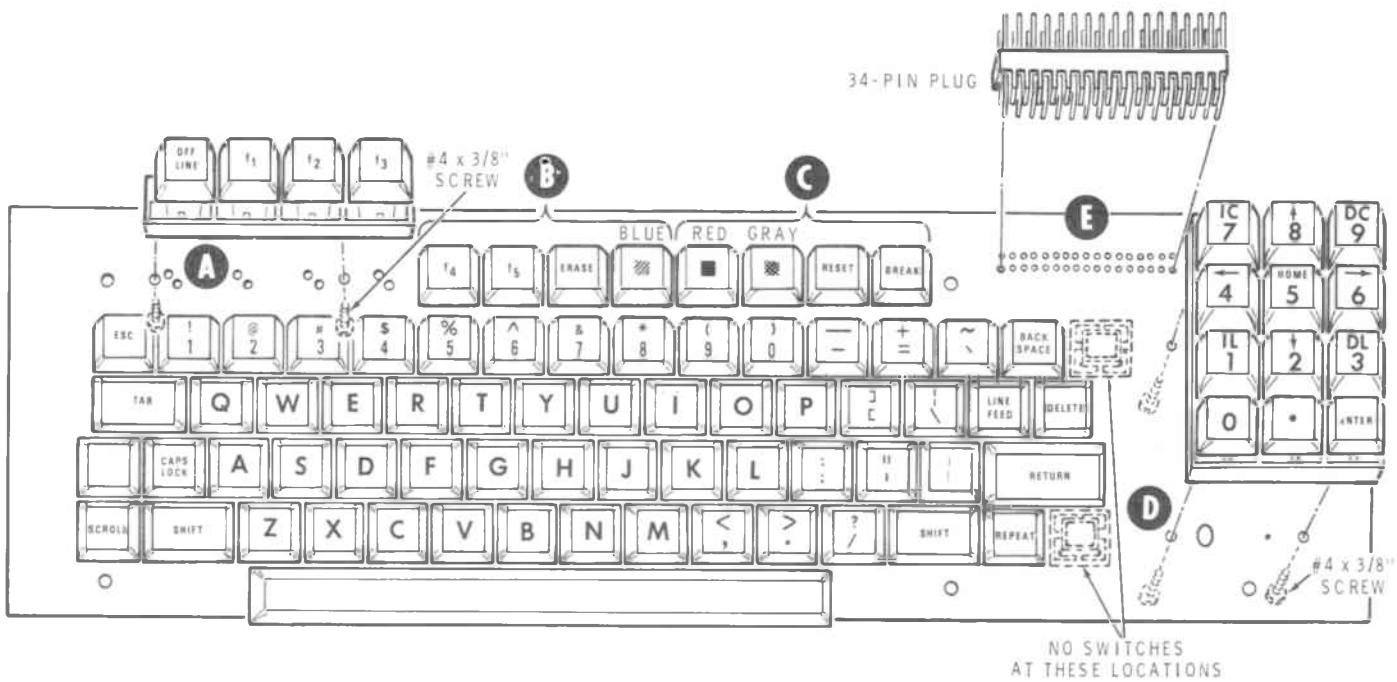
Refer to Pictorial 5-2 (Illustration Booklet, Page 8) for the following steps.

- () Position the front of the terminal base over the edge of your work surface far enough so you can reach the mounting holes underneath. Be careful that you do not extend the base too far over the edge.
- () Locate four 10-32 × 1" screws, four #10 flat washers, and two front panel mounting plates. Use this hardware in the following step.

NOTE: It is advisable to have someone help you mount the front panel in the following steps.

- () Set the front panel into the terminal base and secure it with the hardware from the previous step. Install all of the hardware before you tighten it. Position the front panel as far forward as the hardware will permit. Then set the terminal base back on your work surface.
- () Refer to Detail 5-2A (Illustration Booklet, Page 8) and loosen the screw at CH and the 6-32 × 3/8" hex head screw at the left end of the video circuit board heat sink. Do not remove these screws.
- () Refer to the inset drawing on Detail 5-2A and insert the lower end of the brace under the 6-32 × 3/8" hex head screw on the heat sink. Insert the other end of the brace under the screw at CH. Tighten both screws.

Set the cabinet base aside temporarily and proceed to "Keyboard Assembly."



PICTORIAL 5-3

KEYBOARD ASSEMBLY

Refer to Pictorial 5-3 for the following steps.

- () Position the circuit board with the foil side facing up. Make sure there are two pins present at each key location under the keyboard. (NOTE: There are two unused key locations on the keyboard.) If a pin is missing at any of the designated hole locations, remove the keyboard mounting hardware, straighten the bent pin, and replace the keyboard. After you check all of the pad locations for pins, solder the pins to the foil.
- () Position the keyboard facing up as in the Pictorial.
- () Mount the 4-key keypad (Off Line-f₁-f₂-f₃) at location A with two #4 × 3/8" self-tapping screws. Position the keypad as shown and solder the pins to the foil.
- () Mount the 4-key keypad (f₄-f₅-Erase-Blue) at location B with two #4 × 3/8" self-tapping screws. Position the keypad as shown and solder the pins to the foil.

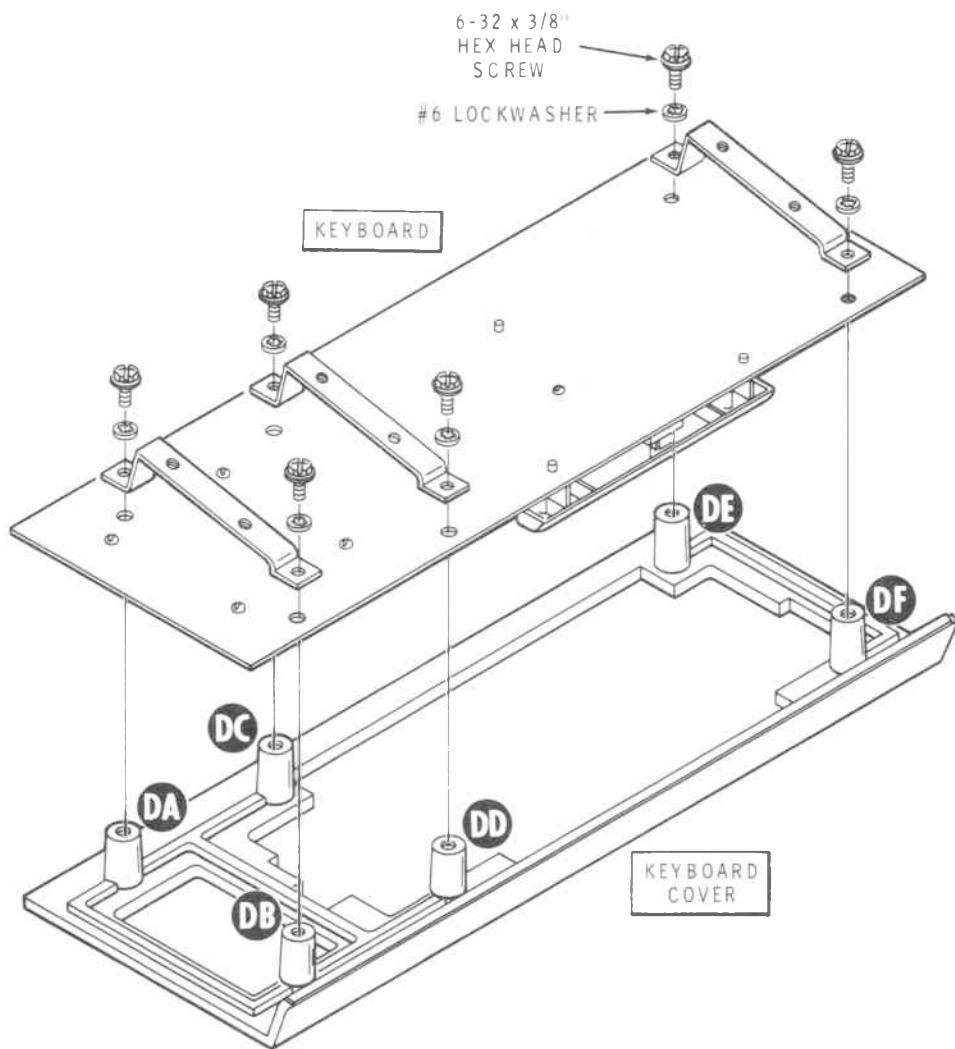
() Mount the 4-key keypad (Red-Gray-Reset-Break) at location C with two #4 × 3/8" self-tapping screws. Position the keypad as shown and solder the pins to the foil.

- () Mount the 12-key keypad at location D with four #4 × 3/8" self-tapping screws. Position the keypad as shown and solder the pins to the foil.
- () Mount the 34-pin plug at location E. Insert the right angle pins through the circuit board holes and solder the pins to the foil.

Circuit Board Checkout

Carefully inspect the circuit board for the following conditions:

- () Unsoldered pin connections.
- () "Cold" solder connections.
- () Solder bridges between foil patterns.



PICTORIAL 5-4

KEYBOARD COVER INSTALLATION

Refer to Pictorial 5-4 for the following steps.

- () Locate the keyboard cover and place it painted side down on a soft cloth.
- () Install brass inserts into the bosses at DA, DB, DC, DD, DE, and DF.
- () Place the keyboard in the keyboard cover. Then mount a keyboard bracket at DE and DF with two 6-32 x 3/8" hex head screws and two #6 lockwashers. Do not tighten this hardware.
- () In the same manner, install a keyboard bracket at DA and DB. Do not tighten this hardware.
- () Install a keyboard bracket at DC and DD. Gently tighten the hardware on all three brackets.
- () Push all of the keys nearest the keyboard cover and check for freedom of movement. If any of the keys bind against the keyboard cover, loosen the screws in the keyboard brackets and reposition the cover. Then tighten the screws.



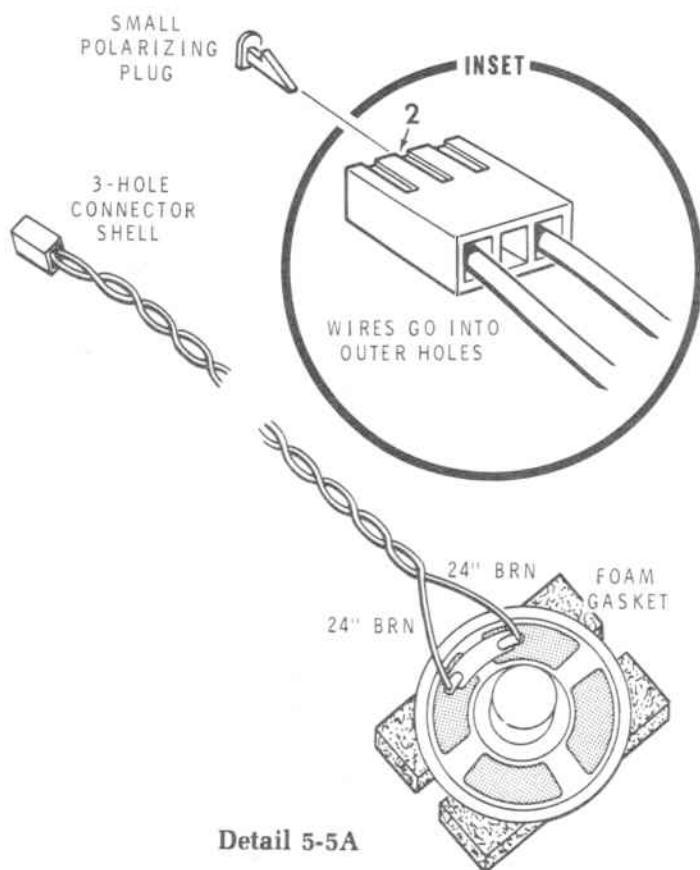
KEYBOARD INSTALLATION

Refer to Pictorial 5-5 (Illustration Booklet, Page 9) for the following steps.

- () Refer to inset drawing #1 and identify the marked end of the flat cable. The marked end will have either a black triangle (\blacktriangle) on one end of the socket or stripe along the outside wire edge as shown.
- () Refer again to inset drawing #1 and push one end of the flat cable onto plug P301 on the keyboard. Position the marked end as shown.
- () Set the keyboard in front of the terminal as shown. Then twist the flat cable one full turn counterclockwise.
- () Route the end of the flat cable through the opening in the front panel and under the video circuit board.
- () Mount the keyboard to the terminal base with six 8-32 \times 5/8" screws and six #8 flat washers.

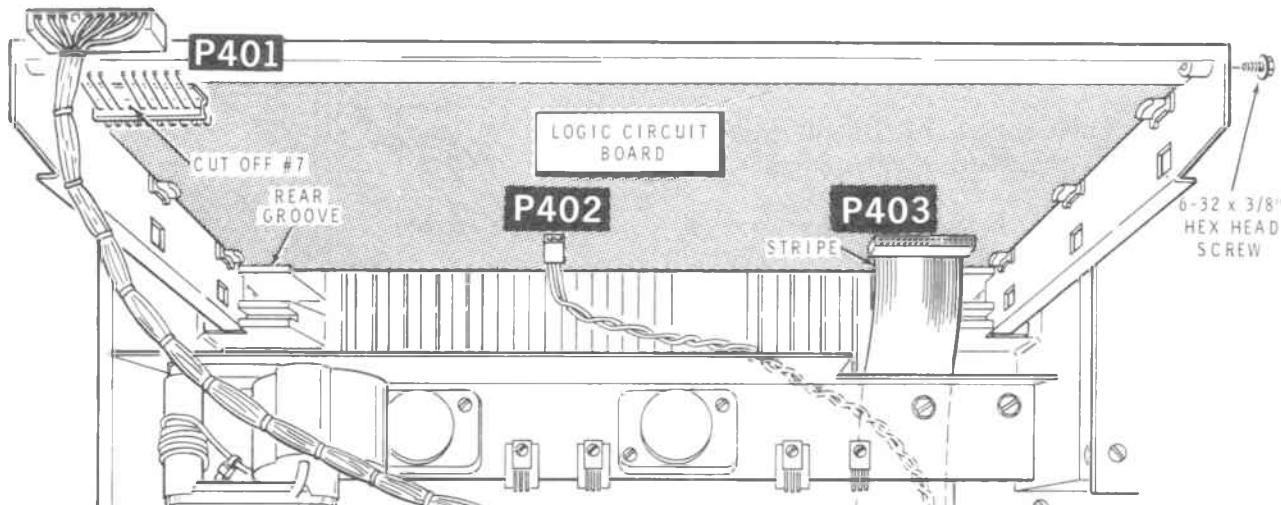
Refer to Detail 5-5A for the next eight steps.

1. () Locate the brown wire and cut it into equal lengths. Then twist these two wires together to form a twisted pair.
2. () Remove 1/8" of insulation from one end of each brown wire and 1/4" of insulation from the other end. Apply a small amount of solder to the bare wire ends to hold the fine wire strands in place.
3. () Crimp and solder small spring connectors onto the 1/8" ends of the twisted pair.
4. () Insert the spring connectors into a 3-hole connector shell as shown.
5. () Insert a small polarizing plug into hole 2 of this connector shell.
6. () Solder the other end of the twisted pair to the speaker lugs. It does not matter which wire goes to which lug.
7. () Locate the 3/4" \times 5" foam gasket and cut it into two equal lengths.



Detail 5-5A

8. () Remove the protective paper backing from one side of both lengths of foam gasket and press the gaskets to the cone side of the speaker. It does not matter if the gasket sticks to the paper cone; however, do not press on the paper cone.
 9. () Remove the protective paper backing from the other side of the foam gasket. Then press the speaker to the back of the front panel just forward of the power transformer.
 - () Route the speaker wires along the video circuit board toward the rear panel and under the video circuit board heat sink.
- Refer to Pictorial 5-6 for the following steps.
- () Locate two circuit board brackets and six nylon guides.
 - () Refer to Detail 5-6A and install these nylon guides into each bracket. NOTE: There are six holes in each bracket. Be sure to use the correct holes.

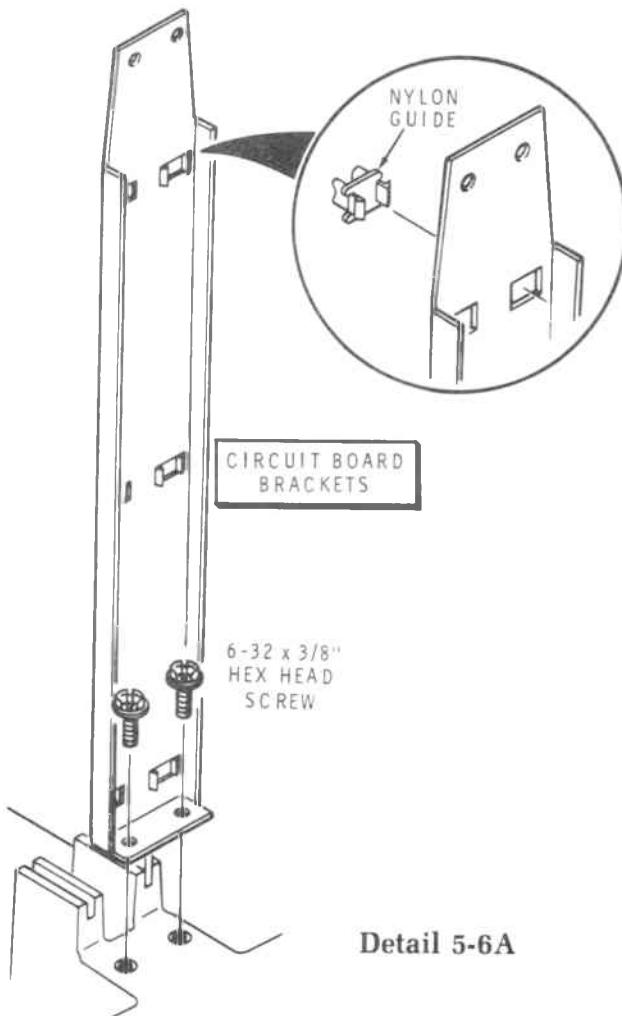


PICTORIAL 5-6

- () Refer again to Detail 5-6A and mount the brackets to the base with four 6-32 × 3/8" hex head screws.
- () Slide the logic circuit board down into the nylon guides. Set the board into the rear grooves at the back of the terminal base. Position the board with the heat sink up and the component side forward.

NOTE: Location U423 on the logic circuit board is not used.

- () Push the connector on the end of the twisted speaker wires onto plug P402 on the logic circuit board.
- () Push the connector on the flat cable onto plug P403 on the logic circuit board. Make sure the cable is positioned with the stripe away from the edge of the circuit board.
- () Secure the circuit board heat sink to the circuit board brackets with 6-32 × 3/8" hex head screws.
- () Use wire cutters to snip off pin 7 of plug P401, if this has not already been done. Numbers printed on the circuit board show how the pins are numbered.
- () Connect the 10-hole harness connector to plug P401 on the logic circuit board.



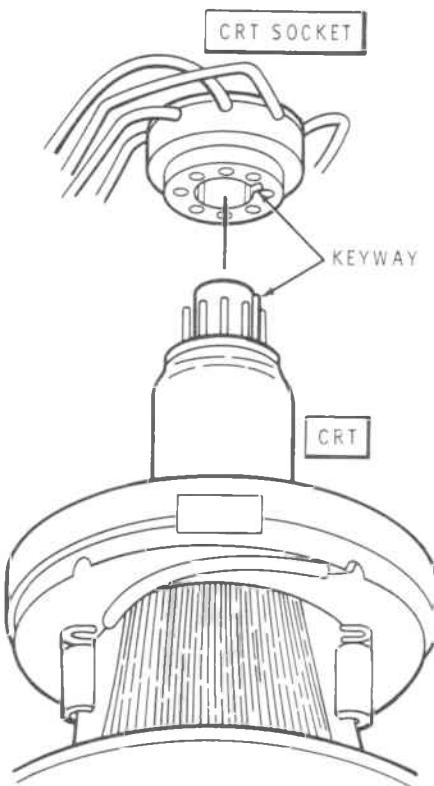
Detail 5-6A

Refer to Pictorial 6-1 (Illustration Booklet, Page 9) for the following steps.

- () Push the 4-hole socket with the blue and red wires onto plug P204 on the video circuit board.
- () Push the 4-hole socket with the brown and yellow wires onto plug P201 on the video circuit board.
- () Push the 8-hole socket coming from the flyback transformer onto plug P203 on the video circuit board.

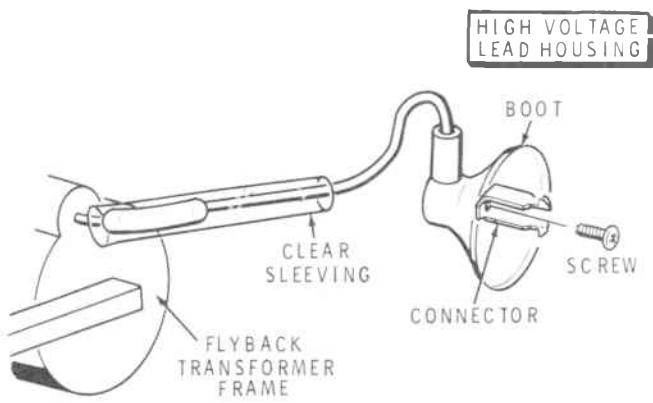
WARNING: It is extremely important that the black GND wire, that you will connect in the next step, always be connected whenever the unit is in operation. To apply power to the unit without this wire connected will result in a very dangerous high voltage situation.

- () Push the connector on the end of the black GND wire onto the solder lug at CE.
- () Remove and discard the plastic pin protector from the CRT pins.
- () Refer to Detail 6-1A and line up the keyway in the CRT socket with the key on the CRT. Then carefully push the socket onto the CRT.
- () Route the CRT socket leads down to the video board and away from the high voltage transformer.

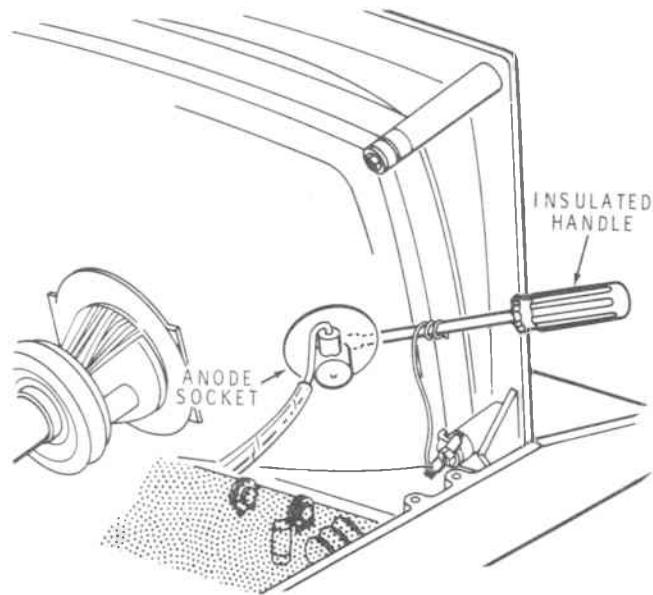


Detail 6-1A

- () Temporarily connect one end of the remaining black wire to the solder lug at CE. Then touch the other end of this wire to the anode socket on the CRT to discharge any stored-up charge. Then remove the wire.



Detail 6-1B



Detail 6-1C

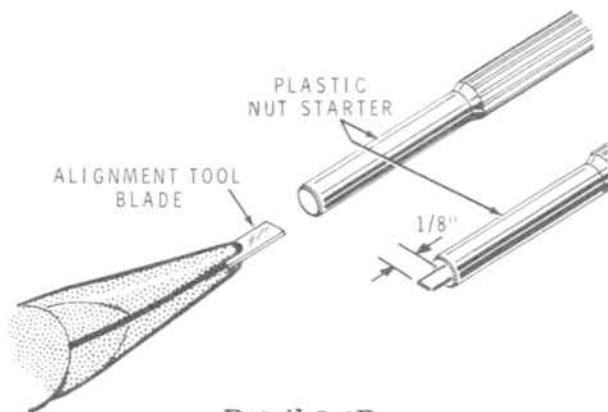
Refer to Detail 6-1B for the next four steps.

- () Remove the screw and connector from the high voltage connector housing.
- () Pull the high voltage lead out of the connector housing.
- () Slide the length of large clear sleeving over the high voltage lead. Position the sleeving down to the flyback transformer.
- () Insert the high voltage lead into the housing as far as it will go. Then reinstall the connector and screw.
- () Refer to the inset drawing on Pictorial 6-1 and install the high voltage lead in the anode socket. Position the connector housing so the lead is up (exits toward the top of the CRT). Make sure this lead is positioned away from the CRT brace.

WARNING: The voltage on the high voltage lead is very high (especially next to the high voltage transformer) and will arc to any other wires near it. Refer to Pictorial 6-1 and position all other leads away from the high voltage lead and the high voltage transformer.

NOTE: If it ever becomes necessary to remove the high voltage lead from the CRT, refer to Detail 6-1C and proceed as follows:

1. First discharge the CRT. This is important, since the high voltage present at the CRT anode is dangerous. Connect one end of a wire to the solder lug at CE, and connect the other end to a small-blade screwdriver. Then slip the screwdriver under the plastic boot on the high voltage connector to make contact with the anode socket. **CAUTION:** Do not touch anything with your other hand while you perform this step.
2. Fold the plastic boot back and use a screwdriver to push one of the high voltage clips toward the other. This will permit you to remove the connector.



Detail 6-1D

- () Refer to Detail 6-1D and push the alignment tool blade into the small end of the nut starter. Leave 1/8" of the blade protruding as shown. Use this tool to turn circuit board controls.

VIDEO ADJUSTMENTS

- () Set BRIGHTNESS control R216 (on the rear panel) to its full clockwise rotation as viewed from the rear of the terminal base.
- () Set the other controls on the video circuit board to their center of rotation.
- () Push the 6-hole harness connector onto plug P202 on the video circuit board.
- () On the logic circuit board, set switch slider #2 on S402 to its "1" position.

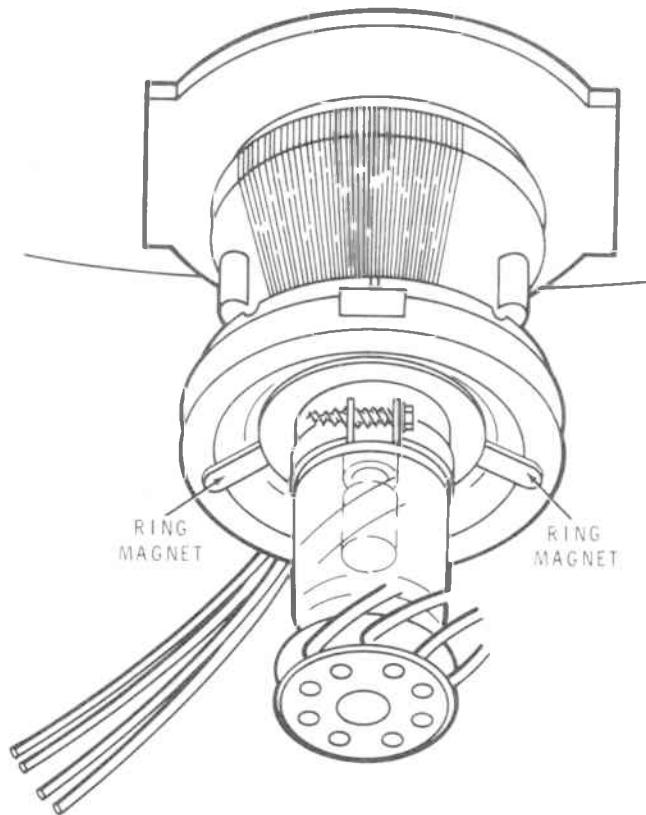
NOTE: When power is applied to the Video Terminal circuits, avoid contact with the flyback transformer, the high voltage lead, or the anode socket in the back of the CRT, as it is possible to receive an electrical shock from these areas. Also, to lessen the chances of an electrical shock while you are making adjustments, keep your other hand away from the Video Terminal and all other metallic objects.

CAUTION: Whenever you turn the power on, make sure you wait at least 30 seconds or until you get a cursor or light raster on the screen before you turn the power off again. A quick turn on and off can cause damage to the CRT.

- () Connect the line cord to an AC outlet and set the POWER switch to ON.
- () After a short warm-up time, a light raster should appear on the screen. If it does not, adjust control G1 (R268) counterclockwise, as viewed from the left side, to cause the raster to appear. NOTE: The raster may be slanted at this time.
- () Grasp the yoke on the back of the CRT and slowly turn the yoke to properly line up the raster on the screen.
- () Adjust the VERT SIZE control R226 (on the video circuit board) so the display is approximately 6" high.
- () Refer to Pictorial 6-3 and rotate the ring magnets on the back of the yoke to center the display on the screen.
- () Adjust the BRIGHTNESS control (R216) on the rear panel to obtain the brightness that is most suitable to you.

NOTE: If the cursor is approximately 1/8" long and positioned near the upper left, disregard the next step. If the cursor is longer and not at the left side of the screen, proceed with the next step.

- () Turn the HORIZ CENTERING control (R253) on the video circuit board counterclockwise (as viewed from the left side) until the cursor moves all the way left and then just begins to move right again. Then turn the control counterclockwise until the cursor is positioned approximately 1/4" in from the left edge of the raster.
- () Set the OFF LINE and CAPS LOCK keys to their down position.
- () Hold the "Z" key and the REPEAT key down and fill the screen with characters.
- () Adjust the HORIZ CENTERING control (R253) on the video circuit board to center the display horizontally.
- () Adjust the VERT LINEARITY control (R228) on the video circuit board so the top and bottom row of characters are of uniform size.



PICTORIAL 6-3

NOTE: The next adjustment should be made in a darkened room.

- () Turn control G1 (R268) on the video circuit board clockwise (as viewed from the left) until the raster just disappears.
- () If the display width is not approximately 8-1/2", adjust the WIDTH coil (L204) to correct the width.
- () Adjust the BRIGHTNESS control (R216) on the rear panel to obtain the brightness which is most suitable to you.

- () Adjust the FOCUS control (R271) on the video circuit board for the best focus.
- () Recheck the display for proper alignment of the screen. If necessary, rotate the yoke a small amount. Then tighten the yoke clamp screw only enough to hold the yoke from turning.
- () Set the POWER switch to OFF and disconnect the line cord.
- () Set slider #2 of switch S402 on the logic circuit board to its "0" position.

This completes the video adjustments. Proceed to "Final Assembly."



POSSIBLE CIRCUIT BOARD PROBLEMS

NOTE: Disregard this section unless you have a problem on a circuit board.

The components listed in the "Possible Area of Trouble" column only indicate an area. This means that the component or part of the circuit associated with this component may be faulty. The causes of trouble most often found are listed below. Check these possibilities carefully.

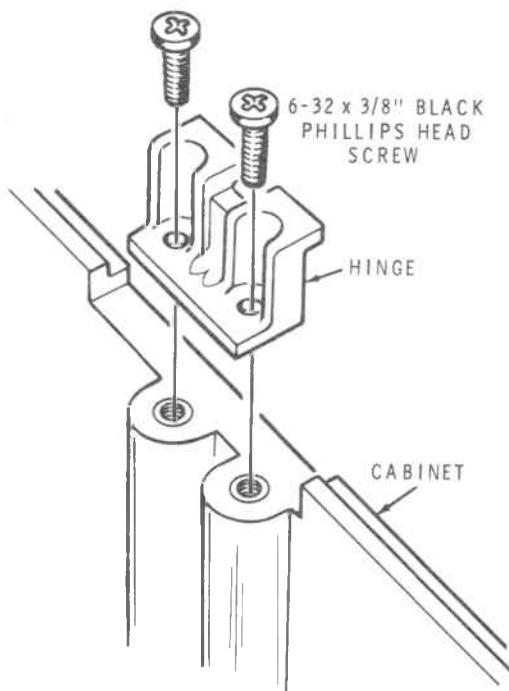
1. Solder bridges between two different foil pads. If the solder is bridged between two connections on the same foil, it is all right.
2. Diodes installed backward. Some diode bands are difficult to see. A diode that is installed backward will not operate properly.
3. Transistors installed backward. A transistor that is installed backward will not operate properly.
4. Diodes or transistors installed in the wrong location. Refer back to the steps where these components were installed and check the part numbers.
5. Electrolytic capacitors installed backward. Make sure that the plus (+) or minus (-) marks on the capacitor correspond to the markings on the circuit board.
6. IC's incorrectly installed in their sockets. An IC pin may be bent under the IC instead of inserted into the socket hole. An IC that is installed backward will not operate properly.
7. Capacitors (mica, ceramic or Mylar) may be the wrong value. For instance, it is easy to install a 500 pF capacitor in place of a .005 μ F.

If you can not resolve your problems here, refer to the "In Case of Difficulty" section in the "Operation Manual" on Page 21.

FINAL ASSEMBLY

Refer to Pictorial 7-1 (Illustration Booklet, Page 10) for the following steps.

- () Locate the long foam gasket and peel the protective paper from one end for a length of approximately 3". Peel more paper off as you install the gasket.
- () Starting at the base on the right side, press the gasket to the edge of the front panel. Proceed around the front panel edge to the base on the other side. Cut off any excess foam gasket.
- () Insert a small polarizing plug into hole 4 of the socket on the 9-wire interconnect cable.
- () Cut pin 4 off plug P404 (on the foil side of logic circuit board) if this has not already been done.
- () Refer to the inset drawing on Pictorial 7-1 (Illustration Booklet, Page 10) and push the connector end of the 9-wire interconnect cable onto plug P404. Make sure that the gray wire end of the connector is positioned down.
- () Remove the protective paper backing from the blue and white label. Then place the label in a convenient place on the back of the terminal base.
- () Install six brass inserts in the cabinet at EA, EB, EC, and ED.
- () Apply Vibra-Tite to the inside threads of the inserts at EC and ED.



Detail 7-1A

- () Refer to Detail 7-1A and mount a hinge to the cabinet at EA. Use two 6-32 × 3/8" black philips head screws.
- () In the same manner, mount a hinge to the cabinet at EB.
- () Turn a latch pin into the cabinet at EC until it is tight.



- () In the same manner, turn a latch pin into the cabinet at ED.
- () Position the cabinet over the terminal and slide the cabinet hinges into the slots in the rear panel on the terminal base.
- () Lower the front of the cabinet shell so that the latch pins enter the holes in the locking plates. The pins should lock into place.

- () Remove the protective paper backing from the model label. Then press the label onto the lower bottom of the bezel cover on the front panel.

This completes the assembly of your Video Terminal. Proceed to the Operation Manual.

CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. You'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

Please do not send parts for testing, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least THREE INCHES of resilient packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022

HEATH

Schlumberger

HEATH COMPANY • BENTON HARBOR, MICHIGAN

THE WORLD'S FINEST ELECTRONIC EQUIPMENT IN KIT FORM

Heathkit® Manual

for the

VIDEO TERMINAL

Model H9

OPERATION

595-2017-03

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BENTON HARBOR, MICHIGAN 49022**

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