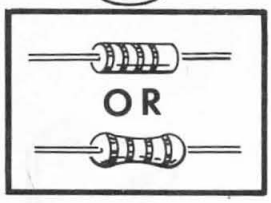
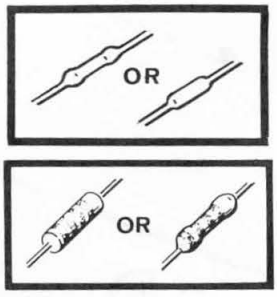
ILLUSTRAT

VERTICAL CIRCUIT

A1

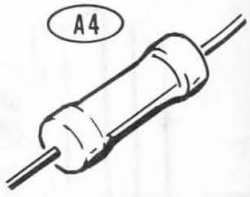


A2

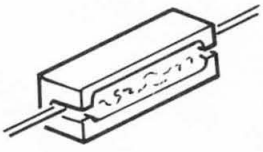


A3

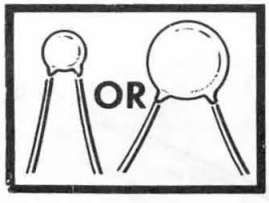
A4



A5



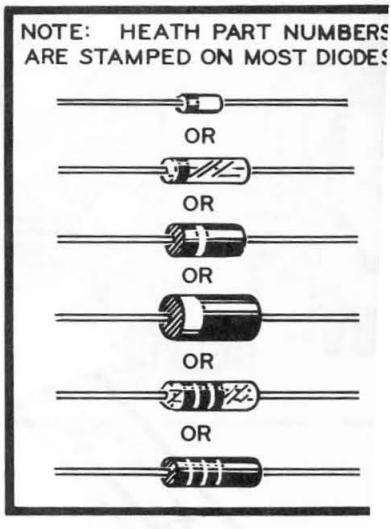
B1



B2

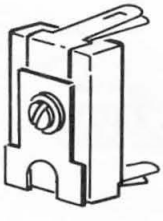
B3

C1



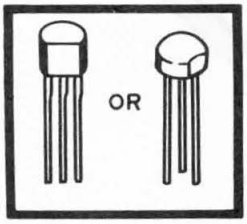
B4

B5

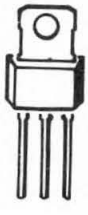


B6

D1

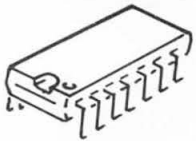


D2



D3

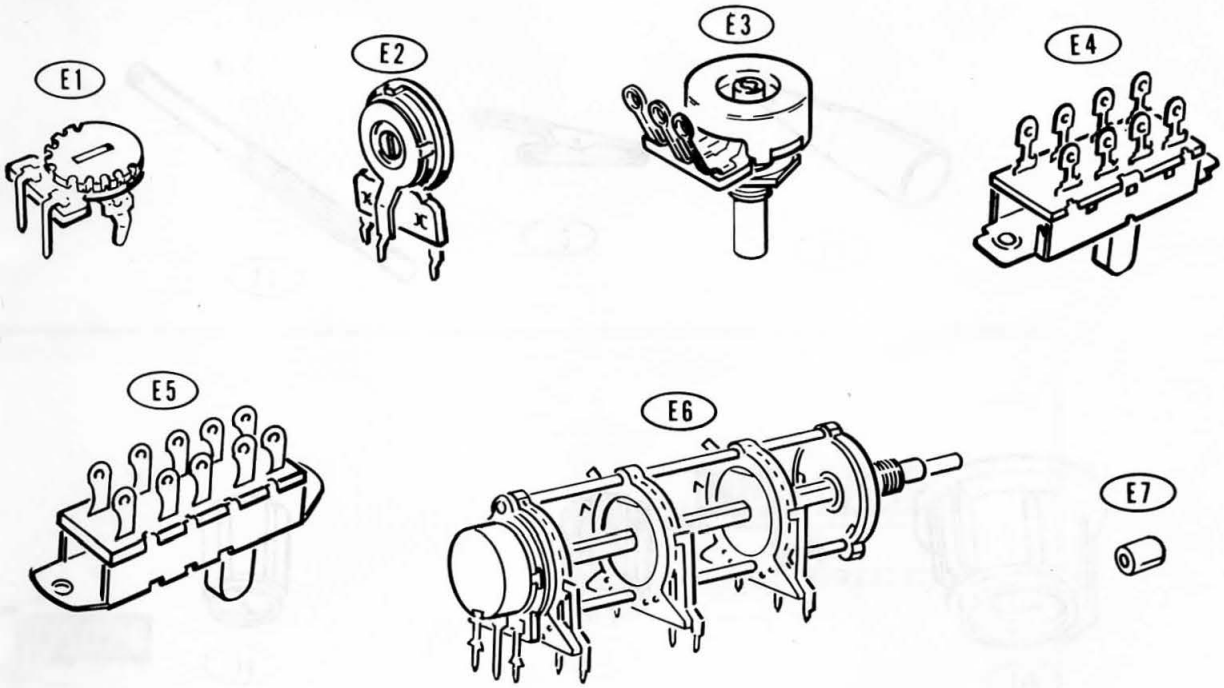
D4

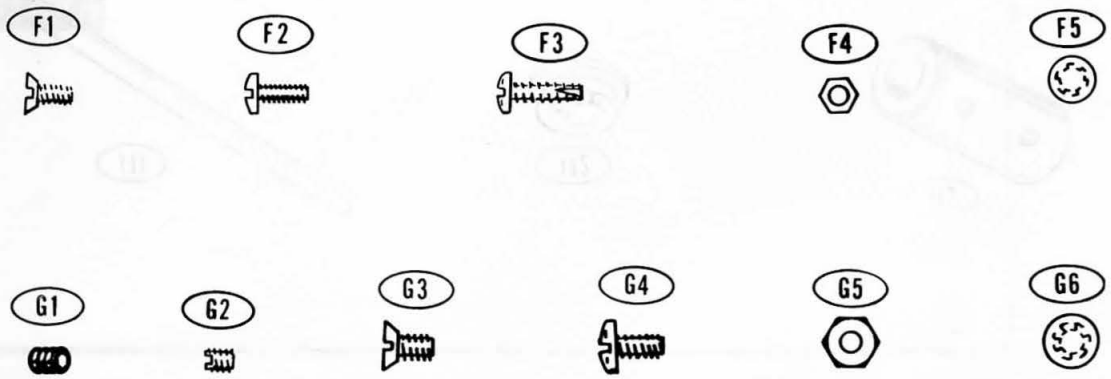


ATION BOOKLET

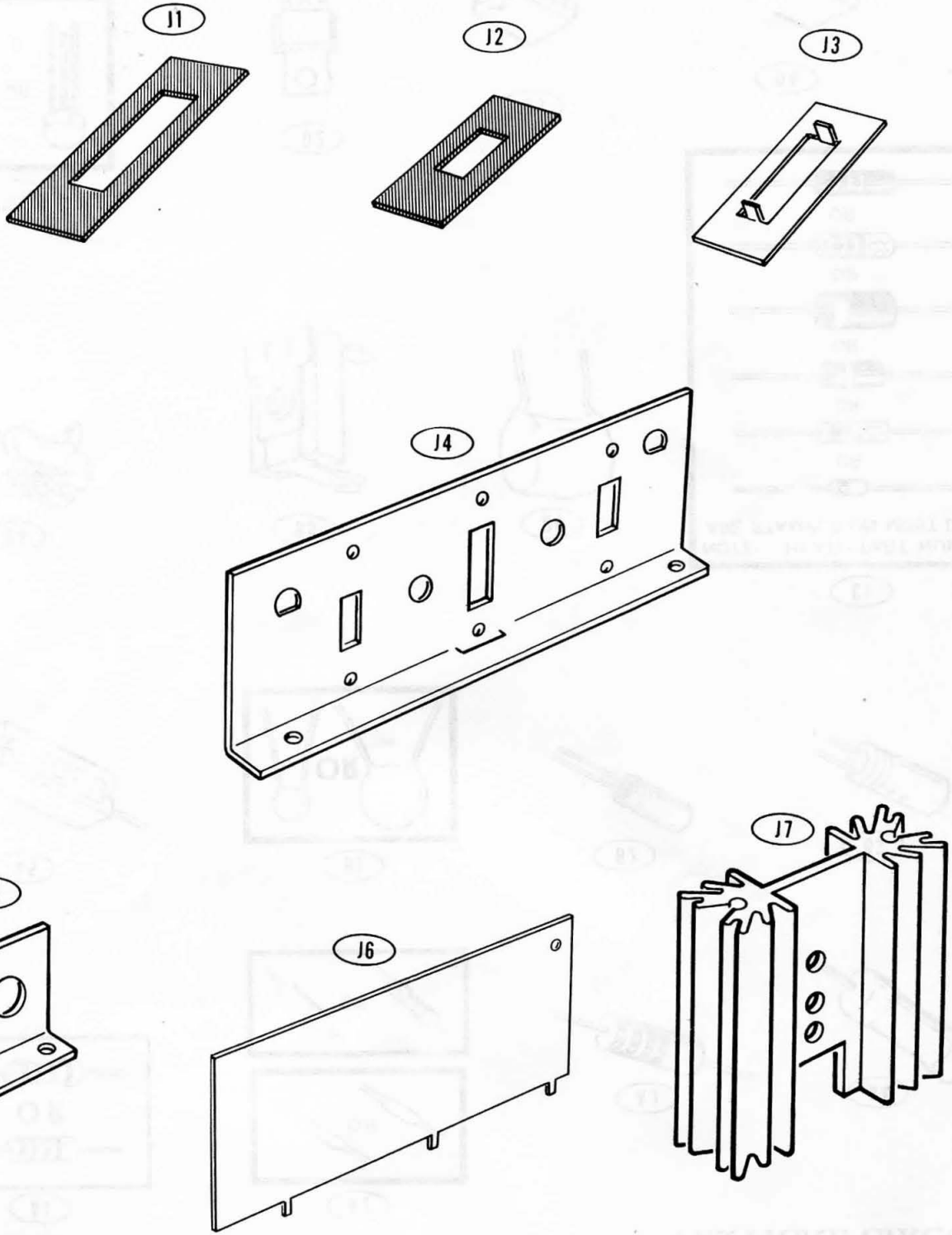
Part of 595-2072

IT BOARD PARTS PICTORIAL

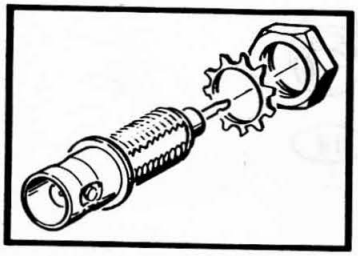




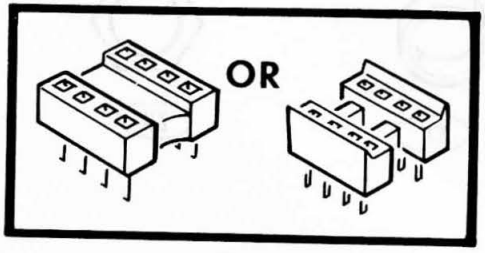
Vertical Circuit Board Parts



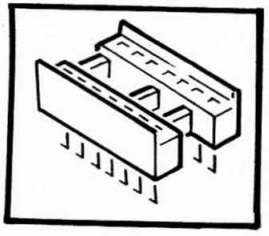
J8



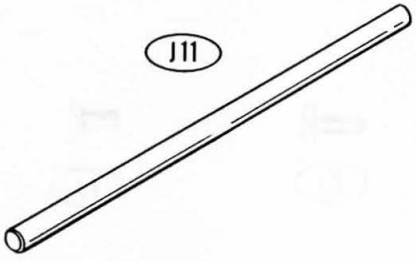
J9



J10

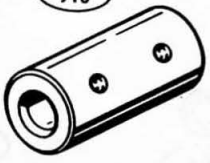


J11



J12

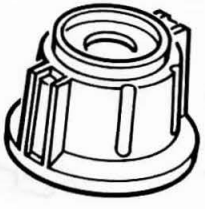
J13



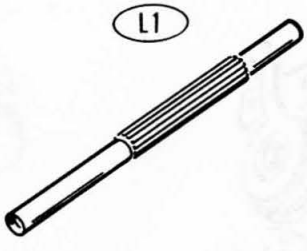
J14

J15

J16

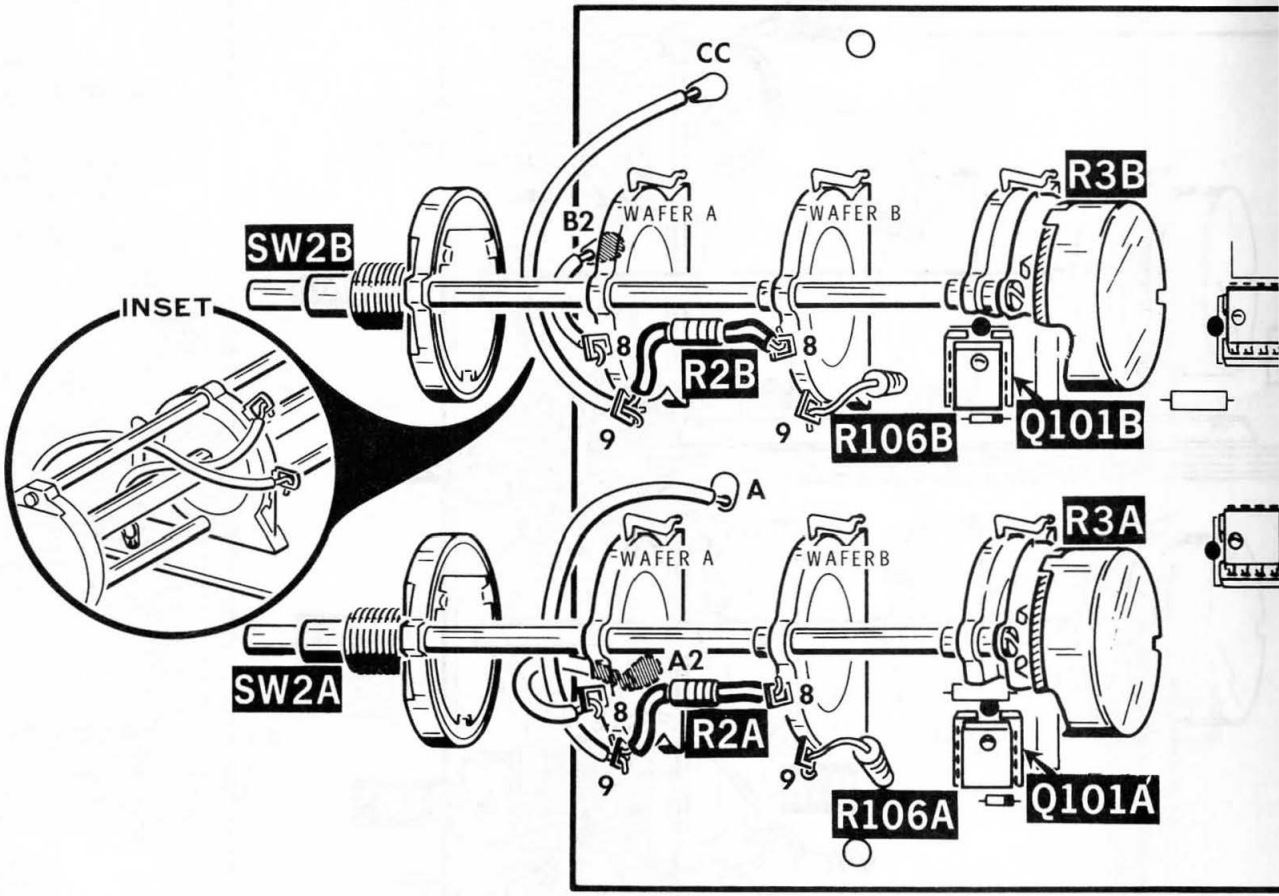


L1

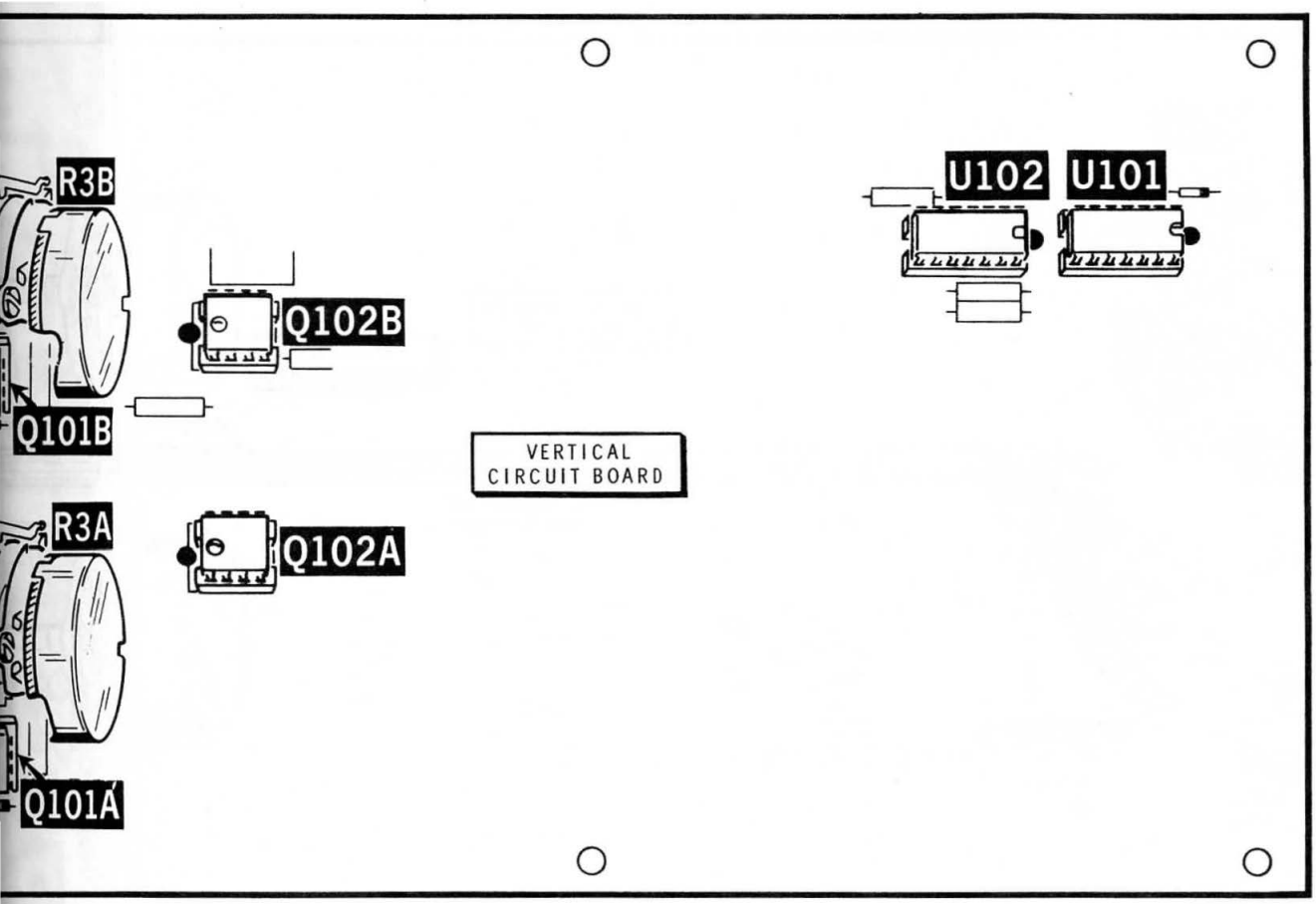


L2

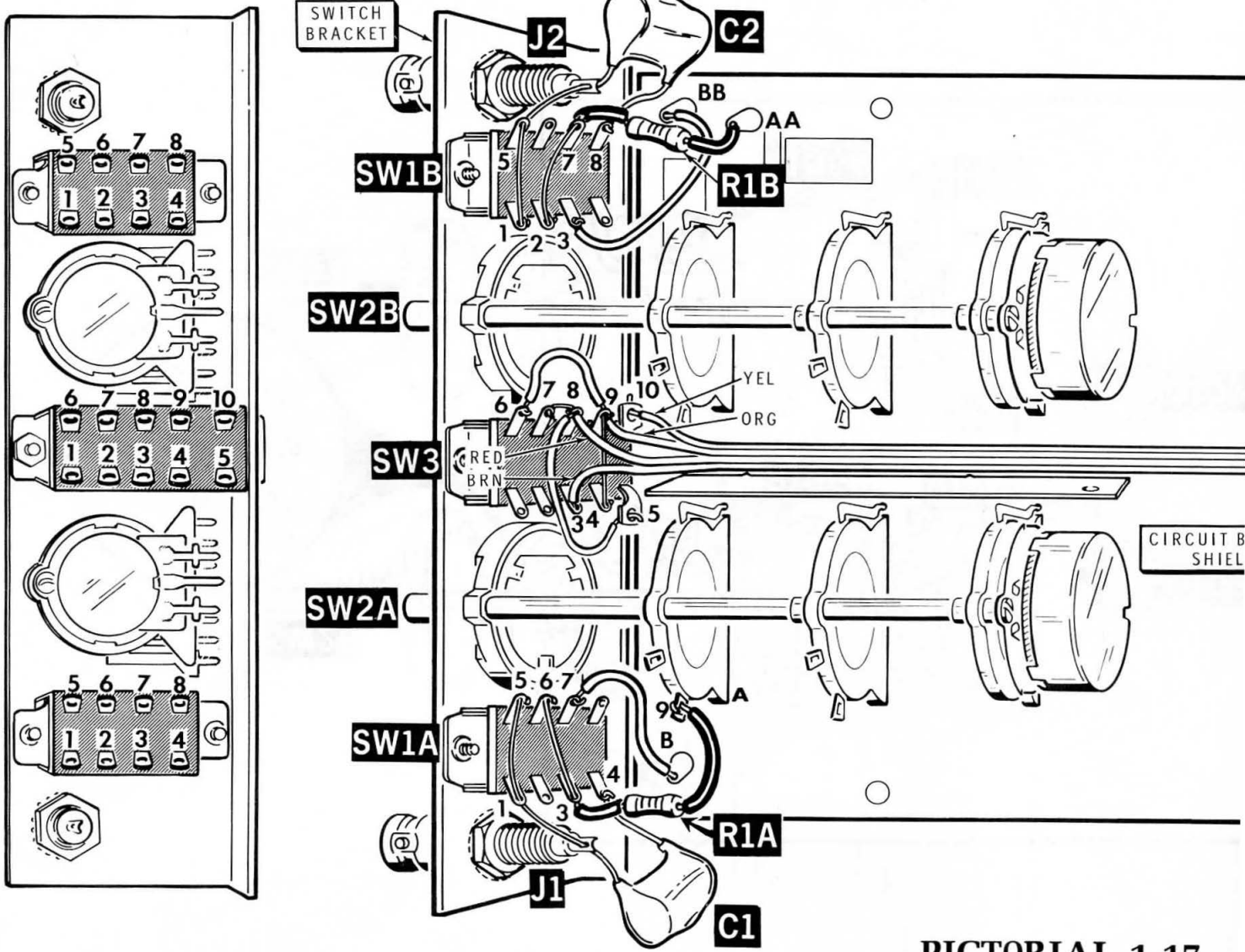
L3


CC
R3B
B2
WAFER A
WAFER B
SW2B
INSET
8
R2B
8
9
9
R106B
Q101B
A
R3A
WAFER A
WAFERB
A2
SW2A
8
8
R2A
9
9
R106A
Q101A

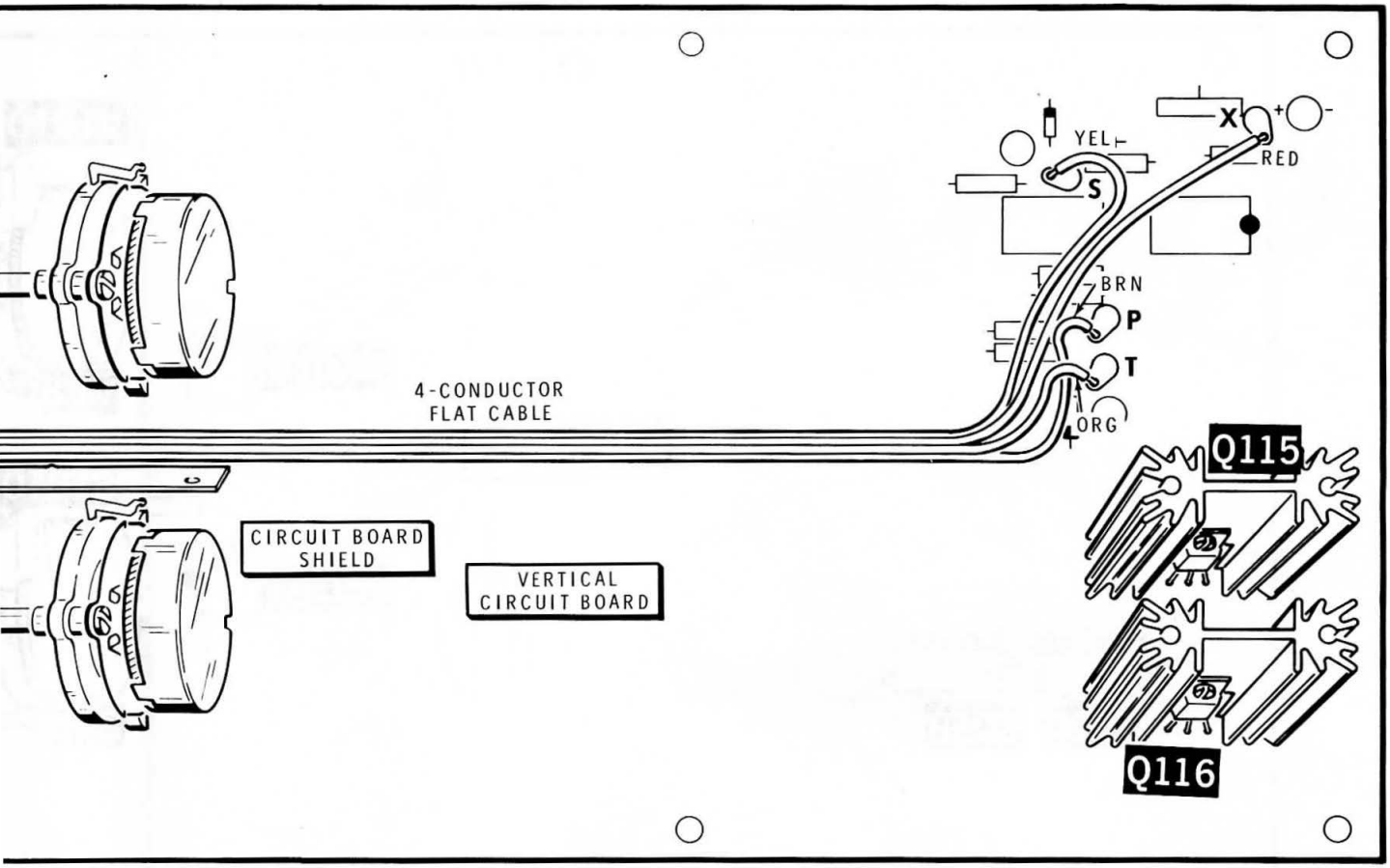
PICTORIAL 1



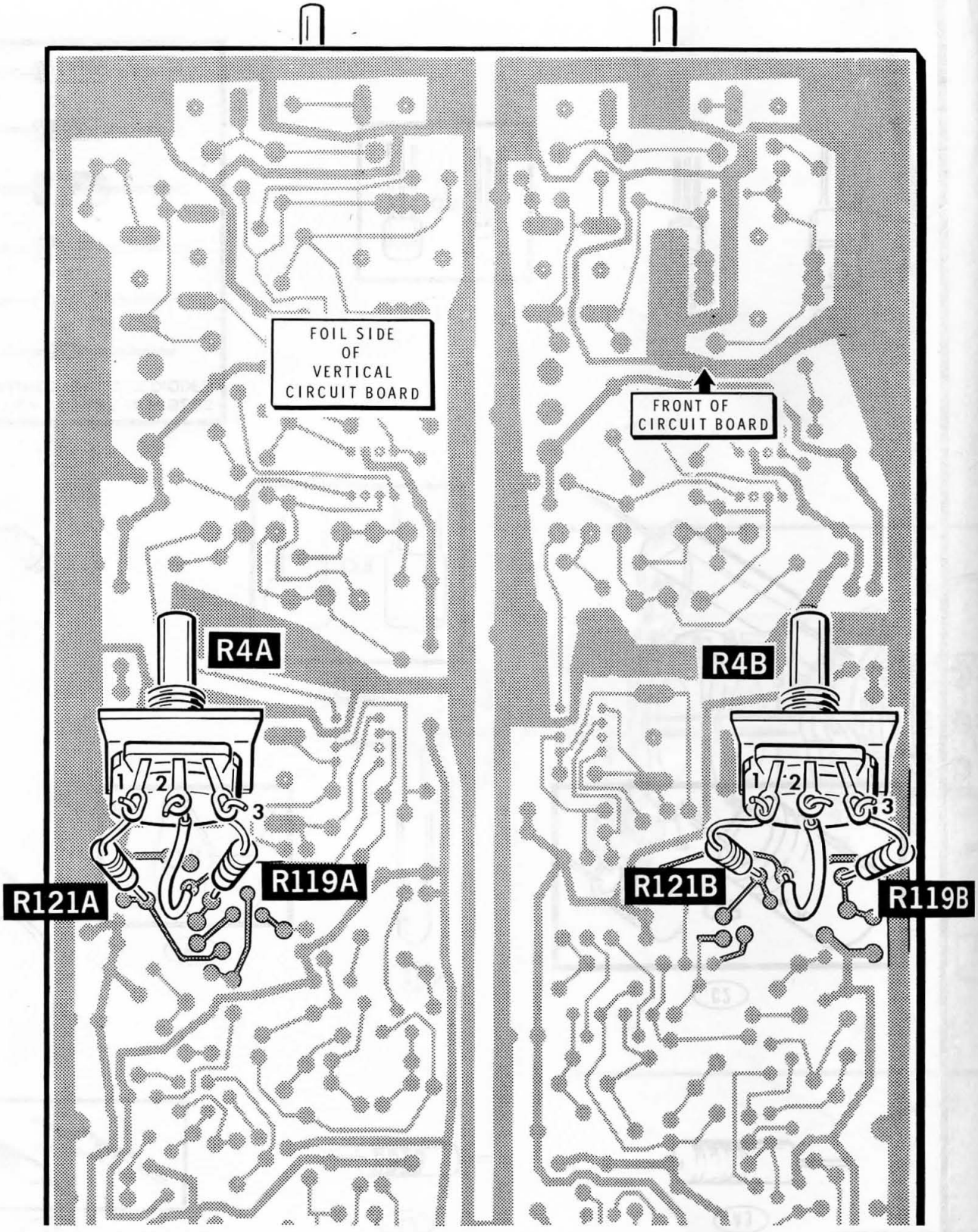
PICTORIAL 1-15



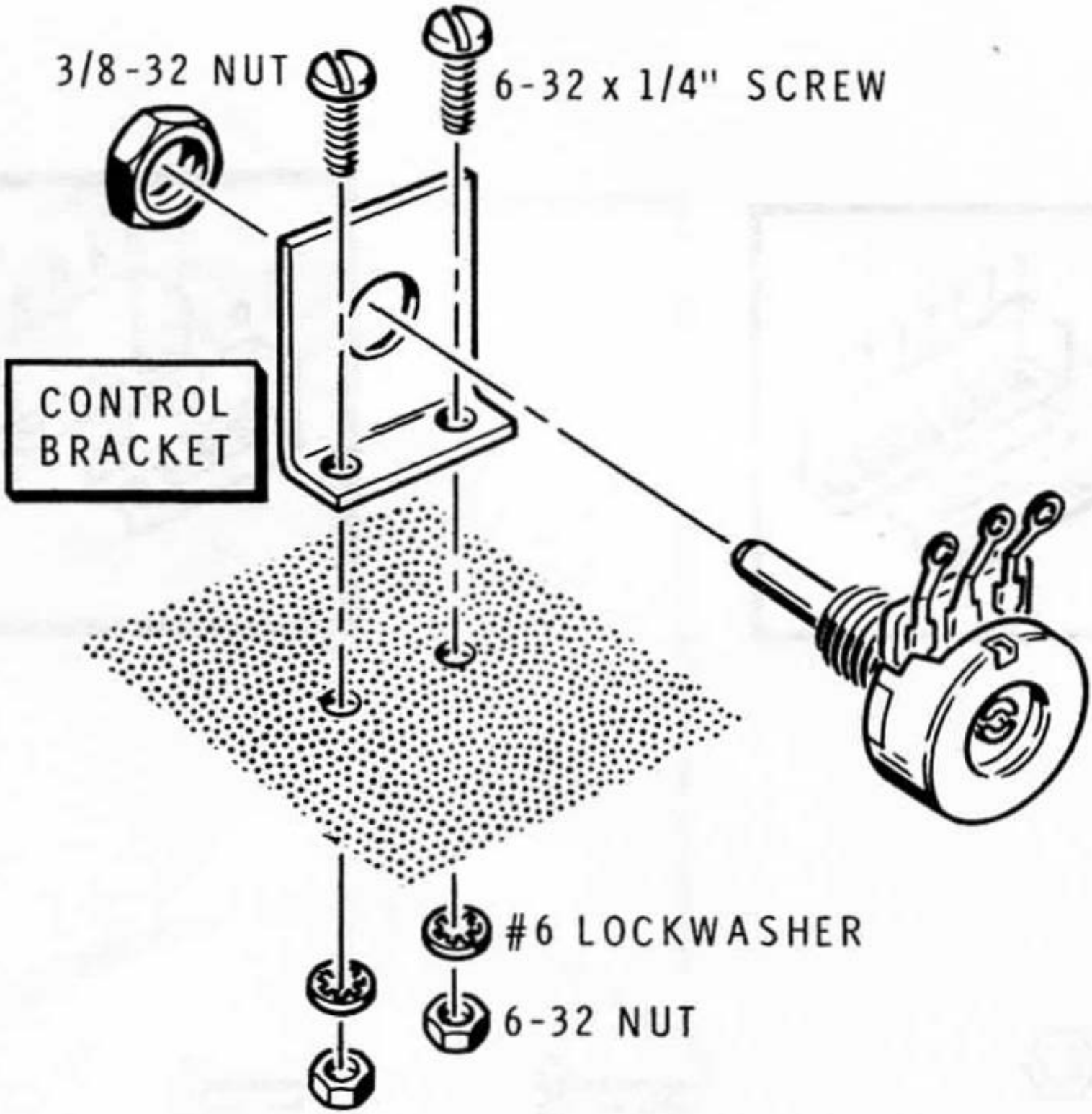
PICTORIAL 1-17



PICTORIAL 1-17



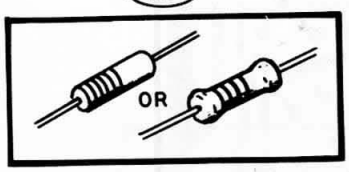
PICTORIAL 1-18



Detail 1-18A

HORIZONTAL CIRCUIT BOARD

A1

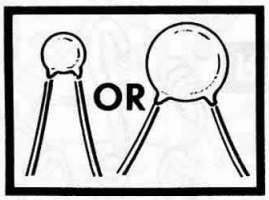


A2

A3

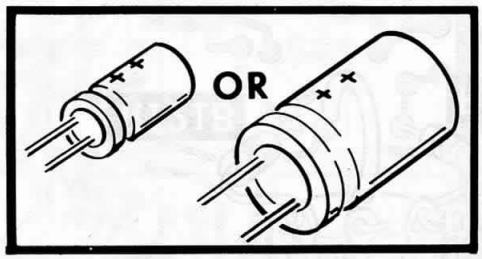
A4

B1



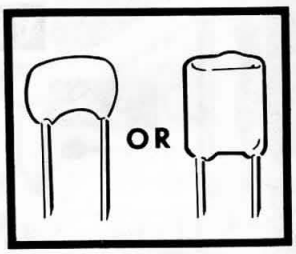
C1

C2

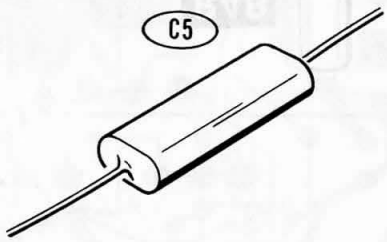


C3

C4

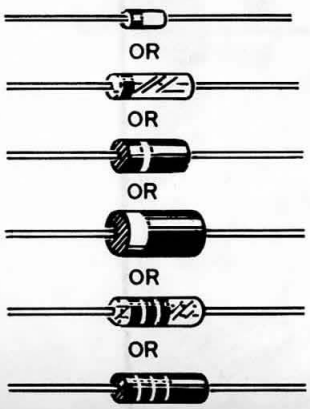


C5

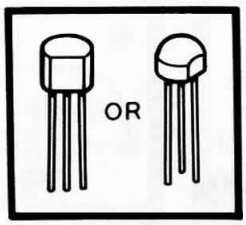


D1

NOTE: HEATH PART NUMBERS ARE STAMPED ON MOST DIODES.

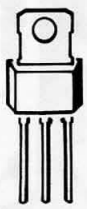


E1



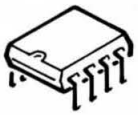
E2

E3

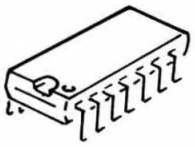


UIT BOARD PARTS PICTORIAL

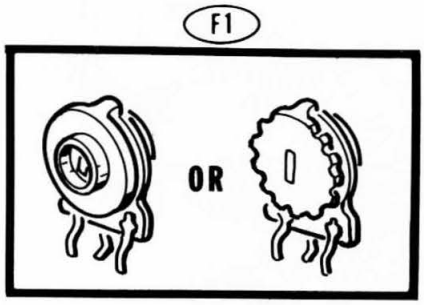
E4



E5



F1



F2

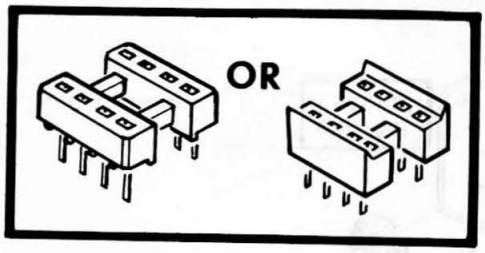
G1

G2

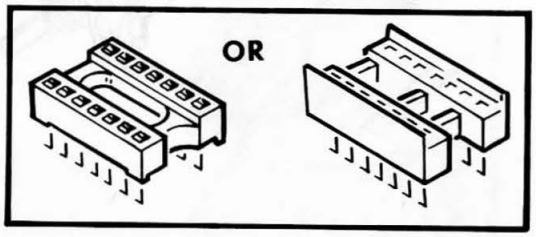
G3

G4

H1



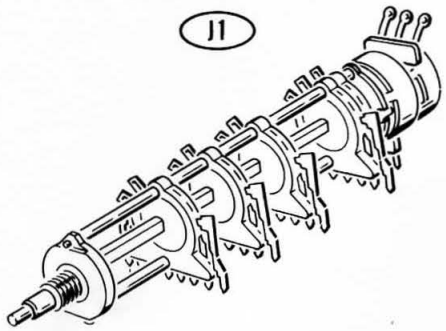
H2



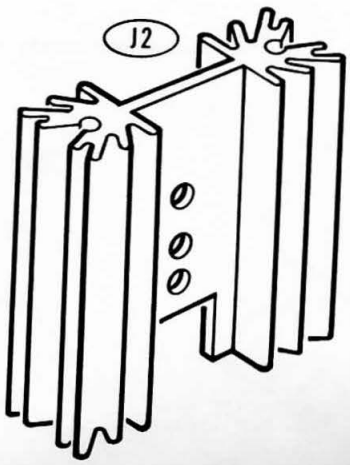
H3

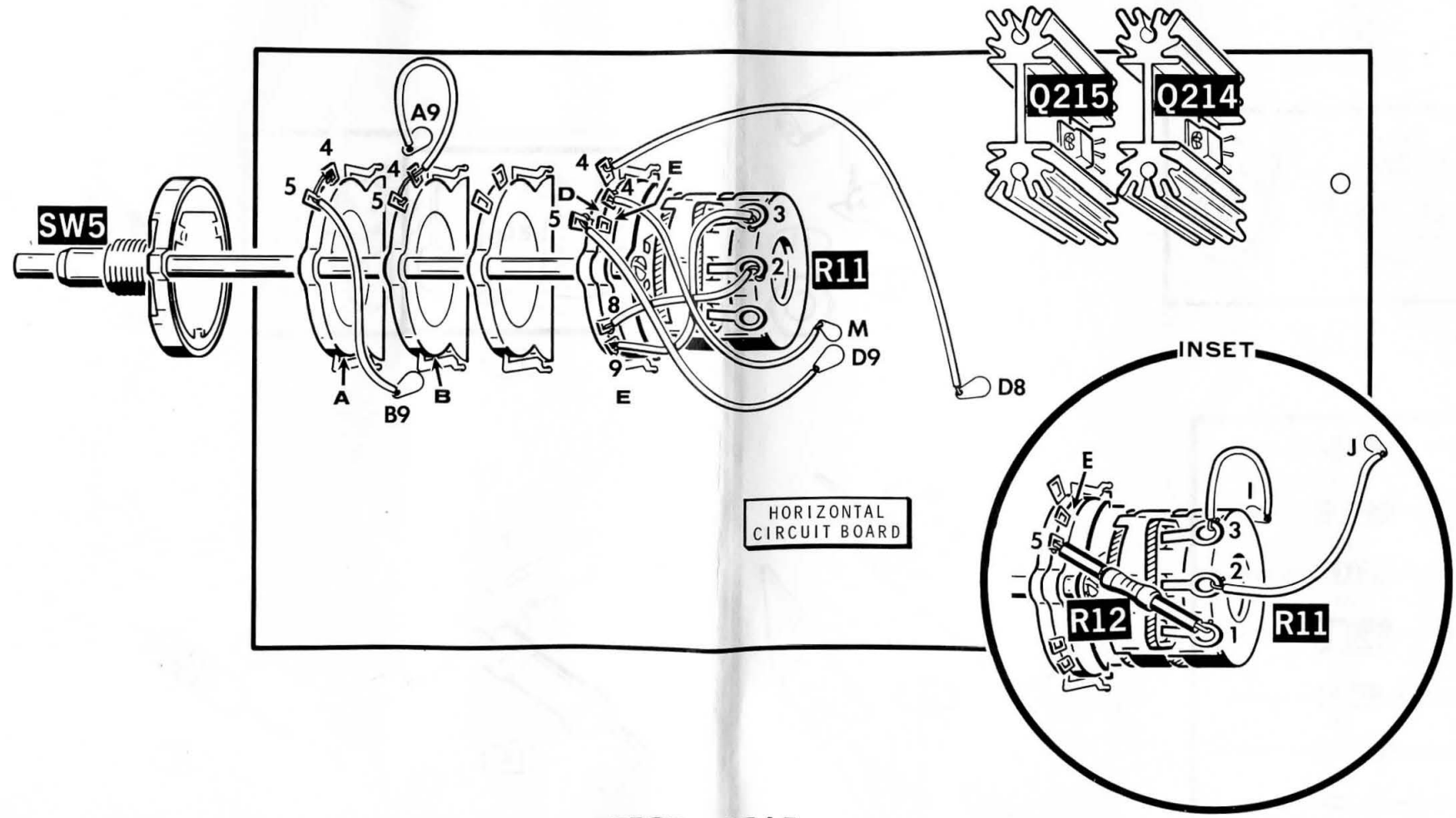
H4

J1



J2





PICTORIAL 2-11

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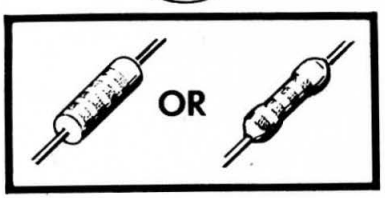
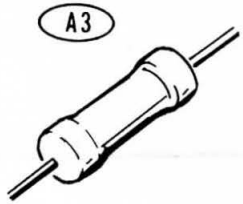
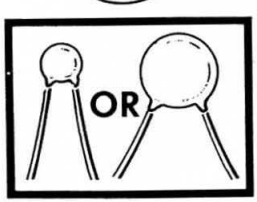


A2

A3

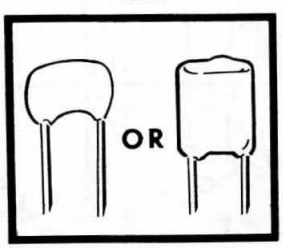


B1

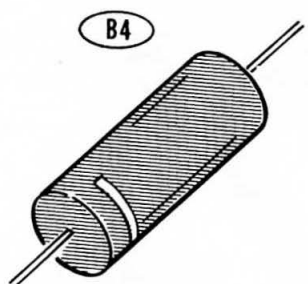


B2

B3



B4

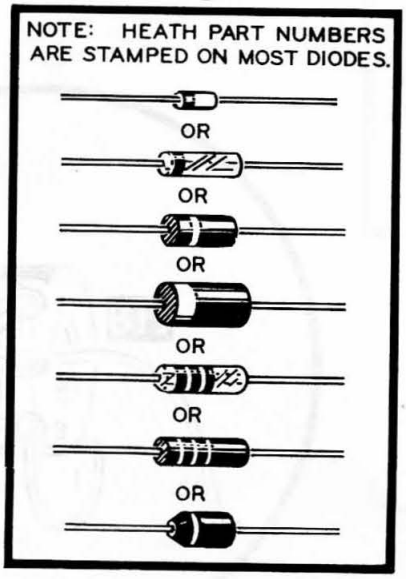


B5

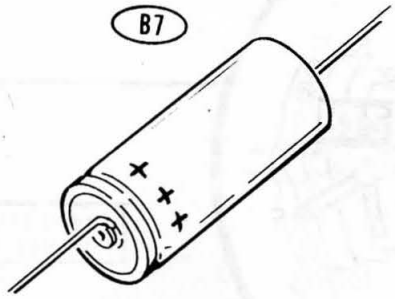
B6

BOARD PARTS PICTORIAL

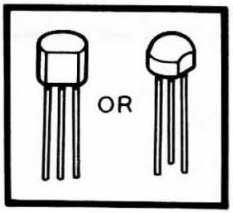
C1



B7

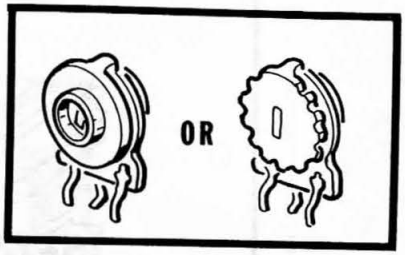


D1



D2

E1



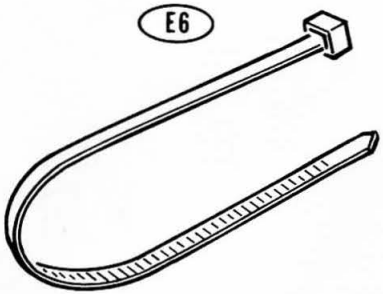
E2

E3

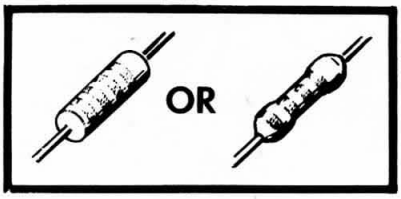
E4

E5

E6

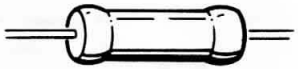


A1

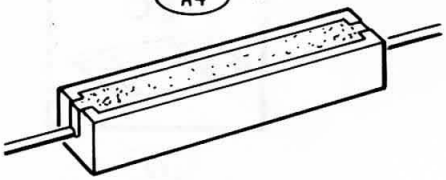


A2

A3

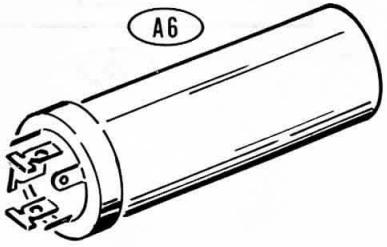


A4

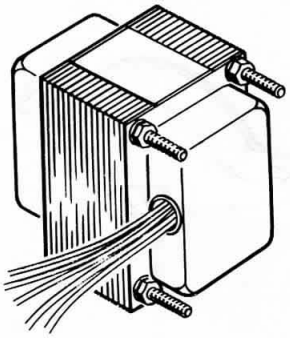


A5

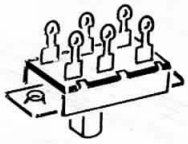
A6



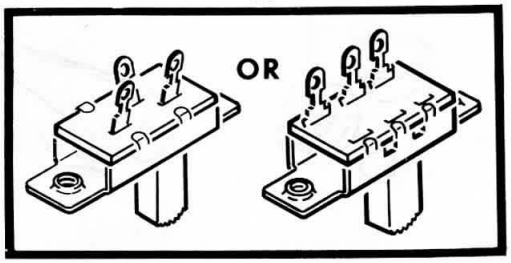
A7



A8

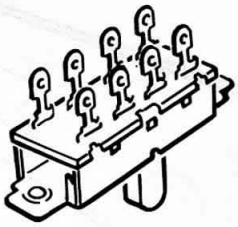


A9

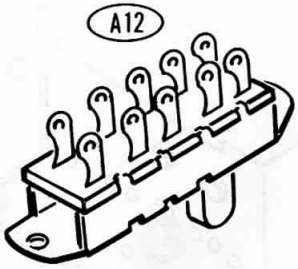


A10

A11



A12



A13

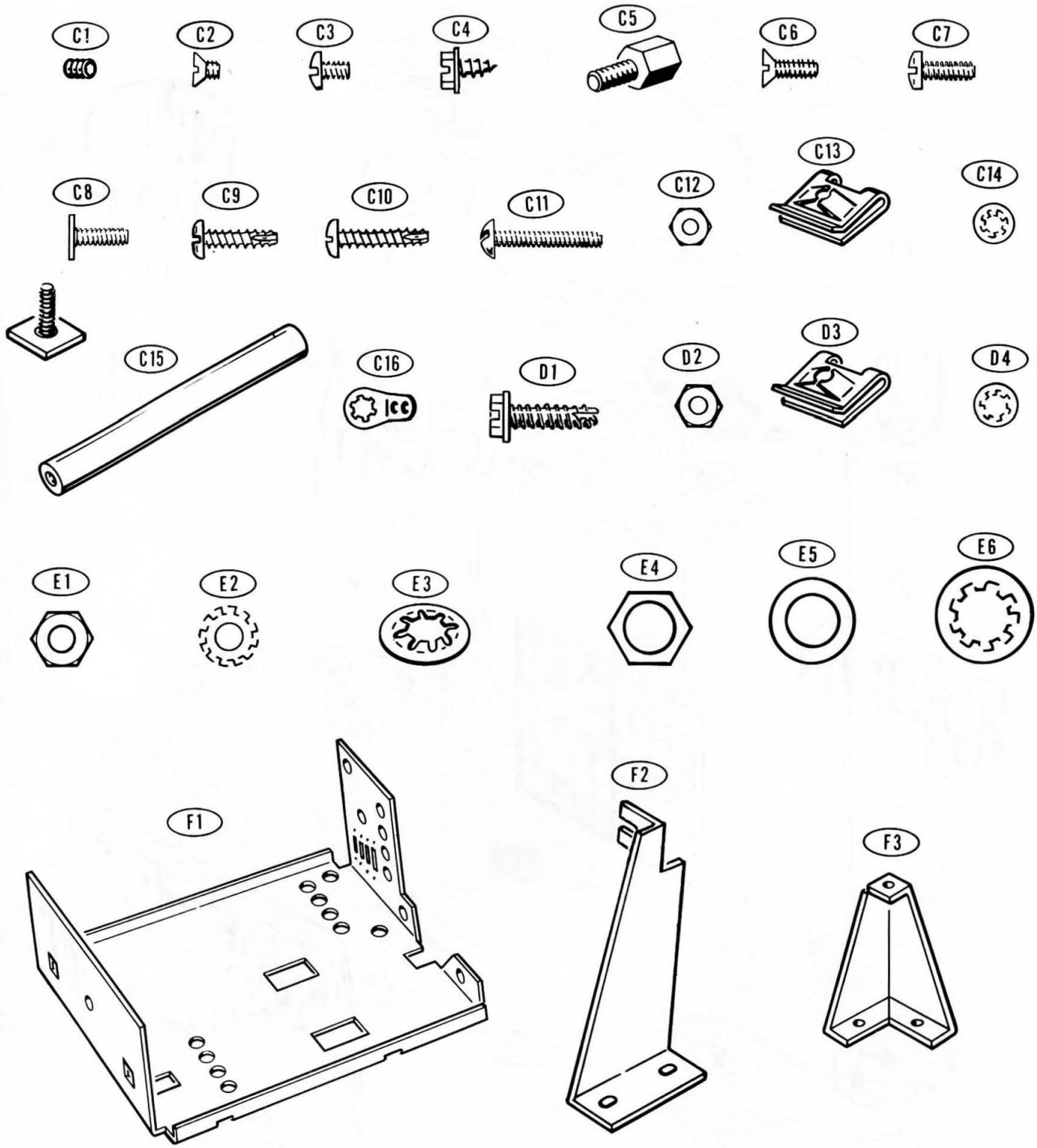
A14

B1

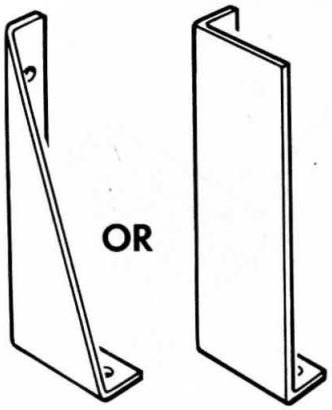
B2

B3

PARTS PICTORIAL



F4



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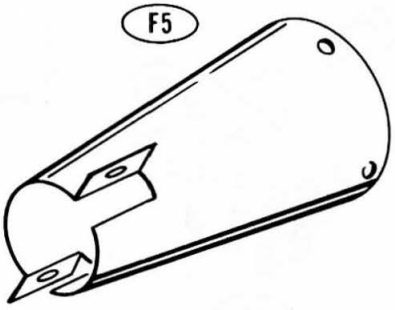

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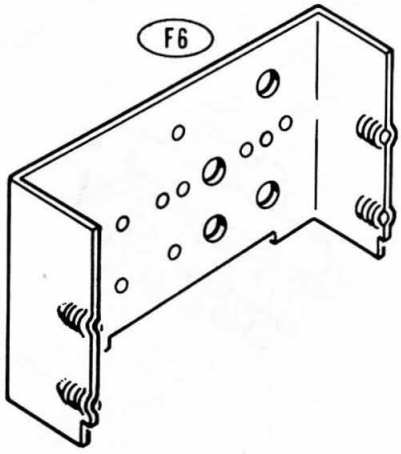


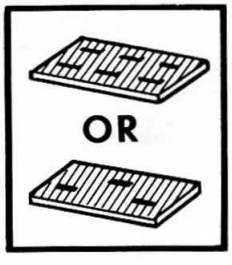
F7

G1

G2

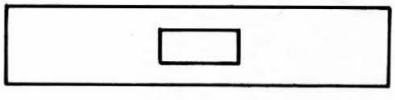
G3

G4

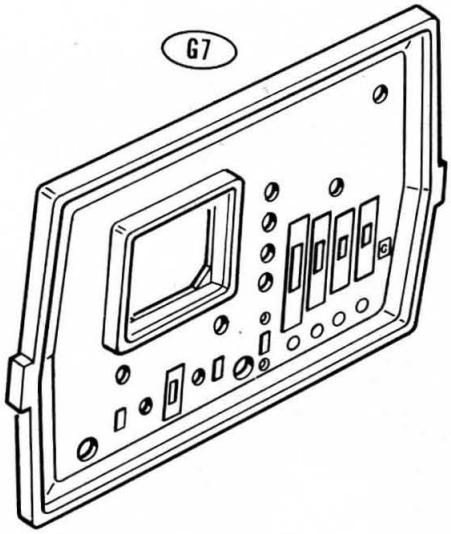


G5

G6



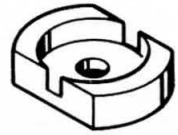
G7



G8

G9

G10



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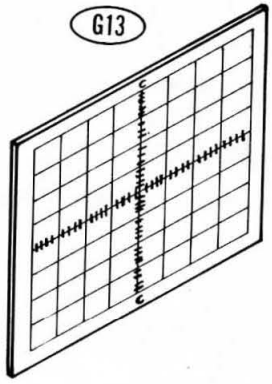
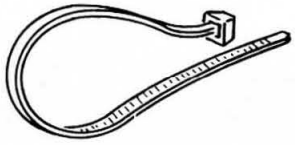


G14

G11



G12

G16

G15

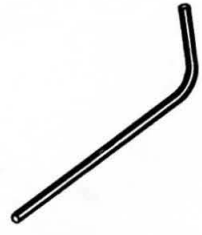
G17

G18

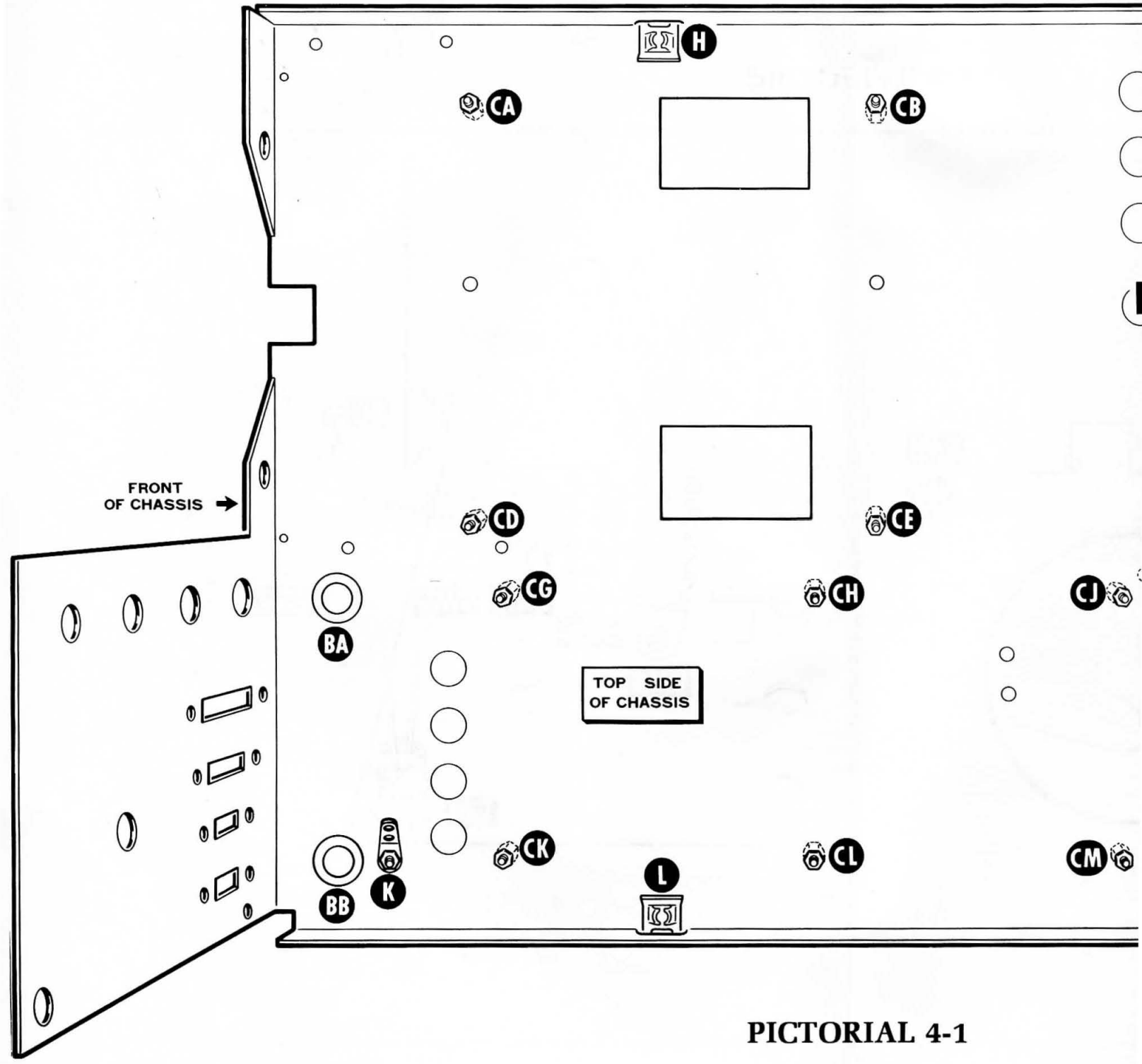
G19

G20

G21



G22



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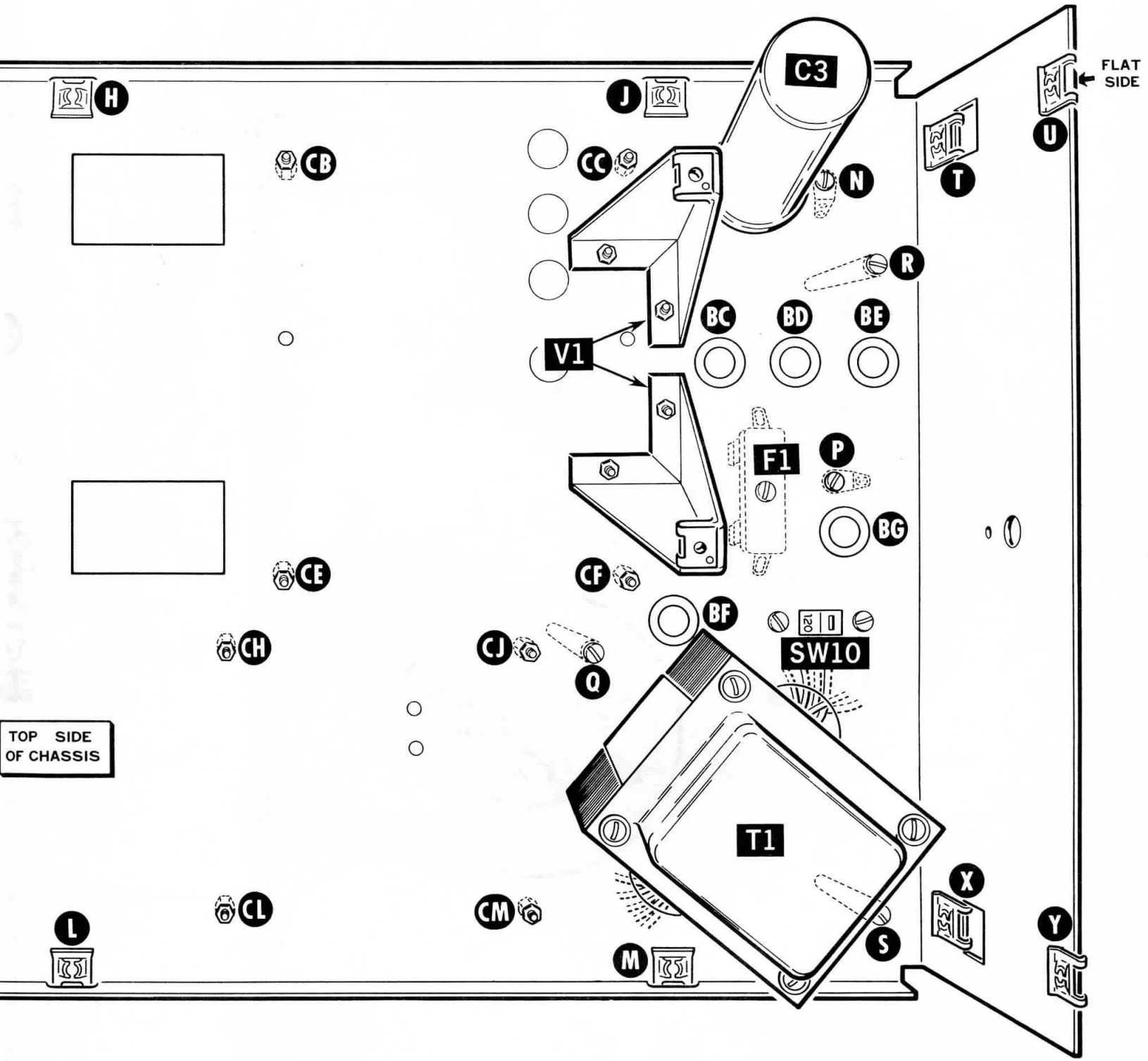
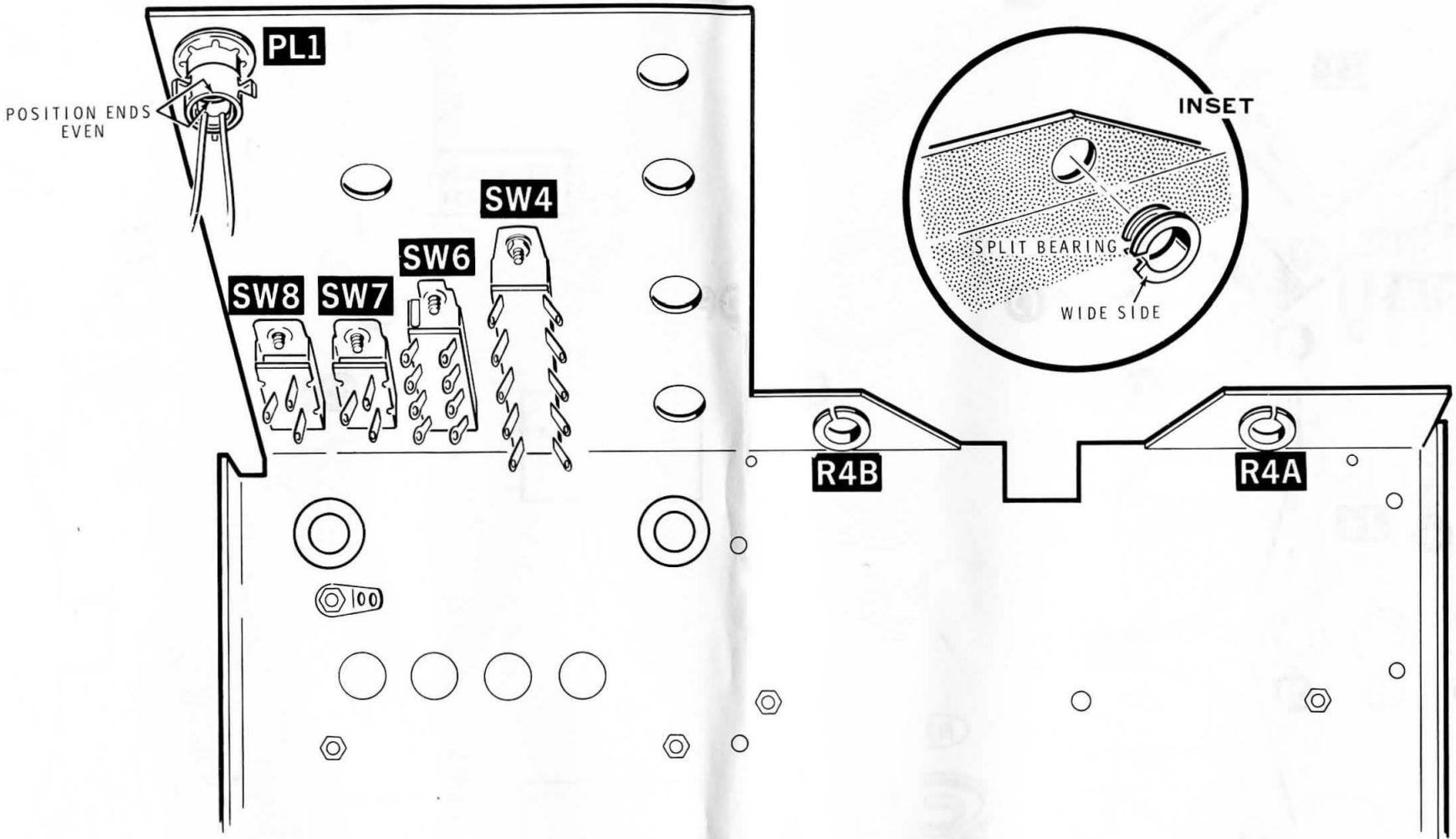
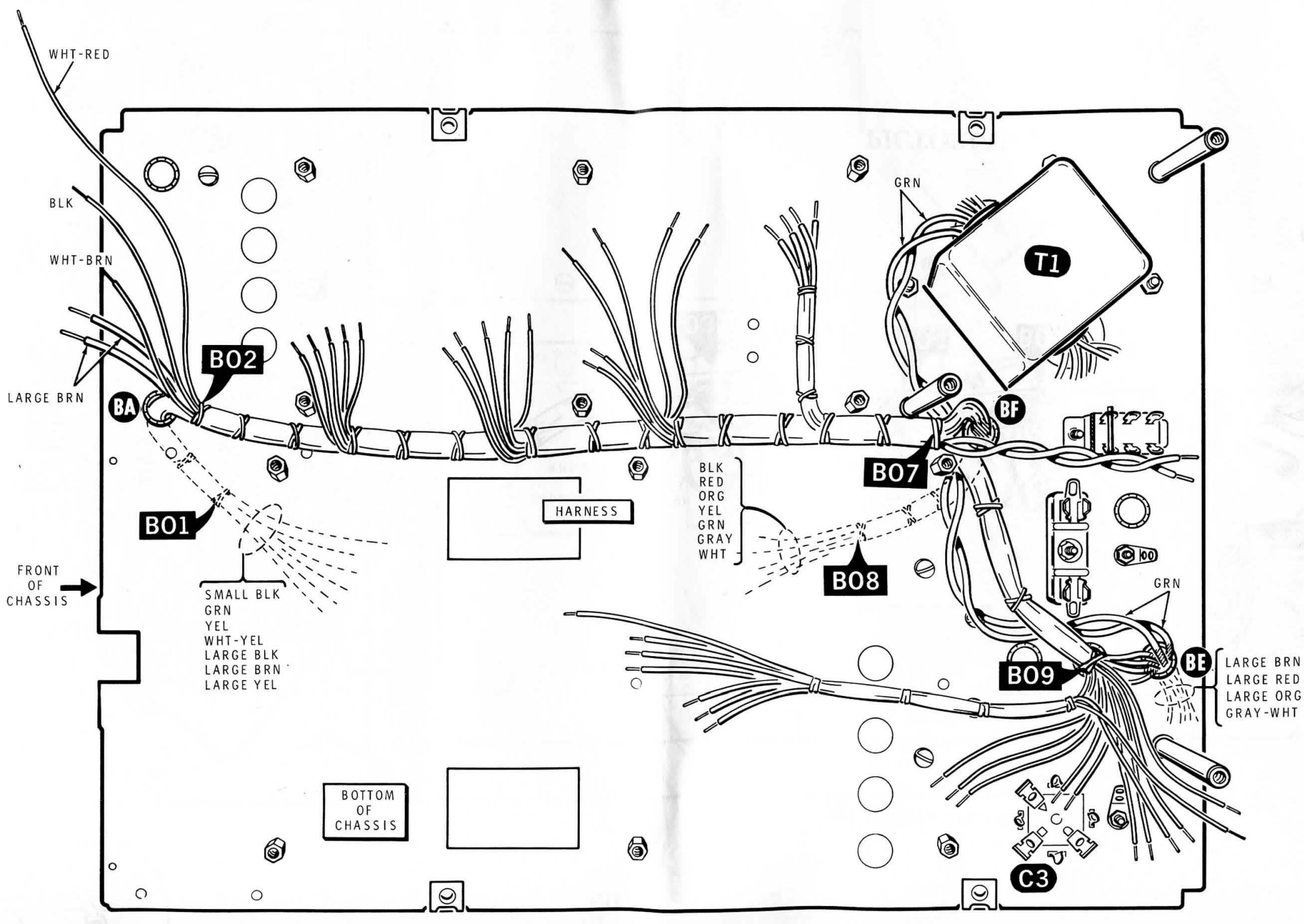
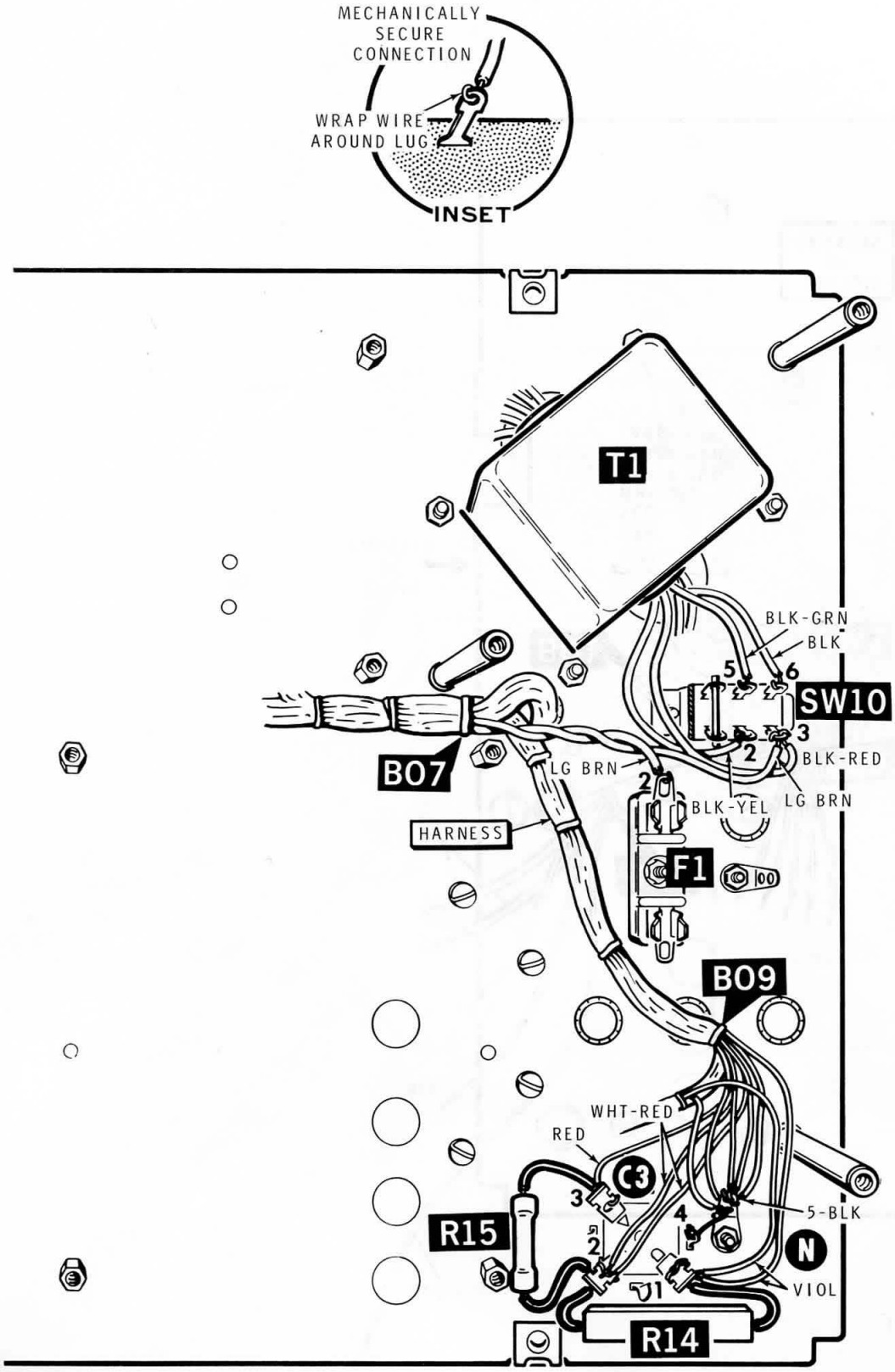


PICTORIAL 4-1

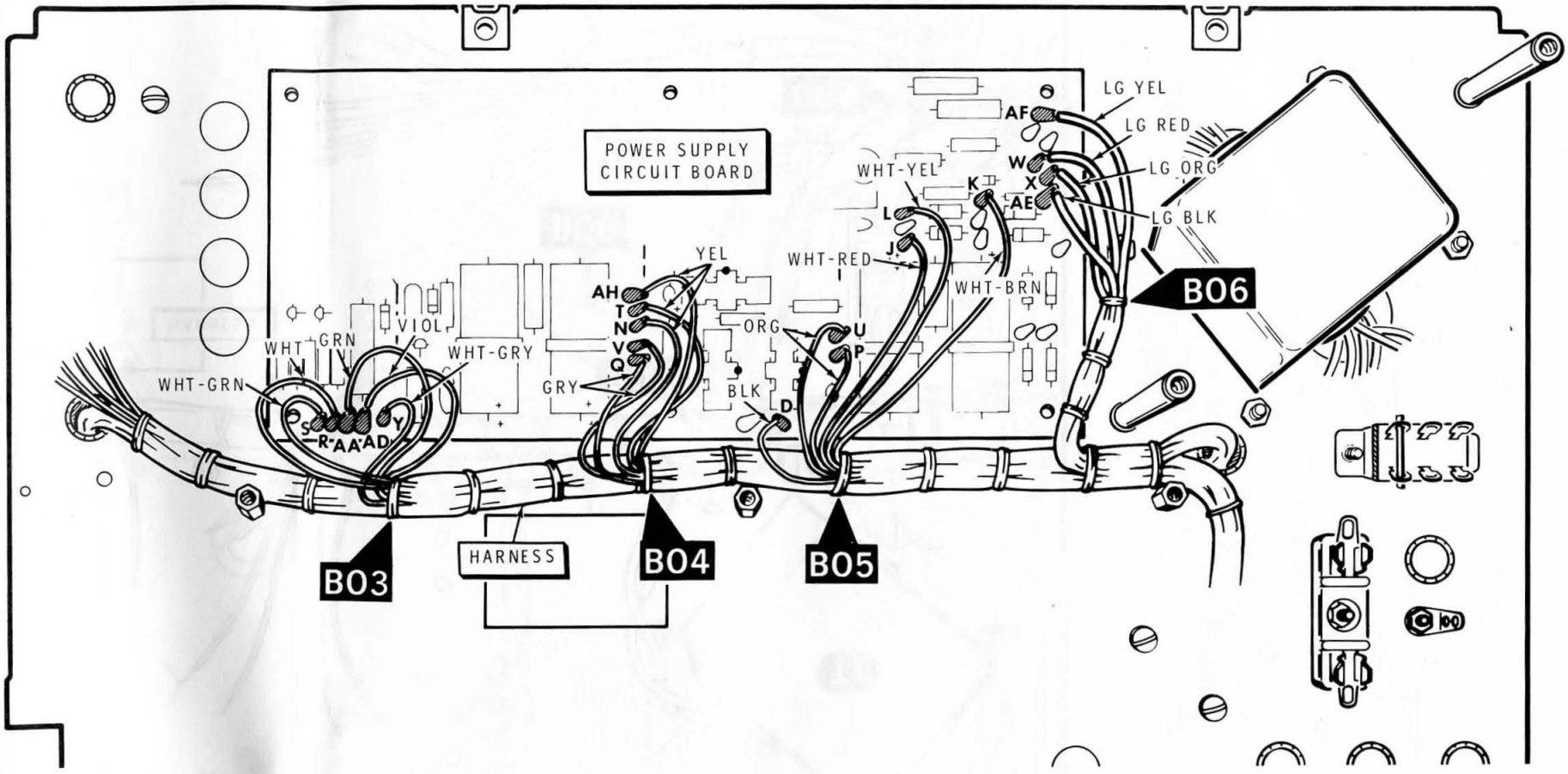


PICTORIAL 4-2

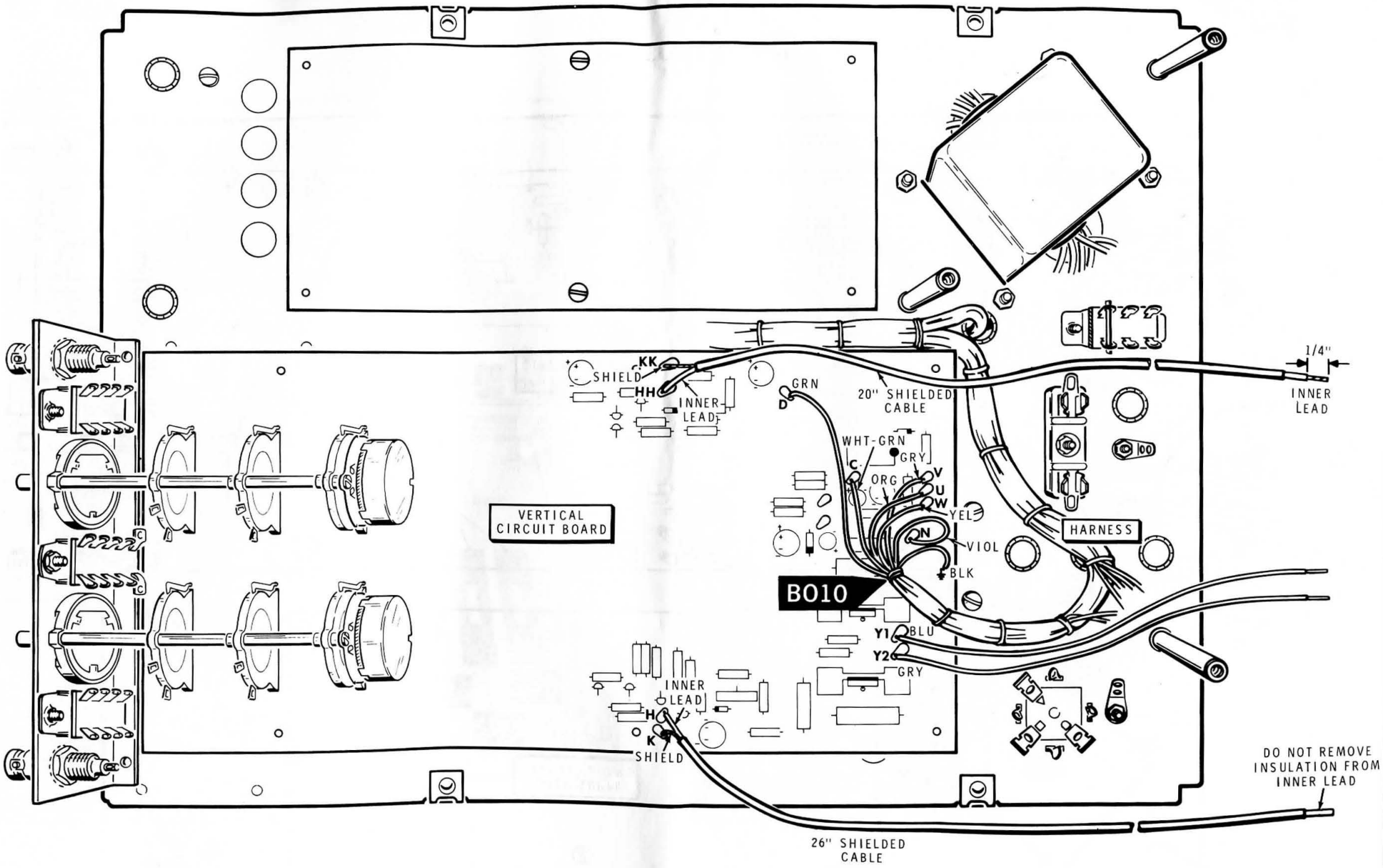

WHT-RED
BLK
WHT-BRN
LARGE BRN
BA
B02
B01
FRONT
OF
CHASSIS
SMALL BLK
GRN
YEL
WHT-YEL
LARGE BLK
LARGE BRN
LARGE YEL
HARNESS
BOTTOM
OF
CHASSIS
GRN
T1
BF
B07
BLK
RED
ORG
YEL
GRN
GRAY
WHT
B08
GRN
B09
BE
LARGE BRN
LARGE RED
LARGE ORG
GRAY-WHT
C3



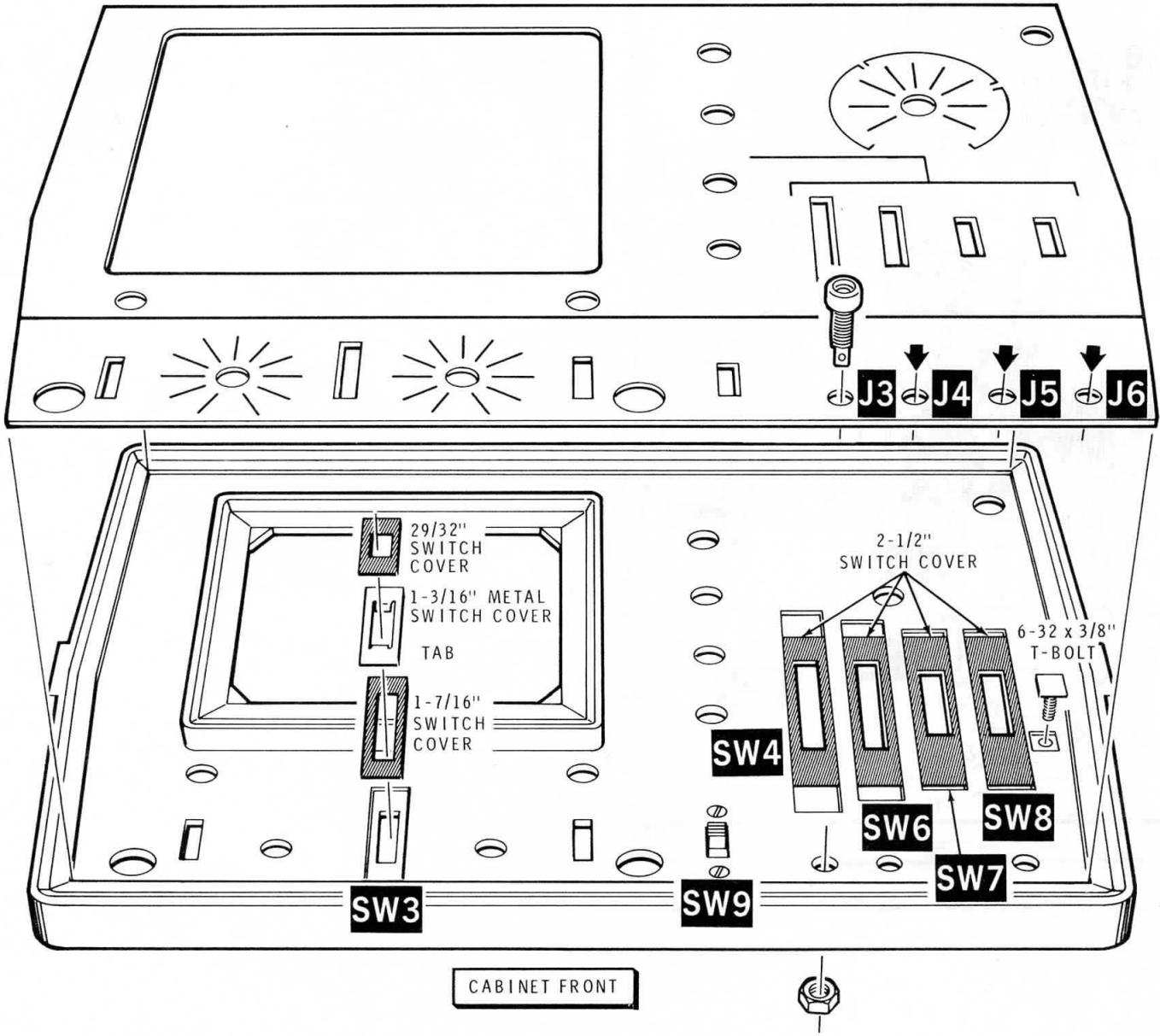
PICTORIAL 4-4



PICTORIAL 4-5



PICTORIAL 4-7



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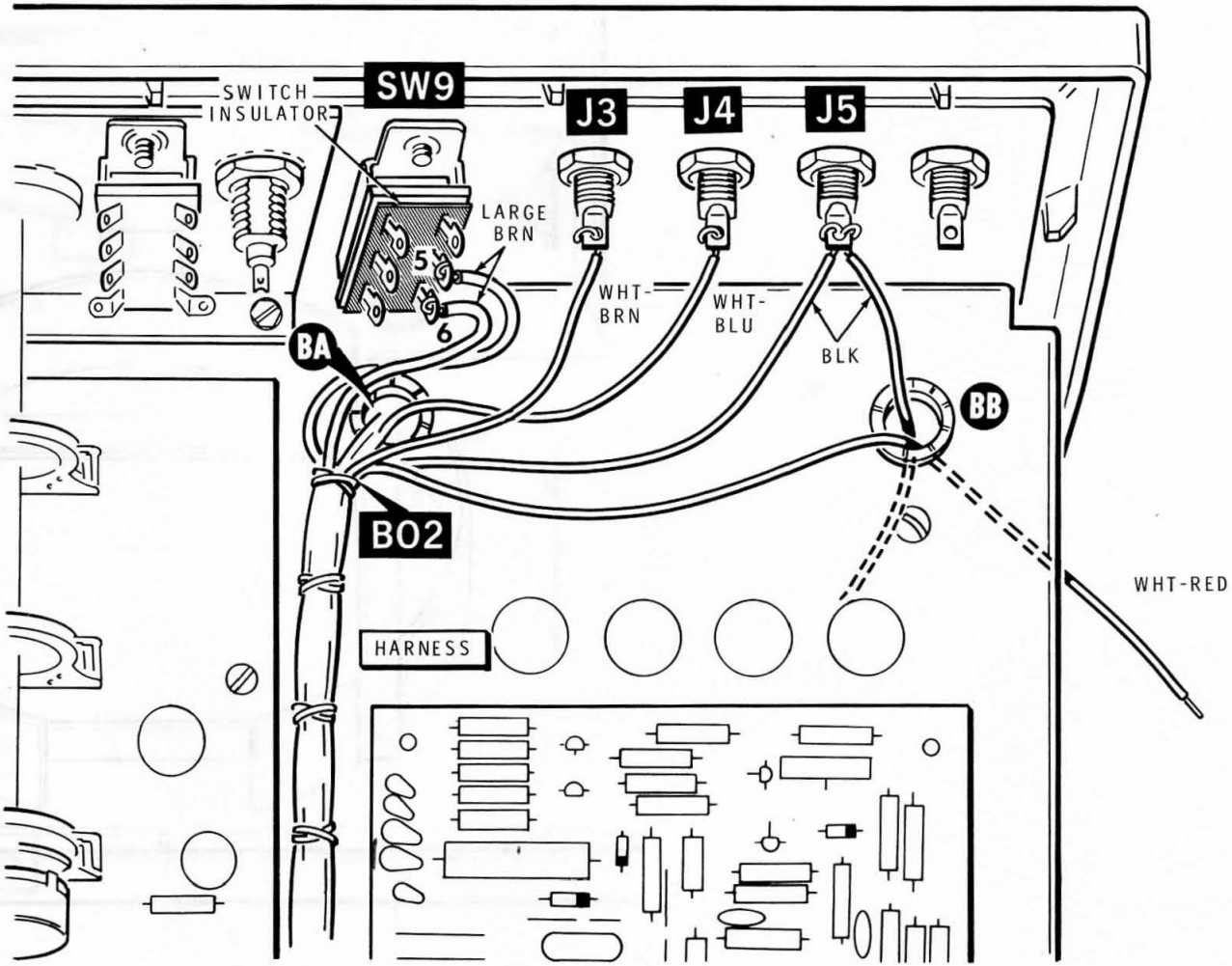

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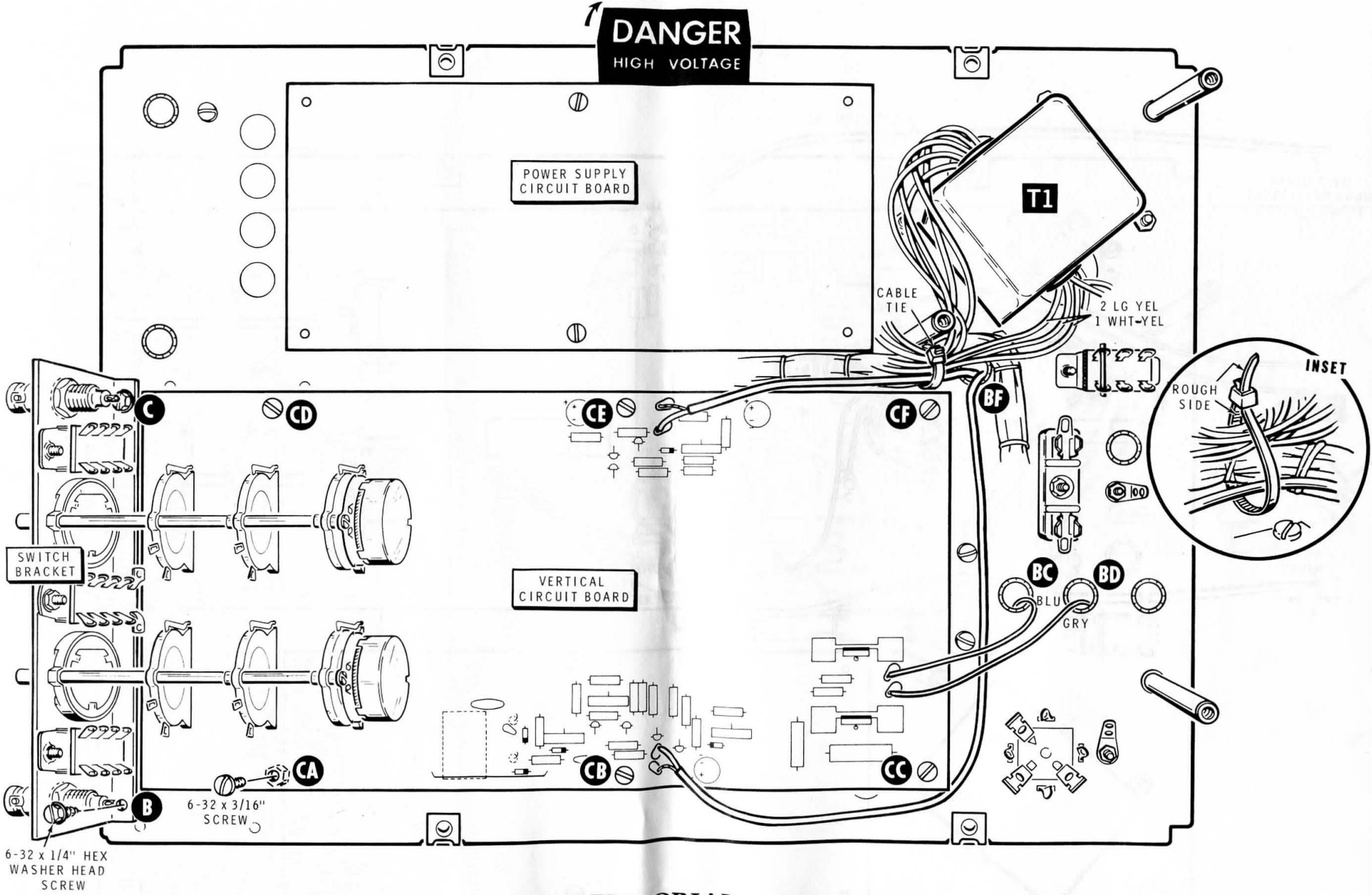
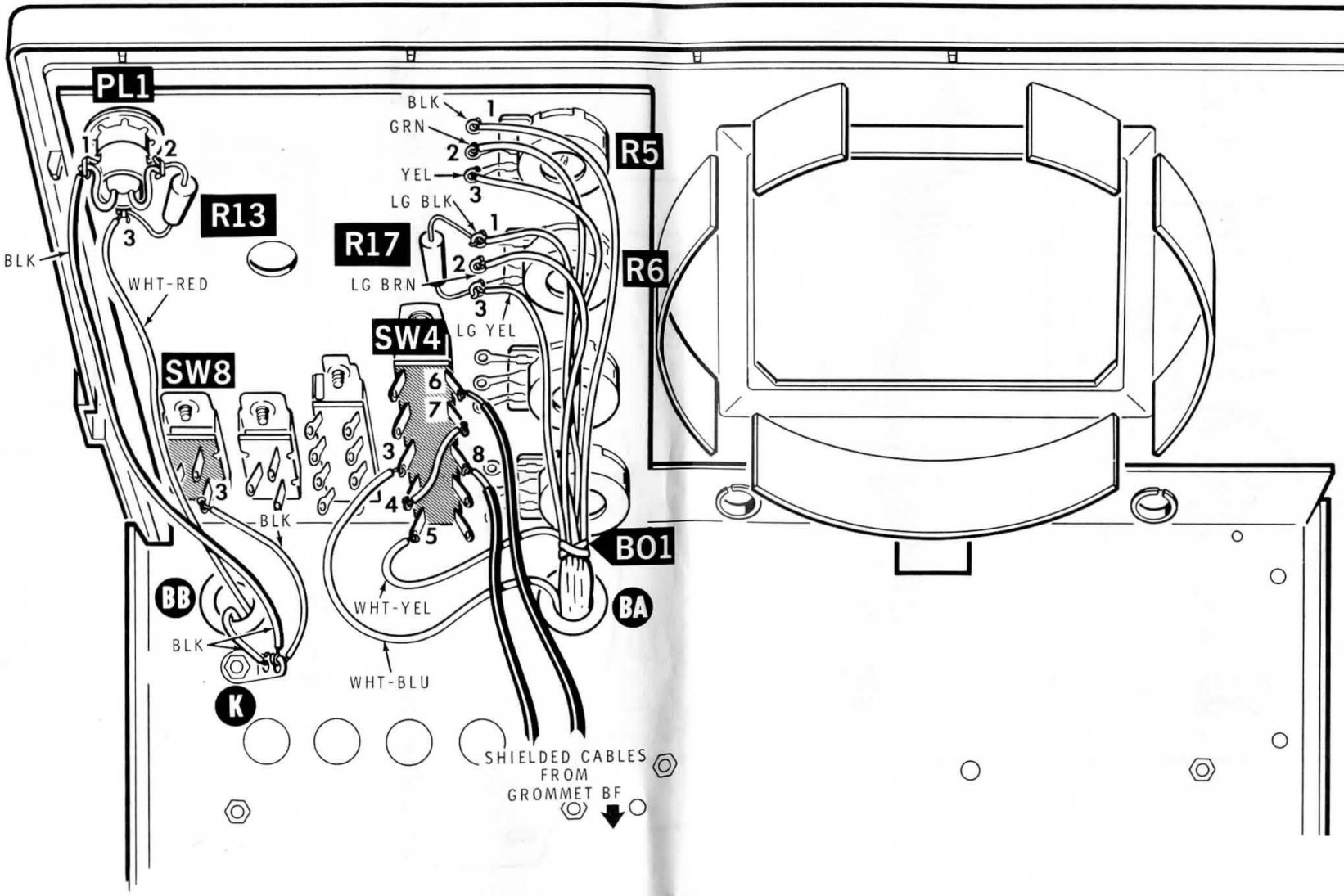
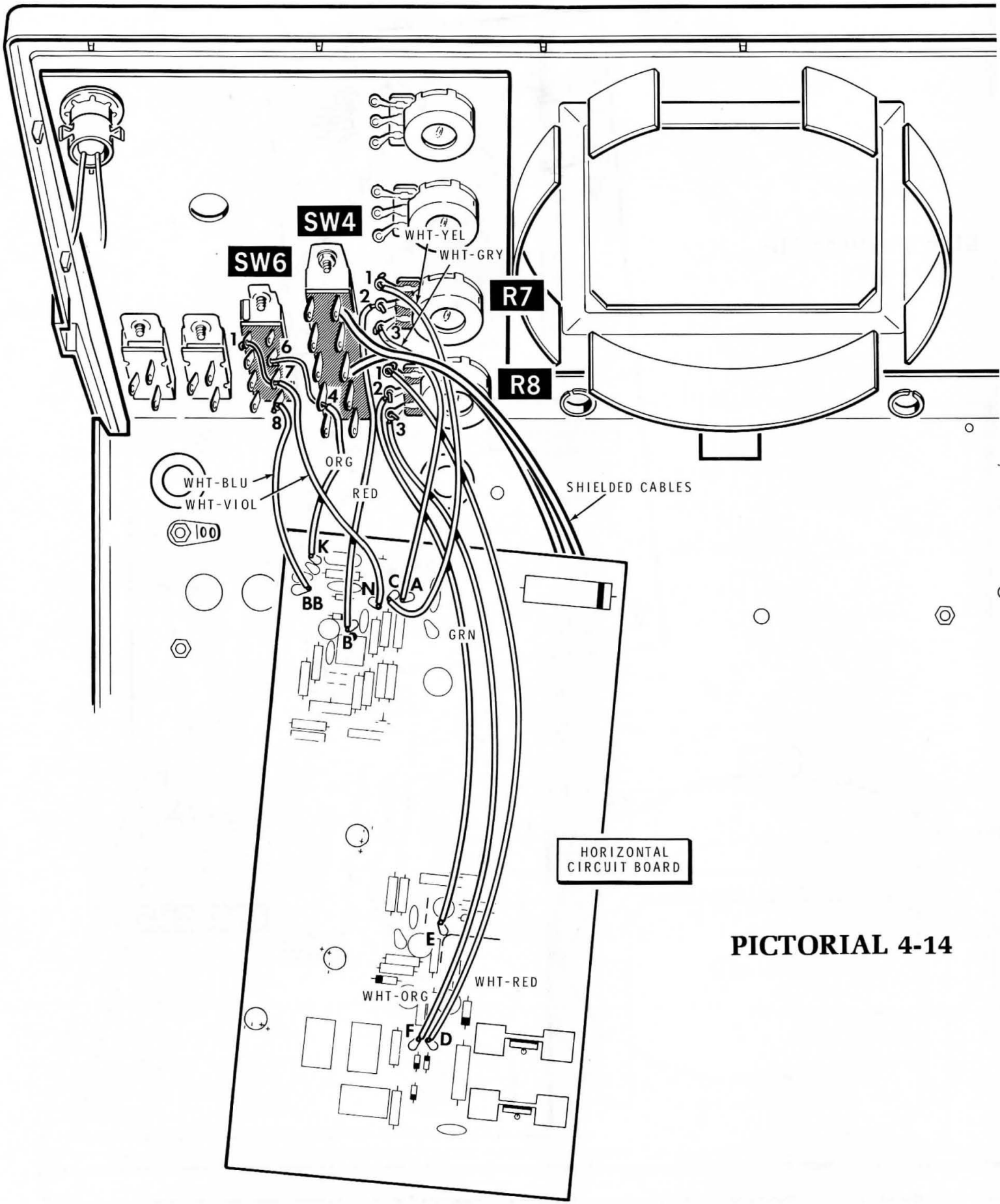


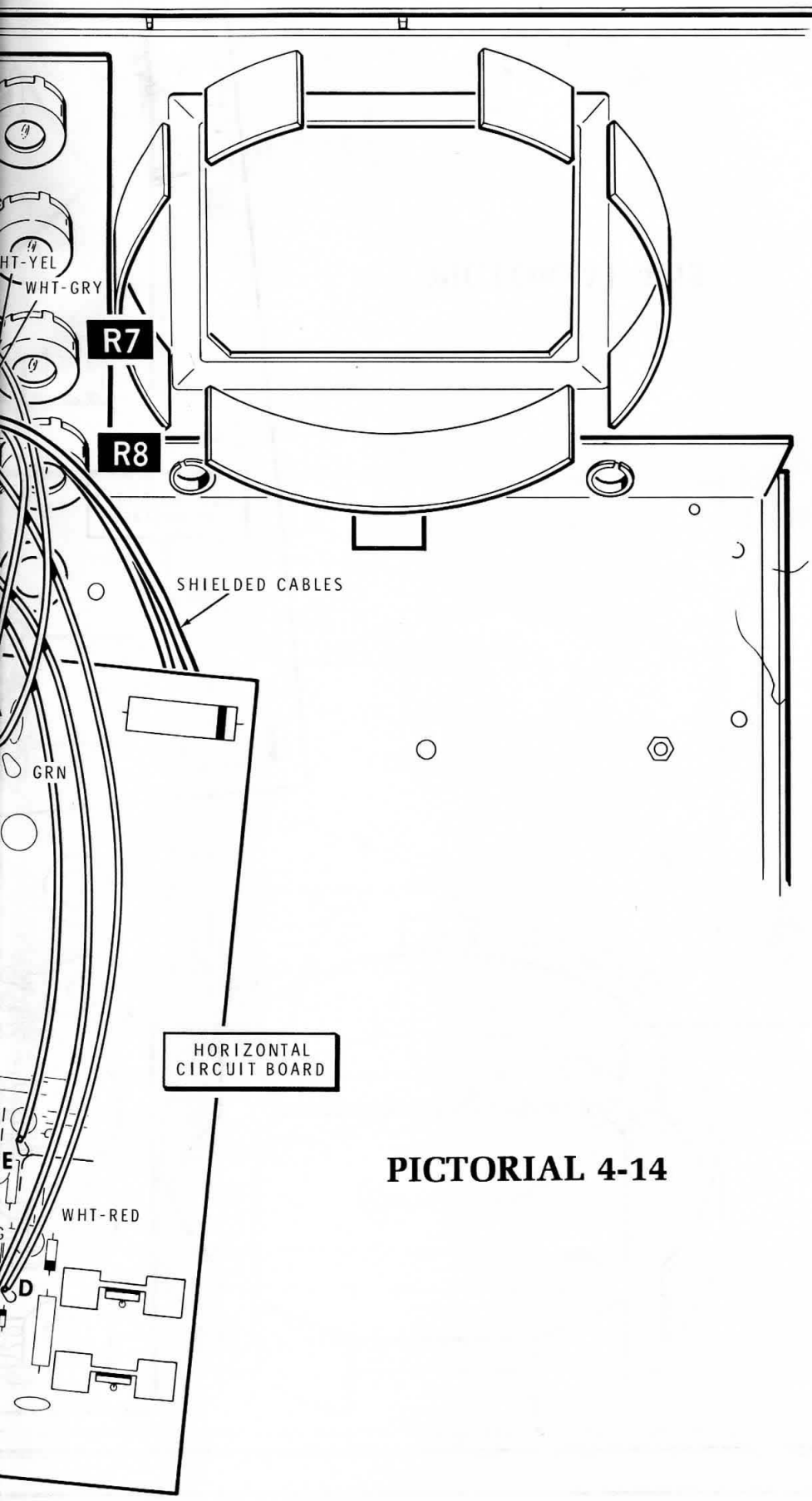
PICTORIAL 4-8



PICTORIAL 4-13



PICTORIAL 4-14



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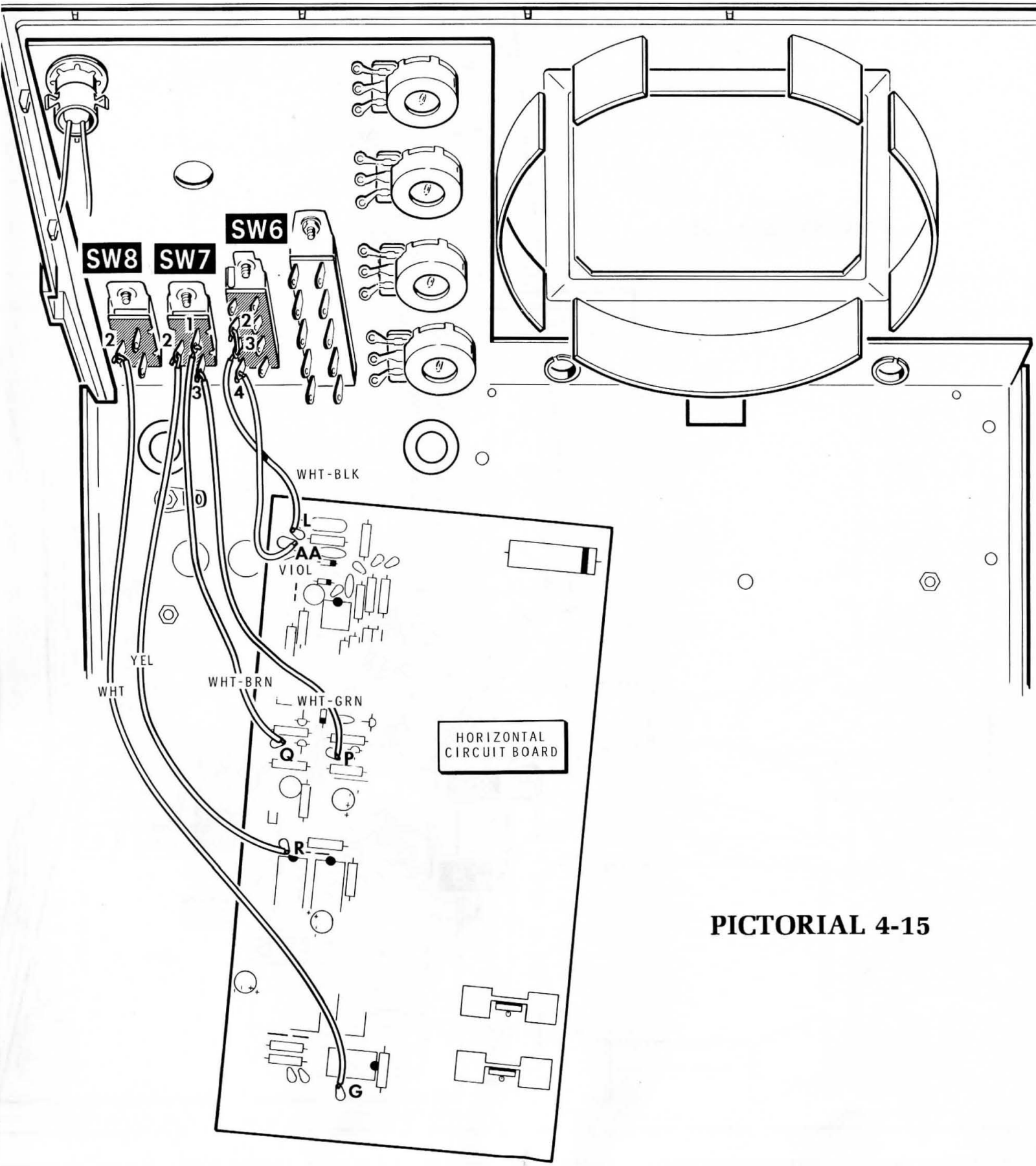
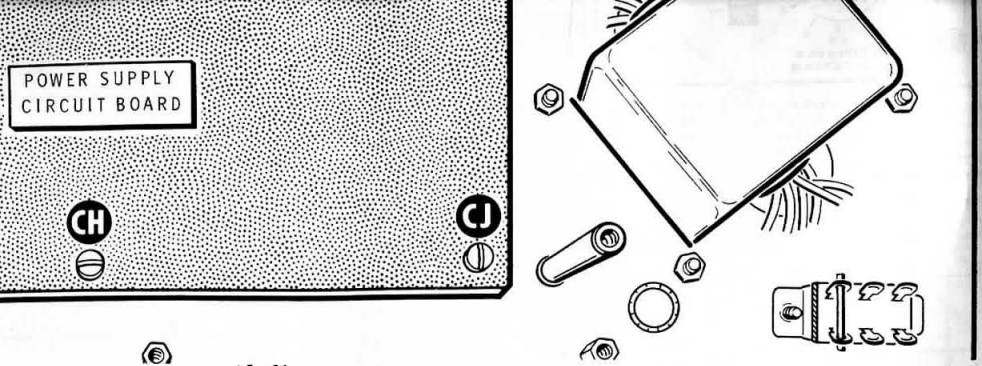
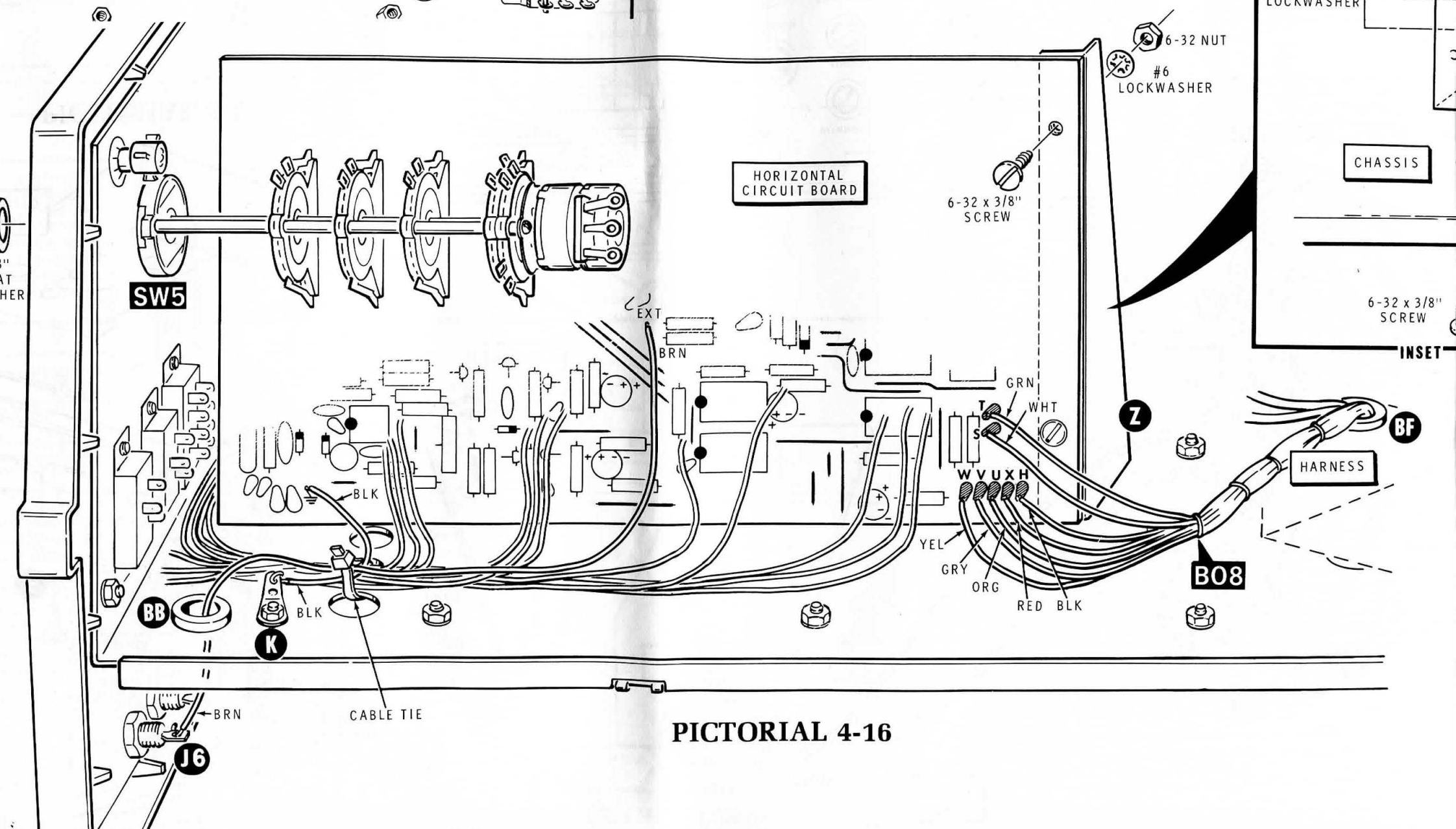


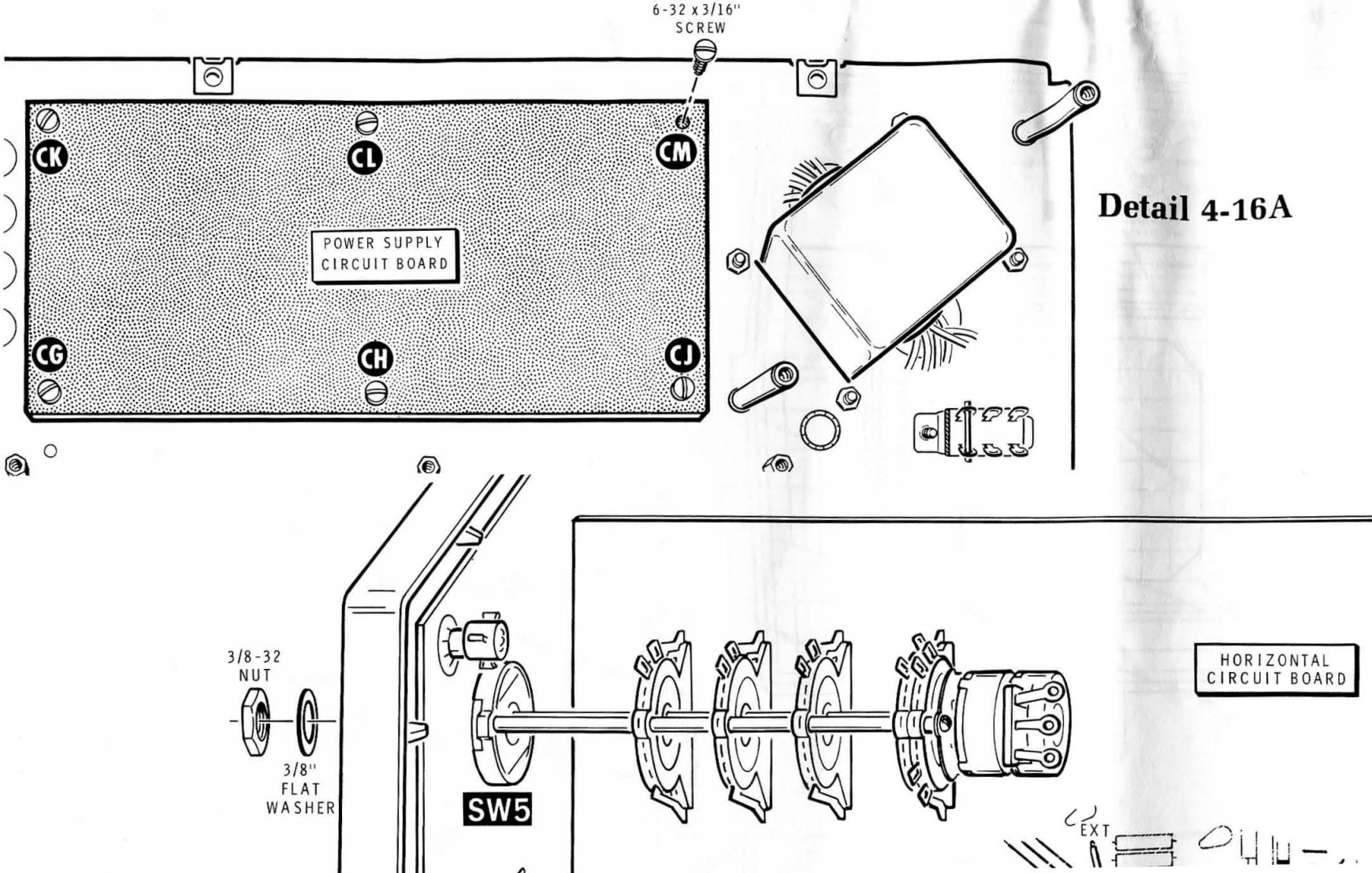
PICTORIAL 4-15



Detail 4-16A

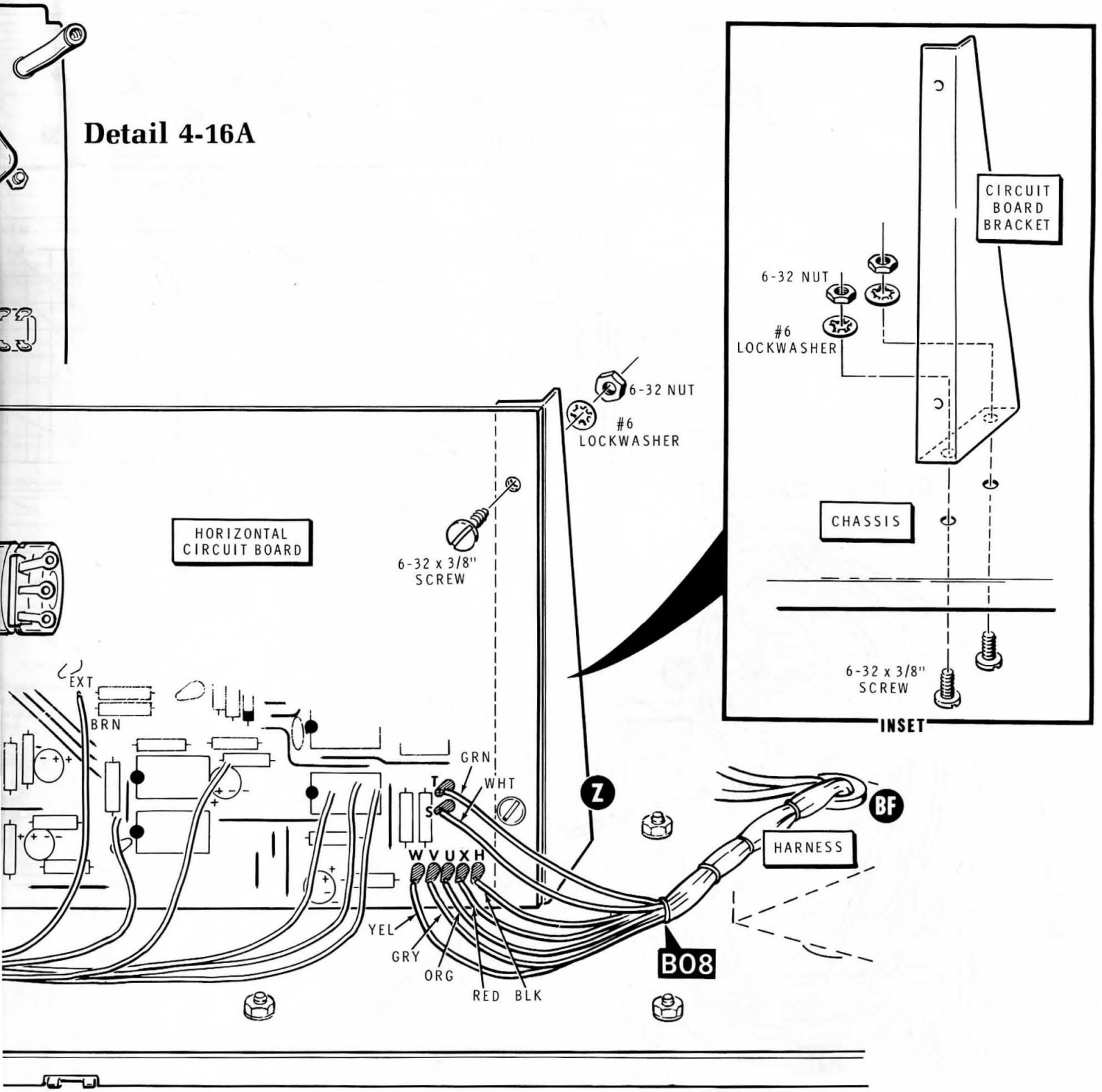


PICTORIAL 4-16

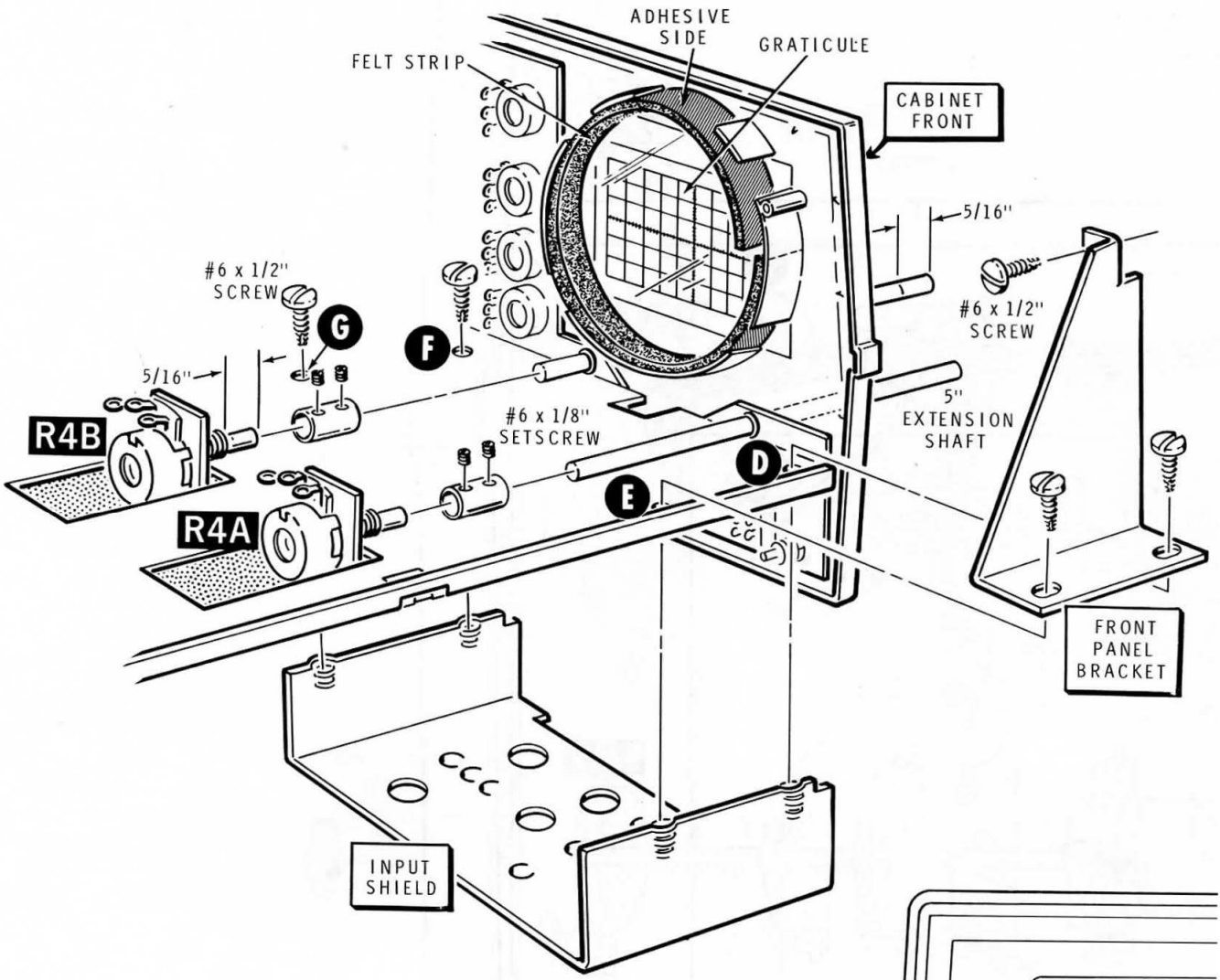

6-32 x 3/16"
SCREW
CK
CL
CM
POWER SUPPLY
CIRCUIT BOARD
CG
CH
CJ
3/8-32
NUT
3/8"
FLAT
WASHER
SW5
HORIZONTAL
CIRCUIT BOARD
EXT

Detail 4-16A

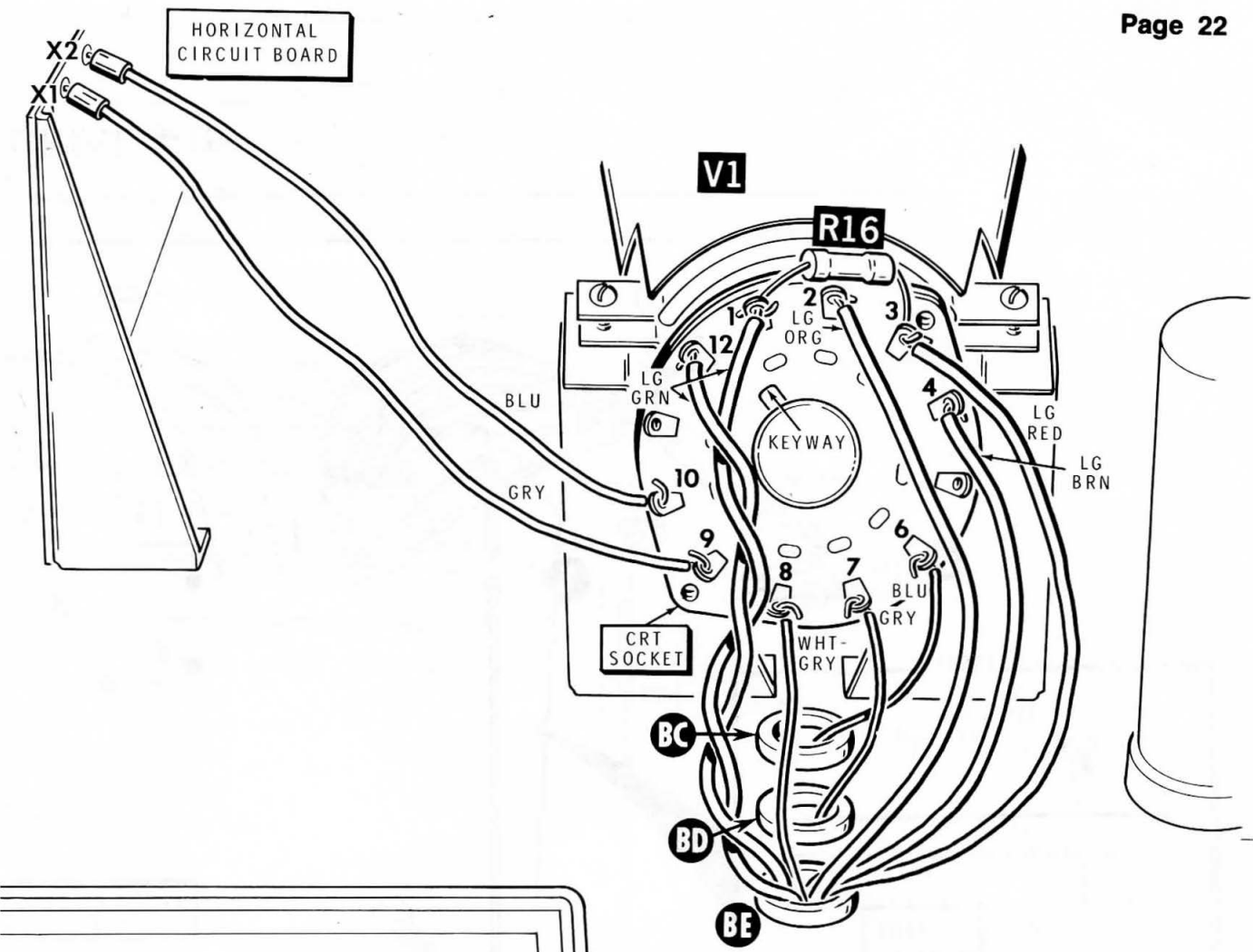
Detail 4-16A

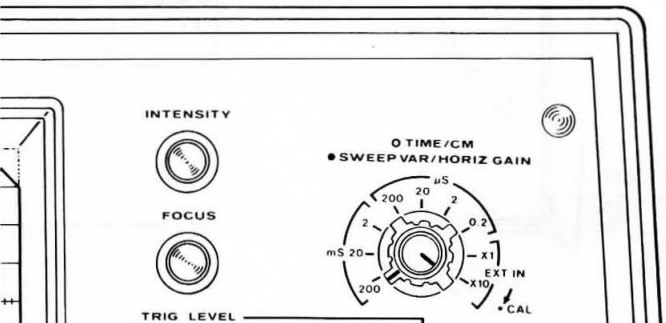


PICTORIAL 4-16

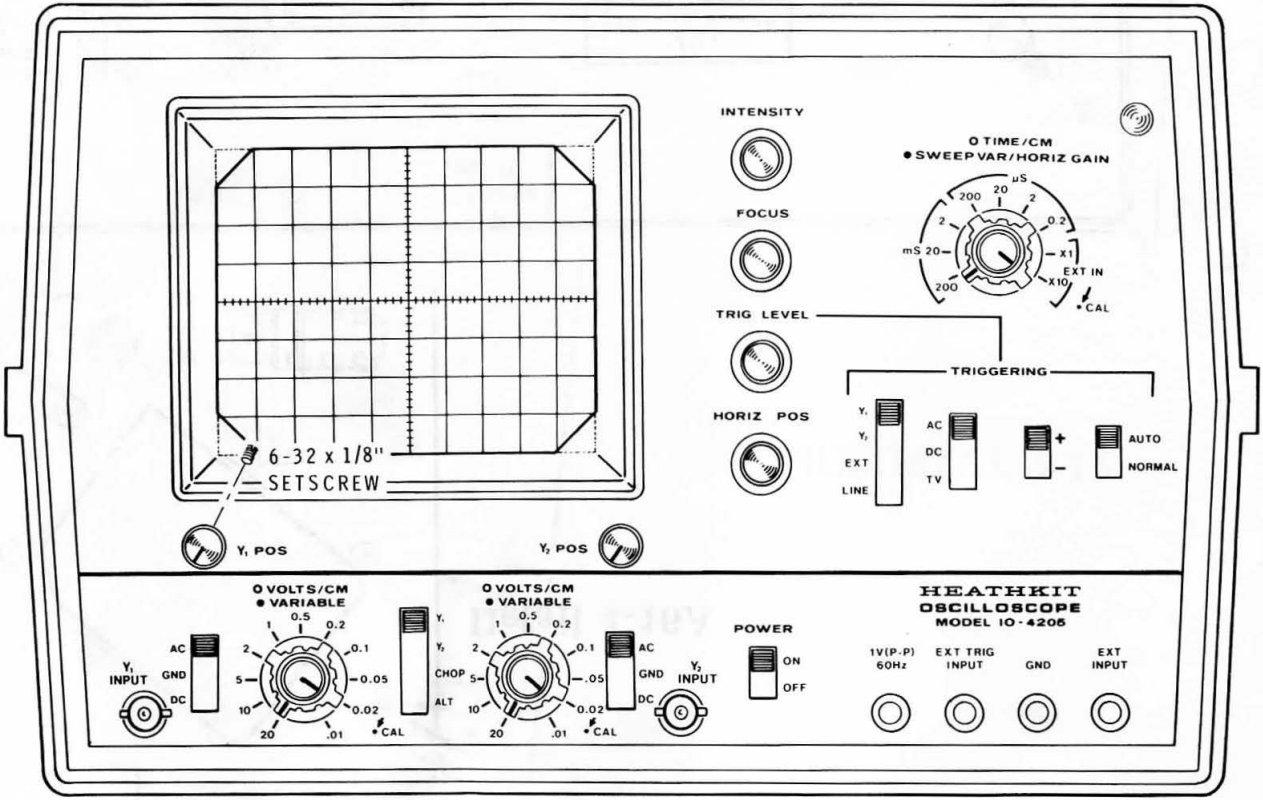


PICTORIAL 4-17





PICTORIAL 4-19



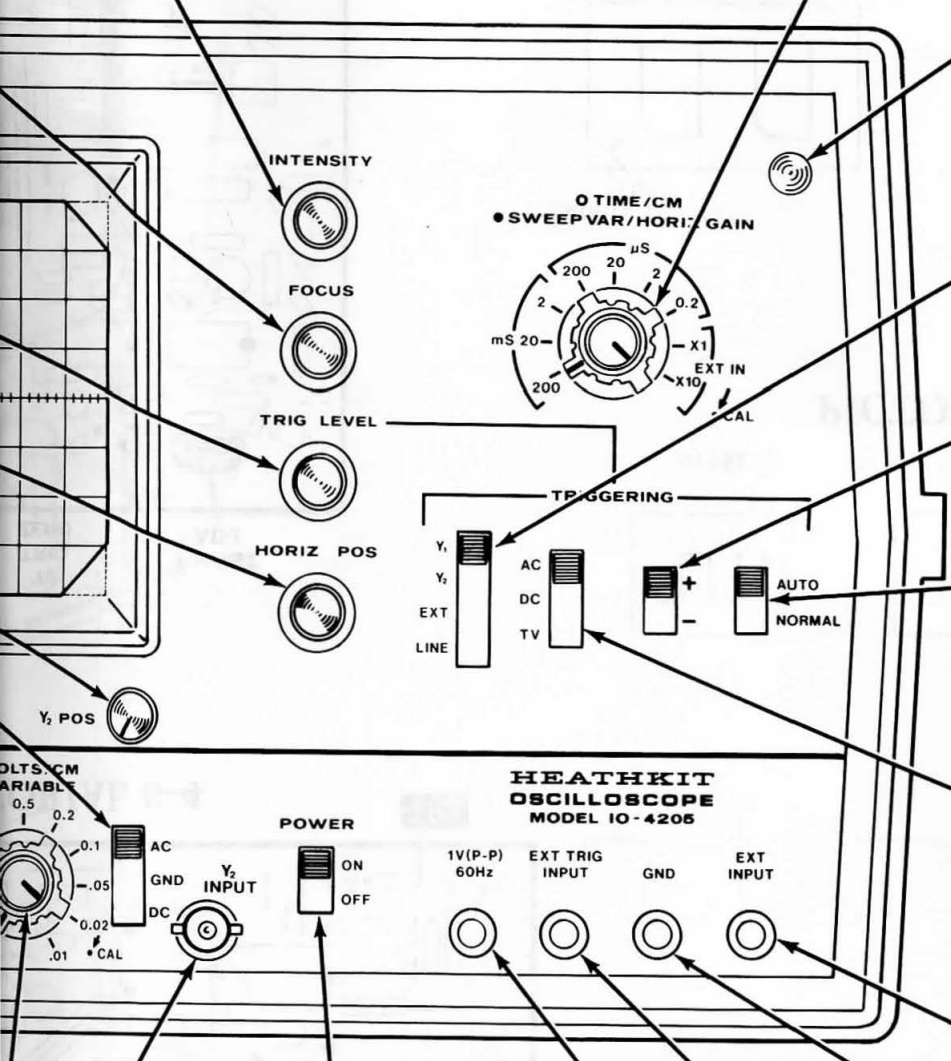
PICTORIAL 4-20

INTENSITY — Clockwise rotation increases the brightness of the display. Adjust as necessary for your room-lighting conditions. Refocusing may be necessary when the intensity is changed. CAUTION: Do not allow a bright spot to remain on the screen as it could damage the CRT.

TIME/CM — The time required for the beam to sweep one centimeter is determined by the TIME/CM switch when the SWEEP VAR/HORIZ GAIN control is fully clockwise (CAL). Counterclockwise rotation decreases the sweep speed.

In the EXT IN positions, the signal at the EXT INPUT connector is coupled to the horizontal amplifier; the SWEEP VAR control then adjusts the horizontal gain (HORIZ GAIN).

POWER LAMP — Glows when AC power is turned on.



TRIGGER SOURCE switch (Y1, Y2, EXT, LINE) — Connects the trigger circuits to the Y1 trigger signal, the Y2 trigger signal, an external trigger signal, or a 60 Hz internal signal.

SLOPE switch (+/−)—The sweep can be started on either a positive or negative slope, depending on the position of the +/− switch.

TRIGGER MODE switch (AUTO-NORMAL) — In the AUTO position, a base line will always be present in the absence of a trigger signal. In the NORMAL position, the base line is not automatically generated.

TRIGGER COUPLING switch (AC-DC-TV) — The DC position couples the trigger signals directly to the trigger circuits. This allows the sweep to be triggered from DC level changes or very low frequency AC signals. In the AC position, the DC component of the trigger signal is blocked so that only the AC component of the signal reaches the trigger circuits. The TV position cuts off unwanted high frequency signals so you can lock onto TV vertical frame signals.

EXT INPUT — Allows you to apply an external X-input signal. (A positive signal moves the trace to the right.)

GND — Provides a connection to circuit ground.

EXT TRIG INPUT — An external signal can be applied through this connector to trigger the sweep circuits when the TRIGGERING switch is in the EXT position.

POWER — Turns the Oscilloscope on and off.

Y2 INPUT — This is the input connector for channel Y2.

1V −(P-P) 60 Hz — Provides a 0.94-volt, peak-to-peak, 60 Hz signal for testing or calibrating.

PICTORIAL 6-1

INTENSITY — Clockwise brightness of the display. Adju room-lighting conditions. Ref sary when the intensity is char allow a bright spot to remain damage the CRT.

FOCUS — Varies the shape and size of the beam striking the face of the CRT. Adjust for the sharpest display.

TRIG LEVEL — Adjusts the trigger circuit so the sweep can be started at any position on the input signal waveform.

HORIZ POS — Positions the trace horizontally on the screen.

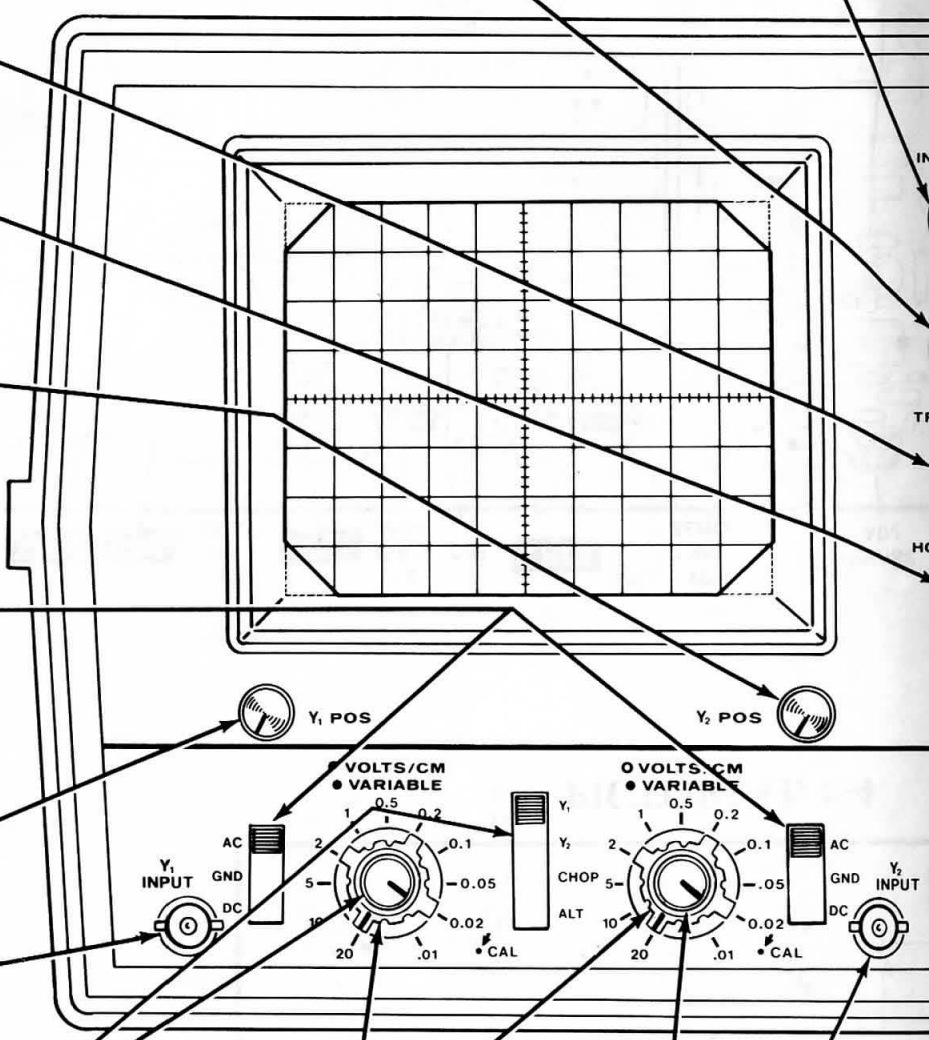
Y2 POS — Positions the channel Y2 trace vertically on the screen.

AC-GND-DC (Input switch)—In the AC position, this switch blocks the DC level of the input signal so that only the AC component is displayed. In the GND position, the input is disconnected and the vertical amplifier input is grounded. Use this position when you wish to set the baseline (trace) at a desired position without disconnecting the input signal. In the DC position, both DC and AC components of the input signal are displayed.

Y1 POS — Positions the channel Y1 trace vertically on the screen.

Y1 INPUT — This is the input connector for channel Y1.

VERTICAL MODE switch (Y1-Y2-CHOP-ALT) — Displays either channel Y1, Y2, or both when in the CHOP or ALT position. In the CHOP position, the two inputs are sampled at approximately a 100 kHz rate and displayed. In the ALT position, the horizontal sweep alternates between inputs. A complete sweep of one input is displayed and then a complete sweep of the other input signal is displayed.



VOLTS/CM — Each position of this attenuator switch is marked for the number of volts (peak-to-peak) required to produce a pattern one centimeter high on the graticule.

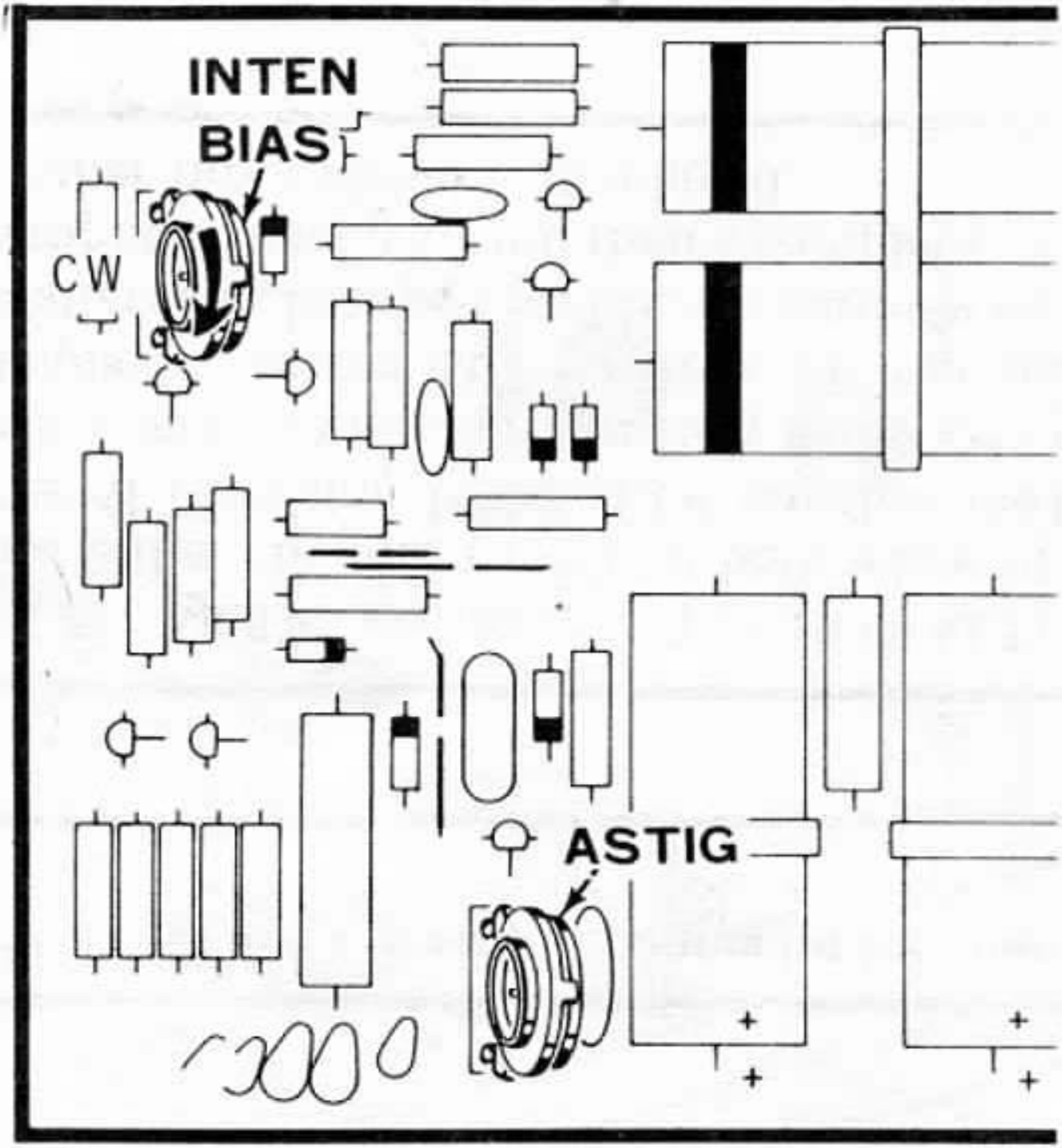
VARIABLE — This control is normally operated in its fully clockwise (CAL) position where the VOLTS/CM switch positions are calibrated. Vertical gain decreases as the control is turned counterclockwise, permitting the vertical trace size to be adjusted. However, the display is then uncalibrated.

POWER — Tu

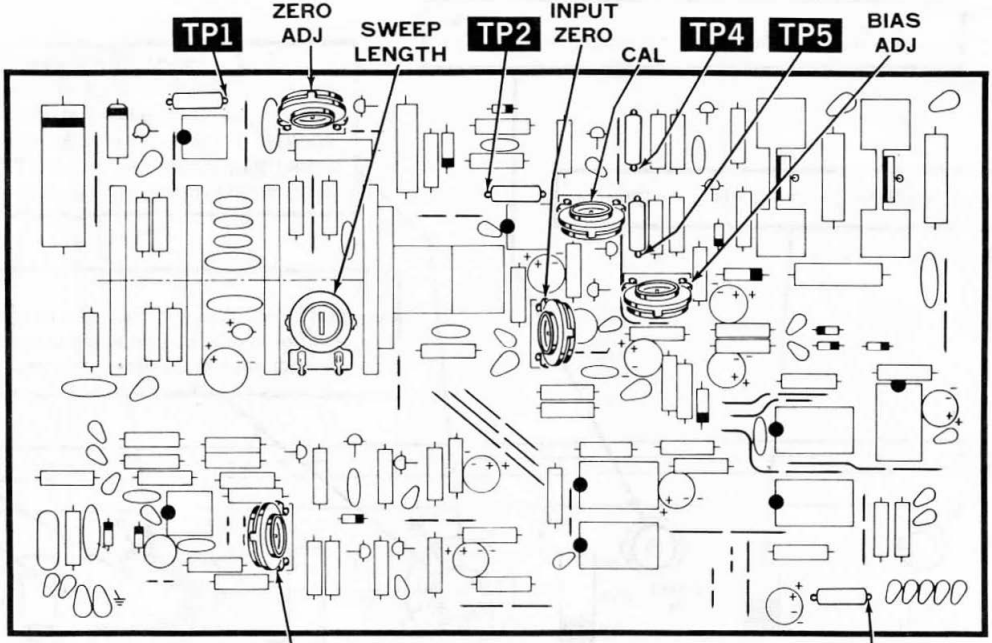
Y2 INPUT — This is the inp Y2.

PICTORIAL 6-

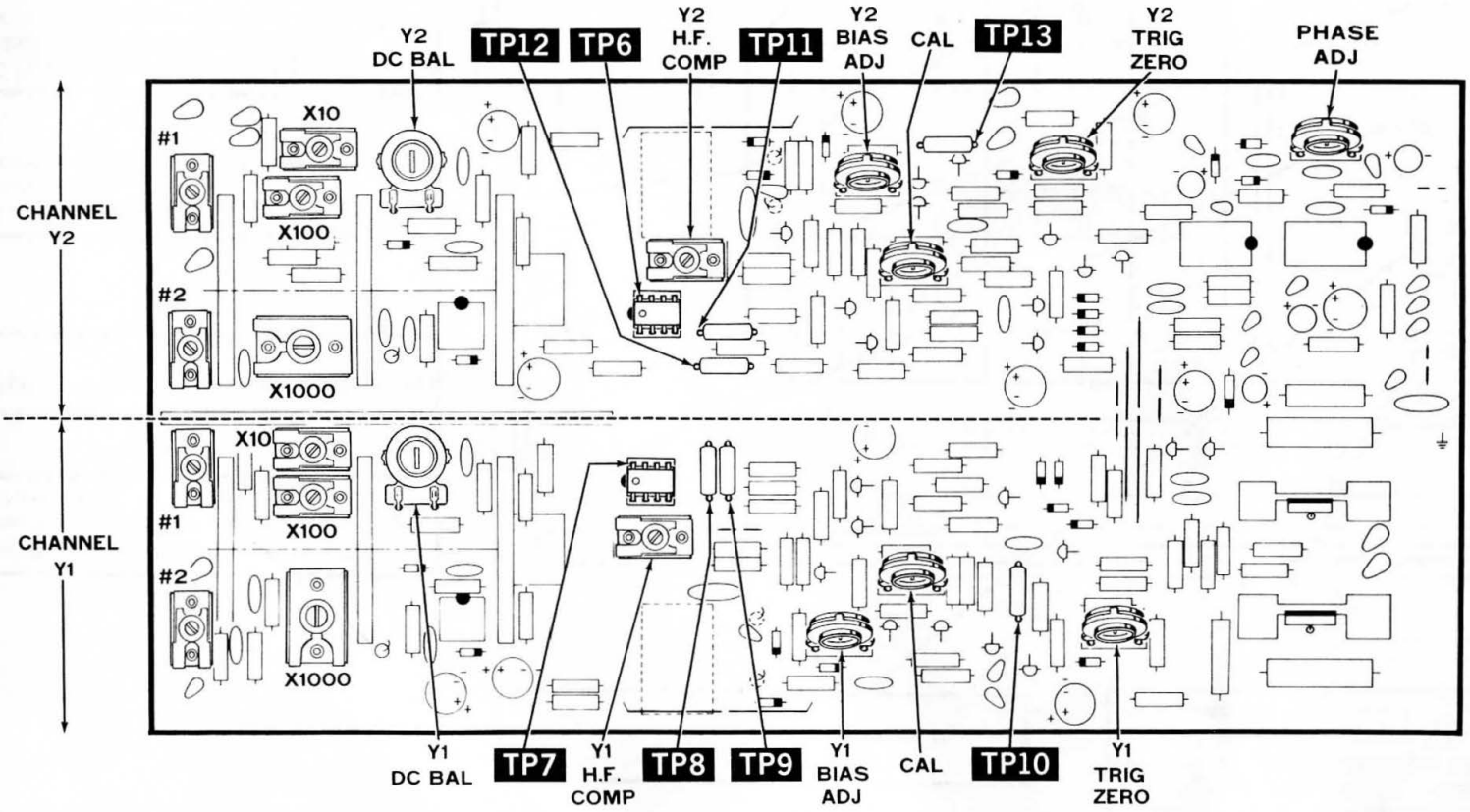
POWER SUPPLY CIRCUIT BOARD



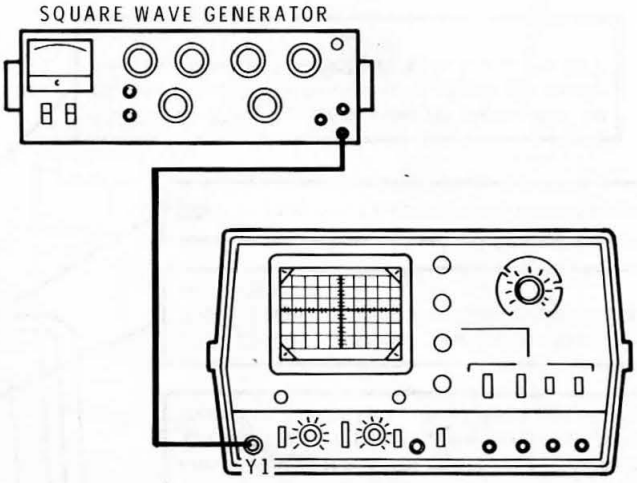
PICTORIAL 6-3



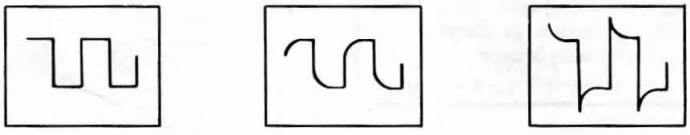
PICTORIAL 6-4



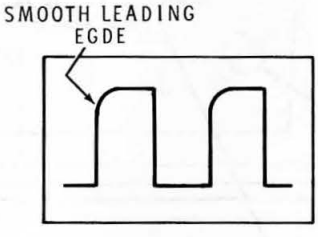
PICTORIAL 6-5



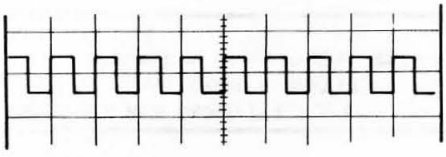
PICTORIAL 6-6



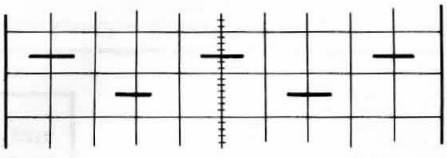
PICTORIAL 6-7



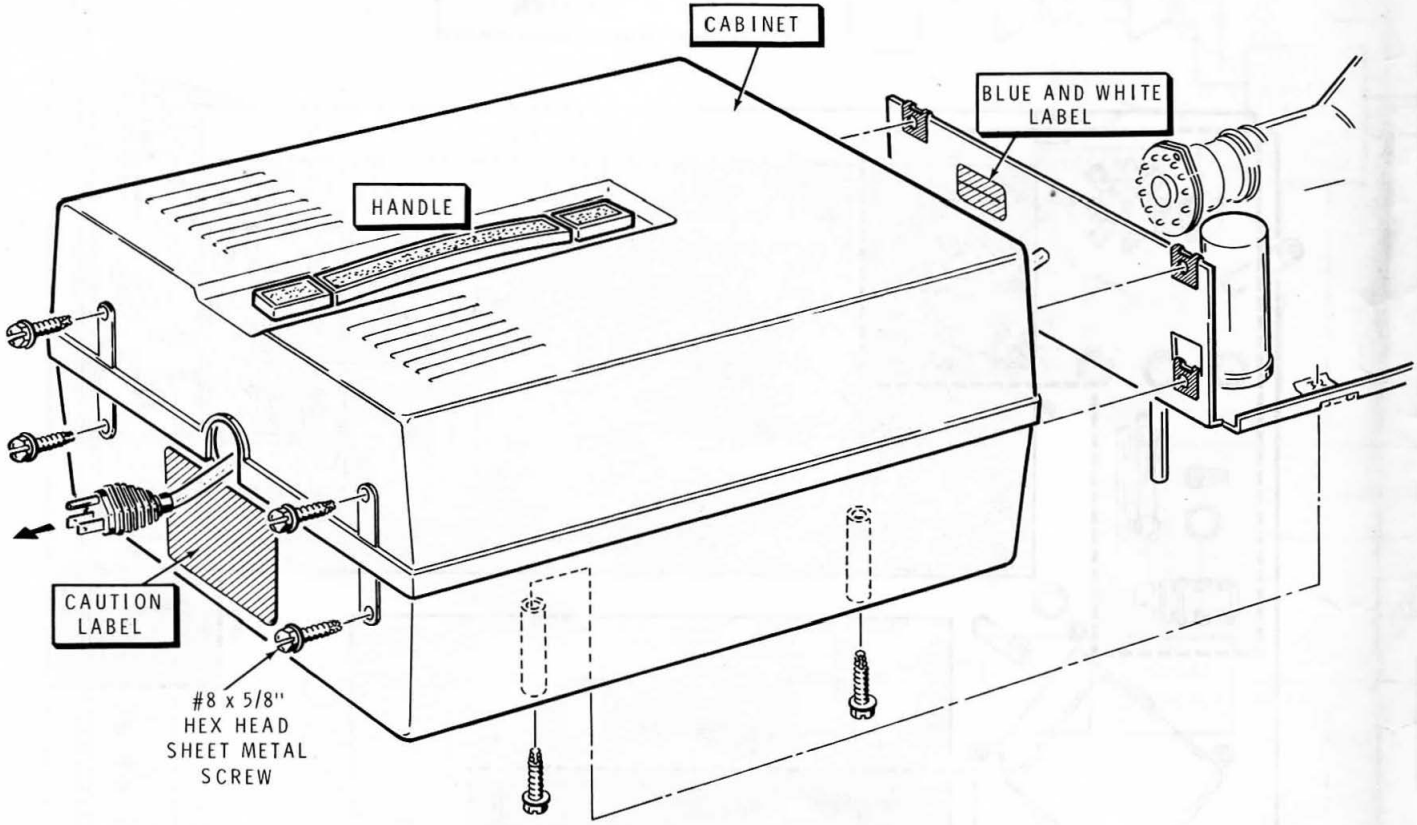
PICTORIAL 6-8



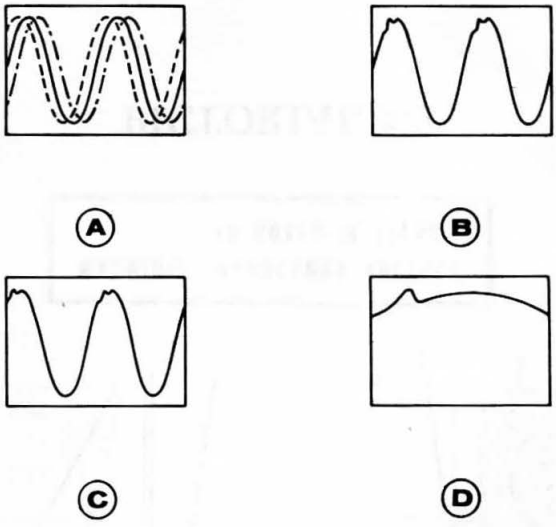
PICTORIAL 6-9



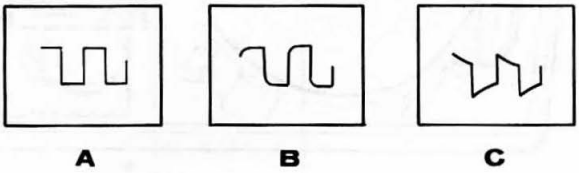
PICTORIAL 6-10



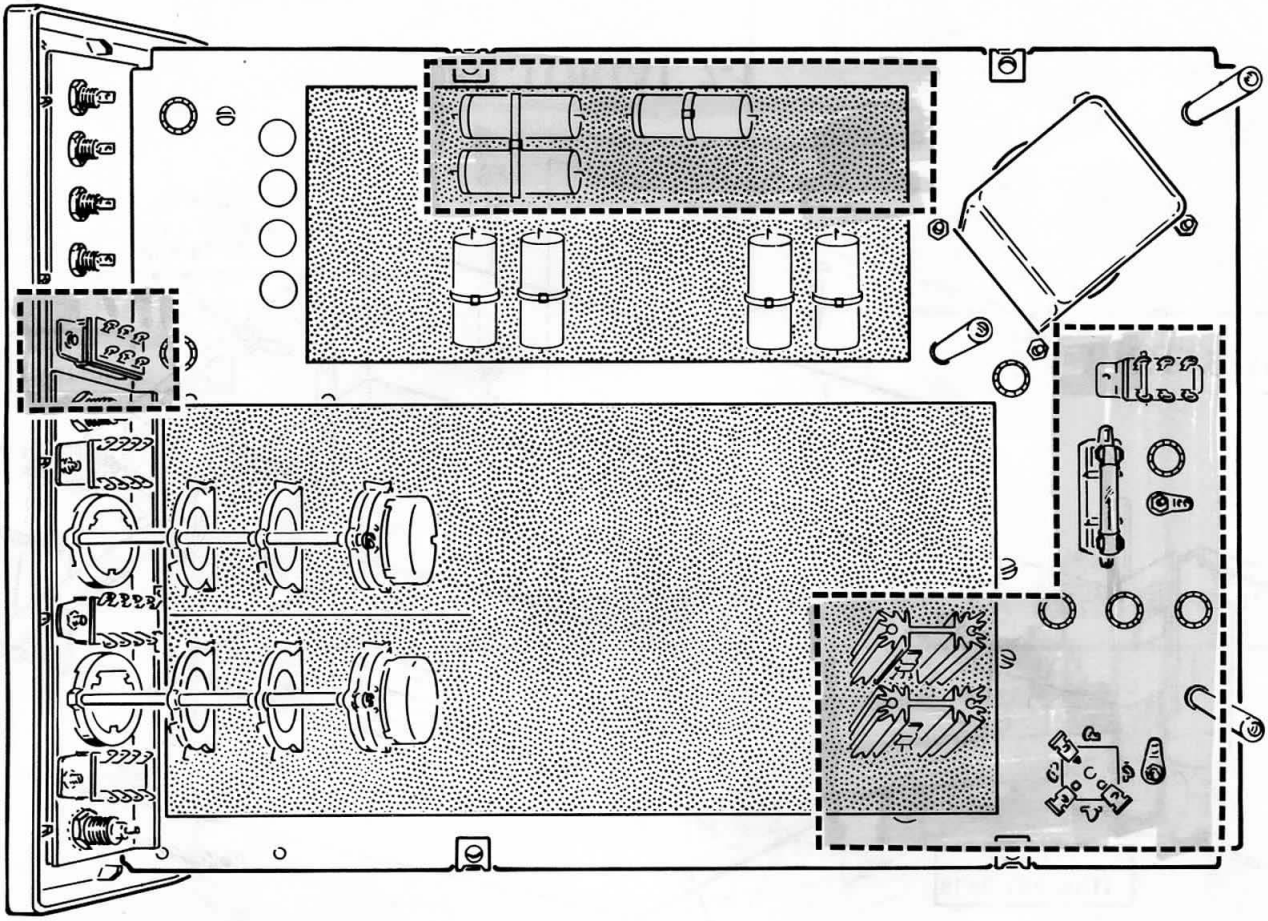
PICTORIAL 7-1



PICTORIAL 8-1

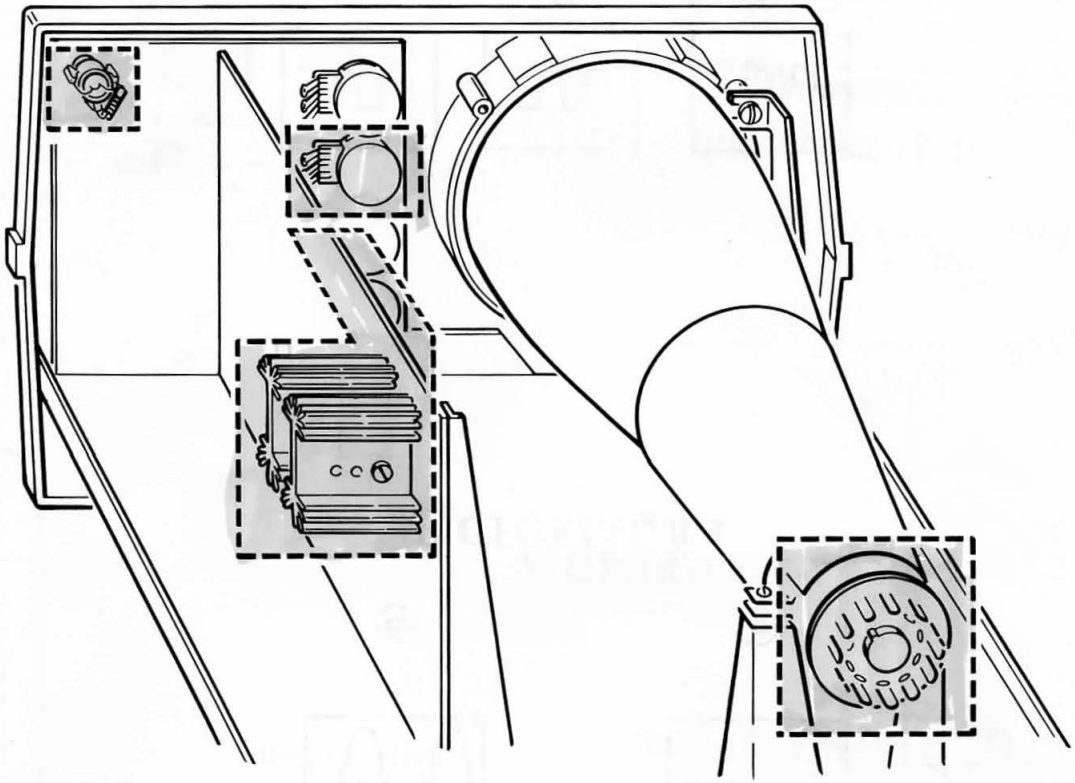


PICTORIAL 8-6



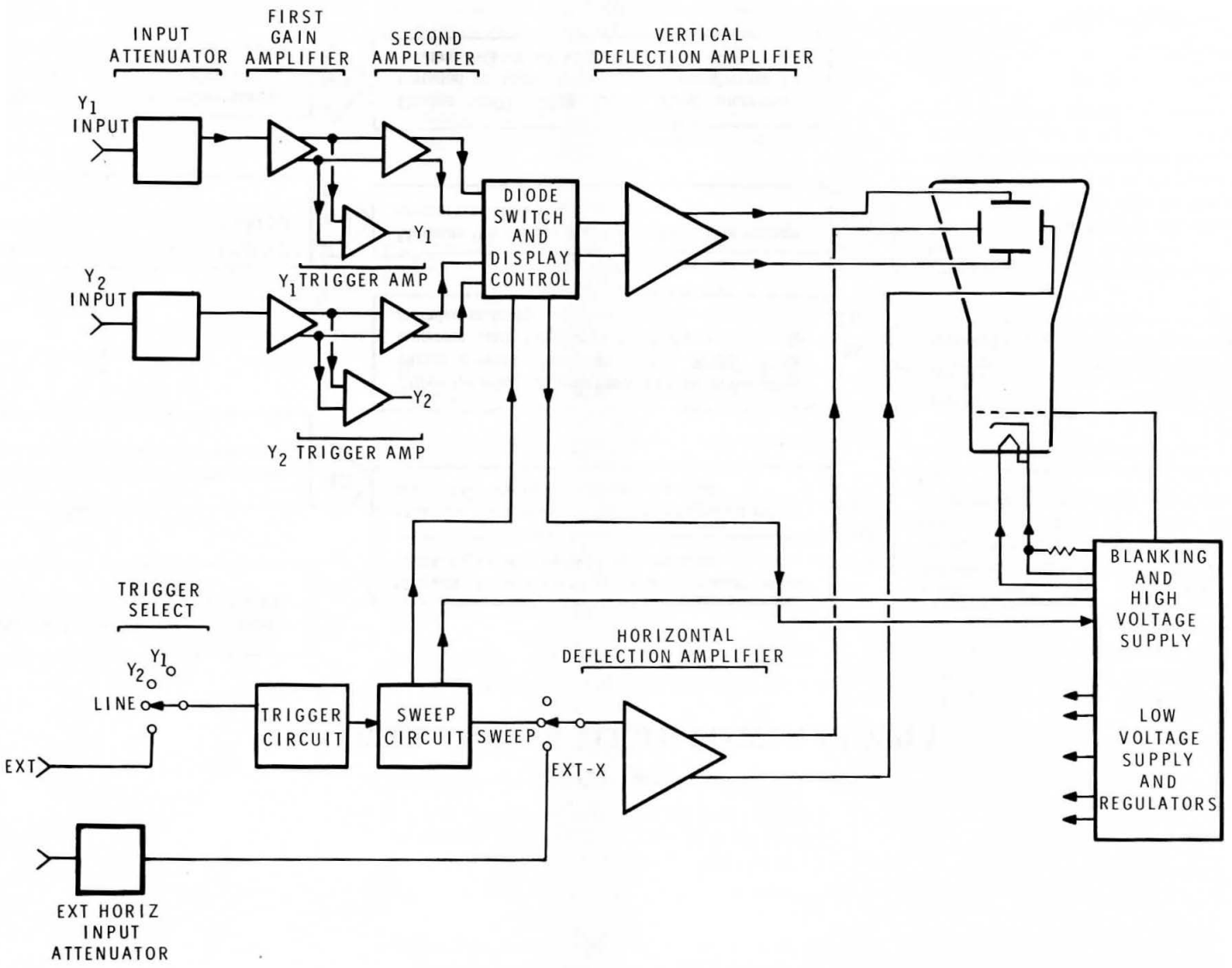
WARNING
DANGEROUS VOLTAGE
IN BOXED-IN AREAS

PICTORIAL 9-1



WARNING: DANGEROUS VOLTAGE IN BOXED-IN AREAS

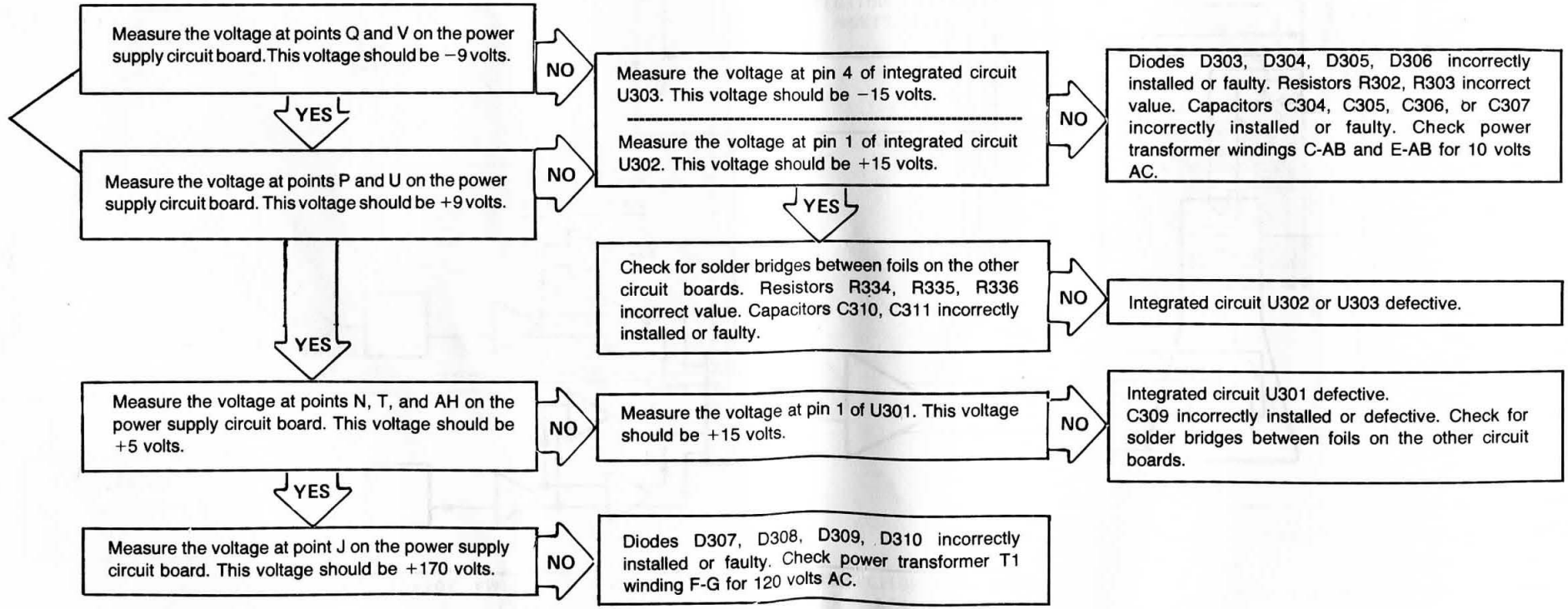
PICTORIAL 9-2



BLOCK DIAGRAM

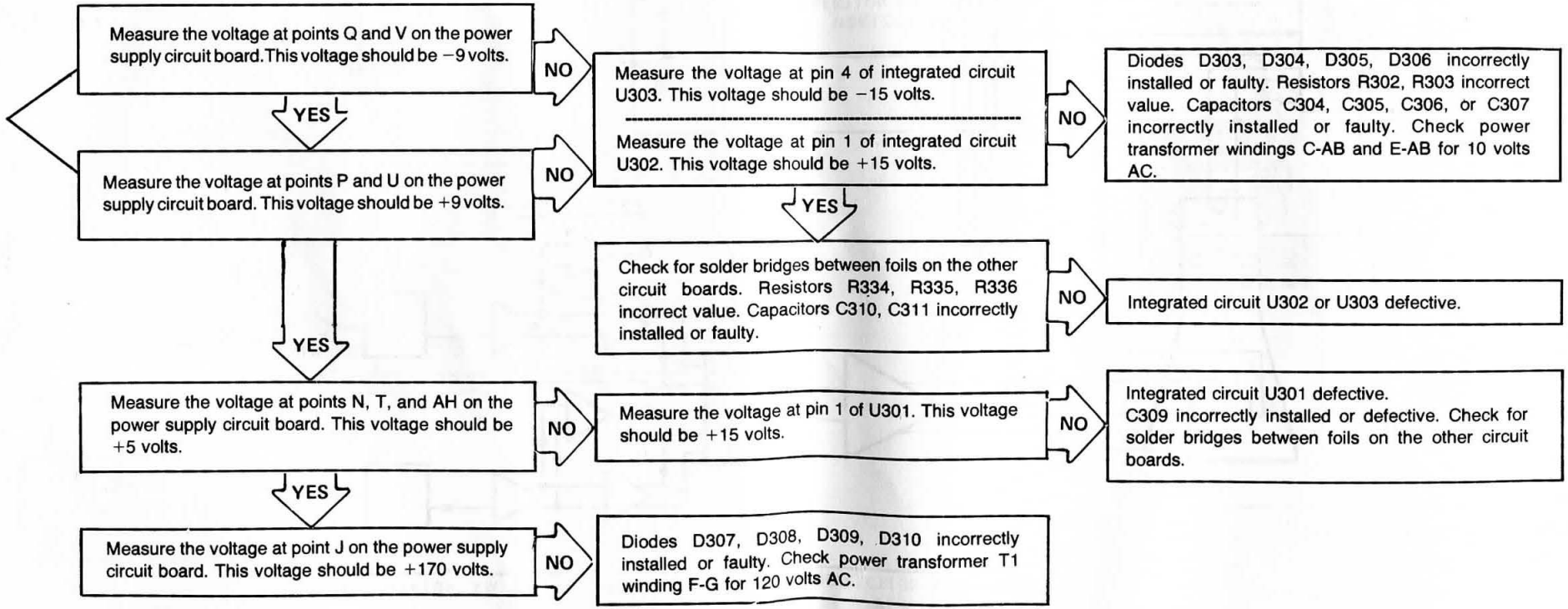
TEST #1
±9 VOLTS AND +5 VOLTS POWER SUPPLY

: These supplies track each other. If
upply fails, the other will also shut



TEST #1
±9 VOLTS AND +5 VOLTS POWER SUPPLY

: These supplies track each other. If
upply fails, the other will also shut



TEST #2
VERTICAL DEFLECTION AI

(Y1-Y2-CHOP-ALT)

NOTE: Components on the vertical circuit board have their numbers followed by "A" for channel Y1, and "B" for channel Y2.

Make sure Vertical Mode switch SW1 (Y1-Y2-CHOP-ALT) is in the Y1 position. Measure the voltage at the collector (c) of Q118. This voltage should be +9.0 volts. Then measure the voltage at the collector of Q117. This voltage should be +.6 volts. NOTE: These voltages will be reversed with the Vertical Mode switch in the Y2 position.

NO

Measure the voltage on U102. These should be: pin 6 greater than +2.4 volts and 8 less than +.8 volts.

YES

Q117 or Q118 incorrectly installed or fau

YES

Measure the voltages at the collector of Q115 and Q116. These voltages should be the same.

NO

Measure the voltage at the drain (pin 6) of adjust the VERTICAL DC BAL control to ob DC.

YES

The vertical deflection amplifier circuits are operating properly.

YES

Turn the power off and short the base of Q base of Q114. Turn the Oscilloscope on.

The collector voltages of Q115 and Q11 same.

YES

Turn the power off and remove the short between Q113 and Q114. Then short t Q111 to the base of Q112. Turn the Oscill

The collector voltages of Q115 and Q1 same.

YES

Turn the power off and remove the shor between Q111 and Q112. Then short Q104 to the base of Q105. Turn the Osci

The collector voltages of Q115 and Q same.

YES

Turn the power off and remove the shor between Q104 and Q105. Then short pin Q102. Turn the Oscilloscope on.

The collector voltages of Q115 and Q1 same.

TEST #2
VERTICAL DEFLECTION AMPLIFIER

(Y1-Y2-CHOP-ALT)

Make sure Vertical Mode switch SW4 (Y1-Y2-CHOP-ALT) is in the Y1 position. Measure the voltage at the collector (c) of Q118. This voltage should be +9.0 volts. Then measure the voltage at the collector of Q117. This voltage should be +.6 volts. NOTE: These voltages will be reversed with the Vertical Model switch in the Y2 position.

NO → Measure the voltage on U102. These voltages should be: pin 6 greater than +2.4 volts; pins 2, 3, and 8 less than +.8 volts.

NO → U102 incorrectly installed or fault
switch SW4 incorrectly wired or fa

Measure the pin 8 of U101. This
less than +.8 volt.

YES → Q117 or Q118 incorrectly installed or faulty.

YES → Measure the voltages at the collector of Q115 and Q116. These voltages should be the same.

NO → Measure the voltage at the drain (pin 6) of Q101 and adjust the VERTICAL DC BAL control to obtain 0 volt DC.

NO → Q101 faulty. Check associated circ
incorrect parts values).

YES → The vertical deflection amplifier circuits are operating properly.

YES → Turn the power off and short the base of Q113 to the base of Q114. Turn the Oscilloscope on.

The collector voltages of Q115 and Q116 are the same.

NO → Q113 or Q114 incorrectly installed o
associated circuitry (soldering, i
values).

YES → Turn the power off and remove the short connected between Q113 and Q114. Then short the base of Q111 to the base of Q112. Turn the Oscilloscope on.

The collector voltages of Q115 and Q116 are the same.

NO → Q111 or Q112 incorrectly installed
associated circuitry (soldering,
values).

YES → Turn the power off and remove the short connected between Q111 and Q112. Then short the base of Q104 to the base of Q105. Turn the Oscilloscope on.

The collector voltages of Q115 and Q116 are the same.

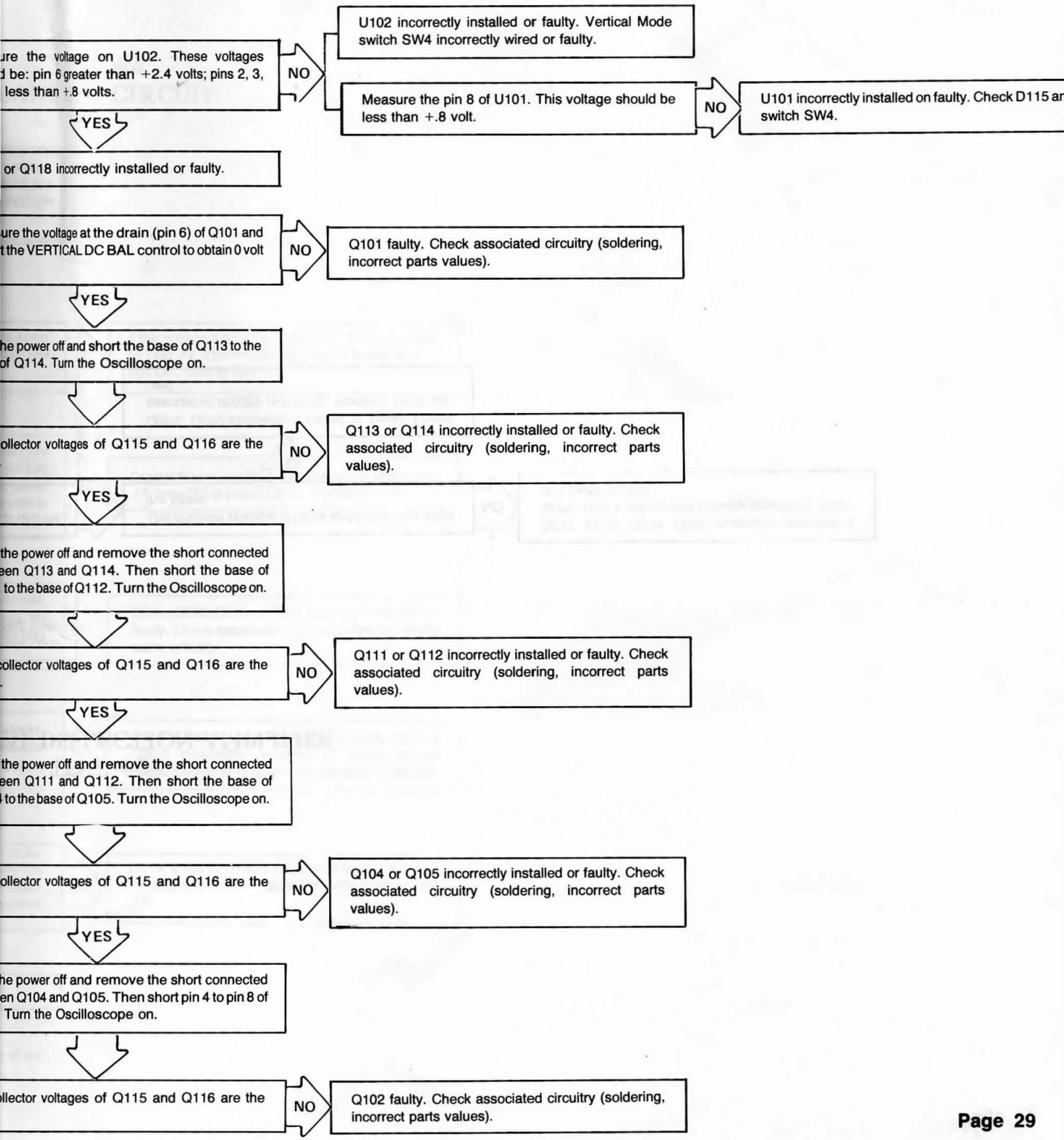
NO → Q104 or Q105 incorrectly installed
associated circuitry (soldering,
values).

YES → Turn the power off and remove the short connected between Q104 and Q105. Then short pin 4 to pin 8 of Q102. Turn the Oscilloscope on.

The collector voltages of Q115 and Q116 are the same.

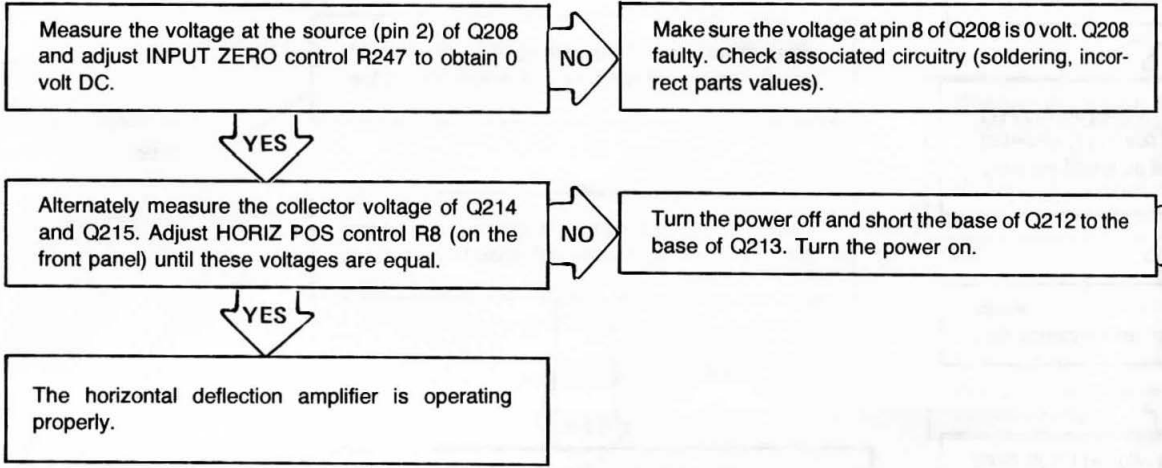
NO → Q102 faulty. Check associated circ
incorrect parts values).

TEST #2
L DEFLECTION AMPLIFIER



TEST #3
HORIZONTAL DEFLECTI

NOTE: Make sure TIME/CM switch SW5 is in EXT IN, ×10 position.



TEST #3
HORIZONTAL DEFLECTION AMPLIFIER

ıe voltage at pin 8 of Q208 is 0 volt. Q208
k associated circuitry (soldering, incor-
alues).

wer off and short the base of Q212 to the
13. Turn the power on.

The collector voltages of Q214 and Q215 should be the same.

NO

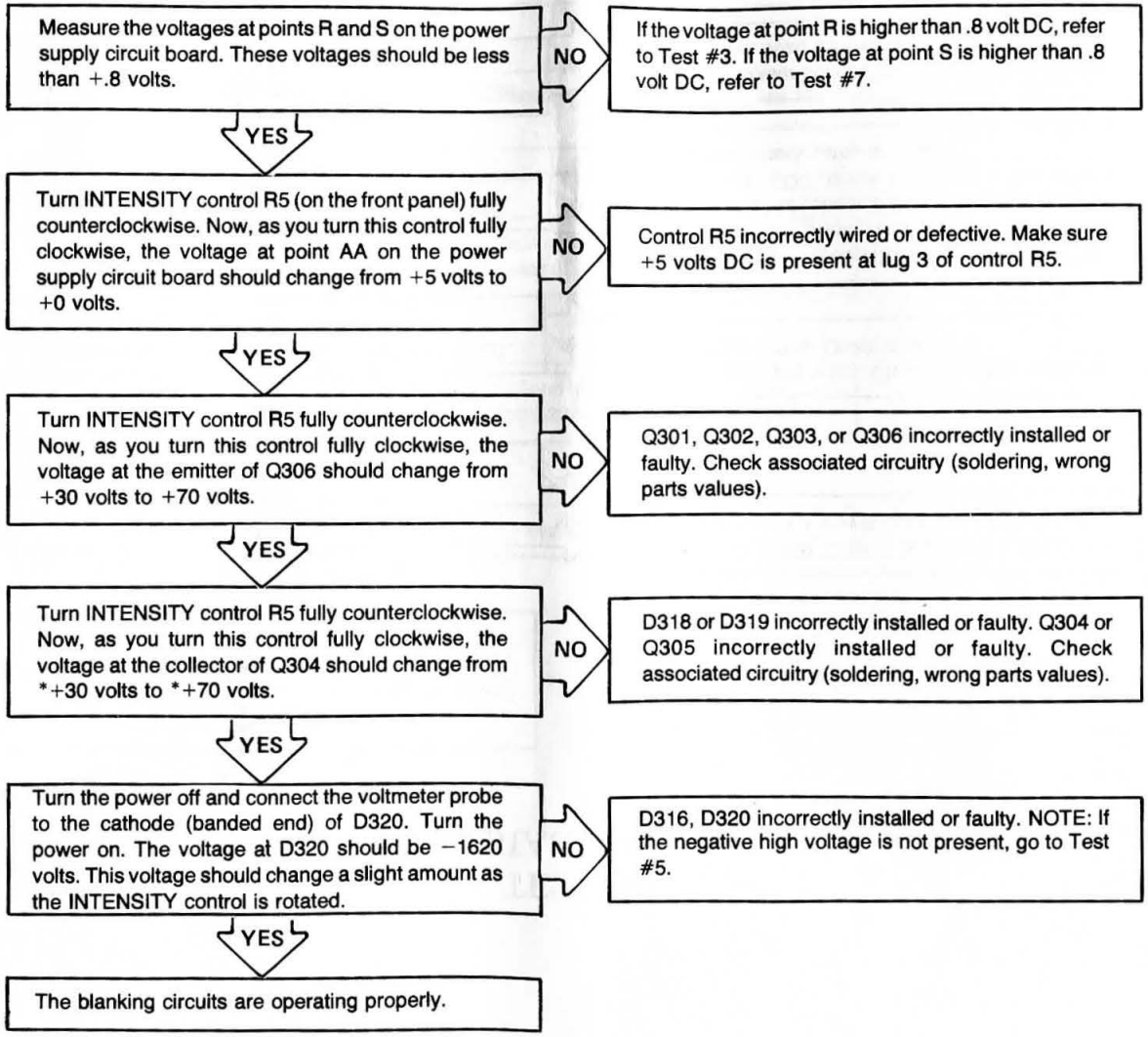
Q212, Q213, Q214, Q215 incorrectly installed or faulty. Check associated circuitry (soldering, incorrect parts values).

YES

Q209, Q210 incorrectly installed or faulty. Check associated circuitry (soldering, incorrect parts values).

TEST #4
BLANKING CIRCUIT

WARNING: You will be making voltage measurements in the high voltage area of the Oscilloscope. Be very careful not to contact this high voltage. See Page 26 of this Booklet.



*These voltage readings depend on the setting of the INTENSITY BIAS control and can vary 40 volts.

TEST #5
CRT BIAS CIRCUITS

CAUTION

When you make any of the following tests, first turn the Oscilloscope off. Then connect the voltmeter to the circuit and turn the Oscilloscope back on again.

Check the voltage at the junction of C301 and R301. It should read −2000 VDC.

NO → Check D301, D302, C301, C302, and T1. Check the voltage between A and B. It should be 360 VAC.

YES

Check the voltage at the junction of C303 and R301. It should read −1650 VDC.

NO → Check C303 and R301. Check for open or shorted foils. Check D316, D320, and D314.

YES

Check the voltage at AE. It should read −1350 VDC.

NO → If it is lower than −1350 VDC, check D317 and C320. Also check divider string R17, R6, R309, and R310 for open and bad connections. If the voltage is higher than −1350 VDC, check for shorts in the divider string, and check wires and foils.

YES

Check the voltage at point W. It should read −1568 VDC.

NO → Check for solder bridges and incorrect wiring to the CRT socket. Also check C320.

YES

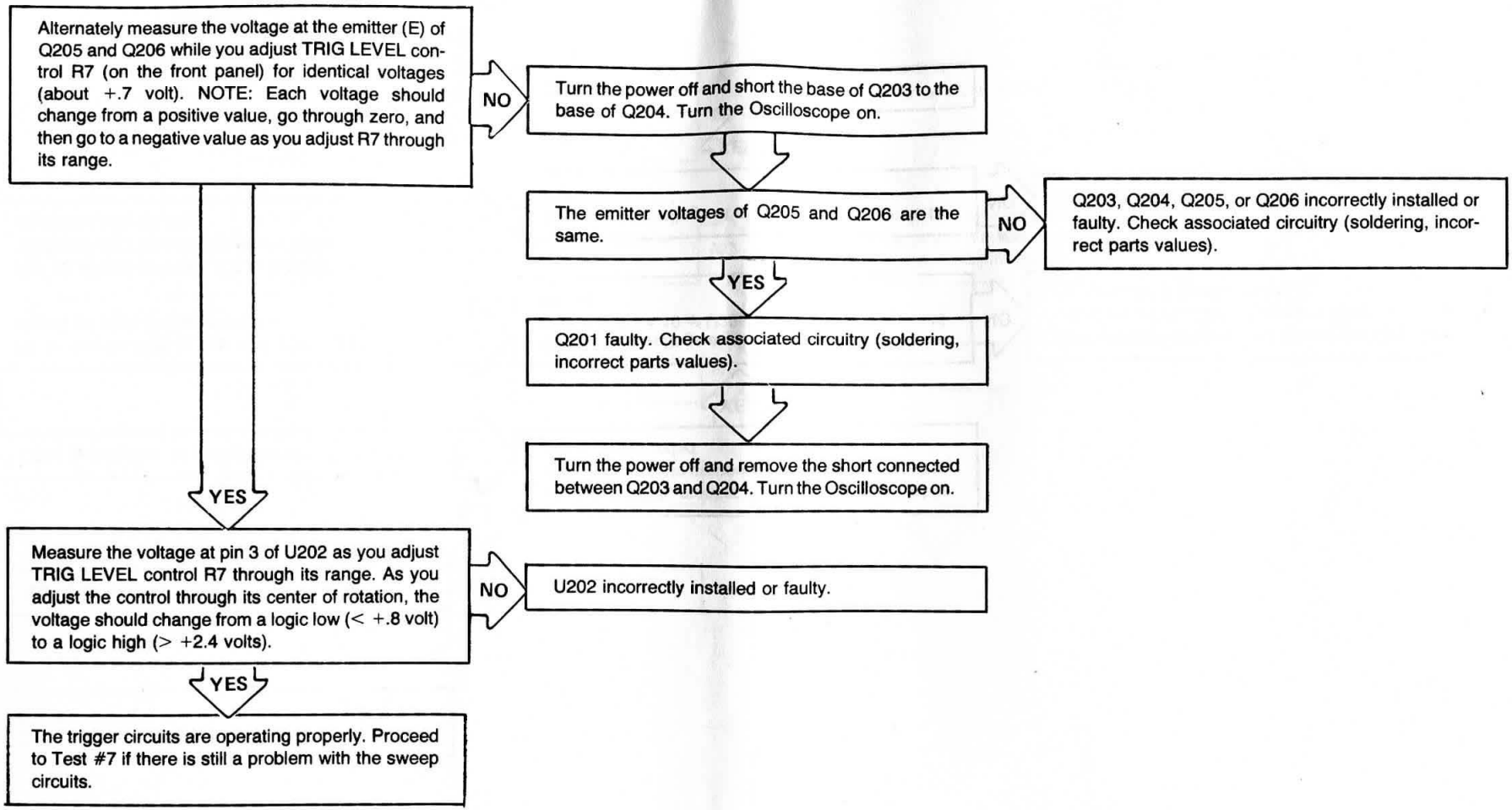
Check the voltage at point Y. It should read +95 VDC. (Adjust it if necessary.)

NO → Check Q307 and associated circuitry.

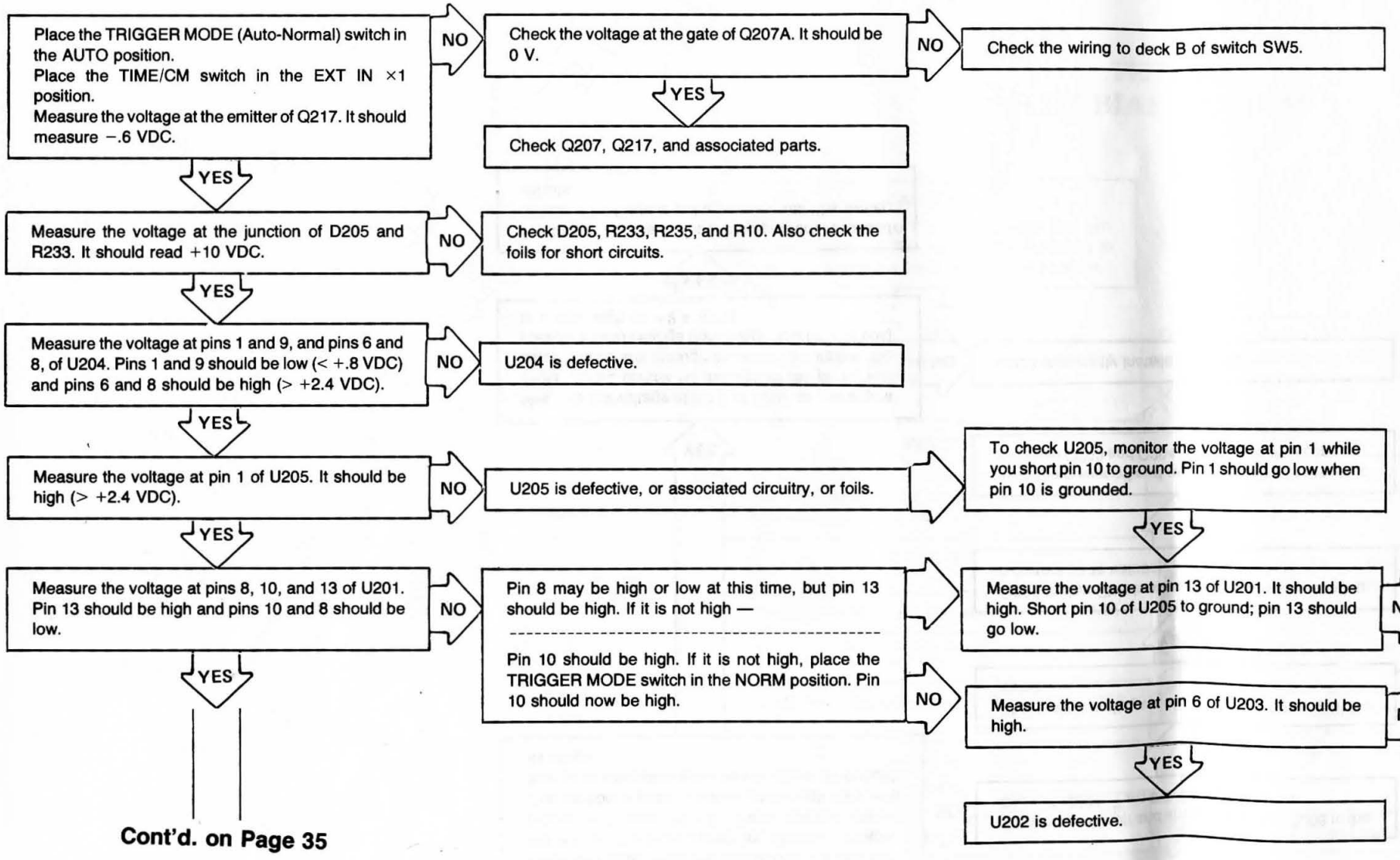
YES

CRT bias circuits are all operating properly.

TEST #6
TRIGGER CIRCUITS



TEST #7
SWEEP CIRCUITS



Cont'd. on Page 35

TEST #7
SWEEP CIRCUITS

ge at the gate of Q207A. It should be

NO → Check the wiring to deck B of switch SW5.

YES

217, and associated parts.

33, R235, and R10. Also check the
cuits.

e.

e, or associated circuitry, or foils.

To check U205, monitor the voltage at pin 1 while you short pin 10 to ground. Pin 1 should go low when pin 10 is grounded.

YES

igh or low at this time, but pin 13
lf it is not high —

---

e high. If it is not high, place the
E switch in the NORM position. Pin
e high.

Measure the voltage at pin 13 of U201. It should be high. Short pin 10 of U205 to ground; pin 13 should go low.

NO → Measure the voltage at pins 11 and 8 of U202 while you short pin 10 of U205 to ground. Pin 11 should go high and pin 8 should go low.

NO → U202 is defective.

NO → Measure the voltage at pin 6 of U203. It should be high.

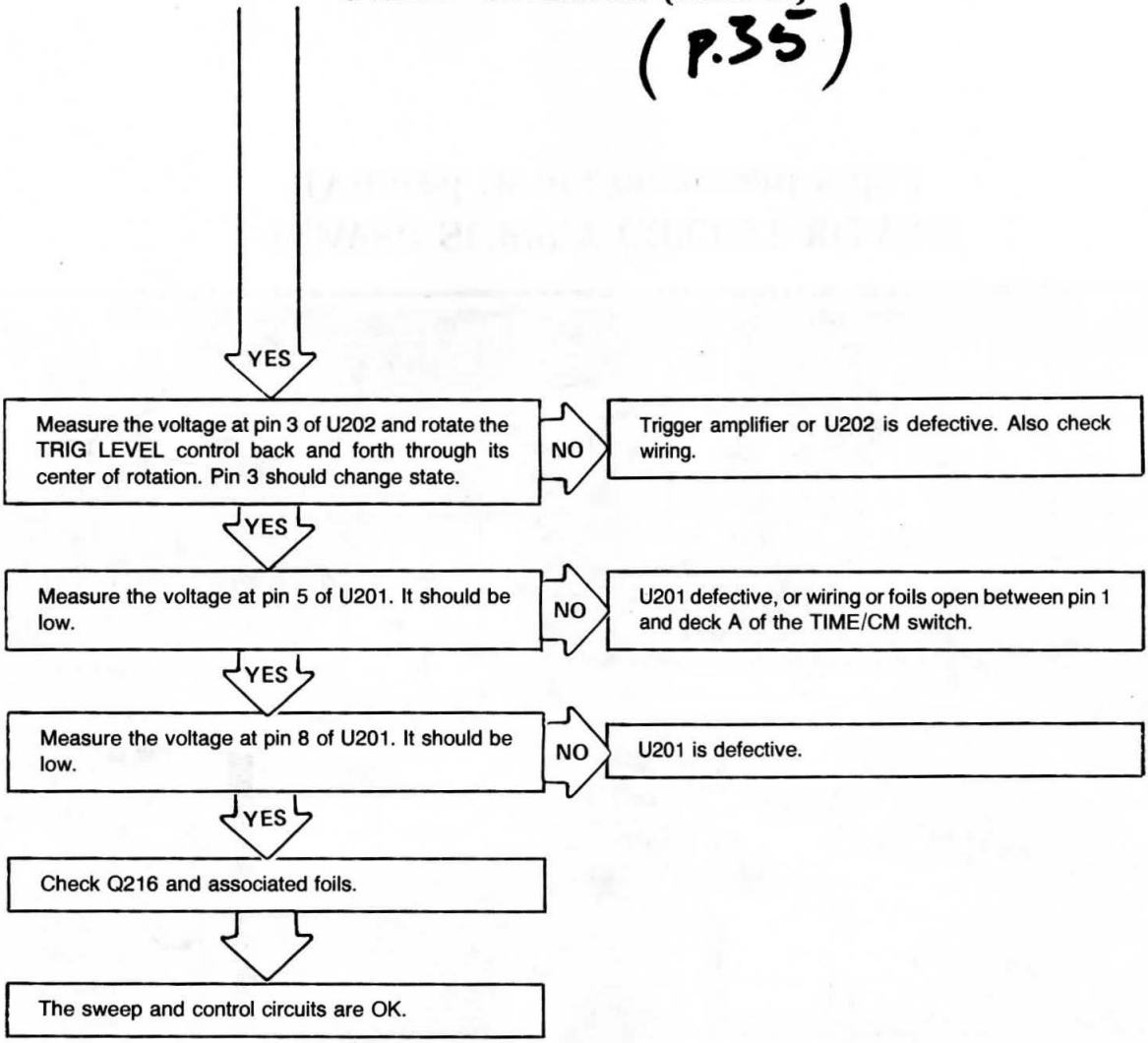
NO → U203 is defective.

YES

U202 is defective.

TEST #7
SWEEP CIRCUITS (Cont'd.)

(P.35)



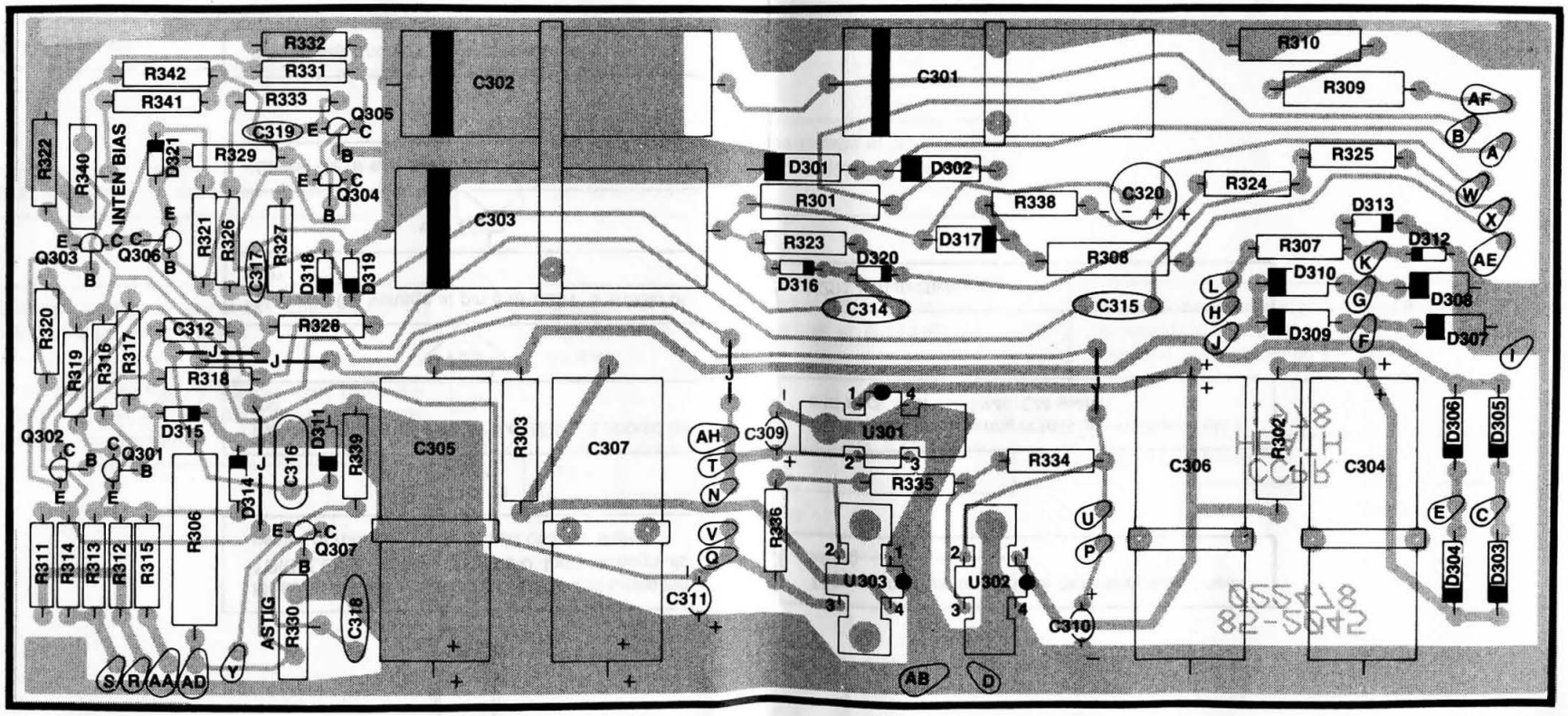
CIRCUIT BOARD X-RAY VIEWS

NOTE: To find the PART NUMBER of a component for the purpose of ordering a replacement part:

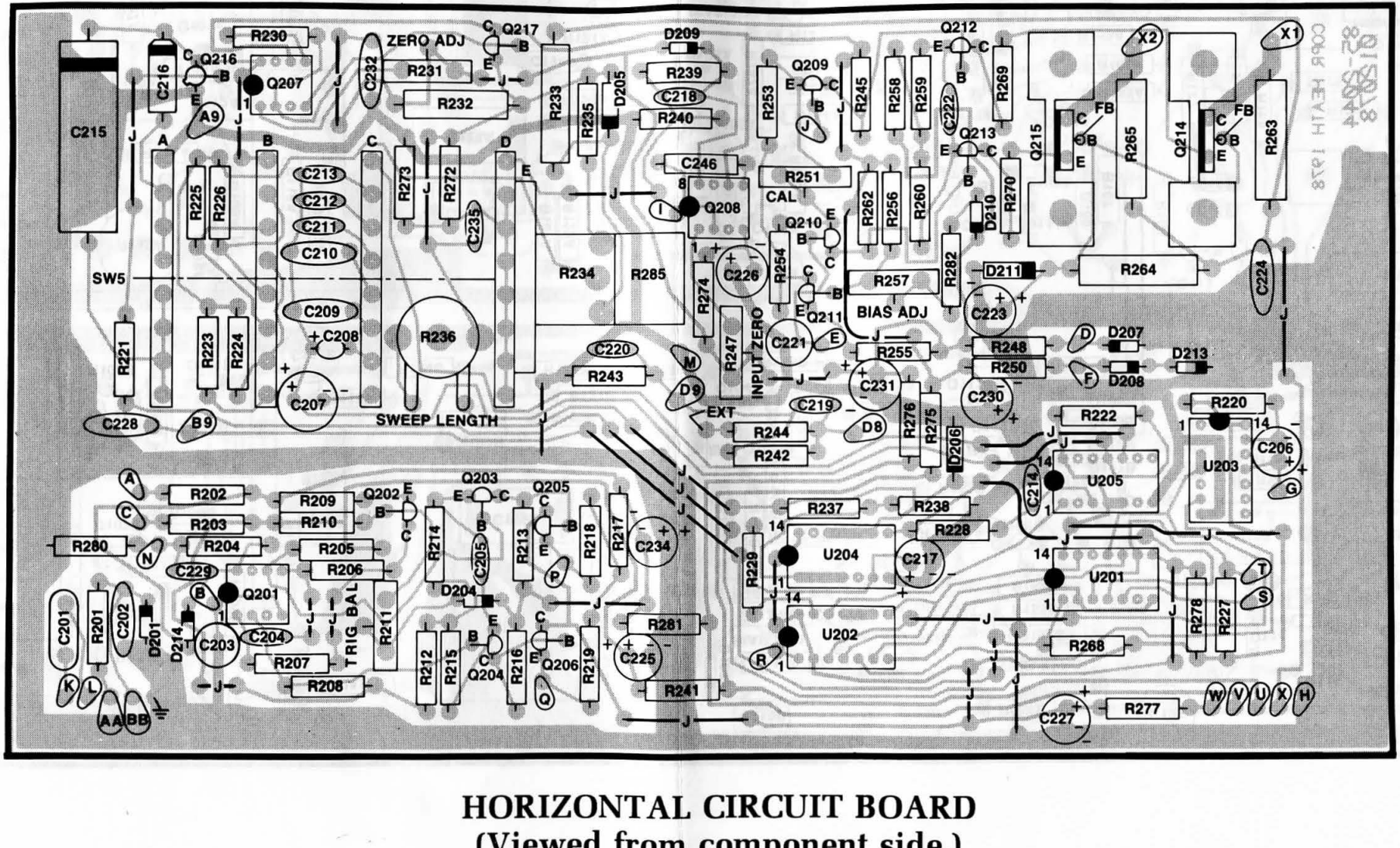
A. Find the circuit component number (R5, C3, etc.) on the "X-Ray View."

B. Locate this same number in the "Circuit Component Number" column of the "Parts List."

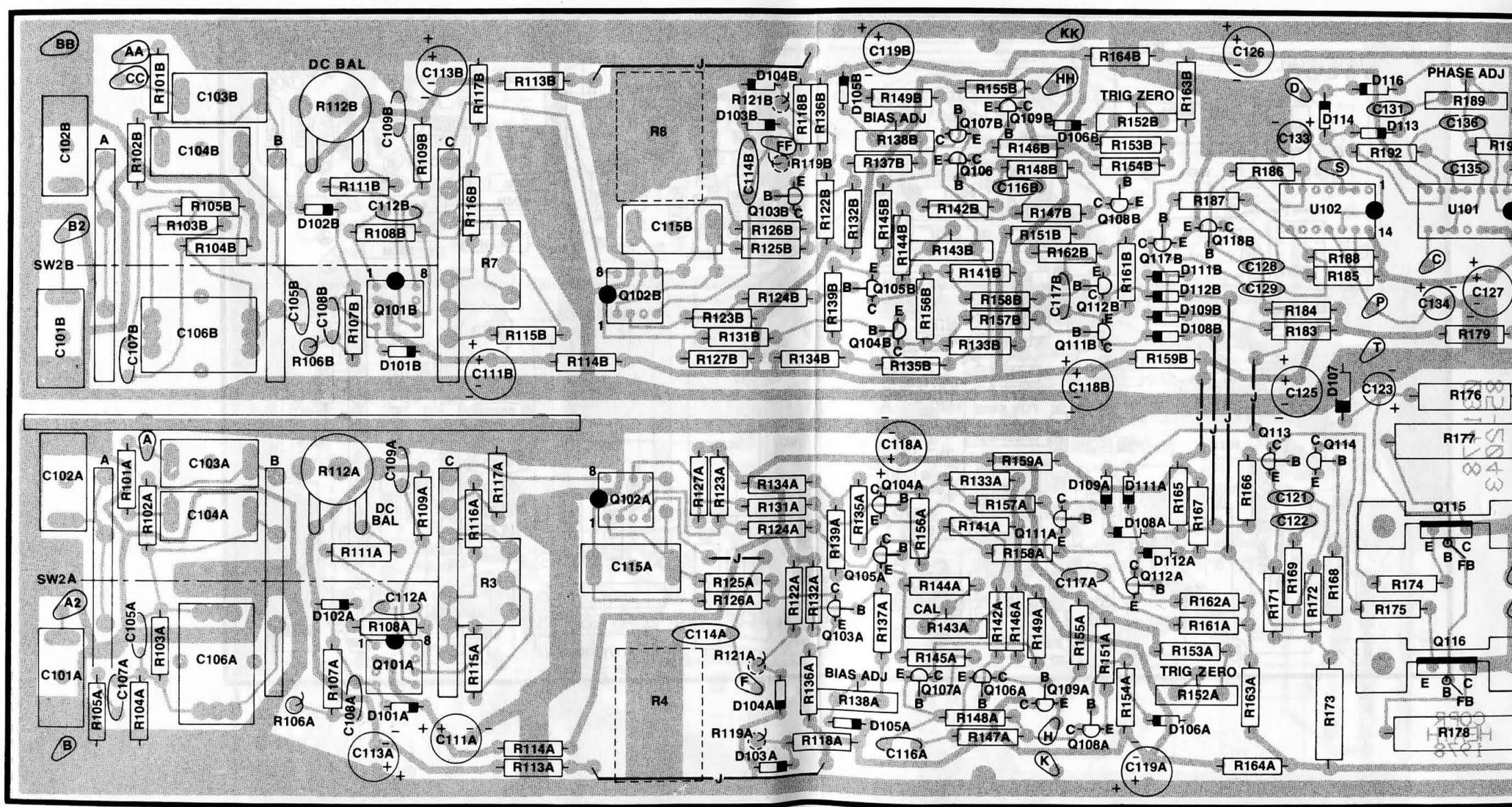
C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION which must be supplied when you order a replacement part.



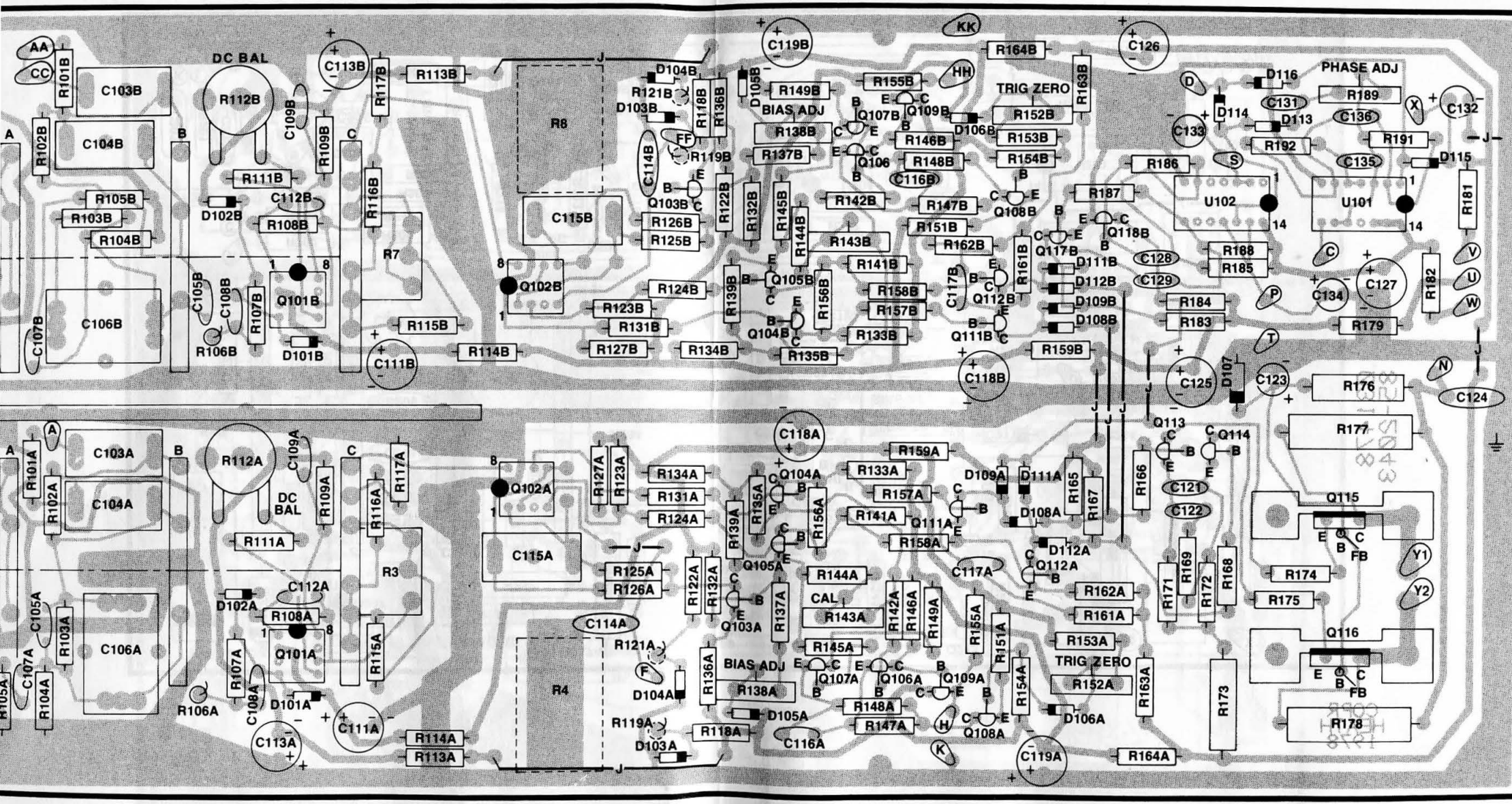
POWER SUPPLY CIRCUIT BOARD
(Viewed from Component side.)



HORIZONTAL CIRCUIT BOARD
(Viewed from component side.)



VERTICAL CIRCUIT BOARD



VERTICAL CIRCUIT BOARD
(Viewed from component side.)