HEWLETT hp PACKARD

SERVICE MANUAL

MODEL 2640B
MODEL 2640N
MODEL 2640S
DISPLAY STATION

Manual part no. 02640-90115

Printed: Aug. 1978

OPTIONS COVERED

This manual covers options 001, 015, 020, 900, 901, 902, and 906 as well as the standard model terminal.

ACCESSORIES COVERED

This manual covers the following terminal accessories:

13231A Display Enhancements
13231A-201 Mathematic Set
13231A-202 Line Drawing Set
13231A-203 Large Character Set
13234A Terminal Memory Module (+4K)
13238A Terminal Duplex Register
13240A Option Slot Extender
13245A PROM Character Set Accessory
13260A Standard Asynchronous Communications
13232A 103/202 Modem Cable Assembly
13232B 12531/12880 Hood-to-Hood Cable
13232C RS232C Cable Assembly
13232F Current Loop Connector Kit
13232G RS232C Cable Assembly (Male)
13232H RS232C Cable Assembly (Female)
13232J 9871 Cable Assembly
13232K Tektronix 4632 Interface Cable Assembly
13232L Conrac TV Monitor Interface Cable Assembly
13232N Modem Cable Assembly
13232S HP 9866 Cable Assembly

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PREFACE

This manual provides field service instructions for the Hewlett-Packard 2640B, 2640N, and 2640S Display Terminals. These terminals are state-of-the-art products and, because of product design, a complete modular philosophy has been implemented to minimize on-site time for installing add-on accessories and for repair.

There are two *customer* manuals associated with each terminal model — a Users Manual and a Reference Manual. The manuals are listed below:

2640B Display Terminal Users Manual, part no. 02640-90109
2640N Display Terminal Users Manual, part no. 02640-90111
2640S Display Terminal Users Manual, part no. 02640-90113
2640B/N/S Display Terminal Reference Manual, part no. 02640-90110

The Users Manual contains operator instructions; the Reference Manual contains programming information, installation instructions for the terminal and accessories, self-test instructions, and a brief overview of the terminal's architecture.

The following accessory manuals are also available:

13236A/B Cartridge Tape Accessory Installation Manual, part no. 13236-90004
13246A/B Printer Subsystem (9866A/B) Operator's Manual, part no. 13246-90901
13250A Data Communications/Serial Printer Interface Accessory Operating and Service Manual, part no. 02640-90042
13254A Video Interface Accessory Operating and Service Manual, part no. 13254-90001
13349A Printer Subsystem (9871A) Operator's Manual, part no. 13349-90901

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INSTALLATION

SECTION I

Refer to the HP 2640B/N/S Reference Manual, part no. 02640-90110, for installation instructions.

FUNCTIONAL OPERATION

SECTION II

2-1. INTRODUCTION

This section contains a block diagram level theory of operation discussion for the terminal.

2-2. GENERAL DISCUSSION

As shown in figure 2-1, the terminal basically consists of a power supply section, display section, memory section, control section, and input/output section. The interaction of these sections to provide the terminal's capabilities is discussed briefly in the following paragraphs.

The power supply section consists of a Power Supply PCA and a Power Supply Control PCA that convert the primary power source into required operating voltages and basic clock pulses for the terminal. Except for the Sweep PCA, all interfacing between the power supply section and other terminal modules is provided by the Backplane Assembly.

The display section consists of a display controller subsection, Sweep PCA, CRT display, and, if installed, a Display Expansion PCA and PROM Character PCA. The display controller subsection generates all timing and control signals for the display section, provides drive signals for the Sweep PCA, initiates ASCII character (data) transfers from the memory section, and converts the ASCII characters into video drive signals. When installed, the Display Expansion PCA generates the required drive signals to add half bright, underline, and blinking display enhancements to the CRT and provides the capability for adding up to three additional 128 character sets to the terminal. (Refer to section 7 of the 2640B/N/S reference manual, part no. 02640-90110.) When installed, the PROM Character PCA provides the capability for adding up to two user generated character sets that can be used to replace the base character set on the Display Control PCA or two existing alternate character sets on the Display Expansion PCA. Set selection and data signal transfers between the PROM Character PCA and the Display Control or Display Expansion PCA's is provided by a separate connector assembly attached between the PCA's. The Sweep PCA is controlled by the Display Timing and Display Control PCA's (also the Display Expansion PCA when installed) and generates all drive signals, including filament and high voltages required by the CRT display. Timing and control signal interfacing between the display controller subsection modules (including the Display Expansion PCA when installed) is provided by the Top Plane Assembly. Data, associated transfer signals, and address interfacing between the subsection modules and other terminal modules is provided by the Backplane Assembly.

The control section is the central processing unit of the terminal and consists of the Processor PCA and part of the ROM/RAM Memory PCA. The Processor PCA fetches instructions from the operating system section (ROM) of the ROM/RAM Memory PCA and executes them; accessing the memory section, implementing input/output section modules or, if installed, implementing the Display Expansion PCA. In addition, the control section also controls and directs received byte information to the display section for translation from ASCII code into video signals. All signal interfacing between the control section and the other terminal modules is provided by the Backplane Assembly.

The memory section provides the operator with the usable RAM storage capability of the terminal. This section consists of part of the ROM/RAM Memory PCA (1K RAM) and, if installed, the +4K Memory PCA. The +4K Memory PCA adds 4096 bytes of memory to the terminal. All read/write memory is accessed by the Processor PCA through the Backplane Assembly.

The input/output section is divided into a keyboard subsection, computer subsection, and peripheral subsection. All three subsections are implemented by the control section through the Backplane Assembly. The keyboard subsection consists of the Keyboard Assembly and Keyboard Interface PCA which provide direct data and instruction entry by the terminal operator. The computer subsection consists of the Asynchronous Data Comm PCA and an interface cable assembly which provide a communication link between the terminal and an external computer. The peripheral subsection, if installed, consists of the Terminal Duplex Register PCA and an interface cable assembly which provide a communication link between the terminal and an external peripheral device such as a paper printer. A Video Output Interface PCA is available for interfacing a video monitor or hard copy unit, such as the Tektronix 4632. Also, an RS232 Serial Printer Interface PCA is available.

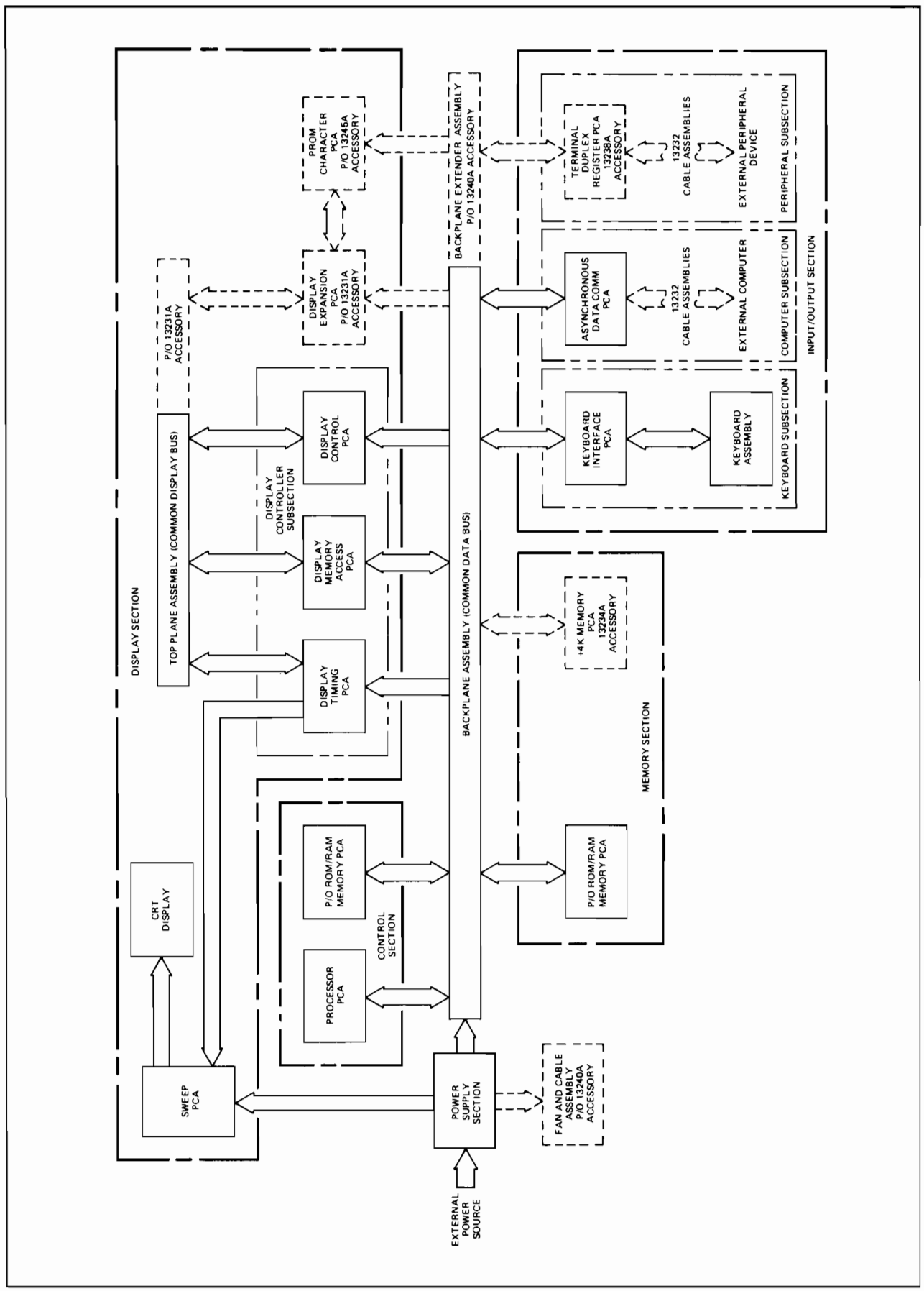


Figure 2-1. Basic Block Diagram

3-1. INTRODUCTION

This section contains troubleshooting information for isolating malfunctions to a replaceable assembly and alignment and adjustment procedures.

WARNING

Hazardous voltages are present inside equipment. The procedures contained in this section shall be performed only by qualified service personnel.

VORSICHT

Innerhalb des Geräts bestehen gefährliche Spannungen. Die in diesem Abschnitt enthaltenen Arbeiten dürfen nur durch Betriebsfachpersonal durchgeführt werden.

ATTENTION

Des tensions dangereuses sont présentes à l'intérieur du matériel. Les opérations décrites dans cette section ne devront être effectuées que par un personnel qualifié.

AVVISO

Pericolo: Alta tensione presente in questa apparecchiatura. Le procedure contenute in questa sezione debbono essere effettuate soltanto da qualificato personale di servizio.

ADVERTENCIA

Hay voltaje peligroso en el interior de este equipo. Los procedimientos expuestos en esta sección sólo deberá llevarlos a cabo el personal de servicio calificado.

高圧危険

内部装置に危険な高電圧がきています。この章にある処置や手続に関しては、専門のサービスマンによってのみ行なって下さい。

3-2. TROUBLESHOOTING

3-3. GENERAL TROUBLE ISOLATION PROCEDURES

The majority of apparent terminal malfunctions are caused by incorrect operation. Therefore, before attempting any detailed trouble isolation procedures, verify that a terminal malfunction truly exists as follows:

a. Ensure that terminal is properly installed (power cord connected and fuse properly installed) and is set to correct operating mode.

b. Ensure that special function keys are being used correctly and in correct sequence.

c. Determine whether or not any recent service routines (accessory installation, cables removed or installed, adjustments performed, etc.) have been performed on terminal. If so, check workmanship.

d. Check all connections in accordance with paragraph 3-4.

e. Check keyboard and communication group in accordance with paragraph 3-5.

f. Perform terminal self test in accordance with paragraph 3-6.

3-4. CONNECTION INSPECTION

Set mainframe rear panel AC POWER switch to OFF, disconnect power cord, and inspect cable connections as follows:

a. Ensure that Keyboard Cable Assembly hood connector is firmly connected to Keyboard Interface PCA.

b. Ensure that interface cable assembly hood connector is firmly connected to Asynchronous Data Comm PCA.

c. If installed, ensure that peripheral interface cable assembly hood connector is firmly connected to Terminal Duplex Register PCA.

d. Open terminal mainframe to its full open position in accordance with instructions in section 7 of the 2640B/N/S reference manual, part no. 02640-90110, and check that all PCA's are firmly seated in Backplane Connector Assembly and, if installed, Backplane Extender Assembly connectors.

e. Remove power supply housing (1, figure 4-1) or cover (15, figure 4-1). Ensure that Power Supply Control PCA is firmly seated in Power Supply PCA connector J5.

f. Ensure that all internal cable assembly connectors are correctly and firmly connected.

3-5. KEYBOARD AND COMMUNICATION GROUP CHECKOUT

The major part of the terminal keyboard can be quickly checked for proper operation by setting the terminal for local operation (REMOTE key up), pressing each of the keys listed in table 3-1, and obtaining the listed results. If an incorrect result is observed, a malfunction exists in either the Keyboard Interface PCA or Keyboard PCA. (Removal and replacement procedures are contained in section IV.) The communication group including the Asynchronous Data Comm PCA can be quickly checked for proper operation as follows:

a. Replace existing cable assembly hood connector connected to Asynchronous Data Comm PCA with HP Test Hood, part no. 02640-60077. The keyboard TRANSMIT indicator will light.

b. Depress REMOTE key, set BAUD RATE switch to 110, and DUPLEX switch to FULL.

c. Hold down any character key and check that associated character is repeatedly displayed across display monitor at a slow rate of speed for as long as the key is held down.

Note: Delete symbol (white square) may appear on display monitor when switching baud rates.

d. While holding down character key, increase baud rate to 150 and then to 300 and check that displayed character repetition rate increases as baud rate increases. If operation is not as stated, a malfunction probably exists in Asynchronous Data Comm PCA or Keyboard Assembly. (Baud rates above 300 will not increase character repetition rate.)

e. Set DUPLEX switch to HALF.

f. Depress any character key once and check that associated charater is displayed twice on display monitor. If operation is not as stated, a malfunction probably exists in Asynchronous Data Comm PCA or Keyboard Assembly.

Table 3-1. Keyboard Checkout Keys

KEY	RESULTS
DISPLAY FUNCTIONS	DISPLAY FUNCTIONS indicator lights
1	1 is displayed
Q or q	Q or q is displayed
Z or z	Z or z is displayed
L	L is displayed
Numeric Pad 1	1 is displayed
Numeric Pad 4	4 is displayed
CNTL G	⍾ is displayed
Release DISPLAY FUNCTIONS key and again press CNTL G keys	Audible "Beep" is generated

3-6. SELF TEST

The self-test feature provides a check of the entire terminal making it possible to quickly analyze and isolate most terminal malfunctions. (Removal and replacement procedures are contained in Section IV.) Perform the test as follows:

a. Set mainframe rear panel AC POWER switch to ON position. Some keyboard indicators may flash on and then off. If any indicators with the exception of TRANSMIT indicator remain lighted, a malfunction exists in Processor PCA.

b. Check that blinking cursor appears in upper left corner of display monitor approximately seven seconds after terminal is energized. This verifies that Processor, ROM/RAM Memory, Display Memory Access (DMA), Display Control, and Display Timing PCA's are operating correctly. If cursor does not appear, malfunction probably exists in Sweep PCA.

c. Press Keyboard TEST key and observe following sequence of events:

(1) Keyboard indicators light. If no indicators light, malfunction probably exists in Power Supply or Power Supply Control PCA.

(2) ROM/RAM Memory PCA ROMs are checked. In most cases, if a ROM malfunction is encountered, monitor will display "ROM TEST FAILED", indicating a defective ROM/RAM Memory PCA.

(3) Entire display including cursor momentarily blanks which checks display portions of Processor, DMA, Display Control, and Display Timing PCA's. If display does not clear (blank), malfunction probably exists in Display Control PCA.

(4) While display is still blanked, ROM/RAM Memory PCA and 4K Memory PCA RAMs are checked. In most cases, if a RAM malfunction is encountered, monitor will display "RAM TEST FAILED" indicating a defective ROM/RAM Memory PCA or 4K Memory PCA.

(5) An audible "beep" is generated. If not, keyboard speaker may be defective or a malfunction probably exists in Processor PCA.

(6) Entire character set is displayed and, after printout, blinking cursor appears in first column of next lower line. The test pattern contains all available symbols and display enhancements. Last line of test pattern displays status of terminal. Refer to the *Reference Manual,* part no. 02640-90110 for status byte definitions (section VI) and correct test pattern displays (section VII). If test pattern is incorrect, refer to paragraph 3-7.

3-7. DETAILED TROUBLE ISOLATION PROCEDURES

Any terminal malfunctions not isolated and corrected by the procedures contained in paragraphs 3-3 through 3-6 can be isolated to a replaceable assembly by performing in sequence the procedures presented in figure 3-1. Some corrective action procedures in figure 3-1 consist of more than one replacement instruction. When these are encountered, replace the first assembly listed and *check if the malfunction has been corrected.* (Removal and replacement procedures are contained in Section IV.) If the malfunction persists, reinstall the first assembly listed, replace the second assembly listed, and again check if the malfunction has been corrected. After any malfunction has been corrected, use the terminals self-test feature to ensure proper operation.

3-8. ALIGNMENT AND ADJUSTMENT

All alignment and adjustment procedures for the terminal and its add-on accessories are contained in the following paragraphs. Unless otherwise specified, these procedures can be performed individually or in any desired sequence.

Note: After performing any alignment or adjustment procedures, always use the terminals self-test feature (paragraph 3-6) to ensure proper terminal operation.

3-9. POWER SUPPLY VOLTAGE ADJUSTMENT

This procedure requires the use of a multimeter with ±0.2% accuracy. Adjust the power supply as follows:

Note: Two types of power supply, with different test point and adjustment locations, are used in the terminal. Compare figures 3-2 and 3-3 with your terminal to determine which figure to use to locate the test points and adjustment potentiometer.

a. Open terminal mainframe to its half-open position (refer to section 7 of the reference manual, part no. 02640-90110, for instructions).

b. Remove power supply housing or cover.

c. Connect multimeter between the +5V diode (figure 3-2 or 3-3) and chassis ground.

d. Turn on power to terminal.

e. Adjust +5V potentiometer (figure 3-2 or 3-3) for a multimeter indication between +4.85V and +5.25V.

f. Check for −40V to −46V at −42V test point (figure 3-2 or 3-3), +11.8V to +12.6V at +12V test point, and −11.8V to −12.6V at −12V test point.

g. If necessary, repeat step e until all voltage levels are as specified in step f.

h. Turn off terminal power, disconnect the multimeter leads, replace the power supply housing or cover, and close the terminal mainframe.

3-10. BRIGHTNESS, HALF BRIGHT, AND FOCUS ADJUSTMENTS

Due to product design, these adjustments seldom need be performed. However, minor adjustment can be made to each potentiometer (see figure 3-4) to suit individual preferences by opening the terminal mainframe to its half open position, removing the CRT shield (65, figure 4-1), energizing the terminal, and adjusting the applicable potentiometer for the desired display appearance. If extensive repair or replacement procedures have been performed on the terminal, it is suggested that the adjustment procedure below be performed in its entirety to ensure optimum terminal performance.

This procedure requires the use of the HP Display Test Module, part no. 02640-60063. The brightness, half bright, and focus adjustments are interactive and, therefore, must be performed together. Perform the adjustments using a nonconductive tool as follows:

a. Open terminal mainframe to its full open position.

b. Insert connector removal tool under Top Plane Connector Assembly and remove assembly by pressing down on removal tool handle. (See Reference Manual, page 7-8.)

c. Remove Display Memory Access (DMA) PCA from Backplane Assembly.

d. If necessary, rearrange backplane PCA configuration so that Keyboard Interface PCA is installed in Backplane Assembly connector closest to power supply, the next connector is vacant, and Display Timing and Display Control PCA's are installed in the third and fourth connectors.

e. Install Display Test Module on top connectors of Display Timing and Display Control PCA'S so that test module cable is toward front of mainframe.

f. Connect test module cable plug to Display Timing PCA +5V red test jack located on top front of PCA.

g. Connect power cord between ac power source and mainframe rear panel LINE connector.

h. Set rear panel AC power switch to on position.

i. Set test module HALF BRIGHT switch to off position, INVERSE VIDEO switch to off position, and DOTS/CROSSHATCH switch to DOTS.

j. Adjust BRIGHTNESS R37 (see figure 3-4) for desired display brightness.

k. Set test module HALF BRIGHT switch to on position, remove button covering CRT shield HALF BRIGHT adjustment access hole, and adjust HALF BRIGHT R5 for desired display half brightness.

l. Repeat steps i, j, and k until desired display contrast is obtained between full bright and half bright.

m. Set test module HALF BRIGHT switch to off position.

n. Adjust FOCUS R33 (see figure 3-4) for best overall display sharpness.

o. If desired focus cannot be obtained, adjust display brightness slightly lower and repeat steps i through n.

p. Set rear panel AC power switch to OFF.

q. Reinstall button to cover HALF BRIGHT adjustment access hole.

r. Disconnect test module cable plug from Display Timing PCA and disconnect test module from Display Timing and Display Control PCA's.

s. Reinstall DMA PCA into vacated Backplane Assembly connector and reinstall Top Plane Connector Assembly on DMA, Display Timing, and Display Control PCA's.

t. Close terminal mainframe.

3-11. DISPLAY EXPANSION FIELD ADJUSTMENT

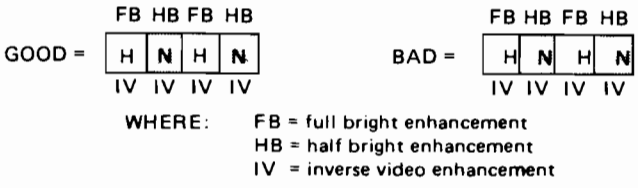
After initial installation of the HP 13231A Display Enhancements Accessory, check and, if necessary, adjust the Display Expansion PCA as follows:

a. Open terminal mainframe to its half open position (see figure 7-1 in the reference manual).

b. Connect power cord between ac power source and mainframe rear panel LINE connector.

c. Set rear panel AC power switch to on position.

d. Using keyboard, set terminal for local operation (REMOTE key up) and press each of the following keys once: CAPS LOCK, ENHANCE DISPLAY, B, H, ENHANCE DISPLAY, J, N, ENHANCE DISPLAY, B, H, ENHANCE DISPLAY, J, N. Compare display against examples below.



e. If necessary, adjust Display Expansion PCA FIELD potentiometer R10 to center full bright and half bright enhancements over characters displayed on monitor.

f. Set rear panel AC power switch to OFF and close terminal mainframe.

3-12. DISPLAY RASTER ALIGNMENT AND ADJUSTMENT

This procedure requires the use of the HP Display Test Module, part no. 02640-60063. Align and adjust the display raster as follows:

a. Open terminal mainframe to its full open position. Remove CRT shield.

b. Insert connector removal tool under Top Plane Connector Assembly as shown in figure 7-7 of the reference manual and remove assembly by pressing down on removal tool handle.

c. Remove DMA PCA from Backplane Assembly.

d. If necessary, rearrange backplane PCA configuration so that Keyboard Interface PCA is installed in Backplane Assembly connector closest to power supply, the next connector is vacant, and Display Timing and Display Control PCA's are installed in the third and fourth connectors.

e. Install Display Test Module on top connectors of Display Timing and Display Control PCA's so that test module cable is toward front of mainframe.

f. Connect test module cable plug to Display Timing PCA red test jack located on top front of PCA.

g. Connect power cord between ac power source and mainframe rear panel LINE connector.

h. Set rear panel AC power switch to on position.

i. Set test module HALF BRIGHT switch to off position, INVERSE VIDEO switch to on position, and DOTS/CROSSHATCH switch to center off position.

j. The monitor should display an inverse video rectangular pattern. If no pattern is displayed, adjust BRIGHTNESS R37 (see figure 3-4) until pattern is displayed. If this step is required, perform brightness and focus adjustments in accordance with paragraph 3-10 after completing raster alignment and adjustment procedures.

WARNING

High voltage is present on exposed portions of Yoke Cable Assembly.

VORSICHT

An den offenen Stellen des Joch-Kabelsatzes (Yoke Cable Assembly) besteht Hochspannung!

ATTENTION

Du courant haute tension passe dans les parties exposées de l'ensemble de câbles de culasse (Yoke Cable Assembly).

AVVISO

Voltaggio ad alta tensione presente su parti scoperte della linea montaggio di cavo collegamento (Yoke Cable Assembly).

ADVERTENCIA

Hay voltaje peligroso en las partes al descubierto del conjunto de cable de horquilla (Yoke Cable Assembly).

高圧危険

ヨーク・ケーブルアセンブリの露出部には、高電圧がかかってます。

k. Rotate Yoke Cable Assembly (see figure 3-4) until displayed rectangle is horizontal and parallel to monitor frame.

l. Rotate centering magnets (black tabs) until displayed rectangle is centered on monitor screen.

m. Adjust WIDTH R28 until displayed rectangle is 9.5 in. (24 cm) wide. This should give a border of approximately 0.5 in. (1.2 cm) on either side.

n. Adjust HEIGHT R10 until displayed rectangle is 4.75 in. (12 cm) high. This should give a border of approximately 0.25 in. (.6 cm) at the top and bottom.

o. Set rear panel AC power switch to OFF and replace the CRT shield.

p. Disconnect test module cable plug from Display Timing PCA and disconnect test module from Display Timing and Display Control PCA's.

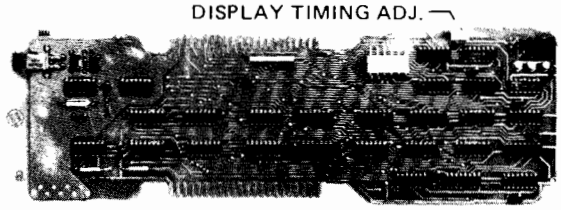
q. Reinstall DMA PCA into vacated Backplane Assembly connector and reinstall Top Plane Connector Assembly on DMA, Display Timing, and Display Control PCA's.

r. Close terminal mainframe and check for correct raster alignment.

3-13 DISPLAY TIMING ADJUSTMENT

After installation of the Display Timing PCA (part no. 02640-60088), check and, if necessary, adjust the CRT dot size for equal brightness of vertical and horizontal lines. Before performing the adjustment, check that the BRIGHTNESS, HALF BRIGHT, and FOCUS are adjusted properly (refer to paragraph 3-10).

a. With the terminal mainframe in its half open position and power applied to the terminal, locate the display timing adjustment (see figure below).



b. Press and hold the "E" key to produce a row of uppercase E's on the display.

c. Adjust display timing so that the vertical and horizontal lines of the E's are of equal brightness (see figure below).

d. Again, check that the BRIGHTNESS, HALF BRIGHT, and FOCUS are adjusted for proper display.

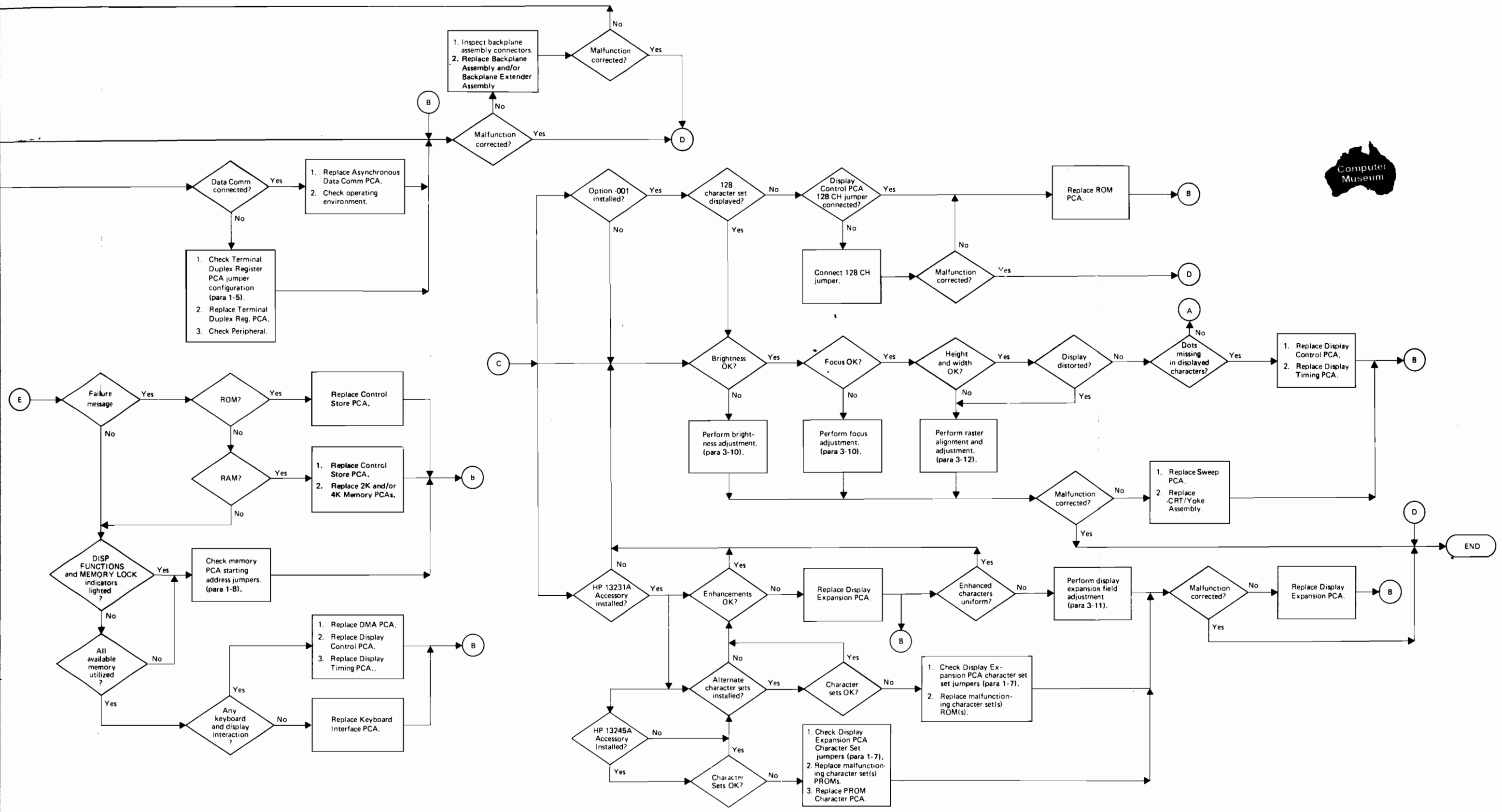
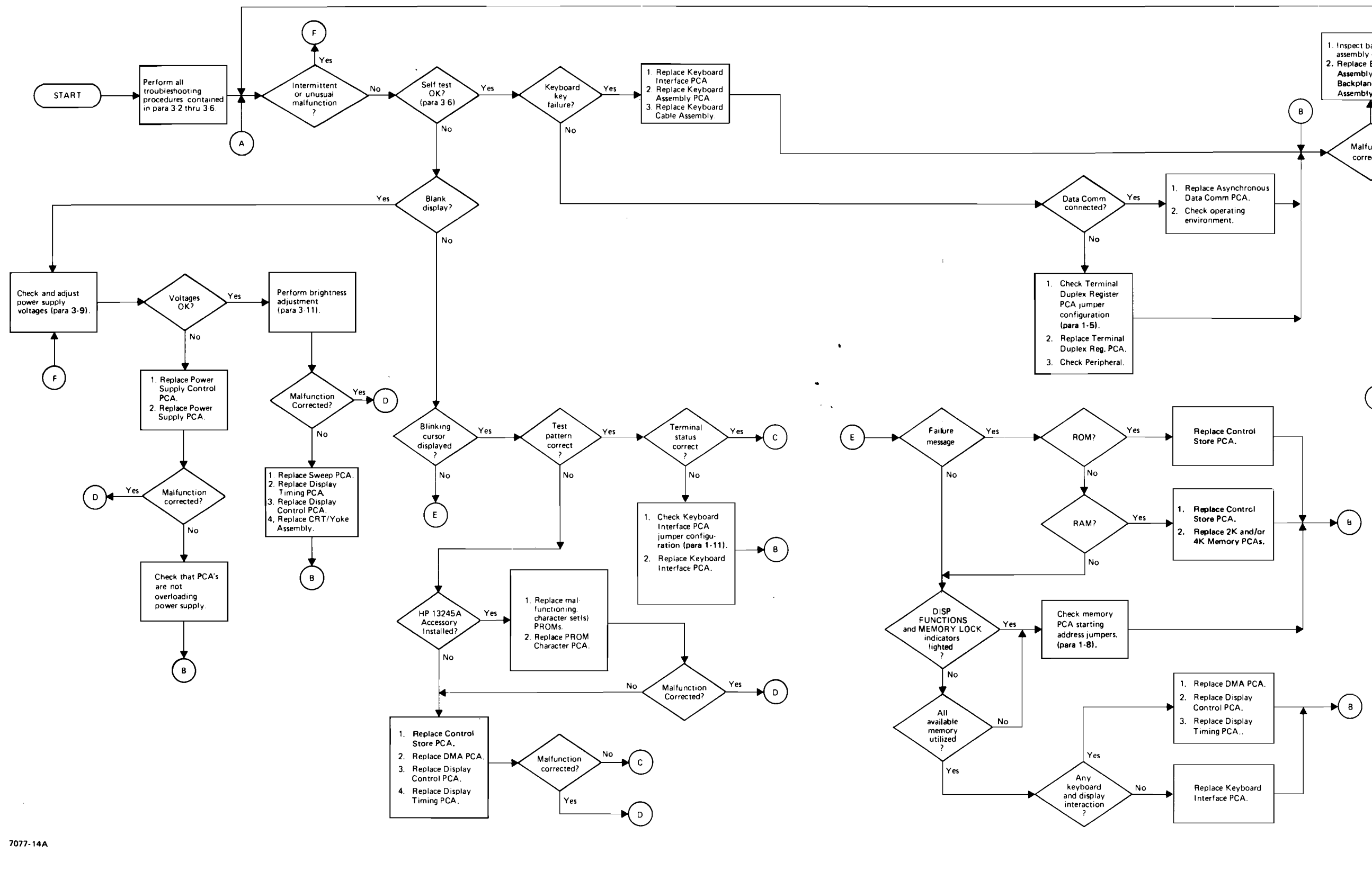


Figure 3-1. Troubleshooting Flowchart


START
Perform all troubleshooting procedures contained in para 3-2 thru 3-6.
Intermittent or unusual malfunction ?
Self test OK? (para 3-6)
Keyboard key failure?
1. Replace Keyboard Interface PCA.
2. Replace Keyboard Assembly PCA.
3. Replace Keyboard Cable Assembly.
Blank display?
Check and adjust power supply voltages (para 3-9).
Voltages OK?
1. Replace Power Supply Control PCA.
2. Replace Power Supply PCA.
Malfunction corrected?
Check that PCA's are not overloading power supply.
Perform brightness adjustment (para 3-11).
Malfunction Corrected?
1. Replace Sweep PCA.
2. Replace Display Timing PCA.
3. Replace Display Control PCA.
4. Replace CRT/Yoke Assembly.
Blinking cursor displayed ?
Test pattern correct ?
Terminal status correct ?
1. Check Keyboard Interface PCA jumper configu-ration (para 1-11).
2. Replace Keyboard Interface PCA.
HP 13245A Accessory Installed?
1. Replace mal-functioning character set(s) PROMs.
2. Replace PROM Character PCA.
Malfunction Corrected?
1. Replace Control Store PCA.
2. Replace DMA PCA.
3. Replace Display Control PCA.
4. Replace Display Timing PCA.
Malfunction corrected?
Data Comm connected?
1. Replace Asynchronous Data Comm PCA.
2. Check operating environment.
1. Check Terminal Duplex Register PCA jumper configuration (para 1-5).
2. Replace Terminal Duplex Reg. PCA.
3. Check Peripheral.
1. Inspect backplane assembly connectors.
2. Replace Backplane Assembly and/or Backplane Extender Assembly
Malfunction corrected?
Failure message
ROM?
Replace Control Store PCA.
RAM?
1. Replace Control Store PCA.
2. Replace 2K and/or 4K Memory PCAs.
DISP FUNCTIONS and MEMORY LOCK indicators lighted ?
Check memory PCA starting address jumpers. (para 1-8).
All available memory utilized ?
1. Replace DMA PCA.
2. Replace Display Control PCA.
3. Replace Display Timing PCA..
Any keyboard and display interaction ?
Replace Keyboard Interface PCA.
Option -001 installed?
128 character set displayed?
Brightness OK?
Perform brightness adjustment (para 3-10).
HP 13231A Accessory installed?
Enhancement OK?
Alternate character sets installed?
HP 13245A Accessory Installed?
Character Sets OK?
A
B
C
D
E
F
Yes
No

7077-14A

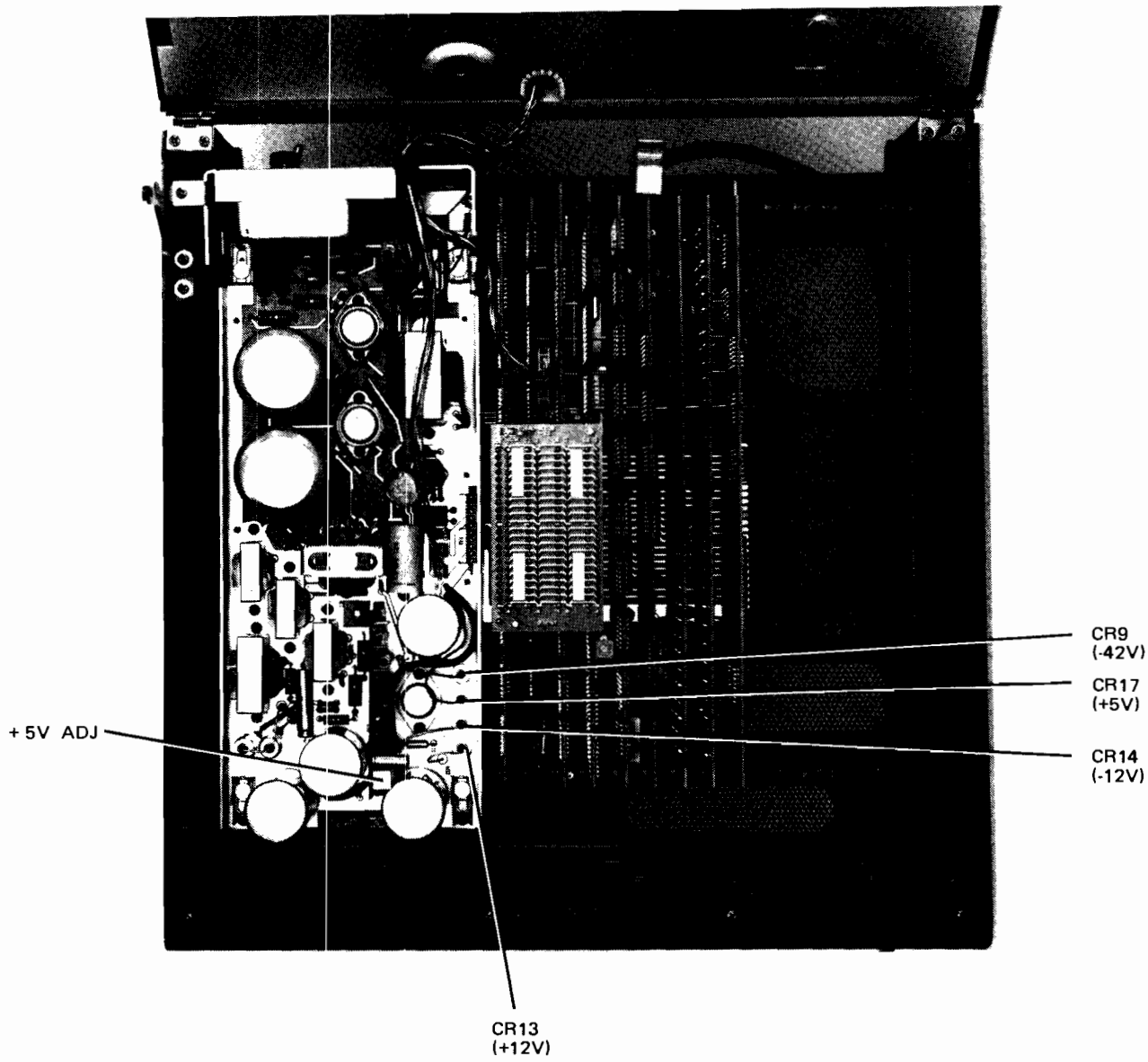


Figure 3-2. Power Supply Test Point and Adjustment Locations (Early Model Power Supply)

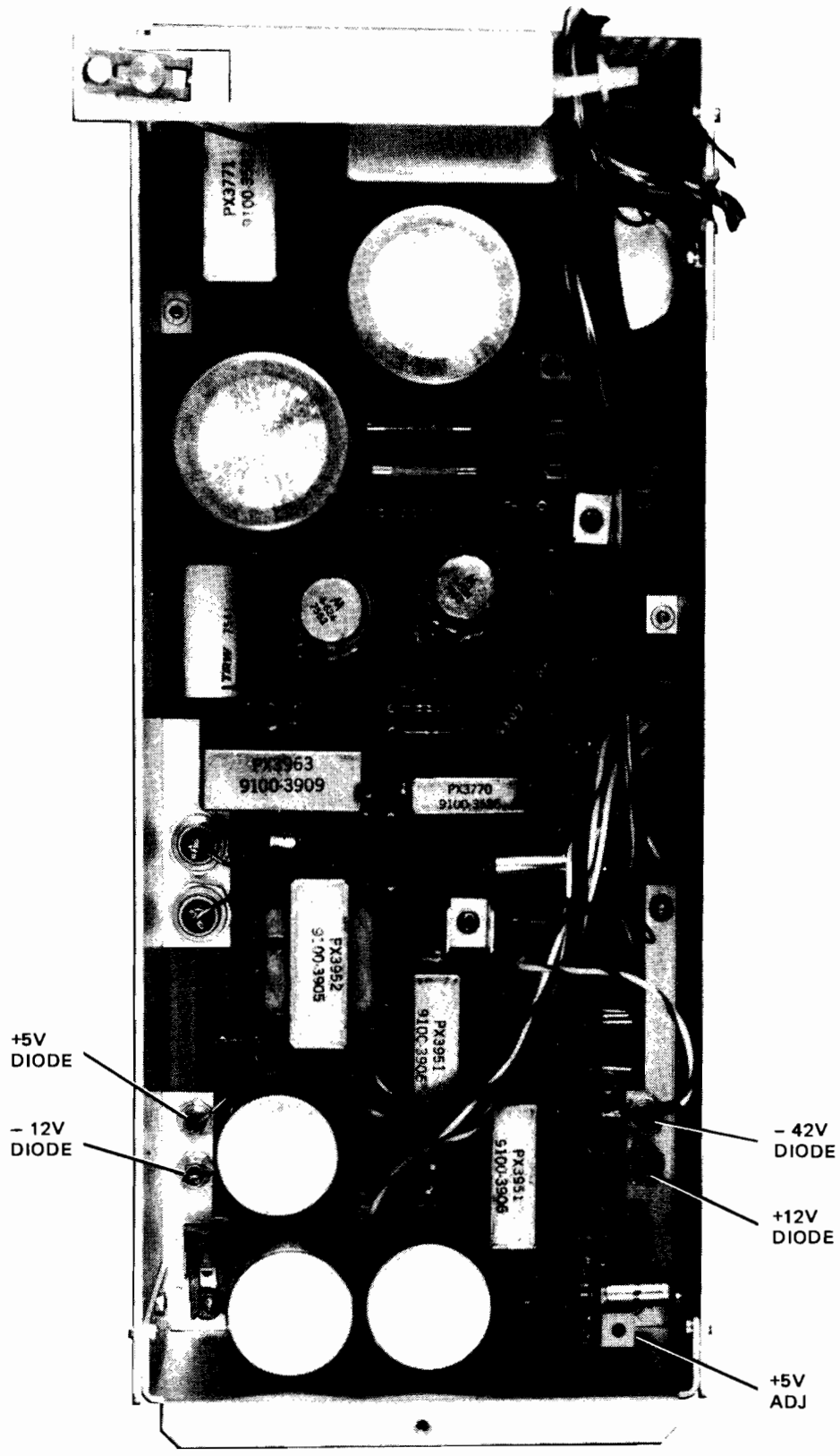


Figure 3-3. Power Supply Test Point and Adjustment Locations (Late Model Power Supply)

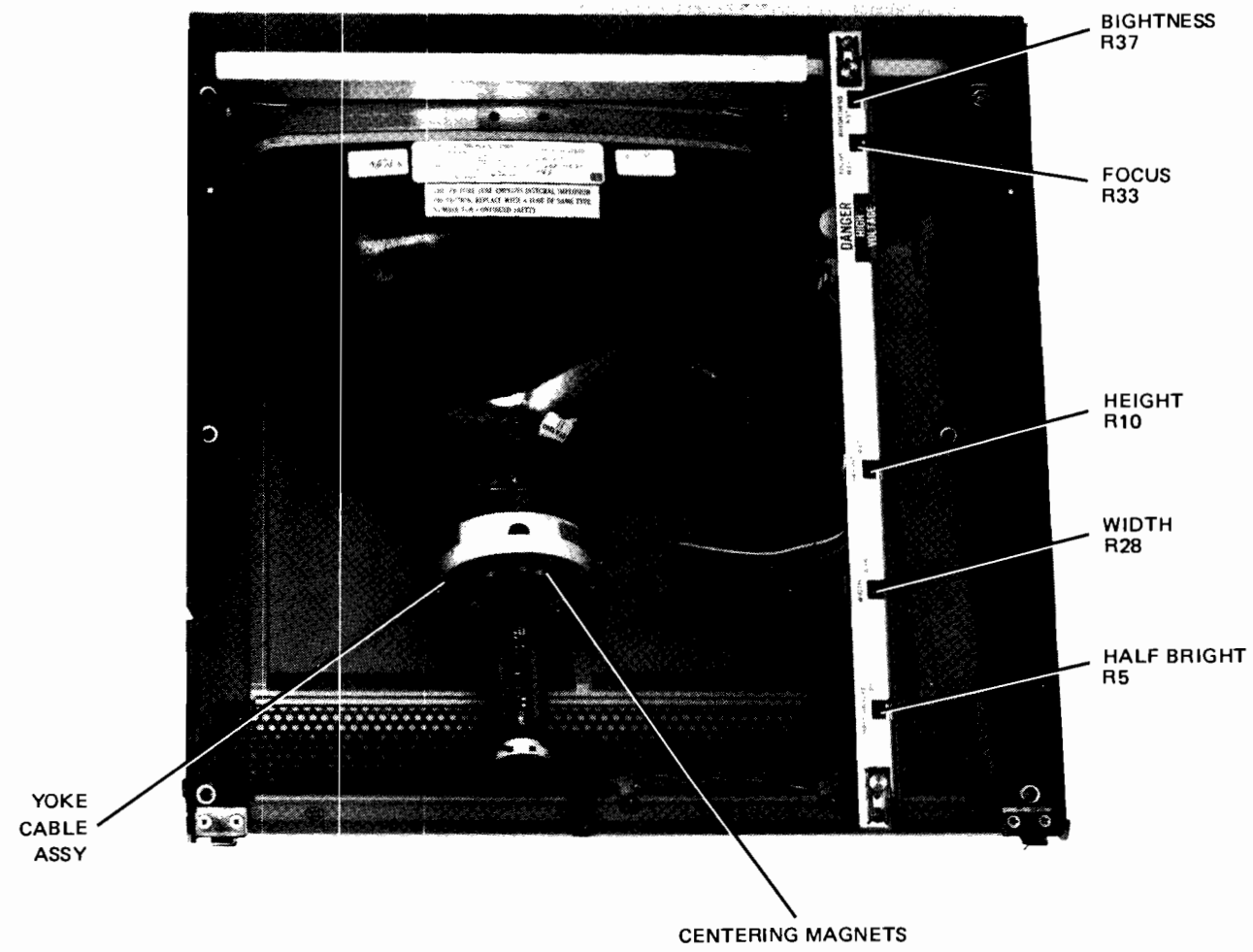


Figure 3-4. Mainframe Top Adjustment Locations

REPAIR

SECTION IV

4-1. INTRODUCTION

This section contains instructions for removing and replacing terminal assemblies and a listing of field-replaceable parts.

WARNING

Hazardous voltages are present inside equipment. The procedures contained in this section shall be performed only by qualified service personnel.

VORSICHT

Innerhalb des Geräts bestehen gefährliche Spannungen. Die in diesem Abschnitt enthaltenen Arbeiten dürfen nur durch Betriebsfachpersonal durchgeführt werden.

ATTENTION

Des tensions dangereuses sont présentes à l'intérieur du matériel. Les opérations décrites dans cette section ne devront être effectuées que par un personnel qualifié.

AVVISO

Pericolo: Alta tensione presente in questa apparecchiatura. Le procedure contenute in questa sezione debbono essere effettuate soltanto da qualificato personale di servizio.

ADVERTENCIA

Hay voltaje peligroso en el interior de este equipo. Los procedimientos expuestos en esta sección sólo deberá llevarlos a cabo el personal de servicio calificado.

高圧危険

内部装置に危険な高電圧がきています。この章にある処置や手続に関しては、専門のサービスマンによってのみ行なって下さい。

4-2. REMOVAL AND REPLACEMENT

WARNING

Always remove AC power from terminal before attempting any parts replacements. Use extreme caution when working near the CRT, Yoke Cable Assembly, and Sweep PCA high voltage sections.

VORSICHT

Vor Auswechseln von Einzelteilen ist jeweils der Wechselstromanschluss von der Klemme zu trennen. Bei Arbeiten in der Nähe der Hochspannungsteile von Kathodenstrahlröhre (CRT), Joch-Kabelsatz (Yoke Cable Assembly) sowie der gedruckten Schaltung für den Kipposzillator (Sweep PCA) ist grösste Vorsicht zu beachten.

ATTENTION

Toujours couper l'arrivée de courant alternatif des bornes avant d'entreprendre tout remplacement de pièces. Redoubler de prudence lorsqu'on travaille à proximité des sections haute tension du tube cathodique (CRT), de l'ensemble de câbles de culasse (Yoke Cable Assembly), et de l'ensemble de tableau de circuit oscillant (Sweep PCA).

AVVISO

Isolare sempre la tensione c.a. dal morsetto prima di procedere alla sostituzione di qualsiasi parte. Usare estrema cautela durante operazioni in prossimità delle sezioni ad alta tensione del tubo a raggi catodici (CRT), della linea montaggio cavo collegamento (Yoke Cable Assembly), e della linea del circuito stampato per l'oscillatore di base di tempi (Sweep PCA).

ADVERTENCIA

Desconéctese siempre la corriente alterna del terminal antes de intentar reemplazar cualquier pieza. Téngase sumo cuidado al trabajar cerca de las secciones de alta tensión del tubo de rayos catódicos (CRT), del conjunto de cable de horquilla (Yoke Cable Assembly), y del circuito impreso del oscilador de base de tiempo (Sweep PCA).

⚠ **高圧危険** ⚠

どんな部品でも交換する場合は、その前にＡＣの電源コードを機器よりはずして下さい。ＣＲＴ、ヨーク・ケーブルアセンブリ、スイープＰＣＡなどの高電圧がかかっている部分の近くでは、危険ですから特に注意を払って下さい。

Due to the modular design of the terminal, no special instructions are required for removing and replacing parts except for those discussed in paragraphs 4-3 through 4-8. To remove most replaceable parts, first refer to figure 4-1 and the replaceable parts list to determine how the part is attached and the number of attaching parts involved. Once this is accomplished, removal procedures for the part will be obvious. Always disconnect any attached cable assemblies before attempting to remove a part. Replacing a part is simply a matter of reversing the removal procedure.

4-3. DISPLAY CONTROL PCA

The Display Control PCA is manufactured with a jumper installed for use with a 128 character set terminal (Option 001). When replacing the Display Control PCA, first determine whether the terminal is equipped with a 64 character set (standard model) or a 128 character set. For standard model terminals, disconnect the soldered in 128 CH jumper located approximately in the center of the Display Control PCA before installing it in the terminal. For Option 001 terminals, install the PCA in the terminal as shipped from the factory.

4-4. FAN AND FAN CABLE ASSEMBLY

When removing the Fan and Fan Cable Assembly 81, figure 4-1), first open the terminal mainframe to its full open position. Then, disconnect the assembly's connector from the Power Supply PCA and remove the two cable clamps and wire harness attached to the fan. After removing the assembly's cable from the existing wire harness and cable clamps, remove the four screws and washers securing the assembly to the mainframe top and remove the assembly from the terminal. Installing the Fan and Fan Cable Assembly is accomplished by performing the removal procedures in reverse order. However, care should be taken to ensure that the assembly's cable is secured within the left cable clamp. Also, the assembly must be mounted so that its cable is closest to the back of the mainframe top and CRT, and the fan AIRFLOW arrow must point toward the back of the mainframe top.

4-5. PROM CHARACTER PCA

The PROM Character PCA consists entirely of field-replaceable parts. After removing the PCA from the terminal (figure 4-1), refer to figure 4-2 for component location and identification information.

4-6. KEYBOARD OVERLAY AND KEYBOARD

The keyboard overlay 101, figure 4-1) is tension mounted on the keyboard top (102) by means of the overlay's hooked left end and a tension spring attached under its right end. To remove and replace the overlay, proceed as follows:

a. Locate keyway on right side of keyboard top and insert access key supplied with terminal.

b. Push access key into keyway (no key rotation is required) until overlay tension spring is released.

c. When the tension spring is released, the right end of the overlay will raise up high enough to grasp. If not, the right end of the overlay can be pried up with a small screwdriver or similar tool.

d. Unhook the left end of the overlay from the keyboard top by sliding it to the left and remove overlay from keyboard top.

e. When replacing the overlay, hook the left end of the overlay in place on the keyboard top, guide the overlay down over the switch keys, and press down on the right end of the overlay until the tension spring snaps into place.

The keyboard is disassembled by removing five screws and ten washers from keyboard bottom, and lifting off keyboard top. After keyboard top is off, the Keyboard Assembly can be removed by disconnecting it from the two Keyboard Cable Assembly connectors and Loudspeaker Assembly, and lifting it out of the keyboard bottom.

4-7. POWER SUPPLY CONTROL, POWER SUPPLY, AND SWEEP PCA'S

In addition to its mating connector, the Power Supply Control PCA (2, 18, figure 4-1) is attached to the Power Supply PCA (3) with two slotted PCA mounting guide posts that contain detents to lock the PCA in place. To remove the Power Supply Control PCA, first pull one of the mounting guide posts slightly away from the PCA's edge to free the detent and then, carefully rock the PCA up and out of its mating connector on the Power Supply PCA. To replace the PCA, align the PCA's edges with the mounting guide post slots and press down firmly on the PCA until it is seated in its mating connector and locked in place by the mounting guide post slot detents.

Note: The power supply PCA for the power supply illustrated in figure 4-3 cannot be easily removed from the remainder of the power supply; therefore, no removal instructions are supplied for it.

To remove the Power Supply PCA (3, figure 4-1), first remove the power supply housing (1) by unlatching the two snap locks on front of housing and pulling the housing up and out toward the front of the mainframe shell (60). Then, after disconnecting the three wire harness connectors from the PCA, unlatch the snap locks in each of the four corners of the PCA and lift the entire PCA up and out of the mainframe shell. Installing the Power Supply PCA is basically accomplished by performing the removal procedures in reverse order. However, care should be taken not to damage the Backplane Assembly (54) connector pins that mate with the Power Supply PCA bottom connector J2.

To remove the Sweep PCA (79, figure 4-1), first open the terminal mainframe to its full open position. Then, unlatch the snap locks at each end of the Sweep PCA and move the PCA up and to the right far enough to gain easy access to all cable connectors. Disconnect the High Voltage Cable Assembly from the CRT by pressing the cable assembly connector sides together and pulling it out of the CRT. Disconnect the remaining four cable connectors from the Sweep PCA and completely remove the PCA from the terminal. It is recommended that the cable connectors be disconnected in the order of P1, P2, P4, and P3.

4-8. ACCESSORIES

No special instructions are required to remove any terminal accessories. However, before attempting to replace an accessory, refer to the detailed installation instructions for the applicable accessory in section 7 of the reference manual, part no. 02640-90110, or if available, the accessory manual.

4-9. REPLACEABLE PARTS

Replaceable parts for the terminal are listed in tables 4-1 and 4-2. The replaceable parts in table 4-1 are referenced to the exploded view (figure 4-1) of the terminal by index numbers which are in disassembly order, except attaching parts are listed immediately after the parts they attach. Items in the DESCRIPTION column of table 4-1 are indented to indicate item relationship. In addition, the symbol "— — — X — — —" follows the last of one or more attaching parts. Indention is as follows:

MAJOR ASSEMBLY

- Replaceable Assembly
- Attaching Parts for Replaceable Assembly
- Subassembly Parts
- Attaching Parts for Subassembly Parts

Table 4-1 provides the following information for each part:

a. FIG & INDEX NO. The figure and index where the replaceable parts are shown in the exploded view.

b. HP PART NO. The Hewlett-Packard part number for each replaceable part.

c. DESCRIPTION. The description and any special applications (accessories and options) for each replaceable part.

d. UNITS PER ASSY. The total quantity of each part used in the major assembly.

Table 4-2 provides the reference designation, Hewlett-Packard part number, and description for each PROM Character PCA replaceable part. In addition, table 4-2 provides the original manufacturer's part number for each replaceable part and a manufacturer code number which is cross-referenced to the code list of manufacturers contained in table 4-3. Table 4-3 contains each manufacturer's name, address, and code number. The code numbers are from the *Federal Supply Code for Manufacturers Cataloging Handbooks H4-1* and *H4-2*, and the latest supplements.

4-10. ORDERING INFORMATION

To order replaceable parts for the terminal or options and accessories, address the order to the local Hewlett-Packard Sales and Service Office listed at the end of this manual.

The following information should be included in the order for each part.

a. Complete terminal model number (including options and accessories) and serial number.

b. Hewlett-Packard part number.

c. Complete part description as provided in the replaceable parts list.

Table 4-1. HP 2640B, HP 2640N, and HP 2640S Replaceable Parts

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	UNITS PER ASSY 2640B	2640N	2640S
	2640B/N/S	**Interactive Display Terminal**			
001	02640-00001*	*Housing	1	1	1
002	02640-60029*	*Power Supply Control Assembly	1	1	1
003	02640-60004*	*Power Supply Assembly	1	1	1
004	8120-1378	*Power Cord Set, 250V, 6A (standard)	1	1	1
—	8120-1351	*Power Cord Set, 250V, 13A (used on Option 900)	1	1	1
—	8120-1369	*Power Cord Set, 250V, 10A (used on Option 901)	1	1	1
—	8120-1689	*Power Cord Set, 250V, 10/16A (used on Option 902)	1	1	1
—	8120-2104	*Power Cord Set, 250V, 6A (used on Option 906)	1	1	1
—	02640-60027*	*Rear Panel Assembly	1	1	1
		(Attaching Parts)			
005	2360-0197*	*Screw, Machine, ph, no. 6-32, 3/8 in.	2	2	2
006	2190-0918*	*Washer, Lock, split, no. 6	2	2	2
007	3050-0066*	*Washer, Flat, no. 6	2	2	2
		— — — X — — —			
008	2110-0464*	**Fuseholder Body	1	1	1
		(Attaching Parts)			
—	1400-0090*	**Washer, Neoprene, 5/8 in. OD	1	1	1
—	2190-0037*	**Washer, Lock, int-tooth	1	1	1
—	2950-0054*	**Nut, Hex, 1/2-28	1	1	1
		— — — X — — —			
—	2110-0465*	**Fuseholder Cap	1	1	1
—	2110-0365*	**Fuse, 4A, SB, 250V (F1)	1	1	1
—	2110-0303*	**Fuse, 2A, SB, 250V (F1) (used for Option 015)	1	1	1
009	3101-0646*	**Power Switch	1	1	1
		(Attaching Parts)			
—	0590-0012*	**Nut, Self locking, knurled, no. 15/32-32	1	1	1
—	2190-0102*	**Washer, Lock, int-tooth, 7/16 in. ID	1	1	1
—	2950-0035*	**Nut, Hex, 15/32-32	1	1	1
		— — — X — — —			
010	9135-0028*	**Line Filter	1	1	1
		(Attaching Parts)			
011	2420-0003*	**Nut, Plain, no. 6	2	2	2
		— — — X — — —			
012	02640-60083*	**Ground Wire	1	1	1
—	0890-0006*	**4" Hi shrink Tubing	1	1	1
		(Attaching Parts)			
—	0362-0332*	**Ring Lug	1	1	1
—	2190-0008*	**Washer, Lock, ext-tooth	1	1	1
		— — — X — — —			
013	02640-00042*	**Rear Panel and Connector Housing	1		
014	0400-0082	*Channel Grommet	1		
015	02640-00064**	*Cover, power supply	1		
		(Attaching Parts)			
016	2360-0115**	*Screw, machine, ph, no. 6-32, 0.312 in., with lockwasher	1	1	1
		— — — X — — —			
017	02640-60148**	*Cable Assembly	1	1	1
018	02640-60169**	*Power Supply Control Assembly	1	1	1
019	2110-0202	*Fuse, 0.5A, 250V (not used for Option 015)	1	1	1
	2110-0365	*Fuse, 4A, SB, 250V (not used for Option 015)	1	1	1
	2110-0235	*Fuse, 0.2A, 250V (used for Option 015 in earlier version power supply)	1	1	1
	2110-0303	*Fuse, 2A, SB, 250V (used for Option 015 in earlier version power supply)	1	1	1

*This type of power supply is used on early versions of 2640B/N/S terminals in 115-volt primary power applications (see figure 4-1).

**This type of power supply is used on early versions of 2640B/N/S terminals in 230-volt primary power applications (Option 015) and all later version terminals, regardless of power application (see figure 4-1). This type of power supply also has two versions which require different fuses in 230-volt primary power applications (see index no. 19).

Table 4-1. HP 2640B, HP 2640N and HP 2640S Replaceable Parts (Continued)

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	UNITS PER ASSY 2640B	2640N	2640S
	2110-0588	*Fuse, 200 mA, SB, 250V (used for Option 015 in later version power supply)	1	1	1
	2110-0583	*Fuse, 2A, SB, 250V (used for Option 015 in later version power supply)	1	1	1
019A	02640-60083**	Cable Assembly	1	1	1
020	02640-60202**	*Power Supply Assembly	1	1	1
021	02640-00010	*Support	1	1	1
		(Attaching Parts)			
022	02360-00197	*Screw, Machine, ph, no. 6-32, 3/8 in.	2	2	2
023	2190-0918	*Washer, Lock, split, no. 6	2	2	2
024	3050-0066	*Washer, Flat, no. 6	2	2	2
		— — — X — — --			
025	4040-1023	*Front Bezel (see Note 1)	1		
025	4040-1249	*Front Bezel (see Note 2)	1		
026	7120-1254	*Logo	1		
027	02640-00068	*Front Bezel Insert (see Note 1)	1		
027	02640-00097	*Front Bezel Insert (see Note 2)	1		
	02640-00057	*Front Bezel Insert (see Note 1)		1	
	02640-00096	*Front Bezel Insert (see Note 2)		1	
	02640-00056	*Front Bezel Insert (see Note 1)			1
	02640-00095	*Front Bezel Insert (see Note 2)			1
		(Attaching Parts)			
028	2360-0197	*Screw, Machine, ph, no. 6-32, 3/8 in.	4	4	4
029	2190-0918	*Washer Lock, split, no. 6	4	4	4
030	3050-0066	*Washer Flat, no 6	4	4	4
		— — — X — — --			
031	1390-0326	*Pawl Latch, Left	1	1	1
	1390-0327	*Pawl Latch, Right	1	1	1
032	02640-20007	*Rear Door (see Note 1)	1	1	1
032	02640-20018	*Rear Door (see Note 2)	1	1	1
033	3110-0100	*Hinge, Right	1	1	1
	3110-0101	*Hinge, Left	1	1	1
034	02640-20025	*Hinge Support	2	2	2
		(Attaching Parts)			
035	2360-0197	*Screw, Machine, ph, no. 6-32, 3/8 in.	4	4	4
036	2190-0012	*Washer, Lock, int. tooth, no. 6	4	4	4
		— — — X — — --			
037		(Intentionally left blank)			
038	02640-60123	*Keyboard Interface Assembly	1	1	1
039	02640-60070	*Connector Assembly (used for Accessory 13245A)	1	1	1
040	02640-60053	*PROM Character Assembly (used for Accessory 13245A) See figure 4-2	1	1	1
041	02640-60012	*Top Plane Connector Assembly (three-connector) (used for standard 2640B) (used for Accessory 13231A)	1		
	02640-60022	*Top Plane Connector Assembly (four connector) (used for Accessory 13231A)	1	1	1
042	02640-60112	*Display Control Assembly	1	1	1
	1816-0612	**I.C., 64 Character ROM (upper case 1 Roman)	1		
	1816-0613	**I.C., 64 Character ROM (lower case Roman) (Option 001)	1		
	1816-0866	**I.C., ROM, upper case Norwegian		1	
	1816-0867	**I.C., ROM, lower case Norwegian (Option 001)		1	
	1816-0864	**I.C., ROM, upper case Swedish			1
	1816-0865	**I.C., ROM, lower case Swedish (Option 001)			1
043	02640-60122	*Sweep Extender Cable (used for Accessory 13254A)	1		
044	02640-60088	*Display Timing Assembly	1	1	1
	0410-0647	**Crysta , 21.06 MHz (Y1)	1	1	1
	0410-0646	**Crysta , 17.55 MHz (Y1) (used for Option 015)	1	1	1

NOTES: 1. For gray-tone terminals
2. For brown-tone terminals

Table 4-1. HP 2640B, HP 2640N and HP 2640S Replaceable Parts (Continued)

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	UNITS PER ASSY 2640B	2640N	2640S
045	02640-60119	*Composite Video Interface Assembly (used for Accessory 13254A)	1		
	02640-60009	*Display Memory Access Assembly	1	1	1
046	02640-60024	*Display Enhancement Assembly (used for Accessory 13231A)	1	1	1
	1816-0642	**I.C., ROM (Math Character Set) (used for Accessory 13231A-201)	1	1	1
	1816-0641	**I.C., ROM (Line Drawing Set) (used for Accessory 13231A-202)	1	1	1
	1816-0947	**Large Character Set (used for Accessory 13231A-203)	1	1	1
047	02640-60144	*Basic Memory Assembly	1	1	1
	1818-0173	**I.C., ROM, MOS	1	1	1
	1818-0174	**I.C., ROM, MOS	1	1	1
	1818-0175	**I.C., ROM, MOS	1	1	1
	1818-0201	**I.C., ROM, MOS		1	
	1818-0259	**I.C., ROM, MOS	1		
	1818-0202	**I.C., ROM, MOS			1
048	02640-60008	*Processor Assembly	1	1	1
049	02640-60059	*RS232C Cable Assembly (Accessory 13232C)	1	1	1
	5061-2408	*Current Loop Cable Assembly (used for Accessory 13232F)	1	1	1
	02640-60098	*Male RS232C Printer Cable Assembly (Accessory 13232G)	1	1	1
	02640-60099	*Female RS232C Printer Cable Assembly (Accessory 13232H)	1	1	1
	02640-60116	*9871 Printer Cable Assembly (Accessory 13232J)		1	
	02640-60120	*Tektronix 4632 Interface Cable Assembly (Accessory 13232K)		1	
	02640-60121	*Conrac T.V. Monitor Interface Cable Assembly (Accessory 13232L)		1	
	02640-60131	*Modem Cable Assembly (Accessory 13232N)		1	
	5061-1340	*Connector Kit, 30-pin (used for Option 015 and Accessory 13250A)	1	1	1
	5062-2405	*Connector Kit, 25-pin (used for Option 015 and Accessory 13250A)	1	1	1
050	02640-60086	*Asynchronous Data Comm Assembly (nut used on Option 020)	1	1	1
	02640-60143	*General Purpose Asynchronous Data Comm Assembly (used for Option 020 and Accessory 13250B)	1	1	1
051	02640-60135	*9866 Cable Assembly (Accessory 13232S; used for Accessories 13246A and 13246B)	1	1	1
	02640-60116	*9871 Cable Assembly (Accessory 13232J; used for Accessory 13349A)	1	1	1
052	02640-60031	*Terminal Duplex Register Assembly (used for Accessories 13238A, 13246A, 13246B, and 13349A)	1	1	1
053	02640-60065	*+4K Memory Assembly (used for Accessory 13234A)	1	1	1
054	02640-60153	*Backplane Assembly	1	1	1
		(Attaching Parts)			
055	2360-0197	*Screw, Machine, ph, no. 6-32, 3/8 in.	4	4	4
056	2190-0918	*Washer, Lock, split, no. 6	4	4	4
		— — — X — — —			
057	02640-60002	*Backplane Extender Assembly (used for Accessory 13240A)	1	1	1
		(Attaching Parts)			
058	2360-0197	*Screw, Machine, ph, no. 6-32, 3/8 in.	4	4	4
059	2190-0918	*Washer, Lock, split, no. 6	4	4	4
		— — — X — — —			
060	02640-40001	*Mainframe Shell (see Note 1)	1	1	1
060	02640-40035	*Mainframe Shell (see Note 2)	1	1	1
061	02640-00021	*Access Key	1	1	1
062	02640-40002	*Display Top (see Note 1)	1	1	1
062	02640-40031	*Display Top (see Note 2)	1	1	1
063	3110-0099	*Hinge Top	2	2	2
		(Attaching Parts)			
064	2360-0196	*Screw, Machine, ph, no. 6-32, 3/8 in.	2	2	2
		— — — X — — —			
065	02640-00107	*CRT Shield (see Note 3)	1	1	1

NOTES: 1. For gray-tone terminals
2. For brown-tone terminals
3. Item 065, CRT Shield, part no. 02640-00107, must be used with the later version latching plate and spring.

Table 4-1. HP 2640B, HP 2640N and HP 2640S Replaceable Parts (Continued)

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	UNITS PER ASSY 2640B	2640N	2640S
		(Attaching Parts)			
066	1390-0365	*Plunger, Snap-in	2	2	2
067	1390-0366	*Grommet, Snap-in	2	2	2
		— — — X — — —			
068	02640-40022	*Right Side (see Note 1)	1	1	1
068	02640-40033	*Right Side (see Note 2)	1	1	1
		(Attaching Parts)			
069	2360-0121	*Screw, Machine, ph, no. 6-32, 3/8 in.	3	3	3
070	2190-0918	*Washer, Lock, split, no. 6	3	3	3
071	3050-0066	*Washer, Flat, no. 6	3	3	3
		— — — X — — —			
072	02640-40023	*Left Side (see Note 1)	1	1	1
072	02640-40034	*Left Side (see Note 2)	1	1	1
		(Attaching Parts)			
	2360-0121	*Screw, Machine, ph, no. 6-32, 3/8 in.	3	3	3
	2190-0918	*Washer, Lock, split, no. 6	3	3	3
	3050-0066	*Washer, Flat, no. 6	3	3	3
		— — — X — — —			
073	1460-0688	*Spring, wireform, left (earlier version)	1	1	1
	1460-1579	*Spring, wireform, left (later version) (see Note 3)	1	1	1
	1600-0655	*Plate, latching (later version) (see Note 3)	1	1	1
074	1480-0069	*Pin, 0.125 in., 0.5 in.	1	1	1
075	1460-0687	*Spring, wireform, right (earlier version)	1	1	1
	1460-1580	*Spring, wireform, right (later version) (see Note 3)	1	1	1
	1600-0655	*Plate, latching (later version) (see Note 3)	1	1	1
076	1480-0069	*Pin, 0.125 in., 0.5 in.	1	1	1
077	02640-00044	*Screen, 13.5 in.	1	1	1
078	02640-00046	*Screen, 2.5 in.	1	1	1
079	02640-60095	*Sweep Assembly	1	1	1
	02640-60039	*Sweep Cable Assembly (not shown)	1	1	1
080	02640-60042	*CRT Cable Assembly	1	1	1
081	3160-0208	*Fan (used for Accessory 13240A)	1	1	1
082	02640-60037	*Fan, Cable Assembly (used for Accessory 13240A)	1	1	1
		(Attaching Parts)			
083	3030-0064	*Screw, Cap, no. 6-32, 5/8 in.	4	4	4
084	2190-0918	*Washer Lock, split, no. 6	4	4	4
085	2360-0205	*Screw, Machine, ph, no. 6-32, 3/4 in.	2	2	2
086	2420-0003	*Nut, Plain, no. 6	2	2	2
087	1400-0440	*Cable Clamp (used for Accessory 13240A)	2	2	2
		— — — X — — —			
088	02640-60084	*CRT Yoke Assembly	1	1	1
		(Attaching Parts)			
089	2510-0107	*Screw, Machine, ph, no. 8-32, 1/2 in.	4	4	4
090	2190-0017	*Washer, Spring, no. 8	4	4	4
091	3050-0001	*Washer, Flat, no. 8	4	4	4
092	—	*Static ground wire (P/O item 80)	—	—	—
093	2190-0010	*Washer, Lock, ext-tooth, no. 8	1		
094	02640-00055	*Support Retainer	1		
095	9320-3173	*Symbol Template (Mathematics) (used for Accessory 13231A-201)	1	1	1
	9320-3172	*Symbol Template (Line Drawing) (used for Accessory 13231A-202)	1	1	1
	02640-60145	*Keyboard and Cable Assembly (Standard) (see Note 1)	1		
	02640-60180	*Keyboard and Cable Assembly (Standard) (see Note 2)	1		
	02640-60113	*Keyboard and Cable Assembly (Norwegian) (see Note 1)		1	
	02640-60179	*Keyboard and Cable Assembly (Norwegian) (see Note 2)		1	
	02640-60105	*Keyboard and Cable Assembly (Swedish) (see Note 1)			1
	02640-60178	*Keyboard and Cable Assembly (Swedish) (see Note 2)			1

NOTES: 1. For gray-tone terminals
2. For brown-tone terminals
3. Item 065, CRT Shield, part no. 02640-00107, must be used with the later version latching plate and spring.

Table 4-1. HP 2640B, HP 2640N and HP 2640S Replaceable Parts (Continued)

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	UNITS PER ASSY 2640B	2640N	2640S
096	02640-60081	**Keyboard Cable Assembly	1	1	1
097	2360-0201	**Screw, Machine, ph, no. 6-32, 1/2 in.	1	1	1
098	2190-0918	**Washer, Lock, split, no. 6	1	1	1
099	3050-0066	**Washer, Flat, no. 6	1	1	1
100	1400-0440	**Cable Clamp	1	1	1
		———X———			
101	02640-00059	**Keyboard Overlay (see Note 1)	1	1	1
101	02640-00099	**Keyboard Overlay (see Note 2)	1	1	1
102	02640-40008	**Keyboard Top (see Note 1)	1	1	1
102	02640-40030	**Keyboard Top (see Note 2)	1	1	1
		(Attaching Parts)			
103	2360-0203	**Screw, Machine, ph, no. 6-32, 5/8 in.	5	5	5
104	2190-0918	**Washer, Lock, split, no. 6	5	5	5
105	3050-0066	**Washer, Flat, no. 6	5	5	5
		———X———			
106	02640-60018	**Keyboard Printed Circuit Assembly	1	1	1
107	1990-0486	***Light Emitting Diode	5	5	5
	0370-2646	***ESC Keycap	1	1	1
	0370-2260	***1 ! Keycap	1	1	1
	0370-2261	***2 " Keycap	1	1	1
	0370-2262	***3 # Keycap	1	1	1
	0370-2263	***4 $ Keycap	1	1	1
	0370-2264	***5 % Keycap	1	1	1
	0370-2265	***6 & Keycap	1	1	1
	0370-2266	***7 ' Keycap	1		
	0370-2267	***8 (Keycap	1	1	1
	0370-2268	***9) Keycap	1	1	1
	0370-2641	***0 Keycap	1	1	1
	0370-2648	***- = Keycap	1		
	0370-2654	***^ ~ Keycap	1		
	0370-2651	***\ | Keycap	1		
	0370-2637	***CNTL Keycap	1	1	1
	0370-2286	***Q Keycap	1	1	1
	0370-2292	***W Keycap	1	1	1
	0370-2274	***E Keycap	1	1	1
	0370-2287	***R Keycap	1	1	1
	0370-2289	***T Keycap	1	1	1
	0370-2294	***Y Keycap	1	1	1
	0370-2290	***U Keycap	1	1	1
	0370-2278	***I Keycap	1	1	1
	0370-2284	***O Keycap	1	1	1
	0370-2285	***P Keycap	1	1	1
	0370-2655	***@ ` Keycap	1	1	1
	0370-2653	***[{ Keycap	1		
	0370-2650	***_ DEL Keycap	1		
	0370-2270	***A Keycap	1	1	1
	0370-2288	***S Keycap	1	1	1
	0370-2273	***D Keycap	1	1	1
	0370-2275	***F Keycap	1	1	1
	0370-2276	***G Keycap	1	1	1
	0370-2277	***H Keycap	1	1	1
	0370-2279	***J Keycap	1	1	1
	0370-2280	***K Keycap	1	1	1
	0370-2281	***L Keycap	1		

Table 4-1. HP 2640B, HP 2640N and HP 2640S Replaceable Parts (Continued)

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	UNITS PER ASSY 2640B	2640N	2640S
	0370-2324	***; + Keycap	1		
	0370-2325	***: * Keycap	1		
	0370-2652	***] } Keycap	1		
	0370-2635	***RETURN Keycap	1	1	1
	0370-2636	***SHIFT Keycap	1	1	1
	0370-2295	***Z Keycap	1	1	1
	0370-2293	***X Keycap	1	1	1
	0370-2272	***C Keycap	1	1	1
	0370-2291	***V Keycap	1	1	1
	0370-2271	***B Keycap	1	1	1
	0370-2283	***N Keycap	1	1	1
	0370-2282	***M Keycap	1	1	1
	0370-2296	***, < Keycap	1		
	0370-2297	***. > Keycap	1		
	0370-2298	***/ ? Keycap	1		
	02640-60170	***Space Bar Keycap	1	1	1
	0370-0620	***0 Keycap (Numeric Pad)	1	1	1
	0370-2312	***1 Keycap (Numeric Pad)	1	1	1
	0370-2313	***2 Keycap (Numeric Pad)	1	1	1
	0370-2314	***3 Keycap (Numeric Pad)	1	1	1
	0370-2315	***4 Keycap (Numeric Pad)	1	1	1
	0370-2316	***5 Keycap (Numeric Pad)	1	1	1
	0370-2317	***6 Keycap (Numeric Pad)	1	1	1
	0370-2318	***7 Keycap (Numeric Pad)	1	1	1
	0370-2319	***8 Keycap (Numeric Pad)	1	1	1
	0370-2320	***9 Keycap (Numeric Pad)	1	1	1
	0370-2322	***. Keycap (Numeric Pad)	1	1	1
	0370-2982	***CLEAR TAB Keycap	1	1	1
	0370-2657	***SET TAB Keycap	1	1	1
	0370-2643	***CLEAR DSPLY Keycap	1	1	1
	0370-2658	***ROLL UP Keycap	1	1	1
	0370-2659	***ROLL DOWN Keycap	1	1	1
	0370-2638	***NEXT PAGE Keycap	1	1	1
	0370-2639	***PREV PAGE Keycap	1	1	1
	0370-2642	***(Home) Keycap	1	1	1
	0370-2640	***Arrow Keycap	4	1	1
	0370-2644	**Operating Function Keycap	13	1	1
	0370-2877	***Backspace Keycap	1	1	1
	0370-2878	***TAB Keycap	1	1	1
	0370-2898	***Olive Black Keycap	1	1	1
	0370-2957	***Ö Keycap			1
	0370-2958	***Ø Keycap		1	
	0370-2959	***DEL Keycap		1	1
	0370-2960	***_ ^ Keycap			1
	0370-2961	***- _ Keycap		1	1
	0370-2962	***0 = Keycap		1	1
	0370-2963	***. : Keycap		1	1
	0370-2964	***, ; Keycap		1	1
	0370-2965	***' * Keycap		1	1
	0370-2966	***+ ? Keycap		1	1
	0370-2967	***7 / Keycap		1	1
	0370-2968	***> < Keycap		1	1
	0370-2969	***Å Keycap		1	1
	0370-2970	***Ä Keycap			1
	0370-2971	***Ü Keycap		1	
	0370-2972	***Æ Keycap		1	

Table 4-1. HP 2640B, HP 2640N and HP 2640S Replaceable Parts (Continued)

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	UNITS PER ASSY 2640B	2640N	2640S
	3101-1745	***RESET TERMINAL pushbutton switch	1	1	1
	3101-2137	***Pushbutton switch, momentary contact (under keycap)	99	99	99
	3101-2136	***Pushbutton switch locking (under keycap)	5	5	5
	0370-2765	***f1 Keycap	1	1	1
	0370-2766	***f2 Keycap	1	1	1
	0370-2767	***f3 Keycap	1	1	1
	0370-2768	***f4 Keycap	1	1	1
	0370-2769	***f5 Keycap	1	1	1
	0370-2770	***f6 Keycap	1	1	1
	0370-2771	***f7 Keycap	1	1	1
	0370-2772	***f8 Keycap	1	1	1
	02640-60041	**Speaker Cable Assembly	1	1	1
108	9160-0233	**Loudspeaker Assembly	1	1	1
		(Attaching Parts)			
109	2360-0193	**Screw, Machine, ph, no. 6-32, 1/4 in.	2	2	2
110	2190-0918	**Washer, Lock, split, no. 6	2	2	2
111	1400-0054	**Mounting Clamp	2	2	2
		— — — X — — —			
112	0403-0324	**Rubber Bumper	4	4	4
113	02640-40007	**Keyboard Bottom (see Note 1)	1		
113	02640-40029	**Keyboard Bottom (see Note 2)	1		
114	0370-2991	**BAUD RATE Knob	1	1	1
		(Attaching Parts)			
	3030-0609	**Set Screw, knurled tip, no. 4-40, 1/8 in.	1	1	1
	5040-7433	**Keycap Removal Tool (not shown)	1	1	1
	02640-90042	*Manual, Installation and Service, 13250A (used for Option 020)	1	1	1
	02640-90109	*Manual, User's, 2640B	1		
	02640-90111	*Manual, User's, 2640N		1	
	02640-90113	*Manual, User's, 2640S			1
	02640-90110	*Manual, Reference, 2640B/N/S	1	1	1

NOTES: 1. For gray-tone terminals
2. For brown-tone terminals

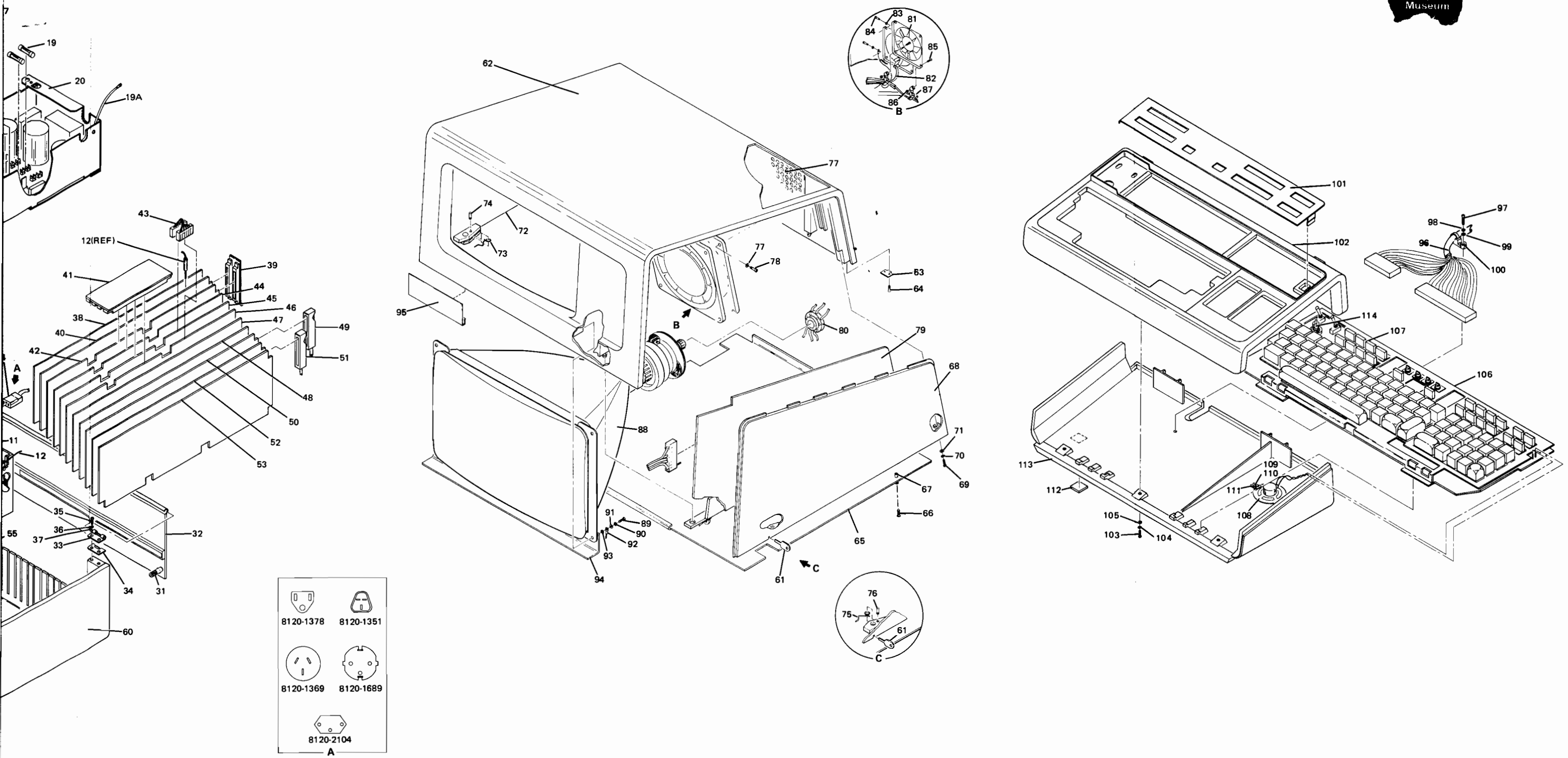
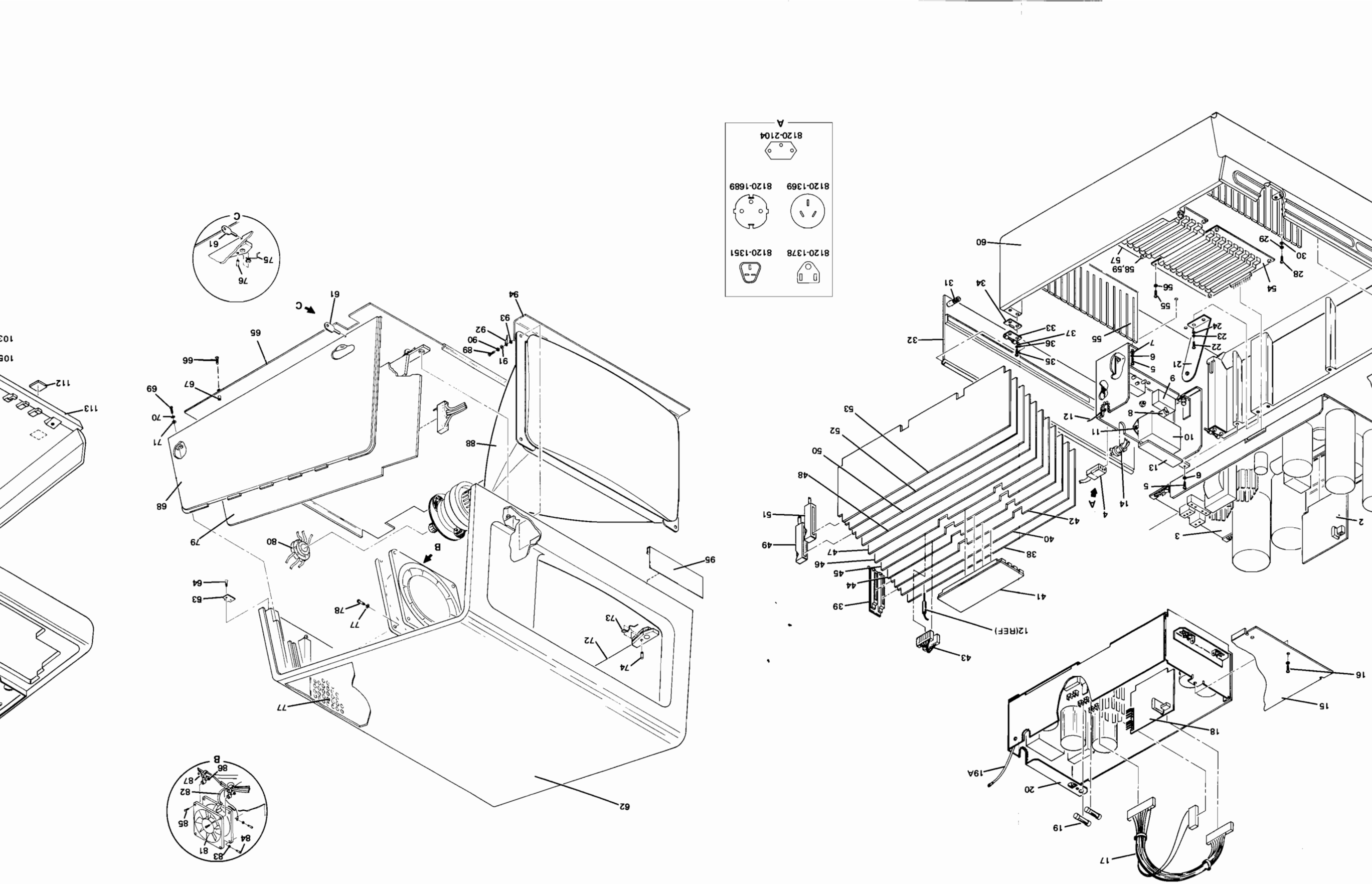


Figure 4-1. HP 2640B/N/S Terminal Exploded View


A
8120-2104
8120-1369
8120-1689
8120-1378
8120-1351
C
B
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2
3
4
5
6
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8
9
10
11
12
12(REF)
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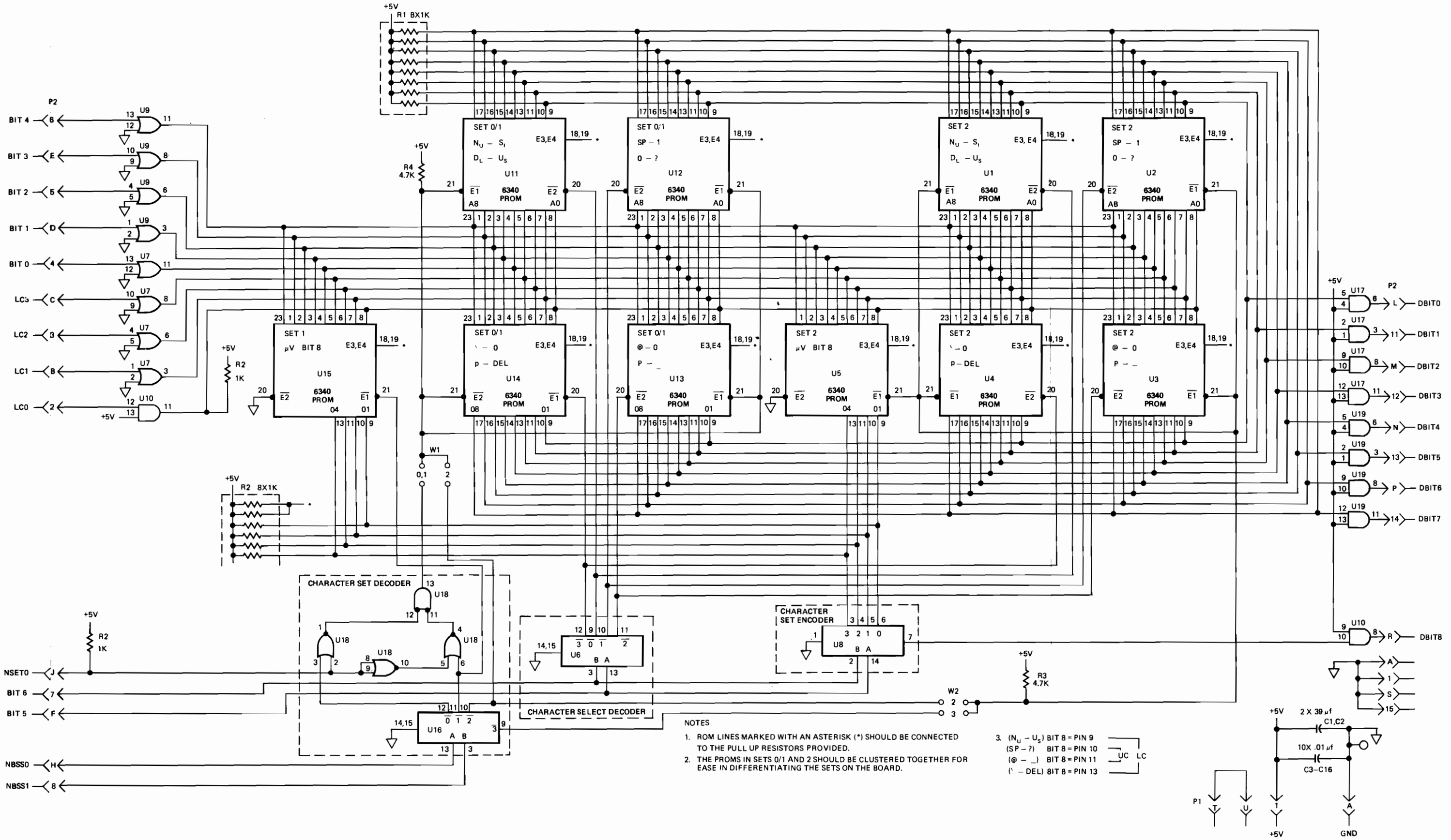
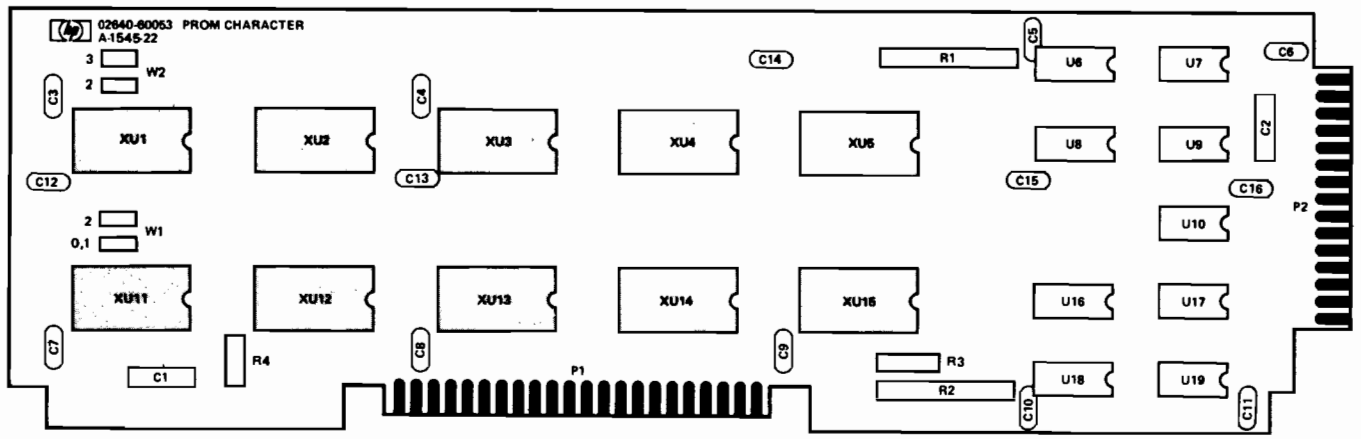


NOTES

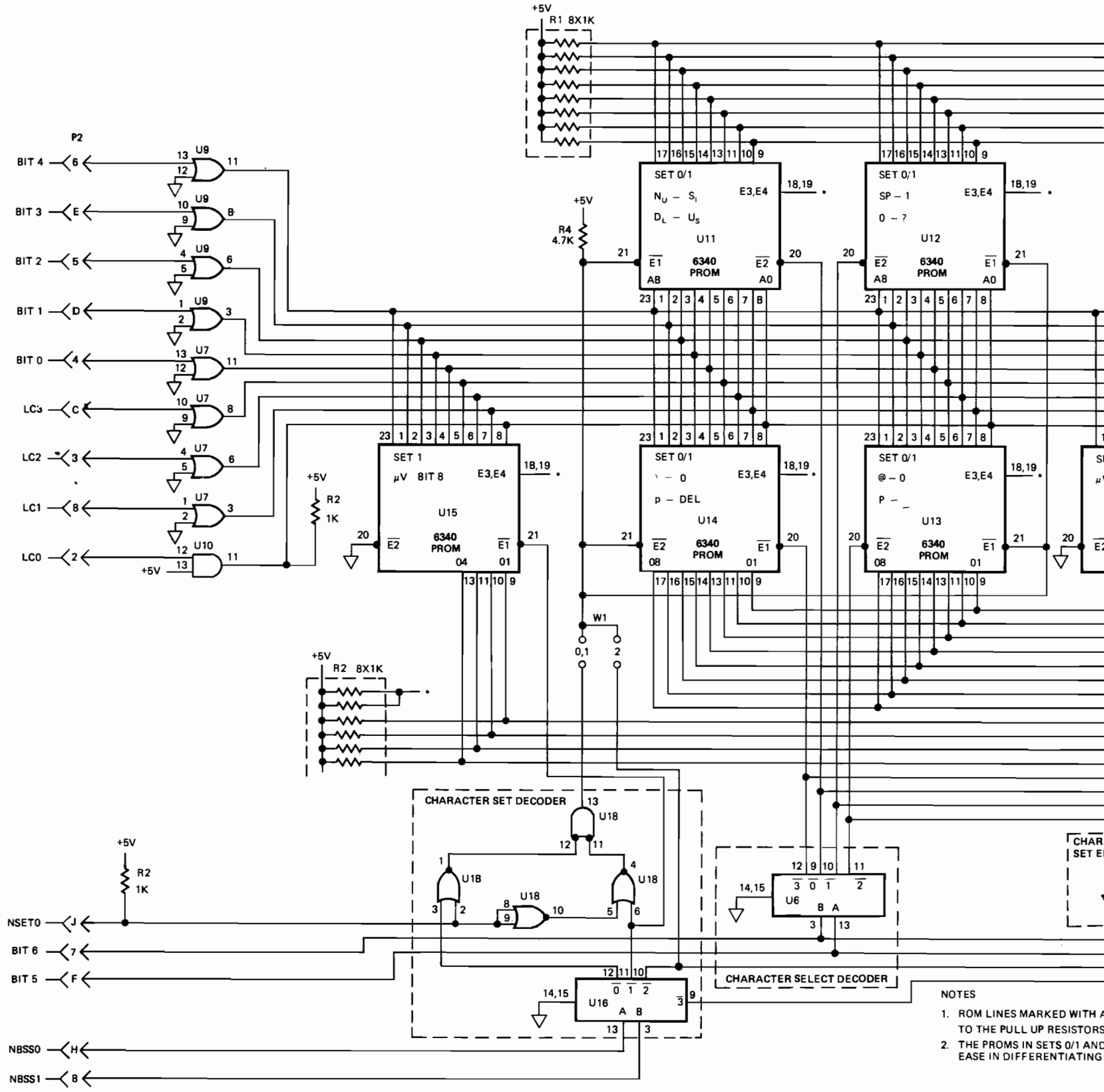
1. ROM LINES MARKED WITH AN ASTERISK (*) SHOULD BE CONNECTED TO THE PULL UP RESISTORS PROVIDED.
2. THE PROMS IN SETS 0/1 AND 2 SHOULD BE CLUSTERED TOGETHER FOR EASE IN DIFFERENTIATING THE SETS ON THE BOARD.
3. ($N_U - U_S$) BIT 8 = PIN 9
   (SP – ?) BIT 8 = PIN 10
   (@ – _) BIT 8 = PIN 11
   (\ – DEL) BIT 8 = PIN 13
   UC LC

Figure 4-2. PROM Character PCA, Schematic Diagram

7077-25A



7077-19



7077-25A