HEWLETT hp PACKARD

2621A/P Interactive Terminal



service manual

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Preface

This manual provides field service information for the HP 2621 Terminal. This manual is intended to be used by qualified service personnel to install and service the terminal. Because of product design, a modular repair philosophy has been implemented to minimize on-site repair time. There is one other manual associated with this Service Manual: the *HP 2621A/P Interactive Terminal Owner's Manual*, part no. 02620-90001.

The Owner's Manual provides user information for installing, programming, and operating the terminal.

WARNING

Always remove AC power before opening the terminal or removing the top cover. If servicing requires that power be on while protective covers are removed, proceed only with extreme caution not to touch exposed areas. Failure to do so can result in serious injury. Heed all WARNING – HAZARDOUS VOLTAGE labels.

Contents

Section I — Page

INTRODUCTION 1-1
Introduction ... 1-1
Manual Overview ... 1-1
Equipment Provided ... 1-2
Options Available ... 1-2
Accessories Available ... 1-3
Specifications ... 1-3

Section II — Page

INSTALLATION 2-1
Introduction ... 2-1
Opening and Closing the Terminal ... 2-2
Opening the Terminal ... 2-2
Removing the Mainframe from the Support ... 2-3
Replacing the Mainframe on the Support ... 2-4
Closing the Terminal ... 2-5
Installing the Terminal ... 2-6
Procedure ... 2-6
Thermal Paper ... 2-10
Introduction ... 2-10
Paper Loading ... 2-10
Interfacing Information ... 2-11
Signal Characteristics ... 2-11
Data Signals ... 2-11
Control and Timing Signals ... 2-11
Cabling ... 2-11
Cable Fabrication ... 2-18
Instructions ... 2-19

Section III — Page

STRAPPING 3-1
Introduction ... 3-1
Why ... 3-1
How ... 3-2
When ... 3-2
Requirements ... 3-2
Procedure ... 3-2
Initiate Configuration Mode ... 3-3
To Select the Default Selections ... 3-4
To Change the Baud Rate ... 3-4
To Change the Parity Type ... 3-4
To Change the Duplex Type ... 3-5
To Change the Straps ... 3-5
Straps Description ... 3-6
To Change the Handshake ... 3-11
To Change the Hz Type ... 3-12
To Change the Start Column ... 3-13
To Change the Return Key Character ... 3-13
Language Configuration ... 3-14
To End Configuration Mode ... 3-15
Configuration Lock ... 3-15
Thermal Print Mechanism (TPM) ... 3-16
Terminal Status ... 3-19
Why ... 3-19
How ... 3-19
When ... 3-21
Procedure ... 3-21

Section IV Page

PREVENTIVE MAINTENANCE 4-1
Introduction 4-1
Battery Replacement 4-1
Why 4-1
How 4-1
When 4-1
Equipment Required 4-2
Procedure 4-2
TPM Preventive Maintenance 4-3
Why 4-3
How 4-3
When 4-3
Procedure 4-3

Section V Page

ALIGNMENT 5-1
Introduction 5-1
Power Supply Adjustment 5-1
Why 5-1
How 5-1
When 5-1
Equipment Required 5-1
Procedure 5-2
Raster Alignment 5-4
Why 5-4
How 5-4
When 5-4
Equipment Required 5-4
Procedure 5-4

Section VI Page

TROUBLESHOOTING 6-1
Introduction 6-1
Preliminary Troubleshooting 6-1
Why 6-1
How 6-1
When 6-1
Procedure 6-1
Troubleshooting 6-2
Why 6-2
How 6-2
When 6-2
Procedure 6-3
Unit Self-Test 6-3
Continuous Self-Test 6-3
Data Comm Self-Test 6-4
TPM Self-Test 6-5
TPM Local Self-Test 6-5
Using the Video Generator 6-8
Purpose 6-8
Installation 6-8
Controls 6-9
Using the Head Load Assembly 6-11
Purpose 6-11
Procedure 6-11

Section VII Page

PARTS LISTS/REPAIR 7-1
Introduction 7-1
Removal and Replacement Procedures 7-1
Top Cover 7-1
Mainframe 7-2
Support 7-5
Pedestal 7-6
Ventilating Fan 7-7
Printed-Circuit Assemblies 7-9
Processor PCA 7-9
Sweep PCA 7-12
Power Supply PCA 7-14
Keyboard Assembly 7-16
Keyboard PCA 7-16
Keycaps 7-17
Battery 7-18

Integrated Circuit 7-20
Thermal Print Mechanism 7-22
TPM PCA 7-23
Print Head 7-25
Replaceable Parts 7-30
Ordering Replaceable Parts 7-31
Exchange Modules 7-31

Section VIII **Page**

FUNCTIONAL OPERATION 8-1
Introduction 8-1
Processor PCA 8-2
Introduction 8-2
Microprocessor Controller 8-4
Z80 Processor 8-4
Program ROM 8-5
Program RAM 8-5
Keyboard Interface 8-5
Data Comm Interface 8-5
Baud Rate Generation 8-5
Printer Interface 8-5
Terminal Timing 8-6
System Clock 8-6
Dot Position Counter 8-6
Character Position Counter 8-6
Character Height and Row Counters 8-6
DMA Row Decode 8-6
Video Controller 8-6
Display Memory 8-7
Display Memory Control 8-7
Address Multiplexer 8-7
Character Pointer 8-8
Row Index 8-8
Character Generation ROM 8-8
Video Dot Generation 8-8
Video Blanking 8-8
Sweep PCA 8-8
Introduction 8-8
Video Drive 8-9
Vertical Drive 8-10
Horizontal Drive 8-10
2621A Power Supply 8-11
Introduction 8-11
+12 Volt Regulator 8-12
+5 Volt Regulator 8-12
−12 Volt Regulator 8-13
Power On/$\overline{\text{Fail}}$ Circuit 8-13
Sync Circuit 8-13
Power Bracket Assembly 8-13
2621P Power Supply 8-14
Introduction 8-14
Primary Switcher 8-15
Line Rectifier 8-15
Primary Switcher 8-15
Secondary Rectifier 8-15
Primary Switching Regulator 8-15
Secondary Regulation 8-16
−12 Volt Linear Regulator 8-16
+12 Volt Switching Regulator 8-16
+5 Volt Switching Regulator 8-16
Protection Circuitry 8-17
Overvoltage Shutdown 8-17
Undervoltage Shutcown 8-17
Logic Signal Interface 8-17
Sync Circuit 8-17
Power On 8-17
Bootstrap Supply 8-18
Keyboard Module 8-18
Introduction 8-18
Keyboard Scanning 8-18

Illustrations

Title	Page
Terminal in Half Open Position	2-1
Terminal Rear View	2-2
Freeing Mainframe from the Top Prop	2-4
Mating the Hinges to the Hinge Openings	2-5
2621A Power Supply PCA	2-8
2621P Power Supply PCA	2-8
13222C (RS232C) Cable Wiring	2-12
13222M (European Modem) Cable Wiring	2-13
13222N (U.S. Modem) Cable Wiring	2-14
13222W (HP 300) Cable Wiring	2-15
13222Y (Three Wire/Male) Cable Wiring	2-16
13222Z (Three Wire/Female) Cable Wiring	2-16
Cable Fabrication	2-18
Strapping Configuration Display	3-3
DC1/DC2 Handshake Protocol	3-8
TPM Configuration and Location (TPM PCA Part No. 02670-60001)	3-16
TPM Configuration and Location (TPM PCA Part No. 02670-60050 Standard Terminal)	3-17
TPM Configuration and Location (TPM PCA Part No. 02670-60050 National Option)	3-18
Test Pattern	3-19
Terminal Status Example	3-22
Terminal Status	3-24
Battery Removal	4-2
2621A Terminal Test Points and +5V Adjustment Locations	5-3
2621P Terminal Test Points and +5V Adjustment Locations	5-3
Location of Four Raster Adjustments (CENTER, HEIGHT, FOCUS, and BRIGHTNESS)	5-5
Location of Raster Width Adjustment and Yoke Collar	5-6
Dot Stretch Adjustment Location	5-7
2621A/P Test Pattern	6-3
2621P Test Pattern	6-5
TPM Local Self-Test Pattern	6-6
Video Generator Installed in Place of the Processor PCA	6-9
Video Generator	6-9
Head Load Assembly	6-12
Terminal Top View	7-2
2621 Terminal (Rear View)	7-3
Terminal Set to the Half-Open Position	7-4
Support and Pedestal	7-6
Fan Removal (2621P)	7-8
Processor PCA Removal	7-10
Sweep PCA	7-13
Power Supply PCA (2621A)	7-15
Power Supply PCA (2621P)	7-15
Keycap Removal	7-17
Battery Removal	7-19
Installing an IC	7-21
TPM Removal	7-23
Tear Window	7-25
TPM Front View	7-26
Print Head Assembly Connector	7-27
Ledge Inside Print Head Carriage	7-28
Print Head Assembly in Place	7-29

Illustrations (Continued)

Title	Page
2621A Terminal	7-33
2621P Terminal	7-33
Mainframe, Exploded View (2621A)	7-36
Mainframe, Exploded View (2621P)	7-36
TPM, Exploded View	7-39
Keyboard Assembly	7-41
Swedish/Finnish Keyboard, Unique Keys	7-45
Danish/Norwegian Keyboard, Unique Keys	7-45
French Keyboard, Unique Keys	7-46
German Keyboard, Unique Keys	7-46
United Kingdom Keyboard, Unique Keys	7-47
Spanish Keyboard, Unique Keys	7-47
Processor PCA	7-48
TPM PCA	7-48
2621A Simplified Block Diagram	8-1
2621P Simplified Block Diagram	8-2
Processor PCA Block Diagram	8-3
Sweep PCA, Simplified Block Diagram	8-9
2621A Power Supply, Simplified Block Diagram	8-11
2621P Power Supply, Simplified Block Diagram	8-14

Tables

Title	Page
2621A Options	1-2
2621P Options	1-2
Terminal Accessories	1-3
RS232C/CCITT V.24 Signal Code-to-Name Translation	2-17
Straps Configuration	3-6
DC1/DC2 Handshake Protocol Strapping Effects	3-10
Handshake Configuration	3-11
ASCII Status Characters	3-20
Power Supply Test Points	5-2
Error Messages	6-7
Video Generator Controls	6-10
Top Cover, Support, and Pedestal	7-32
Mainframe Module Assembly	7-34
Thermal Print Mechanism	7-38
Keyboard Assembly	7-40
2621A/P Keycaps	7-42
Basic Keycaps for National Option	7-43
Keycaps Unique to Each Language	7-44
Removable Components Standard Terminal	7-49
Removable Components National Option	7-50
Character ROMs for Each Language Option	7-50
Exchange Modules	7-51

Introduction

INTRODUCTION ..... This section provides an overview of the service manual, lists terminal equipment provided, and briefly describes the options and accessories available.

MANUAL OVERVIEW ..... The Service Manual consists of the following sections:

Section I — *Introduction.* This section provides a general overview of the service manual, lists terminal equipment provided and briefly describes the options and accessories available.

Section II — *Installation.* This section provides procedures for installing the terminal. Options, accessories, and cabling information are also included in this section.

Section III — *Strapping.* This section provides strapping configuration procedures and status information for the terminal. Also included is a segment on language selection which applies only to the national option.

Section IV — *Preventive Maintenance.* This section provides preventive maintenance information for the terminal.

Section V — *Alignment.* This section provides procedures for adjusting the power supply and raster.

Section VI — *Troubleshooting.* This section provides procedures for isolating terminal failures to a replaceable assembly or component.

Section VII — *Parts Lists/Repair.* This section provides parts lists and repair information for the terminal. This section also provides removal and replacement procedures for the terminal's replaceable parts.

Section VIII — *Functional Operation.* This section provides a brief functional description of the terminal.

EQUIPMENT PROVIDED ..... The following equipment and documentation are provided with the terminal:

For HP 2621A:

1. HP 2621A Interactive Terminal with a standard 120V, 60Hz power source configuration.
2. *HP 2621A/P Interactive Terminal Owner's Manual,* part no. 02620-90001.
3. Alignment Tool, part no. 8730-0016.

For HP 2621P:

1. HP 2621P Interactive Terminal with a standard 115V, 60Hz power source configuration.
2. Thermal Paper.
3. *HP 2621A/P Interactive Terminal Owner's Manual,* part no. 02620-90001.
4. Alignment Tool, part no. 8730-0016.

OPTIONS AVAILABLE ..... Options are factory modifications of a standard terminal that are requested by the customer. Available power options for the terminal are listed in tables 1-1 and 1-2.

Table 1-1. 2621A Options

OPTION	DESCRIPTION
013	240V, 50Hz Power Source
014	100V, 60Hz Power Source
015	220V, 50Hz Power Source
016	100V, 50Hz Power Source

Table 1-2. 2621P Options

OPTION	DESCRIPTION
015	230V, 50Hz Power Source
016	115V, 50Hz Power Source

ACCESSORIES AVAILABLE .....

Accessories may be ordered with the terminal or separately from your local Hewlett-Packard Sales and Service Office. Sales and Service Offices are listed at the back of this manual. Terminal accessories are listed in table 1-3.

Table 1-3. Terminal Accessories

MODEL	HP PART NO.	DESCRIPTION
13222C	13222-60003	RS232 Cable, Female, 2 meters
13222M	13222-60002	European Modem Cable, Male, 5 meters
13222N	13222-60001	US Modem Cable, Male, 5 meters
13222W	13222-60007	HP 300 Cable, Female, 5 meters
13222Y	13222-60005	Three Wire Cable, Male, 5 meters
13222Z	13222-60006	Three Wire Cable, Female, 5 meters

SPECIFICATIONS .....

For terminal specifications, refer to the HP 2621A/P Interactive Terminal Data Sheet, which is available from your local HP Sales and Service Office.

Installation II

INTRODUCTION ..... In addition to procedures for installing the terminal, this section provides instructions for opening and closing the terminal, removing and replacing the mainframe on the support (figure 2-1), and interfacing information.

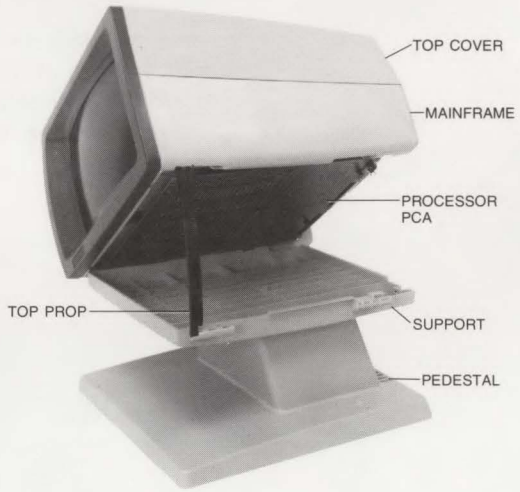


Figure 2-1. Terminal in Half-Open Position

Opening and Closing the Terminal

WARNING

Always remove AC power before opening the terminal or removing the top cover. If servicing requires that power be on while protective covers are removed, proceed only with extreme caution not to touch exposed areas. Failure to do so can result in serious injury. Heed all WARNING – HAZARDOUS VOLTAGE labels.

OPENING THE TERMINAL .....

1. Using a small Phillips-head screwdriver, loosen the quarter-turn fastener (figure 2-2) at the lower left rear of the terminal. Do not overturn the fastener more than a quarter-turn.

2. Hold the pedestal in place with one hand and push forward on the rear of the mainframe to slide the mainframe forward about 1/4-inch on the support. While holding down the pedestal, lift the left side of the mainframe until it tilts approximately 45 degrees and the top prop locks the mainframe in the half-open (service) position.

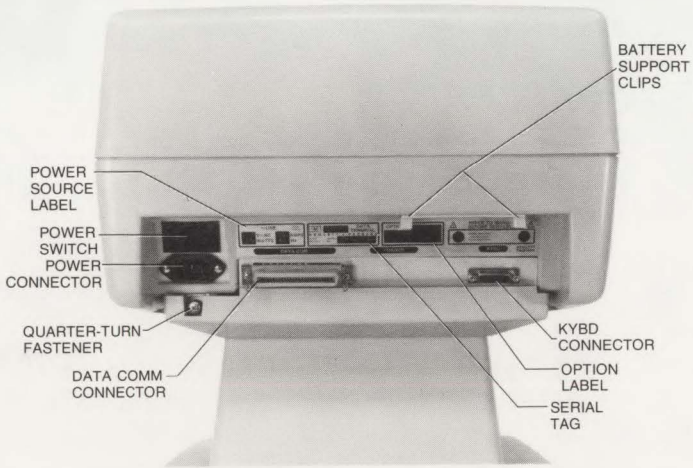


Figure 2-2. Terminal Rear View

REMOVING THE MAINFRAME FROM THE SUPPORT .....

Removal procedures for the 2621A are different from those for the 2621P. For the 2621A, perform steps 2, 3, 6, and 8; for the 2621P, perform steps 1 through 8.

1. On the 2621P, remove the top cover from the terminal by loosening the two quarter-turn fasteners at the top of the terminal. Do not overturn the fasteners.
2. Open the terminal to the half-open (service) position.
3. Disconnect the ground strap from the Processor PCA ground lug.
4. On the 2621P, lower the Processor PCA by unsnapping the four corner snap fasteners which hold it in place.
5. On the 2621P, disconnect the fan cable from the FAN connector (J1) on the Power Supply PCA and pull it through the mainframe assembly so that it lies on the support.

CAUTION

When securing snap-in fasteners, always install each snap-in grommet into their respective fastening holes before pushing-in on each snap-in plunger. Observe that each snap-in plunger clicks to ensure that the snap-in fastener is fully seated and secured. Failure to do so will result in an insecure assembly which may cause damage or failure to the assembly or terminal.

6. Reinstall the Processor PCA and reconnect the ground strap.
7. Free the mainframe from the top prop by squeezing the upper end of the top prop (figure 2-3) while exerting an upward force on the left side of the mainframe.

CAUTION

Use extreme care when freeing the mainframe from the top prop and pedestal. Failure to do so may result in damage to the terminal or injury to yourself.

8. With the mainframe free of the top prop, slide the mainframe forward an additional 1/4-inch past the detents until the right side clears the fixed hinges (figure 2-3) on the right side of the support; then lift the mainframe free of the support.

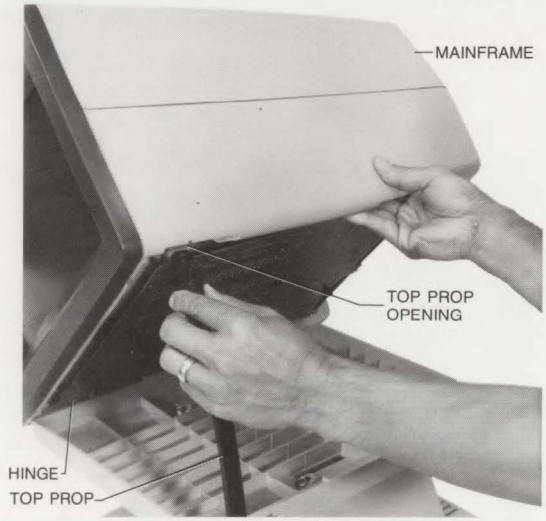


Figure 2-3. Freeing Mainframe from the Top Prop

REPLACING THE MAINFRAME ON THE SUPPORT

1. Hold the mainframe above the support in a tilted position with the left side up, to clear the top prop, and the right side down so that the fixed hinges on the right side of the support enter the hinge openings (figure 2-4) along the right lower edge of the mainframe. Then slide the mainframe rearward past the detents approximately 1/4-inch to lock the hinges.

2. While guiding the top prop so it enters the top prop opening (figure 2-3) in the lower left edge of the mainframe, lower the left side of the mainframe until the top prop locks the mainframe in the half-open (service) position.

3. On the 2621P, make sure the fan cable is routed correctly and seated securely in the support slots and cable clip. Failure to do so may cause unusual cable wear which may cause possible shorts.

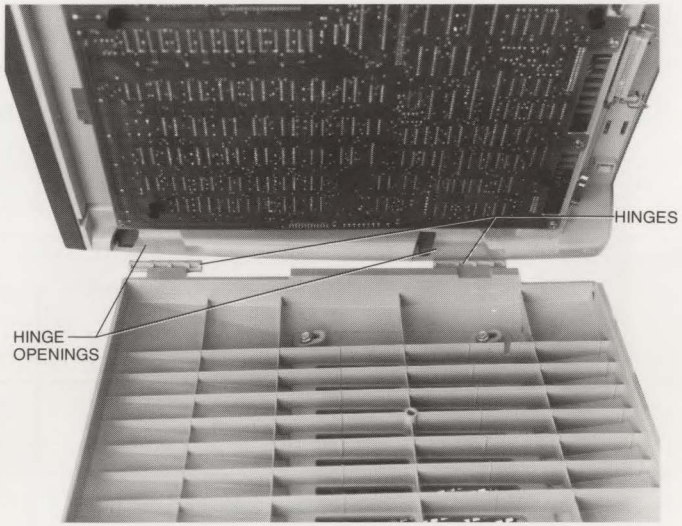


Figure 2-4. Mating the Hinges to the Hinge Openings

CLOSING THE TERMINAL .....

1. While holding the terminal mainframe with one hand to keep it from falling into the closed position, raise it slightly and squeeze the upper end of the top prop to release the catch. Then lower the mainframe to the closed position.

2. Push on the front of the mainframe to slide it rearward approximately 1/4-inch or until it stops.

3. Use a small Phillips-head screwdriver to tighten the quarter-turn fastener at the left rear of the terminal. Do not over-tighten the quarter-turn fastener.

Installing the Terminal

PROCEDURE .....

1. Check that the available power source matches the power source for which the power supply is designed, as marked on the power source and option labels at the rear of the terminal (figure 2-2).

2621A

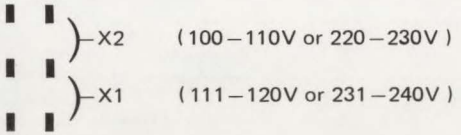
OPTION	POWER SOURCE	RATING	FUSE PART NUMBER	SOCKET	FUSE SIZE
STD	120V, 60 Hz	60W, 0.5A	2110-0043	X1	250V, 1.5A
013	240V, 50 Hz	75W, 0.3A	2110-0063	X1	250V, .75A
014	100V, 60 Hz	60W, 0.6A	2110-0002	X2	250V, 2.0A
015	220V, 50 Hz	75W, 0.4A	2110-0001	X2	250V, 1.0A
016	100V, 50 Hz	60W, 0.6A	2110-0002	X2	250V, 2.0A

2621P

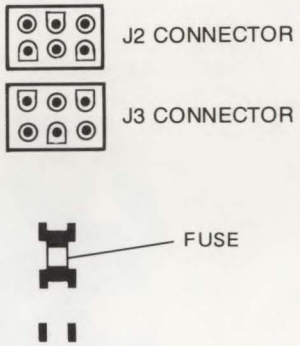
OPTION	POWER SOURCE	RATING	FUSE PART NUMBER	SOCKET	FUSE SIZE
STD	115V, 60 Hz	140W, 2.4A	2110-0010	X2	250V, 5A
015	220V, 50 Hz	170W, 1.2A	2110-0083	X1	250V, 2.5A
016	115V, 50 Hz	170W, 2.4A	2110-0010	X2	250V, 5A

2. Remove the top cover by loosening the two quarter-turn fasteners at the top of the terminal. Do not overturn the fasteners.
3. Check that the fuse is inserted in the set of fuse holders which comes closest to matching the power source (figures 2-5 and 2-6). Also check that the amperage rating of the fuse is as indicated on the Power Supply PCA. For 2621P, the Power Supply PCA must be removed to check the fusing.

On the 2621 the power connector used varies depending on the voltage of the power source. The J2 connector is used for voltages between 100 and 120 volts. The J3 connector is used for voltages between 220 and 240 volts. The fuse placement depends on whether the voltage is in the upper or lower portion of the selected voltage range. Fuse placement is in X1 if the voltage is in the upper half of the range (111-120V or 231-240V) and is in X2 if the voltage is in the lower half of the range (100-110V or 220-230V).



For example a 220 volt supply would use the J3 connector and the fuse would be placed across X2 connection (lower range).



On the 2621P only the fuse position is changed to match the source voltage. The X1 socket is used for voltages between 220 and 240 volts. The X2 socket is used for voltages between 100 and 120 volts.

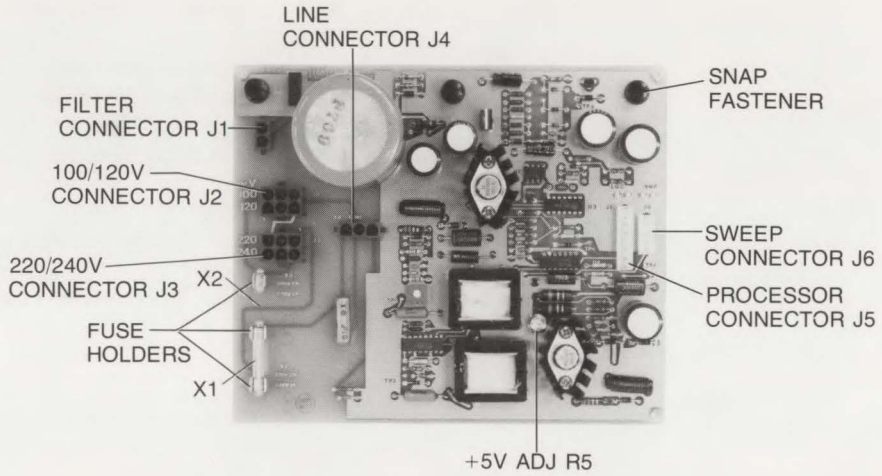


Figure 2-5. 2621A Power Supply PCA

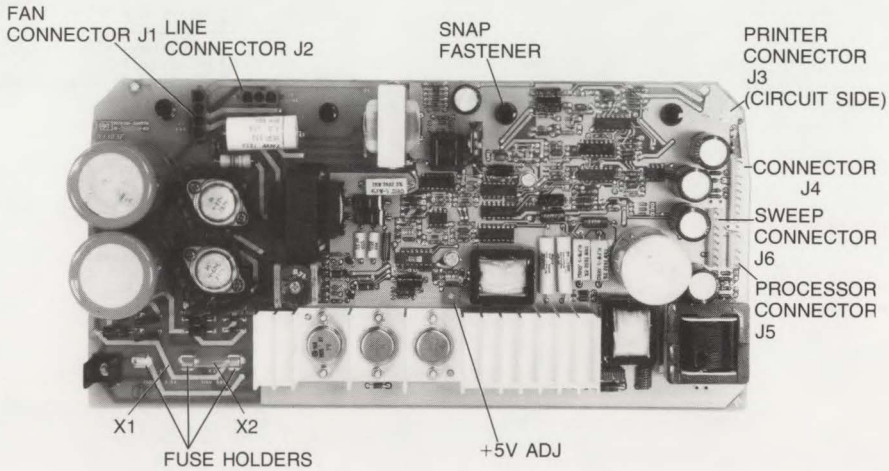


Figure 2-6. 2621P Power Supply PCA

CAUTION

For the 2621A, be sure the voltage of the connector to which the 6-pin transformer cable is to be connected matches the voltage of the power source. If a 220 or 240 volt power source is connected to the 100/120 volt connector, the power supply will be damaged.

4. On the 2621A, check that the 6-pin transformer cable is connected to the Power Supply PCA connector (J2 or J3) which matches the power source.
5. Check that the battery is installed with the proper polarity as marked on the battery support.
6. Position the keyboard in front of the terminal and connect the keyboard cable to the KYBD connector at the lower right rear of the terminal (figure 2-2).
7. Slide the keyboard cable connector lock to the right (as viewed from the rear) to secure the keyboard cable to the KYBD connector.
8. If applicable, connect the data communications cable to the DATA COMM connector at terminal rear and latch the two securing latches at each side of the connector.
9. Connect the power cord to the power connector at the left rear of the terminal, then turn on the power switch and allow time for the terminal to warm up (about 15 seconds).
10. Perform the power supply adjustment procedures and check the raster alignment (refer to the Alignment Section for details).
11. Reinstall the top cover.
12. Perform terminal self-test (refer to the self-test procedure in the Troubleshooting Section).
13. Put the terminal in configuration mode and configure the straps as desired (refer to the Strapping Section).
14. Turn off terminal power, wait 2 to 5 minutes, then turn on terminal power and check that the strapping remains as it was configured.

Thermal Paper

INTRODUCTION .....

The 2621P must use thermal print paper for its thermal print mechanism (TPM). Hewlett-Packard's thermal print paper is especially formulated for prolonged print head life. If Hewlett-Packard's thermal print paper is not used, the equipment warranty and service contract will be void. The part numbers for Hewlett-Packard's thermal print paper are as follows: blue printing 9270-0638, black printing 9270-0656.

PAPER LOADING .....

To load a paper roll into the TPM, perform the following:

1. Raise the TPM door to gain access to the TPM.
2. Raise the door latch (figure 7-13) and remove the remaining paper and paper core (if any) and rod from the TPM mainframe.
3. Remove the rod from the old core and insert the rod through the core of a new paper roll.

   Note

   One side of the thermal paper is coated with printing material (the glossy side) and it must be installed correctly to produce the print image. See the embossed illustration on the underside of the TPM door for correct paper roll installation.

4. With the leading edge of the paper roll facing out (as viewed from the front), place the paper roll and rod into the slotted guides of the TPM housing. Press the paper roll down and toward the rear of the TPM until it clicks into place.
5. Feed the leading edge of the paper roll toward the front between the latching frame and the clear plastic tear window. Be careful not to sharply touch the print head because damage may result.
6. Lower the latching frame without locking it into place.
7. Align the paper roll sides with guide lines embossed on each side of the tear window.
8. Feed approximately 12 inches of paper through the latching frame so that the glue spot is beyond the print head and tear window. The glue spot, which holds the paper roll together, must not be allowed to come in contact with the print head during print operations.

9. Press down on the latching frame until it locks into place with an audible click.
10. Tear off the excess paper using the edge of the tear window as a cutting edge.
11. Close the TPM door securely.

Note

If subsequent print operations appear normal except that no print image appears, the paper may have been installed backwards. An image can be printed only on one side of the paper.

Interfacing Information

SIGNAL CHARACTERISTICS .....

DATA SIGNALS. The characteristics for data signals are as follows:

SPACE	MARK
Logic 0	Logic 1
>+3V but <+25V	<−3V but >−25V

CONTROL AND TIMING SIGNALS. The characteristics for control and timing signals are as follows:

ON (ACTIVE)	OFF (INACTIVE)
Logic 1	Logic 0
>+3V but <+25V	<−3V but >−25V

CABLING .....

Pin-to-pin wiring for six data communication cables is shown in figures 2-7 to 2-12. Table 2-1 translates the RS232C/CCIT V.24 (European equivalent) signal identification code for each signal to the name of the signal.

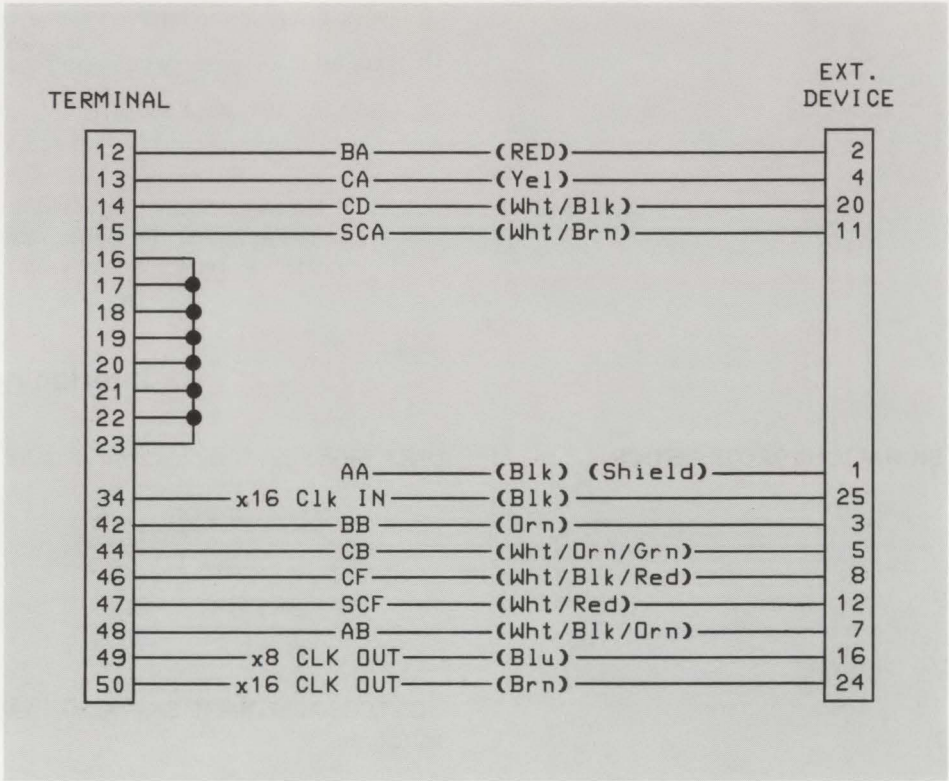


Figure 2-7. 13222C (RS232C) Cable Wiring

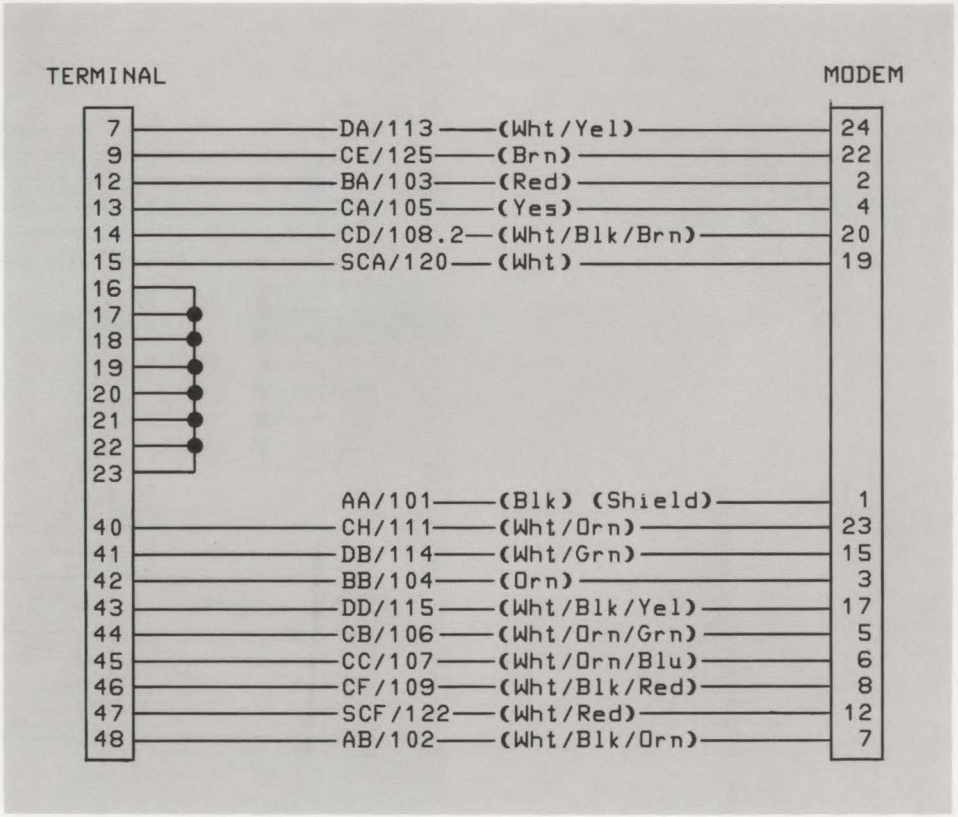


Figure 2-8. 13222M (European Modem) Cable Wiring

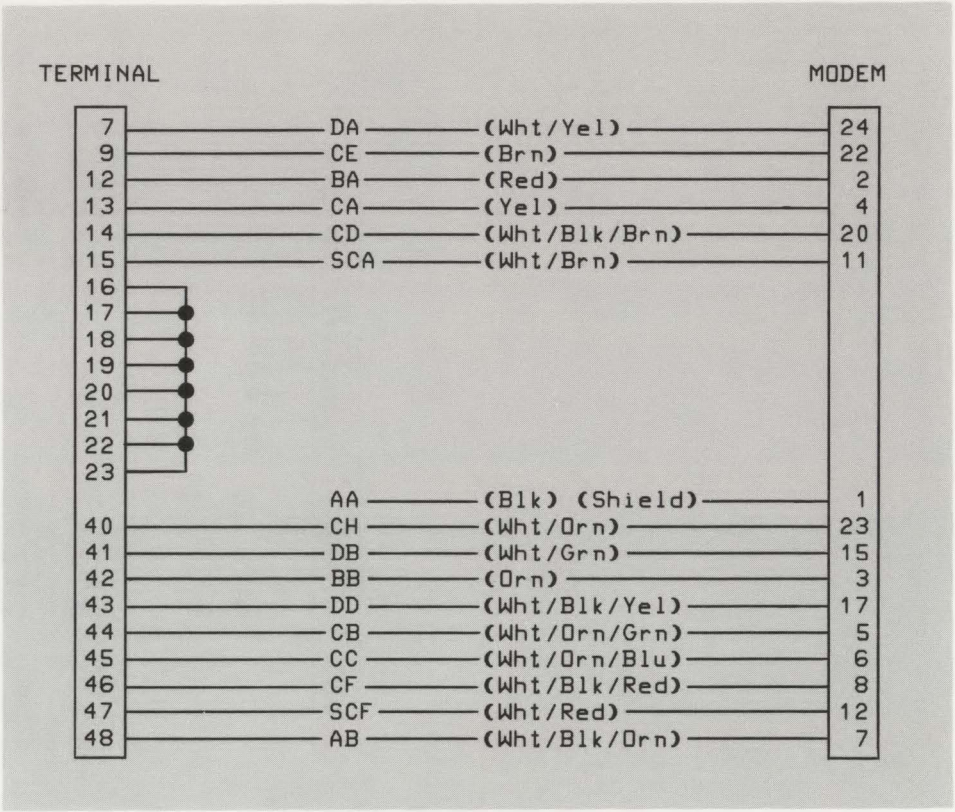


Figure 2-9. 13222N (U.S. Modem) Cable Wiring

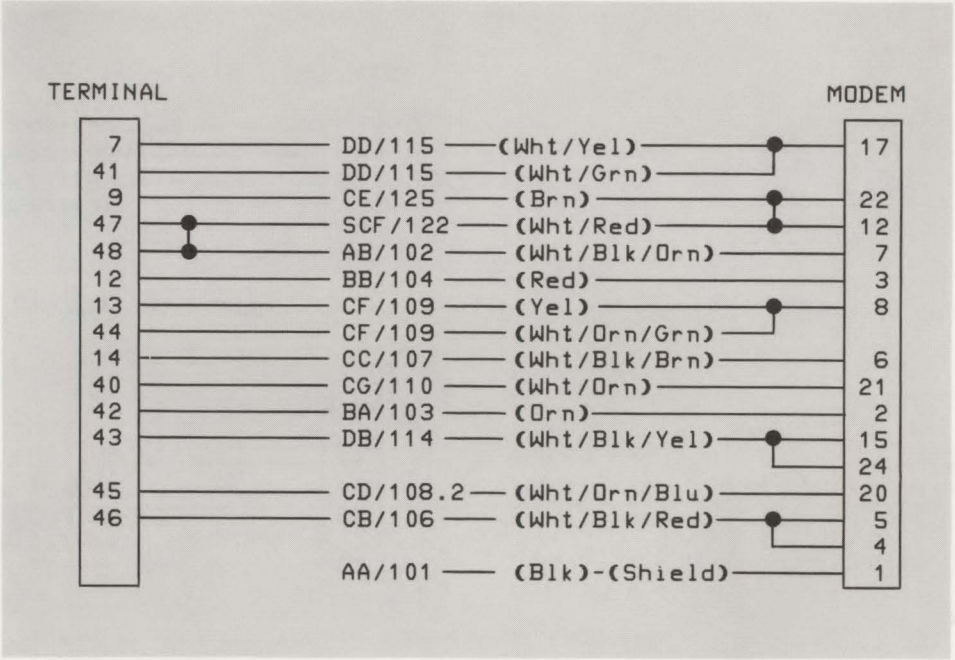


Figure 2-10. 13222W (HP 300) Cable Wiring

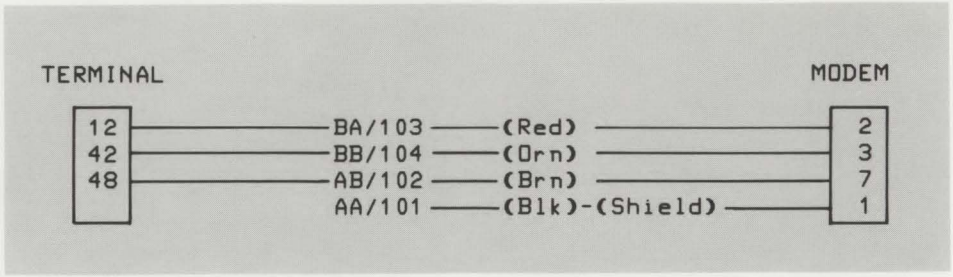


Figure 2-11. 13222Y (Three Wire/Male) Cable Wiring

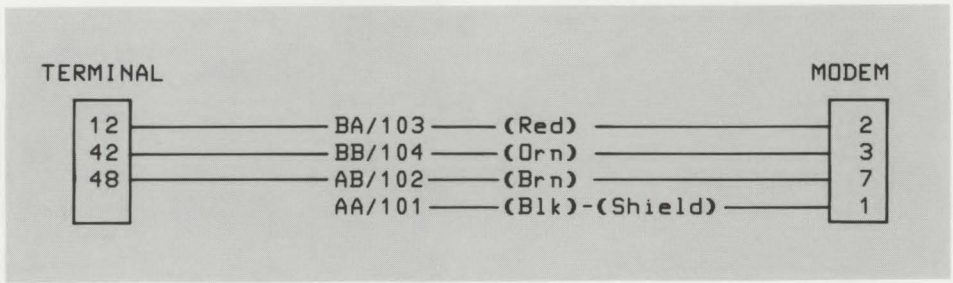


Figure 2-12. 13222Z (Three Wire/Female) Cable Wiring

Table 2-1. RS232C/CCITT V.24 Signal Code-to-Name Translation

CODE		NAME
RS232C	CCITT V.24	
AA	101	Protective Ground
BA	103	Transmitted Data (Data Out)
BB	104	Received Data (Data In)
CA	105	Request To Send
CB	106	Clear To Send
CC	107	Data Set Ready
AB	102	Signal Ground (Common Return)
CF	109	Received Line Signal Detector
SCF	122	Secondary Received Line Signal Detector
DB	114	Transmission Signal Element Timing
DD	115	Receiver Signal Element Timing
SCA	120	Secondary Request To Send
CD	108.2	Data Terminal Ready
CE	125	Ring Indicator
CH	111	Data Signal Rate Selector
DA	113	Transmit Signal Element Timing
x16 Clock In*		Receive Timing
x16 Clock Out*		Transmit Timing
x8 Clock Out*		Transmit Timing

* These signals do not conform to the RS232C/CCITT V.24 voltage levels.

CABLE FABRICATION ..... Parts for cable fabrication are available from Hewlett-Packard if you should need to fabricate your own cable. The required parts are shown in figure 2-13 and are listed below.

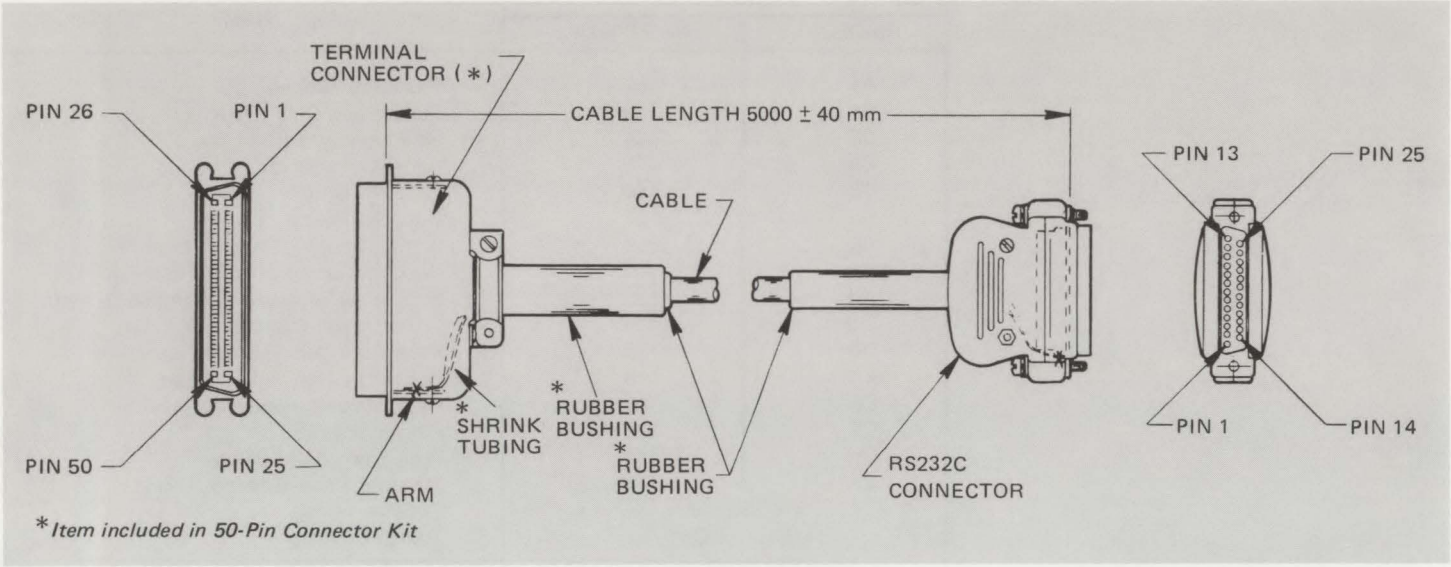


Figure 2-13. Cable Fabrication

ITEM	13222C (RS232C CABLE)	13222M EUROPEAN MODEM CABLE	13222N U.S. MODEM CABLE	13222W HP 300 CABLE	13222Y THREE WIRE CABLE*	13222Z THREE WIRE CABLE*
Cable	8120-1950	8120-2398	8120-2398	8120-2398	8120-2849	8120-2849
50 Pin Kit	5061-2412	5061-2412	5061-2412	5061-2412	5061-2412	5061-2412
Terminal Connector	1251-0086	1251-0086	1251-0086	1251-0086	1251-0086	1251-0086
Shrink Tubing	0890-0311	0890-0311	0890-0311	0890-0311	0890-0311	0890-0311
Rubber Bushing (11.1 mm)	1251-0171	1251-0171	1251-0171	1251-0171	1251-0171	1251-0171
Rubber Bushing (7.9 mm)	1251-0352	1251-0352	1251-0352	1251-0352	1251-0352	1251-0352
RS232C Connector (male/female)	5061-2405	5061-2405	5061-2405	5061-2405	5061-2405	5061-2405

** Cable 13222Y is male. Cable 13222Z is female.*

INSTRUCTIONS .....

Instructions for fabricating a cable are as follows:

1. Solder a bare wire, size 24 AWG, between pins 16 through 23, inclusive, of the terminal connector to ensure contact and solder the wire to each of pins 16 through 23.
2. Solder a black wire, size 24 AWG, to the cable shielding at the RS232C connector end only. (This wire carries the RS232C signal code AA.)
3. At the terminal connector, place shrink tubing over the extended bare arm in the connector housing. Then solder the cable shield flat to the arm which extends from the pin portion of the connector.
4. At the RS232C connector, solder the cable shield flat to the inside of the connector shell.
5. Strip the ends of the cable wires and solder them to the connector pins at the terminal connector.
6. At the RS232C connector end of the cable, strip the ends of the wires, insert them in the pins, crimp the pins, and insert them into the connector shell.

Strapping III

INTRODUCTION ..... This section provides both software and hardware strapping procedures for the terminal. Soft strapping is performed at the Keyboard and hard strapping is performed on the Thermal Print Mechanism (TPM). Terminal status information is included in this section. Also included is a segment on language selection which applies only to the national option.

WHY ..... Strapping enables selection of additional terminal display characteristics and a number of selections associated with data transfer as follows:

DISPLAY CHARACTERISTICS

1. Cursor end-of-line wraparound.
2. Overwrite of existing characters with blanks when the space bar is used.

DATA TRANSFER SELECTIONS

1. Terminal/computer handshakes:
   a. Short transfer trigger handshake.
   b. Long transfer warning handshake.
   c. ENQ/ACK handshake.
   d. Transmit handshake.
   e. XON/XOFF handshake.
2. Data Speed Select.
3. Baud rate.
4. Type of parity.
5. Duplex.
6. Hz (50 or 60).
7. Start column.
8. Return key function.

HOW ..... Strapping selections are entered and maintained in the terminal software with the current selections displayable on the screen by pressing the [SHIFT] and [config] function ([^]) keys. A set of function key labels are also displayed along the bottom of the screen which correspond to eight keyboard keys. The selection of a strap is changed using these keys after the strap has been selected with the cursor. These keys are also used to end the configuration mode.

WHEN ..... The strapping configuration is easily changed, requiring no more than keystrokes, and can be changed whenever desired. The configuration is maintained by a battery while terminal power is off.

REQUIREMENTS ..... Familiarity with the use of the configuration function keys. Refer to "Configuration Function Keys" in Section V of the Owners Manual, part no. 02621-90001, for details.

PROCEDURE ..... Three types of software straps are used: two-selection straps, multiple-selection straps, and a user-defined strap. The two-selection straps: Duplex, Straps (b,c,g,h,x, and z), and Hz have only two selections. The Baud Rate, Parity, and Start Col have multiple-selections. The Return strap is user-defined. In the national option, an additional strap (strap a) exists. Strap "a" is a two-selection strap. The function of each strap and how to change its configuration (strapping) is discussed in the paragraphs that follow.

INITIATE CONFIGURATION MODE

To enter the configuration mode, press the [SHIFT] and [config] function ([ヤ]) keys. The initial configuration data is displayed in the format shown in figure 3-1.

```
Baud Rate  Parity   Duplex  Straps  Handshake  Hz  Start Col  Return
2400       NONE(0)  FULL    bcgHxz  Etx        60    1        [CR ]

 exit  NEXT  PREVIOUS  MODM OFF        REMOTE  CAPS LK  LN MODE  AUTO LF
```

Standard Terminal

```
BAUD RATE  Parity   Duplex  Straps   Handshake  Hz  Start Col  Return
2400       NONE(0)  FULL    abcgHxz  Etx        60    1        (CR )

 language  NEXT  PREVIOUS  MODM OFF        REMOTE  CAPS LK  LN MODE  AUTO LF
```

National Option

Figure 3-1. Default Strapping Configuration Display

TO SELECT THE DEFAULT SELECTIONS

The default selections (figure 3-1) are shown on the display initially. If the default strapping selections are acceptable, execute the exit function ([SHIFT] and [↑]) or press the labels ([blank]) key. For the national option, press the labels ([blank]) key. No further steps are necessary and the configuration mode can be ended.

TO CHANGE THE BAUD RATE

The selections for Baud Rate are EXT., 110, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, and 9600. The selected Baud Rate should match that of the computer or modem (if used). Change the Baud Rate as follows:

1. Use the cursor left [<] or cursor right [>] key to locate the cursor under the first character of the current Baud Rate value on the display. [TAB >] or [TAB <] may also be used to move the cursor to this character.
2. Execute the NEXT or PREVIOUS function ([SHIFT] and [↓] or [SHIFT] and [ROLL ∧]) until the appropriate Baud Rate value is displayed.

TO CHANGE THE PARITY TYPE

The selected Parity type should match the type used by the computer. Change the Parity type as follows:

1. Use the cursor left [<] or cursor right [>] key to locate the cursor under the first character of the current Parity type on the display. [TAB >] or [TAB <] may also be used to move the cursor to this character.
2. Execute the NEXT or PREVIOUS function ([SHIFT] and [↓] or [SHIFT] and [ROLL ∧]) until the appropriate Parity value is displayed. The Parity type selections are:

   a. NONE(0)
   b. NONE(1)
   c. Odd
   d. Even
   e. 8-Bit (allows 8-bit data transfers; appears only in national option)

The default selection is NONE(0).

TO CHANGE THE DUPLEX TYPE

The type of echo Duplex available for data communications transmission may be either FULL or HALF. The default type is FULL Duplex. Change the Duplex type as follows:

1. Use the cursor left [<] or cursor right [>] key to locate the cursor under the first character of the current Duplex type on the display. [TAB >] or [TAB <] may also be used to move the cursor to this character.
2. Execute the NEXT or PREVIOUS function ([SHIFT] and [∨] or [SHIFT] and [ROLL ∧]) to select the appropriate Duplex type.

TO CHANGE THE STRAPS

Each two-selection strap is represented on the display by a single alphabetic character (b,c,g,h,x, and z). In the national option, the two-selection straps are (a,,b, c, g, h, x, and z). A strap is changed by enabling or disabling the state of the displayed character. This is done by selecting the strap and changing it from uppercase to lowercase or vice versa. Refer to table 3-1 for the enabled, disabled, and default conditions of these straps. A description of each strap is described in the paragraphs that follow table 3-1. Change the Straps as follows:

1. Use the cursor left [<] or cursor right [>] key to move the cursor to a position beneath the character (strap) to be changed. [TAB >] or [TAB <] may also be used to move the cursor to the Straps field.
2. Execute the NEXT or PREVIOUS function ([SHIFT] and [∨] or [SHIFT] and ROLL ∧]) to change the character's state.
3. Repeat steps 1 and 2 for all Strap changes.

Table 3-1. Straps Configuration

STRAP	ENABLED	DISABLED	DEFAULT
*Escape Sequence Transmission	A	a	Disabled
Space Overwrite (SPOW) Latch	B	b	Disabled
Wraparound Cursor, End-of-Line	c	C	Enabled
Short Transfer Trigger Handshake	g	G**	Enabled
Long Transfer Warning Handshake	H	h	Enabled
Data Speed Select	X	x	Disabled
Parity Check	z	Z	Enabled

* Escape Sequence Transmission (strap a) exists only on the National Option.

** Although the Short Transfer Trigger Handshake is disabled, transfer conditions become dependent on the state of the Long Transfer Warning Handshake strap. For more information, see the description for these straps (g, and h) below.

STRAP DESCRIPTIONS

Escape Sequence Transmission. Enabling the A strap (A displayed in configuration line), will allow the terminal to send keyboard escape sequences to the computer. If the terminal is set for remote, full duplex operation, certain terminal keys will send their equivalent escape sequences to the computer when pressed. The **[CURSOR UP]** key for example will not move the cursor up but will instead send ESC A to the computer. A list of terminal escape sequences is given in the *2621 Owner's Manual* (HP part number 02620-90002).

Space Overwrite (SPOW) Latch. When this strap is enabled, the SPOW latch can be turned on by **[RETURN]**, and turned off by **[↖]** (home up), a Linefeed, or **[TAB >]**. When the SPOW latch is on, the space bar causes the cursor to move to the right along the current line without overwriting existing characters. When the SPOW latch is off, the space bar causes an overwrite of blank (space) characters as the cursor moves along the current line.

When this strap is disabled (the defaulted state), the SPOW latch is not accessible.

Wraparound Cursor, End-of-Line. When enabled (the defaulted state), this strap causes the cursor to wraparound to the beginning of the next line on the display whenever column 80 of any line is exceeded. The terminal generates a Return and a Linefeed character to accomplish this.

When this strap is disabled, no Return or LINEFEED is generated at the end of a line. The cursor remains in, and overwrites column 80.

Short Transfer Trigger Handshake and Long Transfer Warning Handshake. The HP 2621 provides three kinds of data transfer operations; Long Transfer in Line Mode, Long Transfer in Character Mode, and Short Transfer.

Long Transfer, Line Mode	A data transfer operation initiated via the **[ENTER]** key while the terminal's Line Mode strap is enabled.
Long Transfer, Character Mode	A data transfer operation initiated via the **[ENTER]** key while the terminal's Line Mode strap is disabled.
Short Transfer	A data transfer operation involving: 1. Cursor Sensing 2. Terminal Status 3. f1 through f8 functions

The complete D_1/D_2 handshake protocol consists of a "trigger" signal (D_1) sent from the host computer to inform the terminal that a data transfer is possible. In response, the terminal sends a "warning" signal (D_2) to the host computer indicating that the data to be transferred is ready. The host computer sends another trigger signal (D_1) to enable the transfer. Figure 3-2 illustrates the handshake protocol.

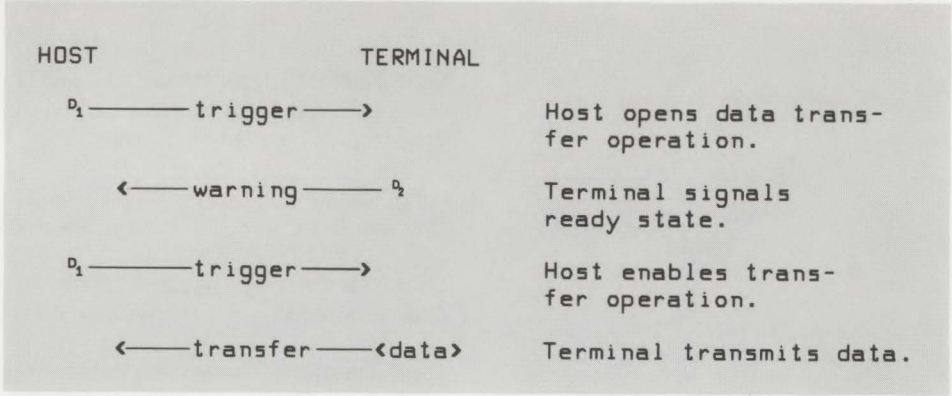
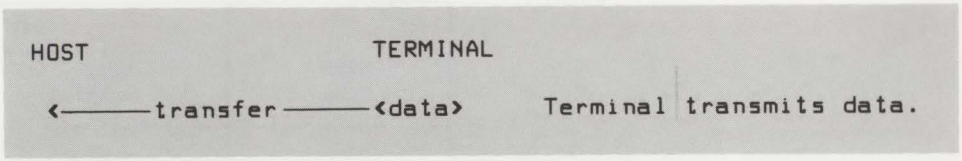


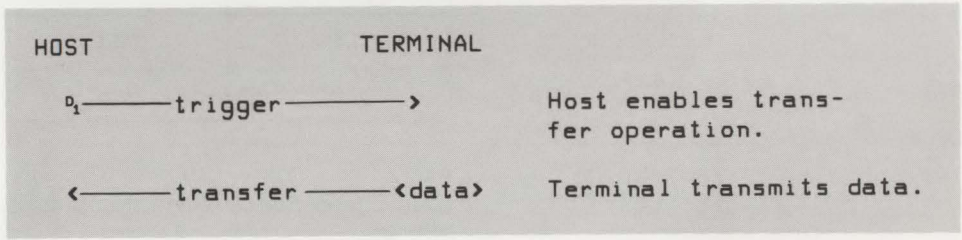
Figure 3-2. D_1/D_2 Handshake Protocol

Depending on the state of the g and h straps, one of three subsets of the handshake protocol shown in figure 3-2 is used by the terminal, as follows:

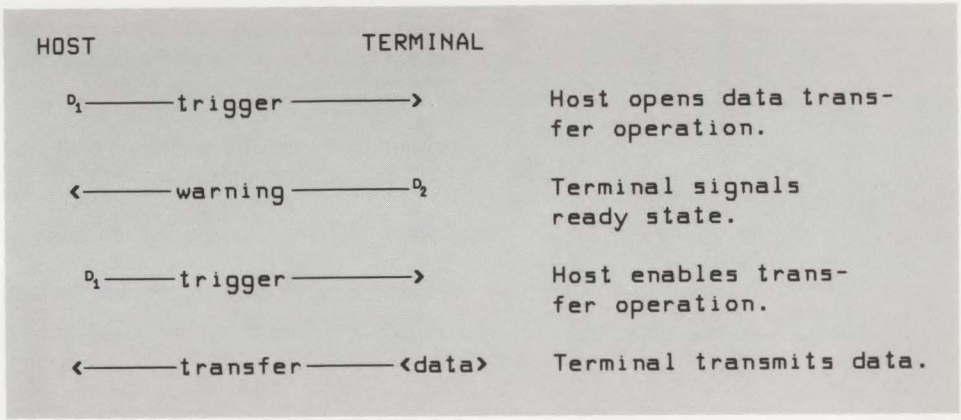
TYPE 1 (No Handshake)



TYPE 2 (D_1 Trigger Handshake)



TYPE 3 ($D_1/D_2/D_1$ Warning Handshake)



The effect of the various g and h strap states is shown in table 3-2.

Table 3-2. D_1/D_2 Handshake Protocol Strapping Effects

Strap State	Transfer Category		
	Long (Line Mode)	Short	Long (Char Mode)
g,h default	TYPE 3	TYPE 2	TYPE 1
g,H	TYPE 1	TYPE 2	TYPE 1
G,H	TYPE 3	TYPE 3	TYPE 1
G,H	TYPE 1	TYPE 1	TYPE 1

Data Speed Select. When this strap is enabled, the data speed signal is set high (CH=on).

When disabled (the defaulted state), the data speed signal is set to low (CH=off).

Parity Check. Parity refers to a vertical redundancy check bit that is added as the high bit of each byte as it is transmitted and checked for the correct value as it is received over the data communications line.

When the Parity Check strap is enabled (the defaulted state), a parity check for even or odd parity is performed by the terminal on received data.

When this strap is disabled, no parity check is performed.

Note that parity is never checked for received data if the terminal is configured for either zero or ones parity.

TO CHANGE THE HANDSHAKE

Each Handshake type is represented by a single alphabetic character (e,t, and x). Each Handshake type is enabled or disabled by changing the state of the displayed character from lowercase to uppercase or vice versa. Refer to table 3-3 for the enabled, disabled, and default conditions of these Handshake types. A description of each Handshake type follows table 3-3. Change the Handshake type as follows:

1. Use the cursor left **[<]** or cursor right **[>]** key to move the cursor to a position beneath the character (e,t, or x) to be changed. **[TAB >]** or **[TAB <]** may also be used to move the cursor to the Handshake field.

2. Execute the NEXT or PREVIOUS function (**[SHIFT]** and **[↓]** or **[SHIFT]** and **[ROLL ^]**) to change the character's state.

3. Repeat steps 1 and 2 for all Handshake changes.

Table 3-3. Handshake Configuration

HANDSHAKE	ENABLED	DISABLED	DEFAULT
ENQ/ACK Handshake	E	e	Enabled
Transmit Handshake	T	t	Disabled
XON/XOFF	X	x	Disabled

ENQ/ACK Handshake. This type of handshake may be used to ensure that the terminal has an empty input buffer before the host computer transmits more data. When this strap is enabled (the defaulted state), an acknowledge signal (ACK) is transmitted by the terminal each time an enquiry signal (ENQ) is encountered from the host computer. Any data contained in the buffer is processed before the ACK signal is transmitted.

When this strap is disabled, any enquiry signal (ENQ) encountered from the host computer is treated as a normal data character. No acknowledge signal (ACK) is generated.

Transmit Handshake. When this handshake type is enabled, the host computer can transmit a "busy" signal across the Clear to Send (CB for RS232C or 106 for CCITT V.24) control line to temporarily stop the transmission of data from the terminal.

When this handshake type is disabled (the defaulted state), data transmission continues uninterrupted by the computer.

XON/XOFF. This handshake protocol allows the terminal to signal the host computer to stop sending data and, subsequently, to resume sending data as the input buffer fills and empties.

When this strap is enabled, the input buffer fills to within approximately 16 bytes of its capacity. At this point, the terminal sends a Transmit Off signal (XOFF) to cause the host computer to stop transmitting data. When the buffer has emptied below half of its capacity, the terminal sends a Transmit On signal (XON) which causes the host computer to resume data transmission. This process is repeated until the current data transfer operation is completed. When disabled (the defaulted state), no XON/XOFF handshake occurs.

Note that the XON signal is represented by a D_{11} (CTRL Q) character transmission. The XOFF signal is represented by a D_{13} (CTRL S) character transmission.

TO CHANGE THE HZ TYPE

The value set for this strap controls the display refresh rate and must match the frequency of the local AC power source. For an area with a 60Hz power source (such as the U.S.A. or Canada), set this value to 60Hz (the defaulted state). For Europe and elsewhere with a 50Hz power source, set this value to 50Hz. Change the Hz type as follows:

1. Use the cursor left **[<]** or cursor right **[>]** key to locate the cursor under the first character of the current Hz type on the display. **[TAB >]** or **[TAB <]** may also be used to move the cursor to this character.

2. Execute the NEXT or PREVIOUS function (**[SHIFT]** and **[v]** or **[SHIFT]** and **[ROLL ^]**) to select the appropriate Hz type (50 or 60Hz).

TO CHANGE THE START COLUMN

The "Start Col" specifies the starting column from which data transmission is to begin on the display. Any characters to the left of the starting column are ignored when the [ENTER] or [RETURN] key is pressed. This allows retransmission of a line without having to physically remove the computer's prompt character. For example, if the computer issues a 1-character prompt in response to terminal entries and the "Start Col" is specified to start at column 2, subsequent entries are transmitted from column 2 to the end of the line. See Owner's Manual for a discussion of how to use the start of column function. The defaulted "Start Col" is column 1. To change this value, proceed as follows:

1. Use the cursor left [<] or cursor right [>] key to locate the cursor under the first character of the current "Start Col" on the display. [TAB >] or [TAB <] may also be used to move the cursor to this character.

2. Execute the NEXT or PREVIOUS function ([SHIFT] and [↓] or [SHIFT] and [ROLL ∧]) to select the appropriate starting column.

TO CHANGE THE RETURN KEY CHARACTER

Either one or two ASCII characters can be selected to be transmitted to the computer each time the [RETURN] key is pressed. The [RETURN] key is usually used to transmit control codes. Refer to Appendix A in the Owners Manual for a list of ASCII characters (control codes). The RETURN key character is changed as follows:

1. Use the cursor left [<] or cursor right [>] key to locate the cursor under the first character of the current "Return" type on the display. [TAB >] or [TAB <] may also be used to move the cursor to this character.

2. Enter the desired character(s) from the Keyboard. The default value is [CR] (Carriage Return).

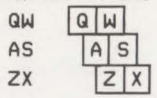
LANGUAGE CONFIGURATION

Language configuration describes how to select the proper language for the terminal and applies only to the national option.

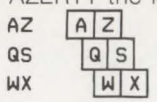
1. Make sure the proper Character ROM is installed.
2. Make sure the proper keyboard is connected to the terminal.
3. Select the language function by pressing **[SHIFT][↑]**.
4. Select the language which matches the keyboard:
   a. For German option **[D]**, press **[↓]**.
   b. For Danish or Norwegian option **[DK/N]**, press **[ROLL ∧]**.
   c. For Spanish option **[E]**, press **[ROLL ∨]**. In addition, pressing **[SHIFT][ROLL ∨]** will cause overstrike to become non-mute (the cursor will move when the accent (´) is pressed; normally the cursor does not move when this accent is pressed).
   d. For French option **[F]**, AZERTY* keyboard, press **[^]**. In addition, pressing **[SHIFT][^]** will cause overstrike to become non-mute (the cursor will move when the accents trena (¨) and circonflex (^) are pressed; normally, the cursor does not move when these accents are pressed.
   e. For French option **[F]**, QWERTY* keyboard, press **[CTRL][^]**. In addition, pressing **[CTRL][SHIFT][^]** will cause overstrike to become non-mute (the cursor will move when the accents trena (¨) and circonflex (^) are pressed; normally the cursor does not move when these accents are pressed).
   f. For Swedish or Finnish option **[S/SU]**, press **[<]**.
   g. For English (European variety) option **[UK]**, press **[>]**.
   h. For English (ASCII) option **[US]**, press **[V]**.
   i. For a data entry US style keyboard **[K45]**, press **[CTRL][V]**.
   j. For a DVORAK system keyboard **[DV]**, press **[CTRL][↑]**.

*AZERTY and QWERTY refer to two styles of French keyboards. The only difference between the two keyboards is how the letters A, Z, Q, and W are positioned.

In QWERTY the letters are positioned:



In AZERTY the letters are positioned:



TO END CONFIGURATION MODE

To end Configuration mode and return to normal operation, execute the exit function ([SHIFT] and [↑]) or press the Labels ([blank]) key. For the national option, press the labels ([blank]) key. The configuration data is stored in nonvolatile memory.

CONFIGURATION LOCK

Once configuration is locked, nothing in the strapping configuration can be changed and nothing in the language configuration can be changed. When configuration is unlocked, both strapping and language can be reconfigured.

To lock configuration, take terminal out of configuration mode and type (Ec&q1L).

To unlock configuration, take terminal out of configuration mode and type (Ec&q0L).

THERMAL PRINT MECHANISM (TPM)

To Change the TPM Strapping. In addition to the soft strapping performed at the Keyboard, the 2621P requires checking the TPM PCA strapping configuration only after replacing the PCA, because TPM strapping is configured at the factory before it is shipped. Figure 3-3 shows the location of the TPM strapping switch and its configuration for the 2621P (TPM PCA part no. 02670-60001).

The TPM PCA for the 2621P has been revised. See figure 3-3A for the strapping configuration for TPM PCA part no. 02670-60050 for the standard terminal. See figure 3-3B for the strapping configuration for TPM PCA part no. 02670-60050 for the national option.

If TPM PCA is replaced, check strapping as follows:

1. Turn off terminal power, disconnect power cord, and remove top cover.
2. Locate TPM strapping switch and check or restrap switch as shown in figure 3-3.
3. Replace top cover, reconnect power cord, and restore power.

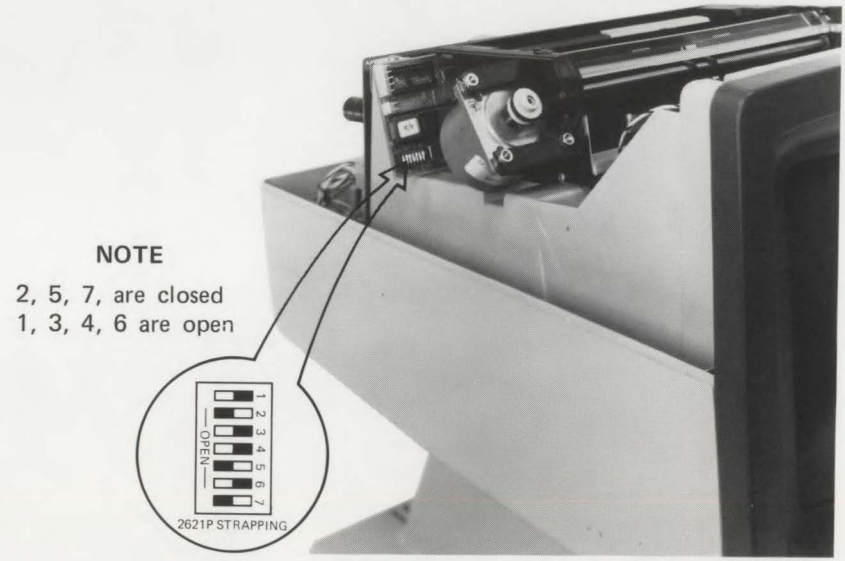


Figure 3-3. TPM Configuration and Location (TPM PCA Part No. 02670-60001)

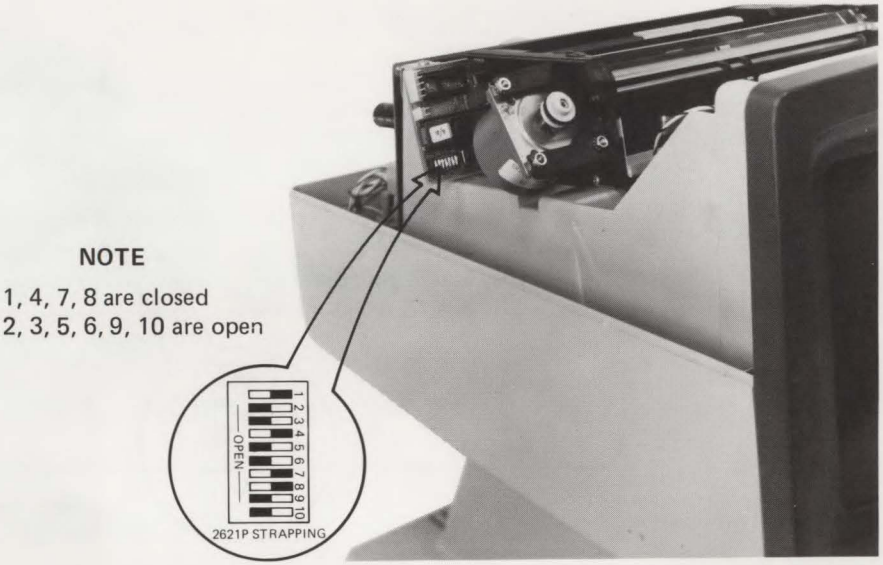


Figure 3-3A. TPM Configuration and Location
(TPM PCA Part No. 02670-60050 Standard Terminal)

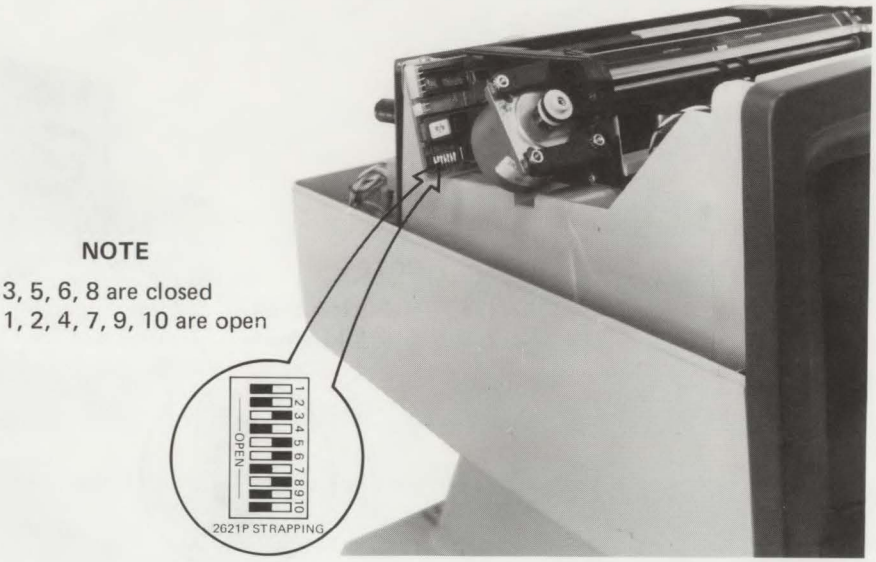


Figure 3-3B. TPM Configuration and Location
(TPM PCA Part No. 02670-60050 National Option)

Terminal Status

WHY ..... Terminal status provides a quick check of the terminal's display memory size, switch settings, keyboard interface configuration, and terminal errors.

HOW ..... Terminal status is obtained by performing terminal self-test or by sending an escape code sequence from the computer to the terminal. In response to status requests the terminal returns an escape code sequence followed by seven bytes. The status bytes are followed by a terminator.

Terminal status is made up of seven status bytes (bytes 0-6) which are displayed below the terminal self-test pattern (figure 3-4). The status information is contained in the lower four bits of each byte. The upper four bits of each byte are set so that the byte will have the value of an ASCII character. Each byte can be interpreted as one of 16 characters (table 3-4).

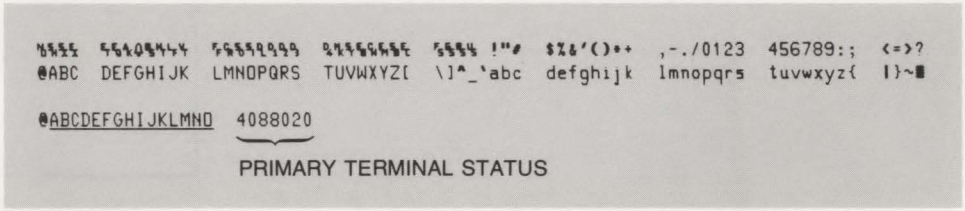


Figure 3-4. Test Pattern

Note

The test pattern (figure 3-4) for terminals of the national option may have characters # [\ ] ^ ` { | } ~ # replaced by national symbols. Table 3-5 shows the symbol replacement scheme for each language option.

Table 3-4. ASCII Status Characters

ASCII CHARACTER	BINARY
0	0011 0000
1	0011 0001
2	0011 0010
3	0011 0011
4	0011 0100
5	0011 0101
6	0011 0110
7	0011 0111
8	0011 1000
9	0011 1001
:	0011 1010
;	0011 1011
<	0011 1100
=	0011 1101
>	0011 1110
?	0011 1111

Table 3-5. Decimal Code Values

		35	64	91	92	93	94	96	123	124	125	126
ASCII (U.S.)		#	@	[	\	]	^	`	{	|	}	~
Swedish/Finnish (S/SU)	001	#	£	Ä	Ö	Å	ü	é	ä	ö	å	ü
Norwegian/Danish (DK/N)	002	#	@	Æ	Ø	Å	^	`	æ	ø	å	~
French (F)	003	£	à	°	Ç	§	^	`	é	ù	è	¨
German (D)	004	£	§	Ä	Ö	ü	^	`	ä	ö	ü	ß
United Kingdom (UK)	005	£	@	[	\	]	^	`	{	|	}	~
Spanish (E)	006	#	@	¡	Ñ	¿	°	`	{	ñ	}	~

Eurokeyboard keys + Language Keys
Eurokeyboard = 2 ", 8(,9), 0=, ≷, ;, :, -

WHEN ..... Terminal status should be performed each time the terminal's configuration is changed.

PROCEDURE ..... Perform terminal status as follows:

1. Perform terminal self-test (refer to Troubleshooting Section).
2. If the terminal is connected to a computer (figure 3-5), send the following escape sequence:

   Terminal Status Request | ESC ^ |

   The terminal responds with an ESC \ and seven status bytes followed by a terminator.

3. Interpret terminal status (test pattern or status response). Make sure that terminal status matches terminal configuration. Figure 3-6 shows how to interpret terminal status.

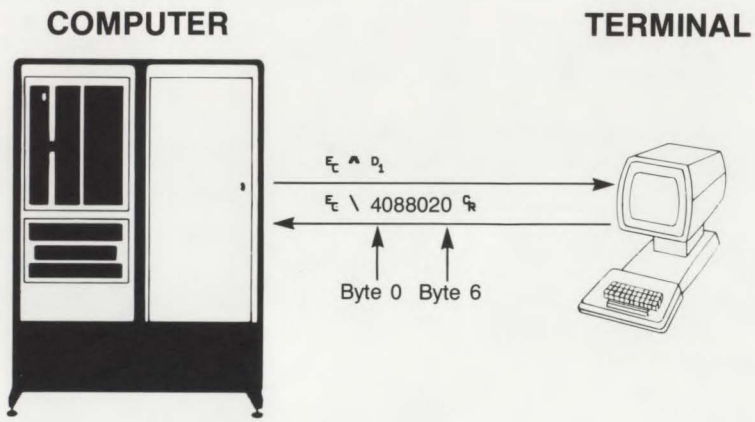


Figure 3-5. Terminal Status Example

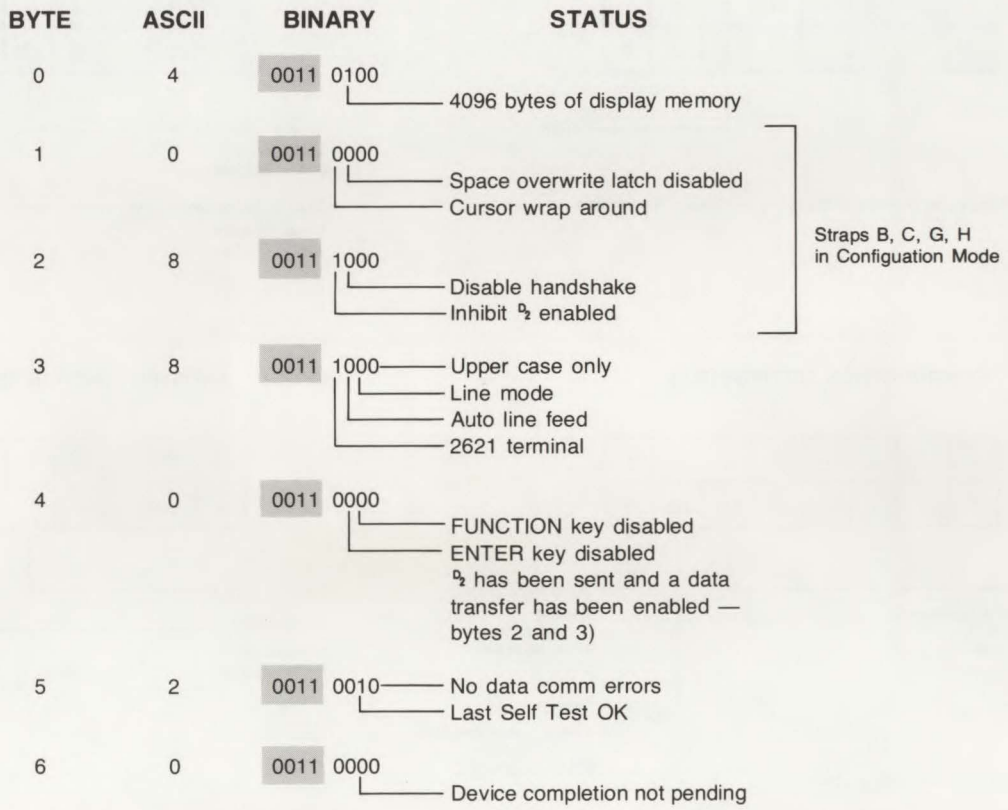


Figure 3-5. Terminal Status Example (Continued)

PRIMARY TERMINAL STATUS

BYTE 0 DISPLAY MEMORY SIZE

8	7	6	5	4	3	2	1
0	0	1	1	0	1	0	0

4096

The amount of display memory (4096 bytes) available in the terminal.

BYTE 1 CONFIGURATION SETTINGS (B,C)

8	7	6	5	4	3	2	1
0	0	1	1	0	1/0	1/0	0

Strap C
(End-of-Line Wraparound)
1 = C (Disabled)
0 = c (Enabled)

*Strap A
(Escape Function Transmission)
1 = A (enabled)
0 = a (disabled)

Strap B
(Space Overwrite Latch)
1 = B (Enabled)
0 = b (Disabled)

*Strap A exists only on national option.

BYTE 2 CONFIGURATION SETTINGS (G,H)

8	7	6	5	4	3	2	1
0	0	1	1	1/0	1/0	0	0

Strap H (Inhibit ℞)
1 = h (Enabled)
0 = H (Disabled)

Strap G (℞ Handshake)
1 = g (Enabled)
0 = G (Disabled)

BYTE 3 LATCHING FUNCTION KEYS

8	7	6	5	4	3	2	1
0	0	1	1	1	1/0	1/0	1/0

Terminal Type (2621)

AUTO LF Key
1 = auto LF
0 = no auto LF

CAPS LOCK Key
1 = upper case only
0 = upper and lower case

LINE MODE Key
1 = line mode
0 = character mode

Figure 3-6. Terminal Status

BYTE 4 TRANSFER PENDING FLAGS

8	7	6	5	4	3	2	1
0	0	1	1	0	1/0	1/0	0

ENTER Key Pending
1 = yes
0 = no

Function Key Pending
1 = yes
0 = no

Cursor Sense Pending
1 = yes
0 = no

BYTE 6 DEVICE TRANSFER PENDING FLAGS

8	7	6	5	4	3	2	1
0	0	1	1	0	0	1/0	0

Device Completion Pending
1 = yes
0 = no

BYTE 5 ERROR FLAGS

8	7	6	5	4	3	2	1
0	0	1	1	0	0	1/0	1/0

Self Test
1 = no error
0 = error

Data Comm
1 = parity or buffer overflow error
0 = no error

Figure 3-6. Terminal Status (Continued)

Preventive Maintenance IV

INTRODUCTION ..... This section provides preventive maintenance instructions for the terminal. Preventive maintenance is performed by the customer. It consists of replacing the nonvolatile memory battery. In addition, for the 2621P, procedures for maintaining quality printing are provided.

CAUTION

Battery contains materials that may require special procedures to discard as dictated by local laws. Check local laws to determine such procedures. Observe battery manufacturer's caution labels.

Battery Replacement

WHY ..... To ensure the contents of the volatile memory are not deleted or distorted because of a weak battery when terminal power is off.

HOW ..... The battery support is removed from the terminal, the battery replaced, and the battery support reinstalled in the terminal.

WHEN ..... The battery should be replaced once a year or if it measures less than 3.2 volts.

Note

Since the shelf life of a battery is one year, stocking batteries is of little use.

EQUIPMENT REQUIRED ..... New battery (HP part no. 1420-0259 or Mallory Duracell TR133) and a voltmeter.

PROCEDURE ..... The battery can be replaced with terminal power on or off. If it is to be done with the power off, the contents of the nonvolatile memory will be lost, making it necessary to copy the contents on paper before replacing the battery. Then, after the battery has been replaced, the contents must be reentered into nonvolatile memory. The copy/reenter procedure can be avoided by replacing the battery with power on.

1. If the battery is to be replaced with power on, go to step 2. If not, copy the contents of nonvolatile memory onto paper then turn off terminal power.

2. To remove the battery from the terminal, compress and pull down on the two battery support clips (figure 4-1) located above the KYBD connector at the rear of the terminal.

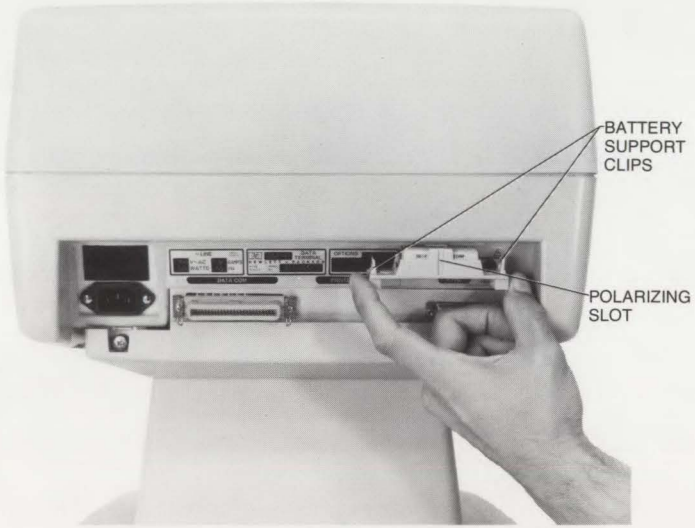


Figure 4-1. Battery Removal

3. Remove the battery from the battery support and measure the battery voltage with a voltmeter. If it measures less than 3.2 volts, replace the battery.

Note

Refer to previous caution in regard to discarding old battery.

4. Insert the new battery in the battery support with the correct polarity, as marked on the battery support.

5. Insert the battery support in the terminal, with the polarizing slot (figure 4-1) facing out, until each end of the battery support clicks into place.

6. If this procedure was performed with power off, reenter the former contents of the nonvolatile memory into the nonvolatile memory (refer to the Strapping Section).

TPM Preventive Maintenance

WHY ..... To ensure quality printing and to prolong optimum performance of the TPM.

HOW ..... Follow the preventive maintenance steps as described in the "PROCEDURE" paragraph below.

WHEN ..... TPM preventive maintenance should be performed each time thermal paper is to be replaced.

PROCEDURE ..... To maintain good print quality and to prolong TPM performance, observe the following:

1. Always replace thermal paper with HP thermal paper, part no. 9270-0638 (blue printing) or part no. 9270-0656 (black printing). If Hewlett-Packard's thermal paper is not used, the equipment warranty and service contract will be void.

2. Install thermal paper with printing (glossy) side facing thermal print head. (Refer to Installation Section.)

3. Be careful not to sharply touch the print head or damage may result.

Alignment V

INTRODUCTION ..... Alignment procedures for the terminal consist of adjustment of the power supply output and raster alignment.

WARNING

Power Supply contains exposed high-voltage components. Use extreme caution not to touch these exposed parts when performing alignment procedures. Failure to do so can cause serious injury.

Power Supply Adjustment

WHY ..... To ensure that the power supply is generating the voltages required to enable correct operation of all terminal circuits.

HOW ..... Adjustment of the +5V power source also adjusts the +12V power source which uses the +5V source as a reference. The −12V source is not adjustable. On the 2621P, the +5V adjustment also affects the +16.1V output.

WHEN ..... Power supply adjustment should be checked at installation and whenever any equipment is added or removed from the terminal.

EQUIPMENT REQUIRED .....

1. A 20,000 ohms/volt voltmeter with a fine voltage probe.
2. Alignment tool 8730-0016, or equivalent.
3. A small Phillips-head screwdriver.

PROCEDURE .....

1. Turn off terminal power.
2. Loosen the two quarter-turn fasteners securing top cover to mainframe. Remove top cover. Do not overturn fasteners.
3. Turn on terminal power.

CAUTION

Use care not to short together exposed Power Supply parts while checking the Power Supply voltages. To do so could result in damage to the Power Supply.

4. Using a 20,000 ohms/volt voltmeter, check the Power Supply PCA voltages (table 5-1 and figure 5-1 or 5-2) for accuracy. A fine-tipped voltage probe can be easily inserted through the holes in the cable connector (J5).
5. Adjust the +5V potentiometer (figure 5-1 or 5-2) until the +5V and +12V (or +16.1V for 2621P) sources are within tolerance. If they cannot be adjusted to be within tolerance or if the −12V source is out of tolerance, refer to the Troubleshooting Section.

Table 5-1. Power Supply Test Points

TEST POINT	SIGNAL	VOLTAGE
J5-1	+5V	+5(±0.2)VDC
NO PIN	—	—
J5-3	+5V	+5(±0.2)VDC
J5-4	+12V	+12(±0.3)VDC
J5-5	RETURN	—
J5-6	RETURN	—
J5-7	PWR ON/FAIL	+4.5(+0.5, −1)VDC
J5-8	−12V	−12V(±0.5)VDC
*J4-1	+16.1V	+16.1(±0.5)VDC

*2621P only.

6. Replace the top cover on the terminal and tighten the two quarter-turn fasteners. Do not overtighten the fasteners.

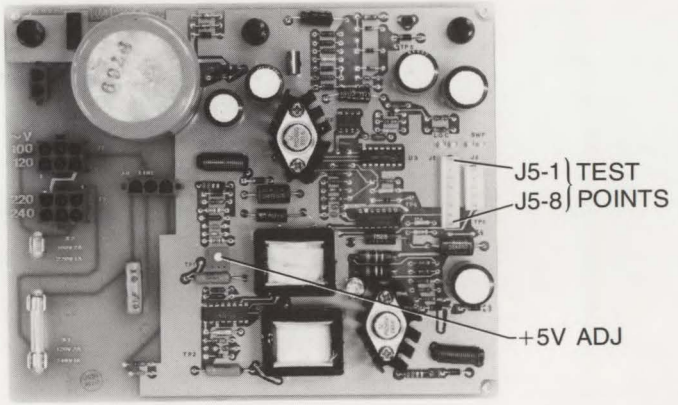


Figure 5-1. 2621A Terminal Test Points and +5V Adjustment Locations

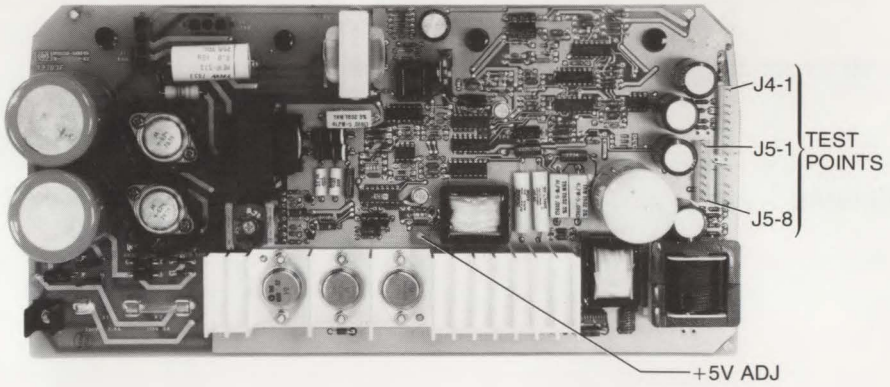


Figure 5-2. 2621P Terminal Test Points and +5V Adjustment Locations

Raster Alignment

WHY ..... This procedure performs the following display adjustments:

1. Centers the display on the screen in the horizontal dimension.
2. Expands or contracts the display in the vertical dimension.
3. Focuses the beam for display clarity.
4. Adjusts for desired display brightness.
5. Expands or contracts the display in the horizontal dimension.
6 Adjusts tilt out of the display.

HOW ..... With a display on the screen, the CENTER, HEIGHT, FOCUS, and BRIGHT adjustments at the top of the terminal, the width adjustment on the Sweep PCA, and the CRT yoke assembly are adjusted for the desired effects.

WHEN ..... Raster alignment can be performed anytime the display is considered unsatisfactory. It should be checked at installation and whenever the Sweep PCA is replaced.

EQUIPMENT REQUIRED ..... 1. A small Phillips-head screwdriver.
2. Alignment tool 8730-0016.

PROCEDURE ..... 1. Fill a portion of the display screen with a single letter, such as "H".

2. Using the hex end of the alignment tool, adjust the CENTER adjustment at the top of the terminal (figure 5-3) to center the display on the screen in the horizontal dimension.

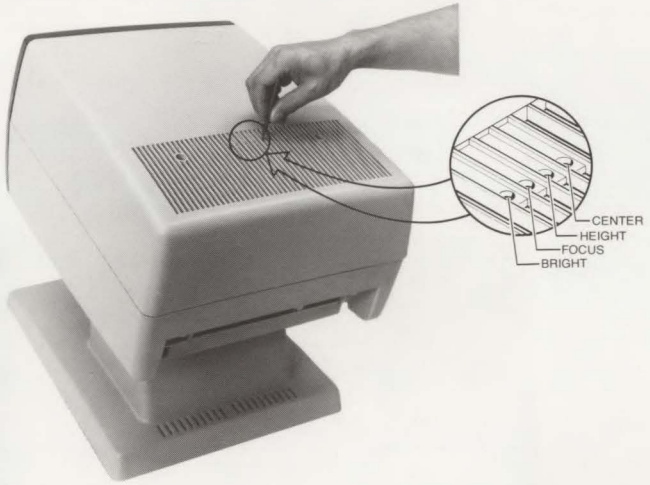


Figure 5-3. Location of Four Raster Adjustments (CENTER, HEIGHT, FOCUS, and BRIGHT)

3. Adjust the HEIGHT adjustment to expand or contract the display in the vertical dimension, as desired.

4. Adjust the FOCUS adjustment for uniform clarity across the screen.

5. Adjust the BRIGHT adjustment for the desired brightness.

6. Open the terminal to the half-open (service) position and lower the Processor PCA to expose the component side of the PCA by pulling on the four snap fasteners which hold it in place. Disconnect the ground strap from the Processor PCA ground lug.

7. Use the alignment tool to adjust the width adjustment on the Sweep PCA (figure 5-4) to expand or contract the display in the horizontal dimension.

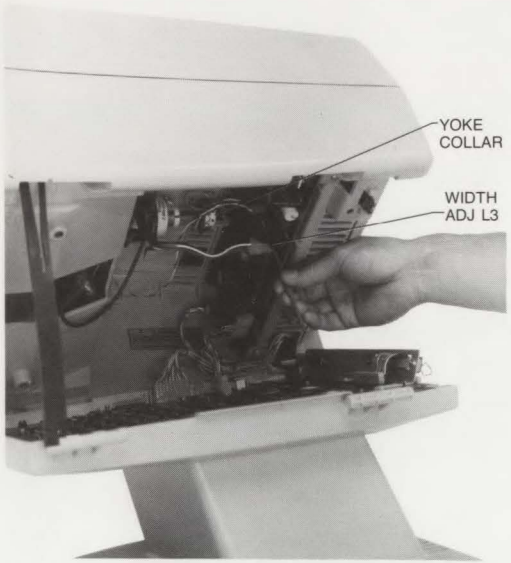


Figure 5-4. Location of Raster Width Adjustment and Yoke Collar

8. While observing the display, adjust the dot stretch adjustment (figure 5-5) on the Processor PCA to produce either uniform width of the vertical and horizontal lines which form a character or the most desirable overall display effect.

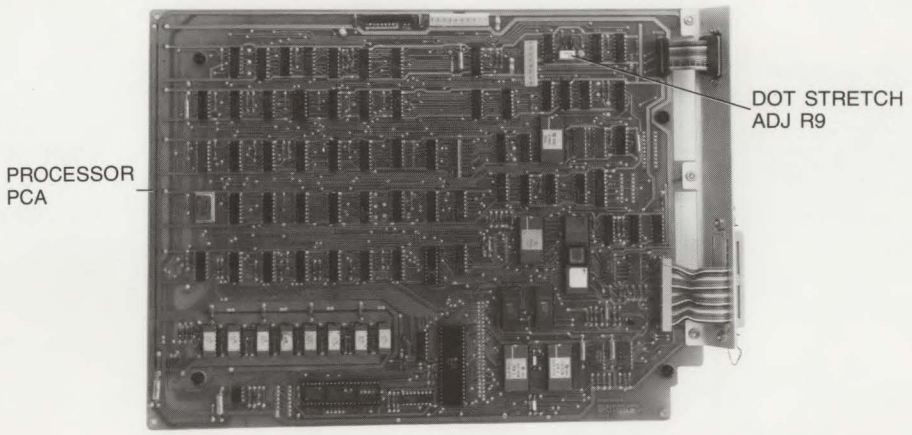


Figure 5-5. Dot Stretch Adjustment Location

WARNING

Use care in performing the following step; high voltages, sufficient to cause serious injury are present on exposed portions of the yoke assembly. Grasp the yoke only by its plastic donut-shaped body.

9. To adjust a tilted display, the yoke assembly must be rotated on the CRT neck by its plastic donut-shaped body, but first the yoke collar screw (figure 5-4) must be loosened. After the adjustment has been made, retighten the yoke collar screw.

10. Replace the Processor PCA by holding it in position (the metal I/O panel on one end of the PCA fits into a groove in the chassis). Install each of the four snap-in grommets into their respective fastening hole and press on each of the four snap-in plungers until they click into place.

11. Reconnect the ground strap to the ground lug on the Processor PCA.

Troubleshooting VI

INTRODUCTION ..... This section provides troubleshooting information for isolating terminal malfunctions to a replaceable assembly or component, and instructions for using the Video Generator.

WARNING

Power Supply and CRT area contain exposed high-voltage components. Use caution not to touch these exposed parts when working in these areas. Failure to do so can result in serious injury.

Preliminary Troubleshooting

WHY ..... To determine if terminal malfunctions truly exist before attempting any detailed trouble isolation procedures, since most malfunctions are caused by incorrect operation.

HOW ..... Checking terminal installation and any recent servicing for workmanship.

WHEN ..... Preliminary troubleshooting should be performed whenever the terminal is not operating correctly.

PROCEDURE .....

1. Check that the terminal is properly installed (power cord connected and fuse properly installed) and is set to the correct operating mode. Refer to Installation Section for installation procedures.

2. Determine whether or not any recent service routines (accessory installation, cables removed or installed, power supply or raster adjustments performed) have been performed on the terminal. If so, check for workmanship. Refer to the Alignment Section for alignment procedures.

3. Check to see if battery is within specs. Refer to Preventive Maintenance Section for details.

4. Check that strapping is properly configured for the terminal. Refer to Strapping Section for configuring terminal strapping.

Troubleshooting

WHY ..... To minimize terminal down-time and to ensure optimum terminal performance.

HOW ..... Using terminal self-test to determine the malfunction and to isolate the malfunction to a replaceable assembly or component. There are five self-tests associated with the terminal:

1. Unit Self-Test. This test checks the overall performance of the terminal once.

2. Continuous Unit Self-Test. This test checks the overall performance of the terminal continuously.

3. Data Comm Self-Test. This test checks the terminal's data communication function.

4. TPM Self-Test. This test checks the terminal's printer unit.

5. TPM Local Self-Test. This test checks the printer continuously to detect intermittent errors.

During terminal turn-on, unit self-test is performed. There is no message displayed unless an error is detected. On the 2621P, the printer interface chip is checked only during turn-on. A normal display is a blinking cursor at the top left of the screen and a set of primary labels at the bottom of the screen. If an error is detected, an error message is displayed at the bottom of the screen. At this time, the contents of the nonvolatile memory is checked. If the contents have changed, the terminal goes into the configuration mode.

WHEN ..... Whenever the terminal is not operating properly after preliminary troubleshooting.

PROCEDURE .....

UNIT SELF-TEST. Unit self-test checks the display RAMS, program RAMS, program ROMS, and the keyboard interface chip. Perform unit self-test as follows:

1. At the keyboard, hold down **[SHIFT]**, and press the TEST function (**[ ]**). In approximately five seconds, a test pattern (figure 6-1) or an error message (table 6-1) will be displayed on the screen.
2. If the test pattern is good, a self-test pattern and primary terminal status is displayed on the screen (figure 6-1). Refer to the Strapping Section for test pattern and terminal status interpretation.
3. If an error is detected, an error message is displayed at the bottom of the screen. Table 6-1 gives the meaning of the error and what action to take to remedy the error.
4. After replacing the defective assembly or component, repeat the test. Repeat this step until the terminal displays a good test pattern.

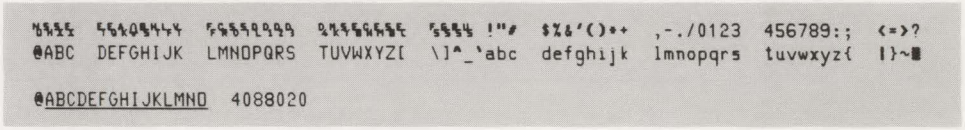


Figure 6-1. 2621A/P Test Pattern

Note

For national option, see note on bottom of page 3-17 for changes in test pattern.

CONTINUOUS UNIT SELF-TEST. This test is performed if the terminal is suspected to be intermittent. Continuous unit self-test is initiated from the nonvolatile memory. Perform continuous unit self-test as follows:

1. Put terminal in configuration mode by executing the CONFIG function (**[SHIFT]** and **[↼]**).
   a. For national option only, press **[SHIFT] [↼]** again to put the terminal in language configuration.
   b. For national option only, press **[V]** to put the terminal in U.S. mode.
   c. For national option only, press the Labels (**[blank]**) key once to return to configuration mode.

2. Press [CTRL], [SHIFT], and [↖].
3. A test pattern or error message is displayed continuously on the screen. On the 2621P, the printer copies the test pattern or error message approximately every hour.
4. Allow test to continue until the error is determined.
5. Exit test by pressing [CTRL], [SHIFT], and [BREAK].
6. For national option only, reconfigure terminal for particular language being used if different than U.S. Press([SHIFT][↖]) to go into configuration mode. See "Language Configuration" page 3-14 for description of language selection.

Note

Continuous unit self-test is in nonvolatile memory. This test is initiated from the keyboard. If this test comes up running continuously at power on, reset the terminal by pressing [CTRL], [SHIFT], and [BREAK].

DATA COMM SELF-TEST. Data comm self-test requires a test hood to loop the signals. 128 characters are transmitted and received at the selected baud rate. When the CE (ring indicator) signal is active, the control lines are checked. Perform data comm self-test as follows:

1. Connect a Data Comm Self-Test Assembly (test hood, part no. 02620-60030) or a modem with loop-back capability to the DATA COMM connector at terminal rear.
2. Press [CTRL], [SHIFT], and TEST function ([↙]). Freezing of the cursor indicates test execution.
3. If an error is detected, a data comm error message is displayed on the screen. If no error is detected, a data comm ok message is displayed on the screen.
4. Exit data comm test by pressing [CTRL], [SHIFT], and [BREAK].

Note

All error messages are cleared by pressing [RETURN].

TPM SELF-TEST. The terminal print mechanism (TPM) test is performed on the 2621P as follows:

1. Press **[SHIFT],** then the PRINTER function (**[^]**).

2. Press **[SHIFT],** then the PRT TEST function (**[↵]**).

3. A test pattern (figure 6-2) is printed on paper and an error message may be displayed on the screen. Table 6-1 gives the meaning of the error message and what action to take.

4. Obtain print-out by advancing the paper. This is done by pressing **[SHIFT],** and then the PAPER function (**[^]**).

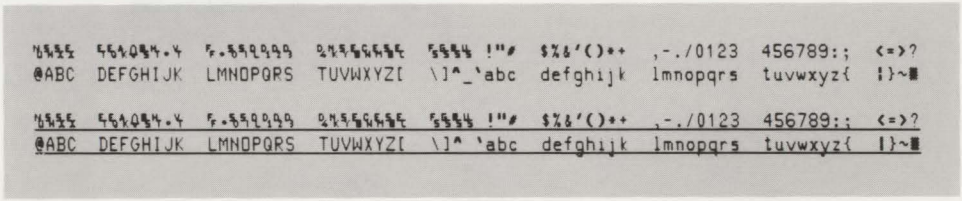


Figure 6-2. 2621P Test Pattern

Note

For national option, see note on bottom of page 3-17 for changes in test pattern.

TPM LOCAL SELF-TEST. This test is used on the 2621P to detect intermittent printer errors. Perform this test only after exhausting the TPM Self-Test described in the previous paragraph. Proceed as follows:

1. Turn off terminal power.
2. Remove TPM top cover.

3. Locate TPM PCA test connector J1 in the upper left-hand corner (as viewed from the front). Using a jumper wire, connect pins J1-1 (GND) and J1-2 (TEST) together.
4. Turn on terminal power.
5. Allow test to continue until printer error is firmly established by checking the print-out (figure 6-3) for missing or faulty characters.
6. Refer to table 6-1 and replace the defective component or assembly.

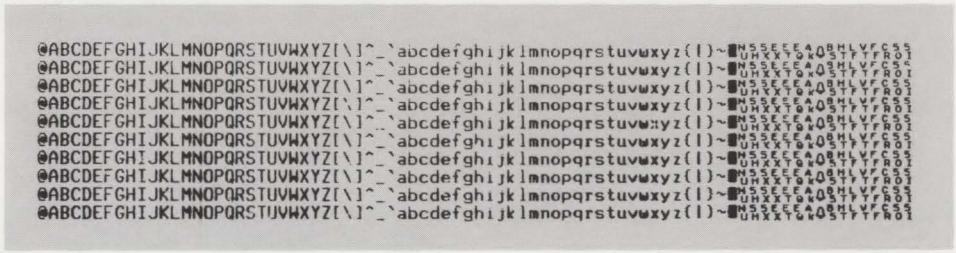


Figure 6-3. TPM Local Self-Test Pattern

Note

For national option, see note on bottom of page 3-17 for changes in test pattern.

Table 6-1. Error Messages

TEST TYPE	ERROR MESSAGE	MEANING	ACTION
UNIT SELF-TEST or CONTINUOUS UNIT SELF-TEST	PROGRAM RAM 0?	CMOS 0 failed.	Replace U69.
	PROGRAM RAM 1?	CMOS 1 failed.	Replace U601.
	DISPLAY RAM 0?	Display RAM 0 bad.	Replace U60.
	DISPLAY RAM 1?	Display RAM 1 bad.	Replace U61.
	DISPLAY RAM 2?	Display RAM 2 bad.	Replace U62.
	DISPLAY RAM 3?	Display RAM 3 bad.	Replace U63.
	DISPLAY RAM 4?	Display RAM 4 bad.	Replace U64.
	DISPLAY RAM 5?	Display RAM 5 bad.	Replace U65.
	DISPLAY RAM 6?	Display RAM 6 bad.	Replace U66.
	DISPLAY RAM 7?	Display RAM 7 bad.	Replace U67.
	ROM 0?	ROM 0 failed.	Replace U79.
	ROM 1?	ROM 1 failed.	Replace U701.
	KYBD CHIP?	Keyboard chip malfunction.	Replace U502.
	PRINTER CHIP?	Printer chip malfunction.	Replace U75.
DATA COMM SELF-TEST	DATA COMM 1?	No clear to send (CB) available.	1. Replace U501. 2. Replace Processor PCA. 3. No self-test hood.
	DATA COMM 2?	Char received not same as char sent (in loop back mode).	1. Replace U501. 2. Replace Processor PCA.
	DATA COMM 3?	Char not received (loop back) within approx. 2.5 seconds.	1. Replace U501. 2. Replace Processor PCA.
	DATA COMM 4?	All control lines did not go true.	1. Replace U501. 2. Replace Processor PCA.
	DATA COMM 5?	All control lines did not go false.	1. Replace U501. 2. Replace Processor PCA.
	DATA COMM SELF-TEST (1) OK	Message received when loop back is modem or similar device. Does not check control lines. CB & CF (true) are required from the modem.	
	DATA COMM SELF-TEST (2) OK	Message received when loop back is standard 25 or 50 pin hood.	
TPM SELF-TEST	PRINTER?	Printer not ready.	1. Add paper, if needed. 2. Close door latch.
		Lost or hung handshake, or other.	1. Replace Intf chip 8041A (U75). 2. Replace Processor PCA. 3. Check print cable. 4. Replace TPM PCA.
TPM LOCAL SELF-TEST	NONE	Detects intermittent printer errors.	1. Replace Intf chip 8041A (U75). 2. Replace Processor PCA.
		Unable to perform TPM local self-test.	1. Check print cable. 2. Replace TPM PCA. 3. Replace TPM unit.

NOTES: 1. Items with more than one action, perform item 1, item 2, and so on.
2. Refer to Parts Lists/Repair Section for parts location and part numbers.

Using the Video Generator

PURPOSE ..... The Video Generator is used for alignment and troubleshooting. It can be used to produce dot and cross hatch displays in either full- or half-bright intensity, inverse video dot and cross hatch patterns, full- or half-bright displays with no video, a half-bright display with inverse video, or a blank display.

INSTALLATION ..... To use the Video Generator the Processor PCA must be removed from the terminal and the Video Generator installed in its place. Install the Video Generator as follows:

Note

When the Processor PCA is removed, all information is deleted from the nonvolatile memory which stores the strapping selections. Therefore, the strapping data should be copied on paper before removing the Processor PCA.

After the Processor PCA is reinstalled, be sure to reenter the information previously copied on paper into the nonvolatile memory.

1. Display the contents of the nonvolatile memory and copy the contents on paper.
2. Turn off terminal power and remove the Processor PCA from the terminal as described in the Parts Lists/Repair Section.
3. Install the Video Generator in place of the Processor PCA (figure 6-4) and connect the power and sweep cables to J1 and J2, respectively, on the Video Generator.
4. Perform the various display patterns as described in table 6-2.

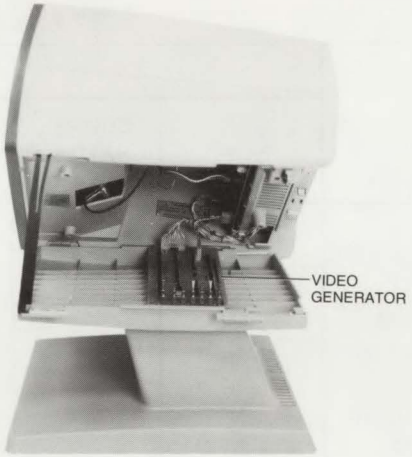


Figure 6-4. Video Generator Installed in Place of the Processor PCA

CONTROLS .....

Displays are produceable using the Video Generator (figure 6-5) and the switch positions listed in table 6-2.

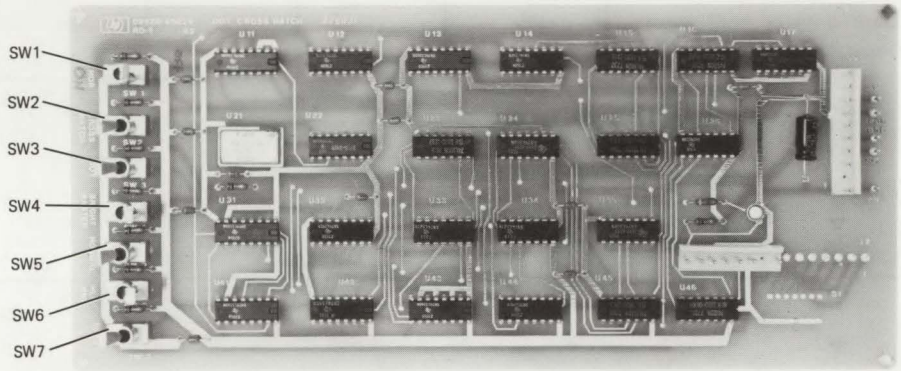


Figure 6-5. Video Generator

Table 6-2. Video Generator Controls

DESIRED EFFECT	SWITCH						
	HOR SW 1	CROSS HATCH SW 2	DOT SW 3	BRIGHT RASTER SW 4	NORMAL SW 5	HLF BRT SW 6	60HZ SW 7
Blank display	OFF	—	—	—	—	—	—
Blank full-bright display	ON	—	—	1	1	—	Note 3
Blank half-bright display	ON	0	0	0	—	1	Note 3
Full-bright cross hatch on dark background	ON	1	—	0	1	0	Note 3
Full-bright cross hatch on half-bright background	ON	1	—	0	1	1	Note 3
Full-bright dot pattern on dark background	ON	0	1	0	1	0	Note 3
Full-bright dot pattern on half-bright background	ON	0	1	0	1	1	Note 3
Dark cross hatch on half-bright background	ON	1	—	0	0	1	Note 3
Dark dots on half-bright background	ON	0	1	0	0	1	Note 3

NOTES: 1. 1 = switch set to the labeled position.
0 = switch set to the unlabeled position.

2. – = don't care.

3. Set at 50 or 60 Hz, as required.

Using the Head Load Assembly

PURPOSE ..... The Head Load Assembly (part no. 02670-60029) is used in place of the TPM print head to help determine if the TPM PCA is defective. The Head Load Assembly checks the status of the print mechanism's dot matrix scheme.

CAUTION

A defective TPM PCA may cause a print head replacement to become defective. Before replacing the print head, use the Head Load Assembly to determine if the TPM PCA is defective.

PROCEDURE ..... To use the Head Load Assembly, the print head cable must be removed and the Head Load Assembly installed in its place. Install the Head Load Assembly in the TPM as follows:

1. Turn off terminal power and remove TPM top cover.
2. Raise door latch and remove paper roll.
3. Carefully disconnect the flex end of the print head cable from the TPM PCA connector.
4. With component side up, plug the long connector side of the Head Load Assembly (figure 6-6) into TPM PCA connector (slot in TPM mainframe). Ensure that the Head Load Assembly is seated fully into TPM mainframe.
5. Place a small piece of paper over the paper detector (microswitch) located inside TPM mainframe at right side.
6. Lower and close door latch.
7. Locate TPM PCA test connector J1 in the upper left-hand corner (as viewed from the front). Using a jumper wire, connect pins J1-1 (GND) and J1-2 (TEST) together.

8. Turn on terminal power and allow this test (TPM local self-test) to run several times.

9. Observe operation of LEDs on Head Load Assembly. If LEDs stay on or off continuously during the test, then TPM PCA may be defective. Normal operation is random blinking of LEDs 2 through 14 while the print head travels from left to right and all LEDs are off as the print head retraces (linefeed and carriage return). LEDs 1 and 15 may flicker slightly but have no affect in determining PCA status.

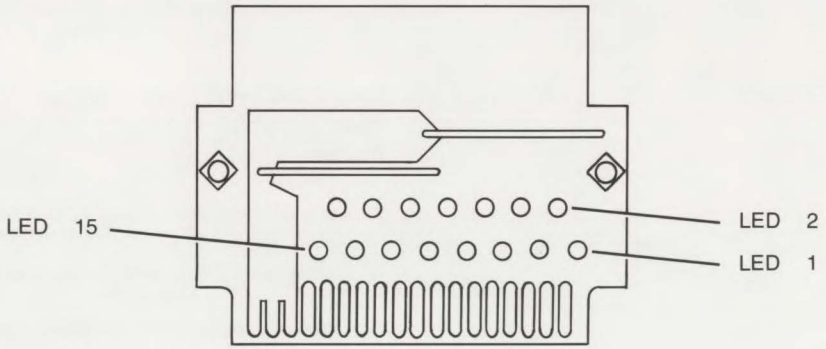


Figure 6-6. Head Load Assembly

Parts List/Repair VII

INTRODUCTION ..... This section provides instructions for removing and replacing terminal assemblies and components designated as field replaceable. Included also is a listing of field replaceable parts, procedures for ordering replaceable parts, and a listing of exchange modules.

REMOVAL AND REPLACEMENT PROCEDURES ..... The terminal's modular design facilitates the removal and replacement procedures for the various field replaceable parts. The following paragraphs describe removal and replacement procedures for the terminal. Differences in the 2621P will be noted in each procedure.

WARNING

Hazardous voltages are present inside the terminal. Always remove AC power when working inside the terminal. Removal and replacement procedures contained in this section shall be performed only by qualified service personnel.

TOP COVER .....

REMOVAL. Set terminal power to the off position, disconnect the power cord, and proceed as follows:

1. Using a small Phillips-head screwdriver, loosen the two quarter-turn fasteners securing top cover to mainframe (see figure 7-1). Do not overtighten the fasteners.
2. Slide top cover toward the rear slightly and remove.

REPLACEMENT. Replace the top cover as follows:

1. Position top cover onto the mainframe and slide it forward into the groove of the bezel.
2. Secure top cover to mainframe by tightening the two quarter-turn fasteners. Do not overtighten the fasteners.

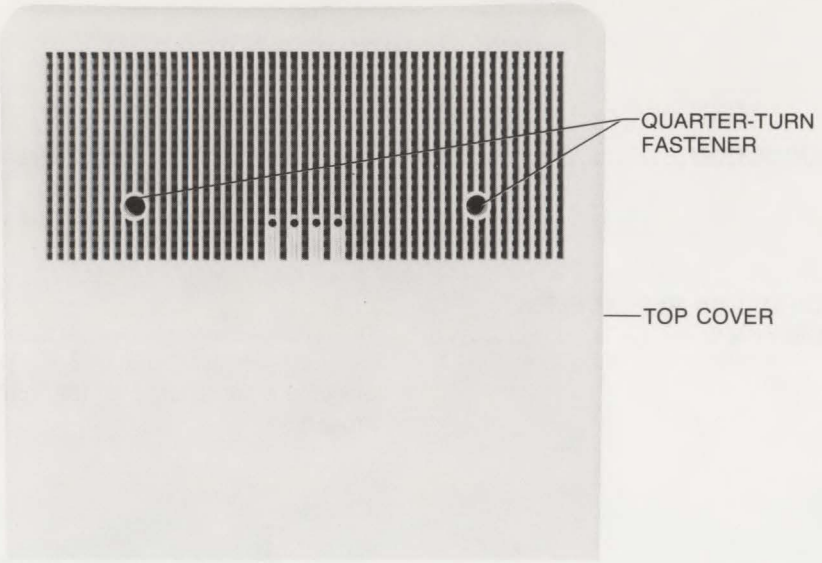


Figure 7-1. Terminal Top View

MAINFRAME .....

REMOVAL. Set terminal power to the off position, disconnect the power cord and keyboard cable assembly, disconnect the data comm cable assembly (if present), and proceed as follows:

1. For 2621P, remove the top cover to disconnect the fan cable assembly from Power Supply PCA connector J1.

2. Loosen the quarter-turn fastener at the left rear of the terminal (as viewed from the rear). See figure 7-2.

3. Hold pedestal in place and slide mainframe forward about 1/4-inch.

3. Hold pedestal in place and slide mainframe forward about 1/4-inch.

CAUTION

Use extreme care when placing the terminal in the half-open (service) position. Failure to do so may cause terminal to tip over causing personal injury or damage to the terminal.

4. Grasp left side of mainframe and lift it upward until the top prop locks the mainframe in the half-open (service) position.

5. For 2621P (refer to "PROCESSOR PCA"), lower Processor PCA onto the support, pull fan cable assembly through opening in mainframe, and reattach Processor PCA to mainframe.

6. Squeeze the upper end of the top prop and lift the mainframe upward (see figure 7-3). Then slide the mainframe forward until it is free from the support hinge and remove.

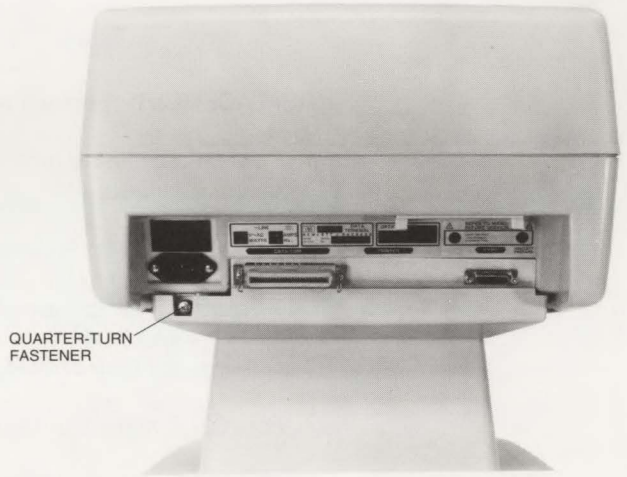


Figure 7-2. 2621 Terminal (Rear View)



Figure 7-3. Terminal Set to the Half-Open Position

REPLACEMENT. Replace mainframe as follows:

1. Position mainframe onto support hinge. Slide mainframe and support together until they are hinged.

2. For 2621P, lower Processor PCA onto support, route fan cable assembly through opening in mainframe and connect it to Power Supply PCA connector J1. Reattach Processor PCA to mainframe and reconnect ground strap.

3. Lower mainframe onto top prop.

4. For 2621P, make sure that the fan cable is resting in the support slots and cable clip.

5. Squeeze upper end of the top prop and lower the mainframe to its closed position.

6. Slide mainframe toward the rear and secure in place by tightening the quarter-turn fastener at left rear of terminal. Do not overtighten the fastener.

7. Replace top cover.

8. Reconnect power cord, keyboard cable assembly, and data comm cable assembly (if required).

SUPPORT .....

REMOVAL. Set terminal power to the off position, disconnect the power cord, disconnect keyboard cable assembly and data comm cable assembly (if present), remove mainframe, and proceed as follows:

1. Remove the four screws and washers securing support to pedestal (figure 7-4).

2. Remove support from pedestal.

3. For 2621P, pull fan cable assembly through opening in support.

REPLACEMENT. Replace support as follows:

1. Position support onto pedestal.

2. For 2621P, route fan cable assembly through support opening, two slots, and cable clip.

3. Secure support in place with the four screws and washers.

4. Attach mainframe to support and secure in place by tightening the quarter-turn fastener. Do not overtighten the fastener.

5. Reconnect keyboard cable assembly, data comm cable assembly (if required), and power cord.

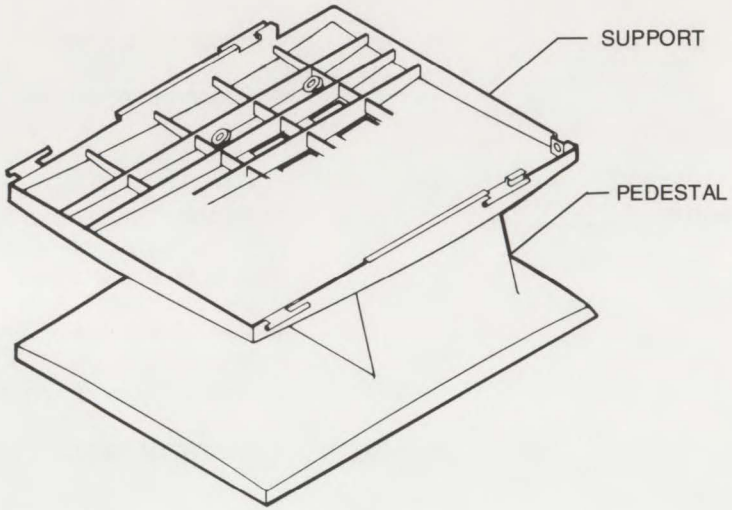


Figure 7-4. Support and Pedestal

PEDESTAL .....

REMOVAL. Set terminal power to the off position, disconnect the power cord, disconnect the keyboard cable assembly and data comm cable assembly (if present), and proceed as follows:

1. Position mainframe to the half-open (service) position.
2. Remove mainframe from support.
3. Remove the four screws and washers securing support to pedestal. Remove pedestal.
4. For 2621P, remove the two screws and washers securing fan assembly to pedestal.

REPLACEMENT. Replace pedestal as follows:

1. For 2621P, reinstall fan assembly onto pedestal (refer to "VENTILATING FAN"). Route fan cable assembly through support opening, two slots, and cable clip.
2. Position support over pedestal and align the four holes.
3. Secure support to pedestal with the four screws and washers.
4. Position mainframe onto support and lower it onto the top prop.
5. For 2621P, connect fan cable to Power Supply PCA connector J1.
6. Lower mainframe onto support, slide it rearward, and secure in place by tightening the quarter-turn fastener. Do not overtighten the fastener.
7. Reconnect keyboard cable assembly, data comm cable assembly (if required), and power cord.

VENTILATING FAN .....

Only the 2621P uses a ventilating fan for cooling. Procedures for removing and replacing the fan follow.

REMOVAL. Set terminal power to the off position, disconnect the keyboard cable assembly and data comm cable assembly (if installed), disconnect the power cord, and proceed as follows:

1. Remove top cover and disconnect fan cable assembly from Power Supply PCA connector J1.
2. Remove mainframe from support (refer to "MAINFRAME").
3. Remove support from pedestal.
4. Remove the two screws and washers securing fan to pedestal cavity (figure 7-5) and remove fan.

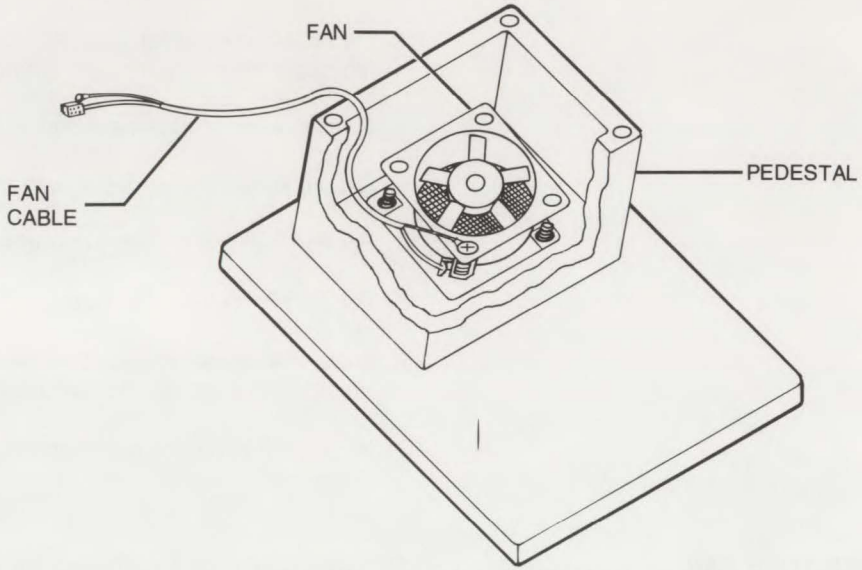


Figure 7-5. Fan Removal (2621P)

REPLACEMENT. Replace ventilating fan as follows:

1. Position fan into pedestal cavity with the air flow direction of the fan facing upward.
2. Route fan cable assembly through support opening, two slots, and cable clip.
3. Reinstall support onto pedestal and secure in place with the four screws and washers.
4. Reinstall mainframe onto support hinges in the half-open (service) position.
5. Lower Processor PCA and route fan cable through mainframe opening. Connect fan cable to Power Supply PCA connector J1.
6. Reinstall Processor PCA and reconnect ground strap to Processor PCA ground lug.

7. Close mainframe and secure in place by tightening the quarter-turn fastener. Do not overtighten the fastener.

8. Replace top cover, reconnect the keyboard cable assembly, data comm cable assembly (if required), and the power cord.

PRINTED-CIRCUIT ASSEMBLIES .....

Printed-circuit assemblies (PCA's) are easily removed and replaced. The following paragraphs provide removal and replacement procedures for each PCA installed in the terminal.

PROCESSOR PCA .....

REMOVAL. Set terminal power to the off position, disconnect the power cord, keyboard cable assembly, and data comm cable assembly (if present), set mainframe to the half-open position, and proceed as follows:

1. Disconnect the ground strap from Processor PCA ground lug at terminal left rear.

2. Pull outwardly on each of the four snap fasteners securing Processor PCA to mainframe bottom. Lower Processor PCA until it rests on the support (figure 7-6).

3. Disconnect the two cable assemblies from their respective connectors (J2 and J3).

4. For 2621P, disconnect the thermal print cable assembly from connector J1.

5. Carefully remove the Processor PCA.

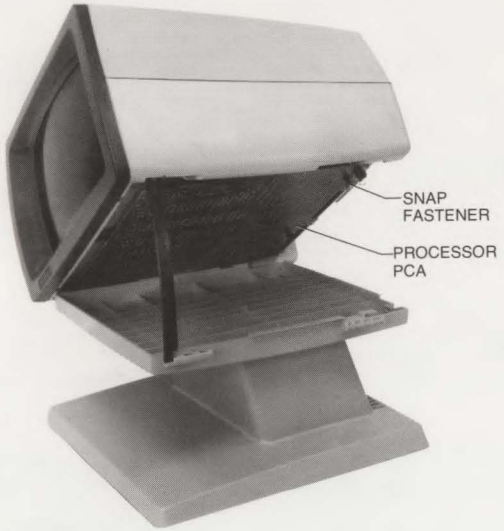


Figure 7-6. Processor PCA Removal

REPLACEMENT. Replace Processor PCA as follows:

1. If replacement PCA requires an I/O Panel, remove the I/O Panel from the just removed Processor PCA. Disconnect the Data Comm and Keyboard interconnecting cable assemblies from the Processor PCA. Remove the ground lug, three screws and washers securing I/O Panel to Processor PCA.

2. Install I/O Panel onto new Processor PCA and secure in place with the three screws and washers and ground lug. Reconnect the Data Comm and Keyboard interconnecting cable assemblies to the Processor PCA.

3. If replacement PCA requires RAMS, ROMS, or IC's, remove them from the just removed PCA. Using care and an IC removal tool (part no. 7710-0585), remove RAMS, ROMS, and IC's from their IC sockets (see figure 7-19).

CAUTION

Integrated circuits can be damaged by electrostatic discharge. Use the following precautions:

***DO NOT** wear clothing subject to static charge buildup, such as wool or synthetic materials.*

***DO NOT** handle integrated circuits in carpeted areas.*

***DO NOT** remove IC from its conductive foam pad until you are ready to install it.*

***AVOID** touching circuit leads. Handle by the plastic package only.*

***ENSURE** that IC, work surface (table, desk, etc.) and PCA are all at the same ground potential. This can be done by touching the foam pad to the PCA and then touch the foam pad, circuit, and PCA to the work surface.*

4. Connect the two cable assemblies to their respective connectors (J2 and J3). For 2621P, connect the thermal print cable assembly to connector J1.

5. Position Processor PCA onto mainframe bottom and align I/O panel into mainframe groove. Install each of the four snap-in grommets into their respective fastening holes and then push inwardly on each of the four snap-in plungers until they click in place.

6. Reconnect the ground strap to the Processor PCA ground lug.

7. Lower mainframe onto support and secure in place by tightening the quarter-turn fastener. Do not overtighten the fastener.

8. Reconnect keyboard cable assembly, data comm cable assembly (if required), and power cord.

SWEEP PCA .....

REMOVAL. Set terminal power to the off position, disconnect the power cord, set mainframe to the half-open position, lower Processor PCA, and proceed as follows:

CAUTION

High voltages are present within the Sweep PCA and CRT area. Use caution when working near these assemblies.

1. Disconnect the four cable assemblies from their respective connectors (J1 thru J4).
2. Use caution and carefully disconnect the high voltage cable assembly from the CRT high voltage connector (hole in CRT) by squeezing the insulated connector.
3. Remove the Sweep PCA (figure 7-7) from the mainframe by pulling outwardly on each of the two snap fasteners. Use care and remove the Sweep PCA.

REPLACEMENT. Replace the Sweep PCA as follows:

1. Carefully position Sweep PCA into mainframe and secure in place by pushing inward on each of the two snap-in grommets and then the two snap-in plungers. Ensure that wiring and cabling are not pinched.
2. Reconnect the four cable assemblies to their respective connectors (J1 thru J4) and the high voltage cable to the CRT connector (hole in CRT). Hook the high voltage cable onto tie-down tab in mainframe.
3. Replace Processor PCA.
4. Lower mainframe and secure in place by tightening the quarter-turn fastener.
5. Reconnect the power cord.

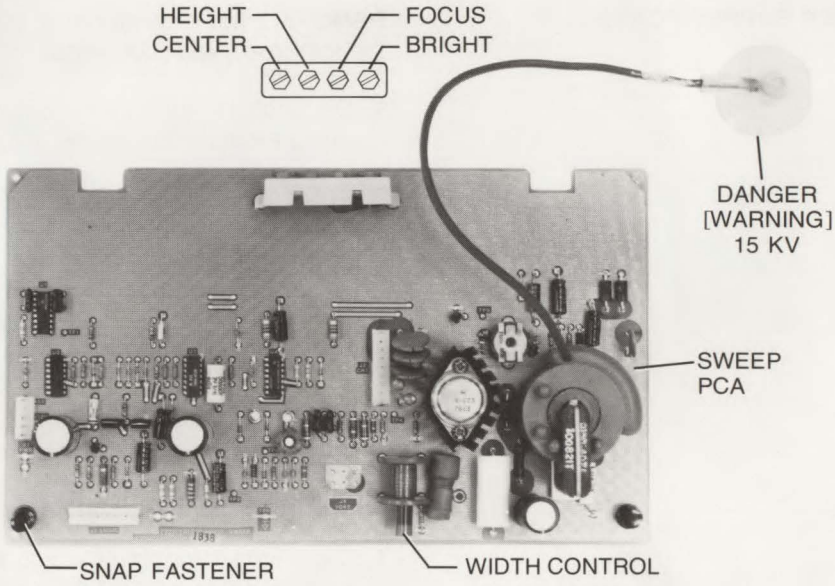


Figure 7-7. Sweep PCA

POWER SUPPLY PCA .....

REMOVAL. Set terminal power to the off position, disconnect the power cord, remove the top cover, and proceed as follows:

1. Disconnect the five cable assemblies from their respective connectors: J1, J2 or J3, and J4 thru J6. For 2621P, the connectors are J1 thru J3, J5 and J6.

2. At top of the Power Supply PCA, pull outwardly on each of the three snap fasteners securing PCA to mainframe (see figure 7-8).

Note

For 2621P, there are four snap fasteners securing Power Supply PCA to mainframe (see figure 7-9).

3. Remove Power Supply PCA by pulling it upward from the mainframe cavity.

REPLACEMENT. Replace Power Supply PCA as follows:

1. Slide Power Supply PCA into mainframe cavity and secure in place by pushing inwardly on each of the three snap-in grommets and then the three snap-in plugers. For 2621P, there are four snap fasteners.

2. Reconnect the five cable assemblies to their respective connectors J1, J2 or J3, and J4 thru J6. For 2621P, these connectors are J1 thru J3, J5 and J6.

Note

For 2621A, connector J2 is for 100-120V and connector J3 is for 220-240V.

3. Check that the line fuse is correct for the configured line voltage. Refer to "Installing the Terminal" in Section II (page 2-6) for a description of fuse placement.

4. Replace top cover and reconnect the power cord.

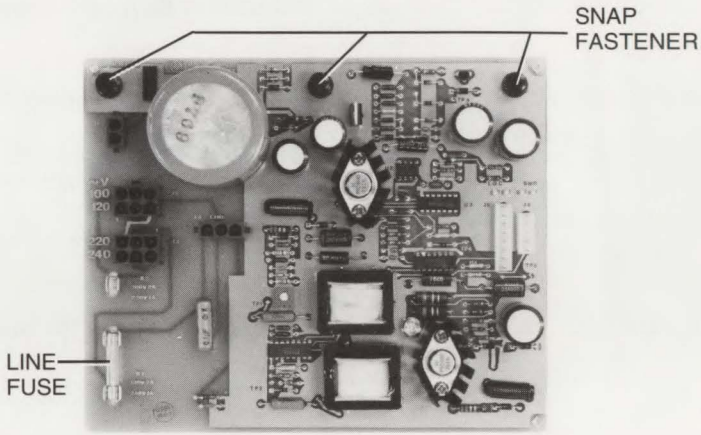


Figure 7-8. Power Supply PCA (2621A)

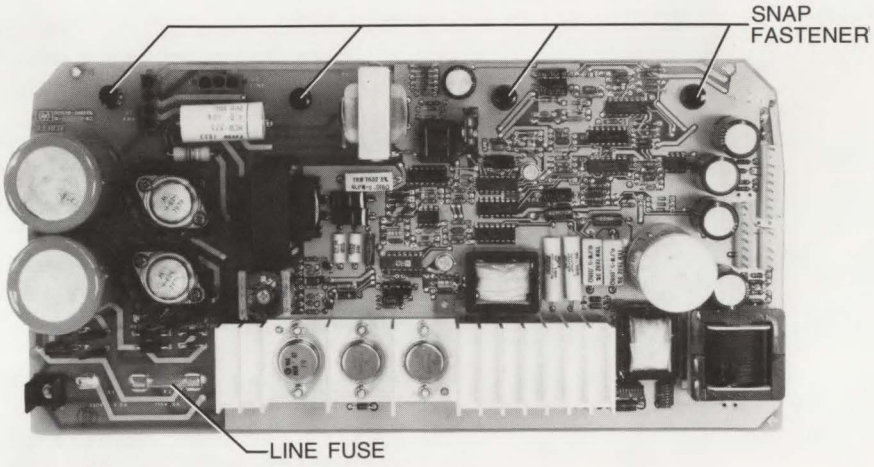


Figure 7-9. Power Supply PCA (2621P)

KEYBOARD ASSEMBLY .....

REMOVAL. Turn off terminal power, disconnect the power cord and keyboard cable, and remove Keyboard Assembly.

REPLACEMENT. Replace Keyboard Assembly as follows:

1. Connect keyboard cable to KYBD connector at terminal rear. Secure in place by sliding connector lock to the right.
2. Reconnect the power cord.

KEYBOARD PCA .....

REMOVAL. Remove the Keyboard PCA as follows:

1. Turn off terminal power and disconnect the power cord.
2. Disconnect the keyboard cable assembly.
3. Remove the four screws securing keyboard top to keyboard base (figure 7-18).
4. Remove keyboard top, disconnect keyboard and speaker cables from the Keyboard PCA, and then remove the Keyboard PCA from the keyboard base.

REPLACEMENT. Replace Keyboard PCA as follows:

1. Place Keyboard PCA over keyboard base standoffs.
2. Route keyboard and speaker cables into their respective grooves on the keyboard base. Reconnect keyboard and speaker cables to their respective Keyboard PCA connectors.
3. Place keyboard top over Keyboard PCA and secure in place with the four screws.
4. Reconnect keyboard cable to KYBD connector at terminal rear and secure cable in place by sliding the connector lock to the right.
5. Reconnect the power cord.

KEYCAPS .....

REMOVAL. Using the keycap disassembly tool (part no. 5040-7433), carefully hook keycap bottom edge and lift keycap from the Keyboard Assembly (see figure 7-10).

REPLACEMENT. Install new keycap over vacated switch on Keyboard Assembly as follows:

CAUTION

Switch Contacts can be damaged if keycap is not installed at its designed angle. Use care when installing keycaps.

1. Position replacement keycap over vacated switch at its designed angle.
2. Push down on the keycap at its designed angle until the keycap is fully seated.



Figure 7-10. Keycap Removal

BATTERY .....

REMOVAL. The battery can be replaced with terminal power on or off. Remove battery as follows:

CAUTION

Configuration will be lost from memory when removing the battery from the terminal and power is turned off. Before removing battery, ensure that configuration is recorded so that original strapping can be duplicated.

1. If battery is to be replaced with power on, go to step 2. If not, record configuration and then turn power off.
2. Locate battery support at rear of terminal.
3. Grasp and squeeze battery support clips and pull it downward for removal. (See figure 7-11.)
4. Remove battery from battery support.

REPLACEMENT. Replace battery as follows:

1. Install new battery in battery support. Observe polarity markings on battery support for correct battery orientation.
2. Install battery support into battery receptacle at rear of terminal. Make sure that battery clips are seated fully. To ensure correct installation, both the battery support and receptacle are keyed.
3. If battery was replaced with power off, restore terminal power and restrap configuration (refer to Strapping Section).

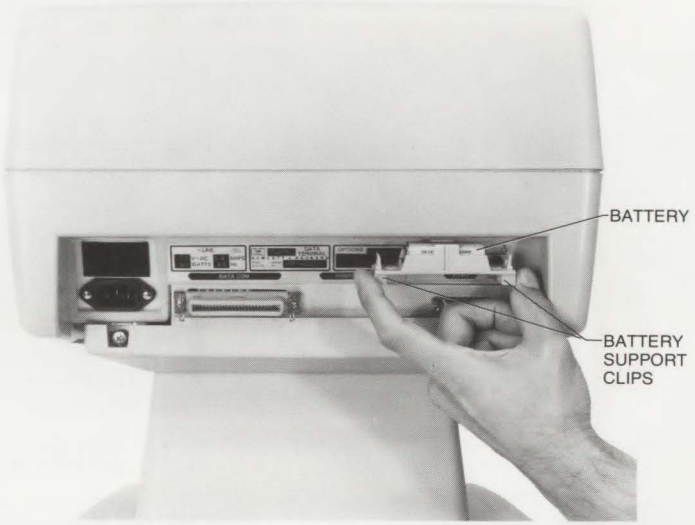


Figure 7-11. Battery Removal

INTEGRATED CIRCUIT .....

REMOVAL. If a defective integrated circuit (IC), such as a Read-Only-Memory (ROM) or Random-Access-Memory (RAM) is to be replaced; set terminal power to the off position, disconnect the power cord, remove defective PCA, and proceed as follows:

CAUTION

Integrated circuits can be damaged by electrostatic discharge. Use the following precautions:

***DO NOT** wear clothing subject to static charge buildup, such as wool or synthetic materials.*

***DO NOT** handle IC's in carpeted areas.*

***DO NOT** remove the IC from its conductive foam pad until you are ready to install it.*

***AVOID** touching the circuit leads. Handle by the plastic package only.*

***ENSURE** that the circuit, work surface (table, desk, etc.) and PCA are all at the same potential. This can be done by touching the foam pad to the PCA and then touch the foam pad, circuit, and PCA to the work surface.*

1. Locate defective IC.

2. Using an IC removal tool (part no. 7110-0585), remove defective IC from its socket.

REPLACEMENT. When replacing a defective IC, be aware that each IC must be oriented and aligned in its socket, i.e., pin 1 of the IC matches pin 1 of the PCA. All IC's on a PCA are usually installed in the same direction, i.e., the notched ends of the IC's are facing in one direction for correct orientation. Pin 1 is marked on the PCA by a square hole, and pin 1 on the IC is marked by a dot or notch. These markings help to ensure that both the IC socket and IC are installed correctly (figure 7-12). Install new IC as follows:

1. Observe correct IC orientation and install replacement IC into IC socket.

2. Reinstall PCA.

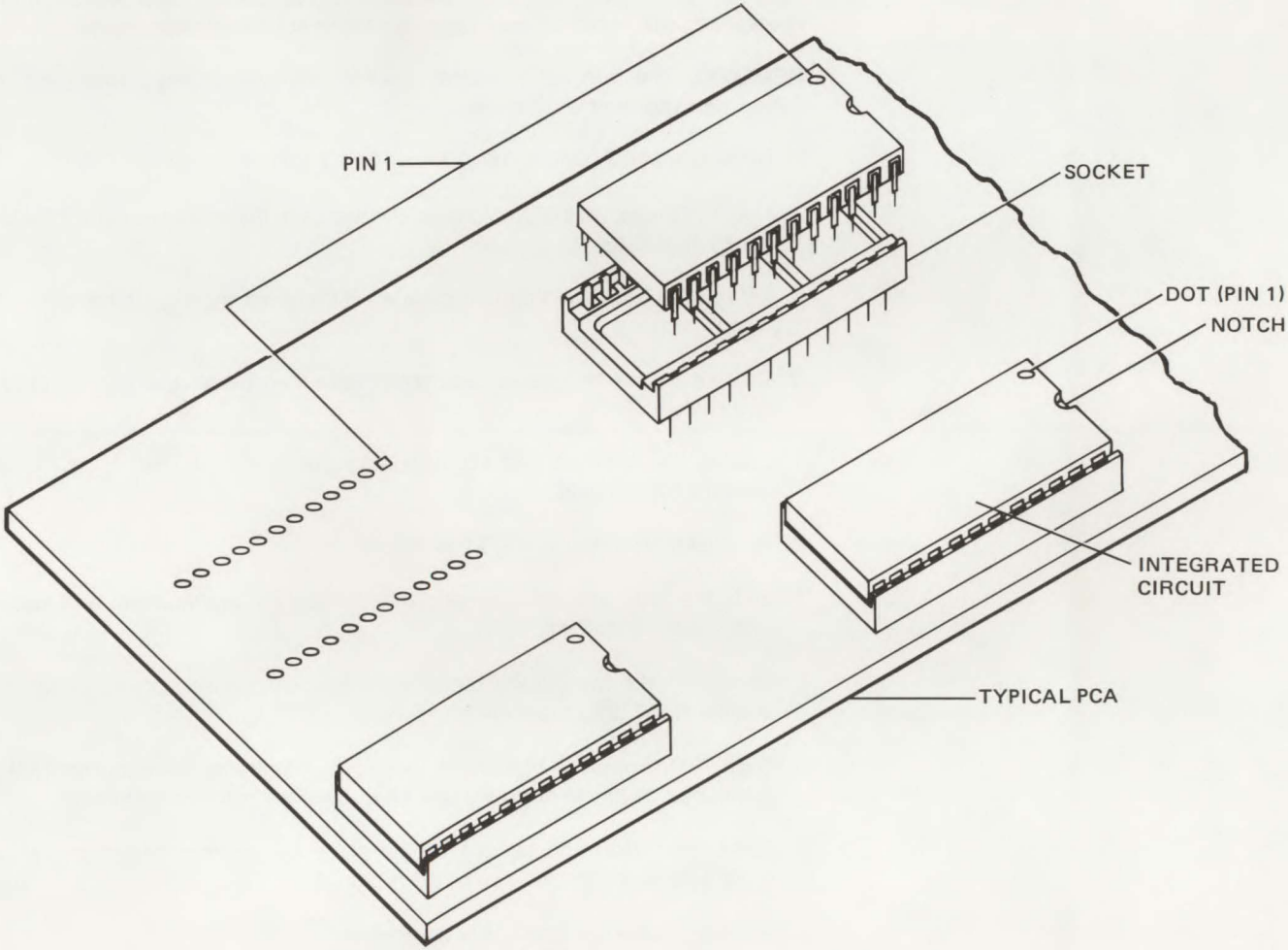


Figure 7-12. Installing an IC

THERMAL PRINT MECHANISM ..... The thermal print mechanism (TPM) is replaceable as an assembly, however, several subassemblies have been designated as field replaceable: the TPM PCA, and print head. Procedures for removing and replacing these subassemblies follow:

REMOVAL. Set terminal to the off position, disconnect the power cord, remove top cover, and proceed as follows:

1. Raise door latch and remove paper and paper roll rod from TPM.
2. Use an IC removal tool and unsnap the two snap fasteners securing TPM to mainframe (see figure 7-13).
3. Lift back of TPM mainframe and slide TPM forward slightly. Do not grasp TPM motors when handling TPM.
4. Disconnect the two cable assemblies from their respective connectors (J2 and J3) and remove TPM.
5. Loosen the three screws securing magnetic shield to TPM. Slide magnetic shield outward for removal.

REPLACEMENT. Replace TPM as follows:

1. Slide the just removed magnetic shield onto TPM replacement and secure in place with the three screws.
2. Reconnect the two cable assemblies to their respective connectors (J2 and J3) and position TPM onto mainframe.
3. Slide TPM forward to hook front hooks onto mainframe. Be sure that TPM is properly positioned at the front hooks and snap fastener holes in mainframe.
4. Raise door latch and secure TPM in place by pushing inward on the two snap-in grommets and then the two snap-in plungers.
5. Replace paper roll and lower door latch.
6. Replace top cover and reconnect the power cord.

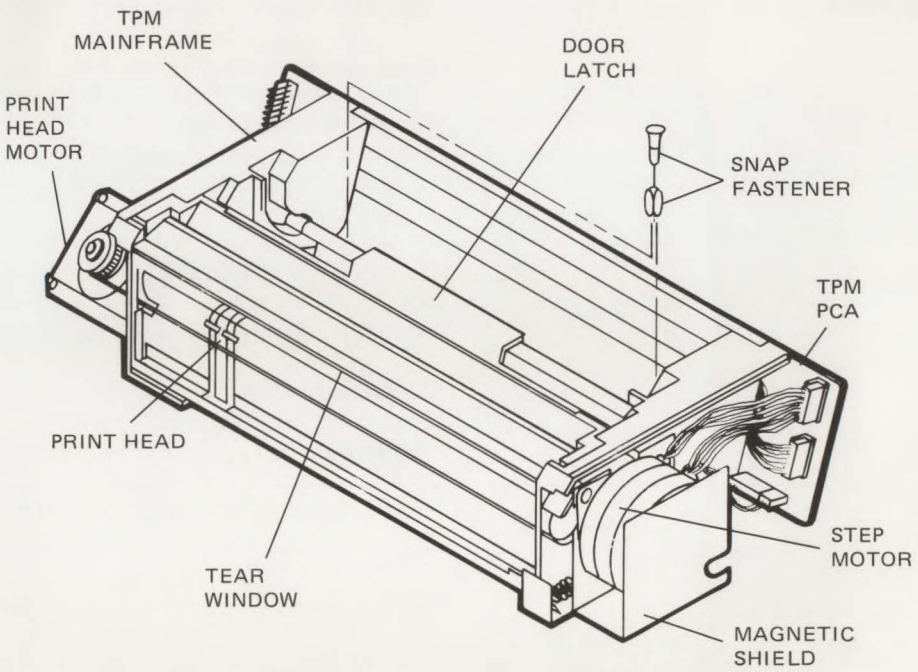


Figure 7-13. TPM Removal

TPM PCA .....

REMOVAL. Set terminal power to the off position, disconnect the power cord, remove top cover and TPM, and proceed as follows:

1. Remove the three screws securing TPM PCA to TPM mainframe.
2. Disconnect the remaining five cable assemblies from their respective connectors.
3. Remove TPM PCA from TPM mainframe.

REPLACEMENT. Replace the TPM PCA as follows:

1. If replacement PCA requires ROMS, remove them from the just removed PCA. Reinstall these ROMS in their respective IC sockets. Refer to "INTEGRATED CIRCUIT" and see figure 7-26.

2. Position TPM PCA onto TPM mainframe hooks and secure in place with the three screws.

3. Install print head (flex) cable into connector J4 (slot in TPM mainframe).

4. Reconnect the remaining cable assemblies to their respective connectors.

5. Reinstall TPM.

6. Replace top cover and reconnect power cord.

7. Reconfigure TPM strapping (refer to Strapping Section).

PRINT HEAD .....

Removal of the print head is made up of two major parts. First the thermal print mechanism must be removed from the terminal. Second the print head assembly (which includes the print head) must be removed.

To remove thermal print mechanism (TPM) from terminal proceed as follows:

1. Set terminal to the off position, disconnect the power cord, and remove the top cover.
2. Raise door latch and remove paper and paper roll rod from TPM.
3. Use an IC removal tool and unsnap the two snap fasteners securing TPM to mainframe (see figure 7-13).
4. Lift back of TPM mainframe and slide TPM forward slightly. Do not grasp TPM motors when handling TPM.
5. Disconnect the two cable assemblies from their respective connectors (J2 and J3) and remove TPM.

To remove print head assembly from TPM proceed as follows:

1. Raise door latch.

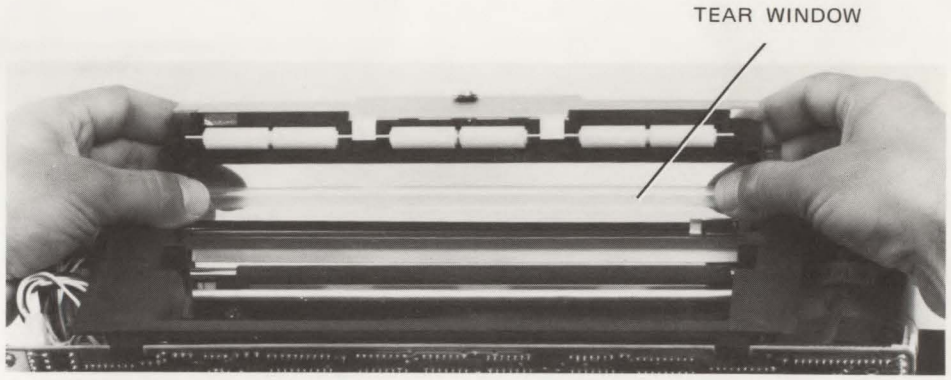


Figure 7-13A. Tear Window

2. Remove tear window. (See figure 7-13A.)
3. Remove removeable rod.

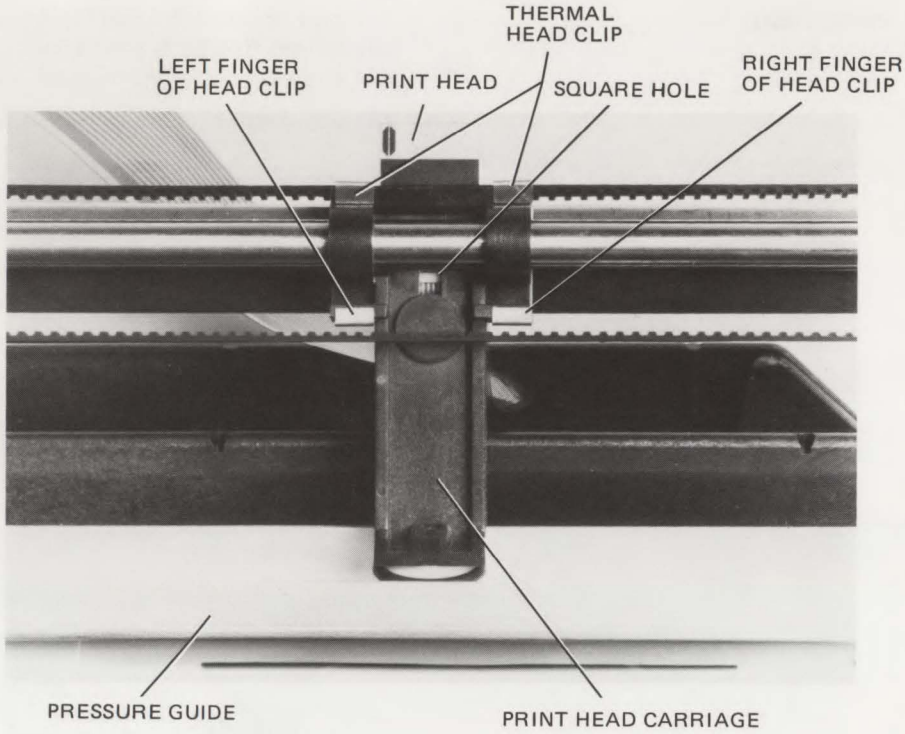


Figure 7-13B. TPM Front View

4. Slide print head carriage down to the middle of the TPM. (See figure 7-13B).
5. Loosen right and left fingers of the thermal head clip which secures the print head in place. (See figure 7-13B.)
6. Push the print head out from the print head carriage and down.
7. Pull the print head out of the print head carriage.

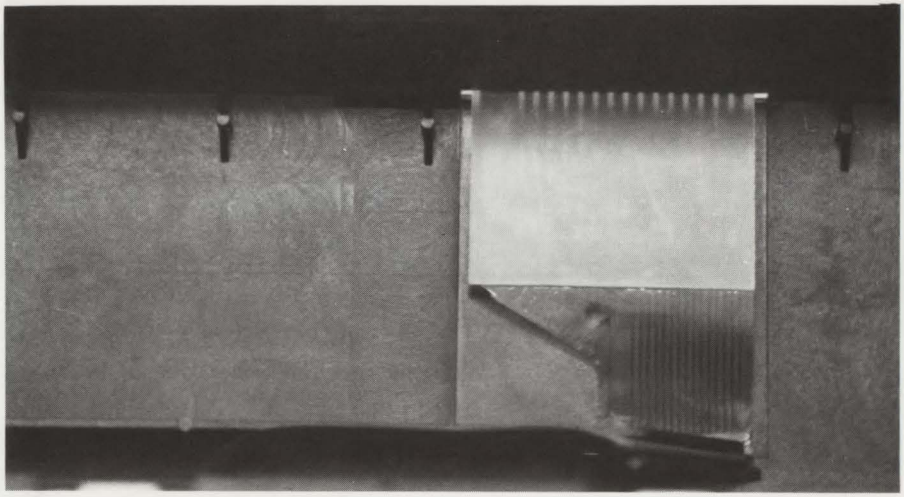
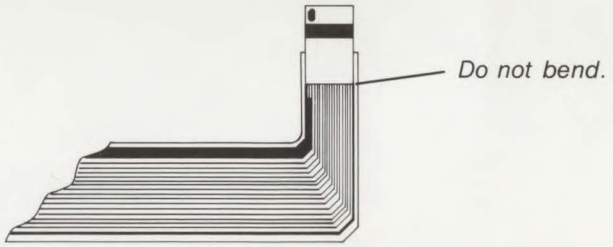


Figure 7-13C. Print Head Assembly Connector

8. Unplug the connector end of the print head assembly. (See figure 7-13.)
9. Pull the print head assembly out of the thermal print mechanism.

CAUTION



When replacing the print head assembly do not bend the flex cable where it connects to the print head.

Replace print head as follows:

1. Put the TPM on the edge of a table top with the pressure guide and print head carriage facing you. The pressure guide needs to hang over the edge of the table. (See figure 7-13B.)
2. Hold the print head so that the side which is one-half silver and one-half black is facing you. Thread print head under pressure guide between pressure guide and black portion of TPM.
3. Slide the print head up the print head carriage between the print head carriage and the thermal head clip. (See figure 7-13B.) Do not bend flex cable where it connects to the print head because the wires will break.

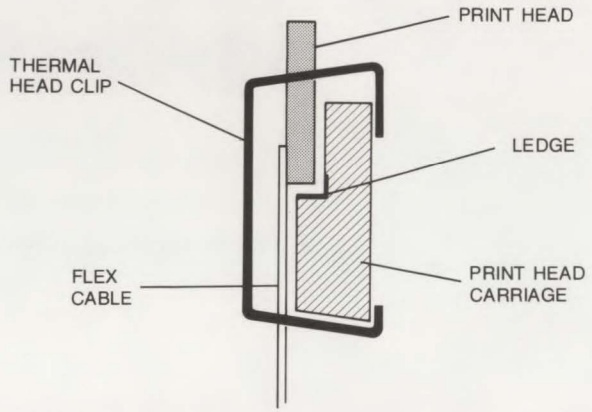


Figure 7-13D. Ledge Inside Print Head Carriage

4. Pull the print head up until you can see some of the flex cable through the square hole in the front of the print head carriage. Then push the print head back down until it rests on the ledge which exists on the inside of the print head carriage. (See figure 7-13D.)
5. Look through the square hole of the print head carriage. Be sure that print head ceramic is seen in half of the square hole, and that flex cable is seen in the other half of the sequare hole. (See figure 7-13B.)

6. Latch the left and right fingers of the thermal head clip. (See figure 7-13B.)
7. Press the flex cable back inside of the TPM.

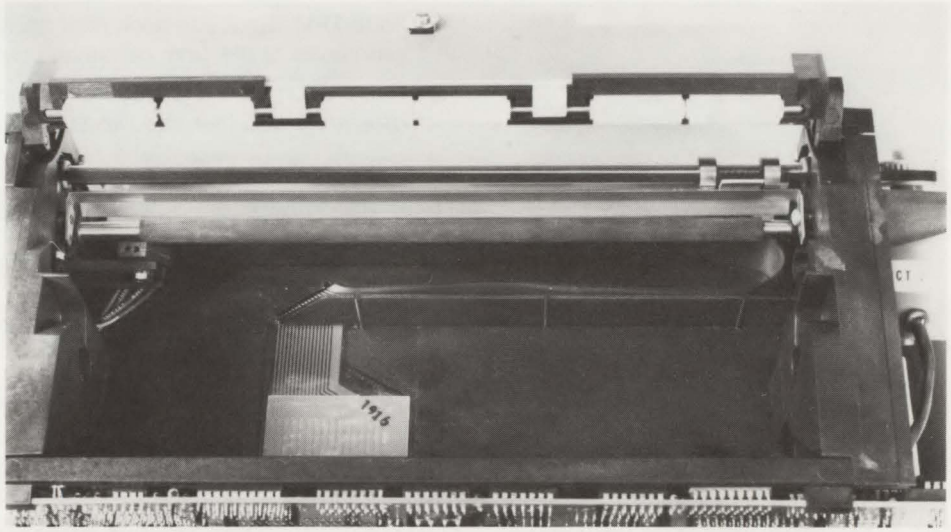


Figure 7-13E. Print Head Assembly in Place

8. Make similar fold in flex cable as in defective flex cable and route along TPM trough. (See figure 7-13E.)

Note

To sensure correct folding of flex cable, the replacement cable has been previously creased.

9. With insulated side up, install flex cable into TPM PCA connector (slot in TPM mainframe). Ensure that flex cable is seated fully into TPM PCA connector and that the contacts of the print head cable assembly are aligned with the contacts on the TPM PCA. To be sure of a perfect alignment, turn the TPM upside down to view the connection pin assignment. (See figure 7-13C.)

Replace the TPM complete with new print head back into the terminal as follows:

1. Reconnect the two cable assemblies to their respective connectors (J2 and J3) and position TPM onto mainframe.
2. Slide TPM forward to hook front hooks onto mainframe. Be sure that TPM is properly positioned at the front hooks and snap fastener holes in mainframe.
3. Raise door latch and secure TPM in place by pushing inward on the two snap-in grommets and then the two snap-in plungers.
4. Replace removable rod.
5. Replace paper and paper roll rod.
6. Replace tear window.
7. Lower and secure door latch.
8. Replace cover and reconnect power cord.

REMOVABLE PARTS .....

Removable parts for the terminal are listed in tables 7-1 through 7-10. The removable parts in tables 7-1 through 7-4 are referenced to the exploded views (figures 7-14 through 7-18) of the terminal by index numbers which are in disassembly order, except attaching parts are listed immediately after the parts they attach. Table 7-8 gives the part numbers for removable components shown in figures 7-19 and 7-20. Items in the DESCRIPTION column of tables 7-1 through 7-4 are indented to indicate item relationship. In addition, the symbol "— — — x — — —" follows the last one or more attaching parts. Indention is as follows:

MAJOR ASSEMBLY
*Removable Assembly
*Attaching Parts for Removable Assembly
**Subassembly Parts
**Attaching Parts for Subassembly Parts

Tables 7-1 through 7-4 provide the following information for each part:

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

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

c. DESCRIPTION. The description and any special application (accessories and options) for each removable part.

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

ORDERING REMOVABLE PARTS .....

To order removable parts for the terminal or options and accessories, address the order to your 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 removable parts list.

EXCHANGE MODULES .....

Exchange modules are replacement modules less some removable components. Table 7-11 lists the available exchange modules and the components that must be removed before a module is sent to Hewlett-Packard's Customer Service Division (CSD). These exchange modules are available from CSD under the "Blue Stripe Program." The Customer Service Engineer can exchange a defective module for a replacement module at the prevailing exchange rate. Contact your local HP Sales and Service Office for details.

Table 7-1. Top Cover, Support, and Pedestal

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO.	DESCRIPTION
	2621A	2621P		
7-14	1		4040-1479	*Top Cover
7-15		1	4040-1481	*TPM Top Cover
				(Attaching Parts)
	2	2	1390-0475	*Quarter-Turn Fastener
	2	2	1390-0293	*Quarter-Turn Spring
	2	2	1390-0257	*Quarter-Turn Retainer
	2	2	1390-0071	*Quarter-Turn Washer
				— — — x — — —
7-15		1	4040-1482	*TPM Door
				— — — x — — —
7-14,15	1	1	4040-1484	*Support
				(Attaching Parts)
	1	1	1390-0475	*Quarter-Turn Fastener
	1	1	1390-0293	*Quarter-Turn Spring
	1	1	1390-0257	*Quarter-Turn Retainer
	1	1	1390-0071	*Quarter-Turn Washer
	1	1	7120-7538	*Label
				— — — x — — —
	1	1	4040-1447	*Top Prop
				— — — x — — —
7-14,15	1	1	4040-1480	*Pedestal
				(Attaching Parts)
	4	4	0624-0439	*Screw, tapping
	4	4	3050-0099	*Washer, flat
	6	6	0403-0284	*Foot, press-in
7-15		1	02620-60012	*Fan
				(Attaching Parts)
		2	2360-0127	*Screw, machine, 6-32 x 7/8
		2	3050-0066	*Washer, flat, no. 6

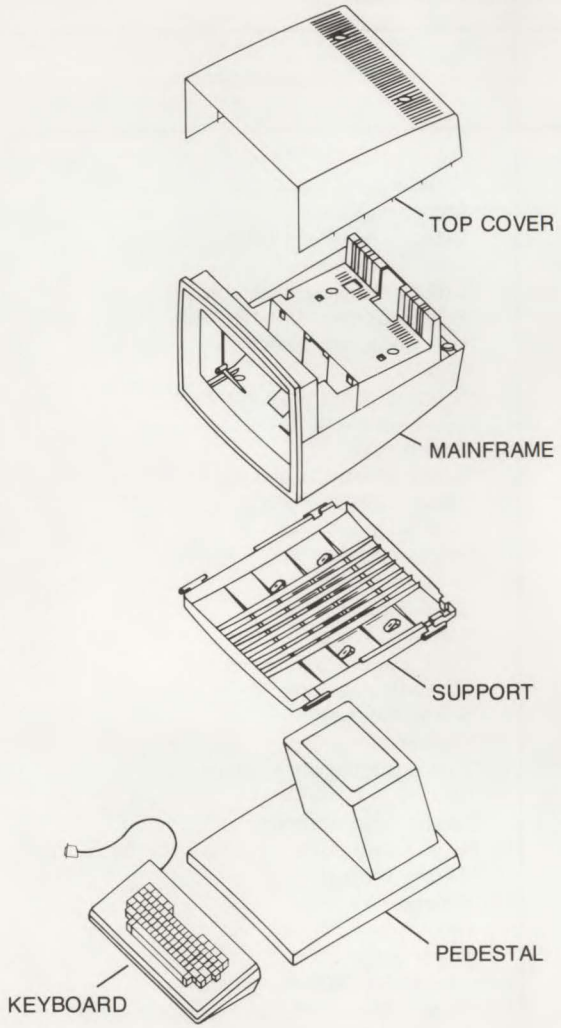


Figure 7-14. 2621A Terminal

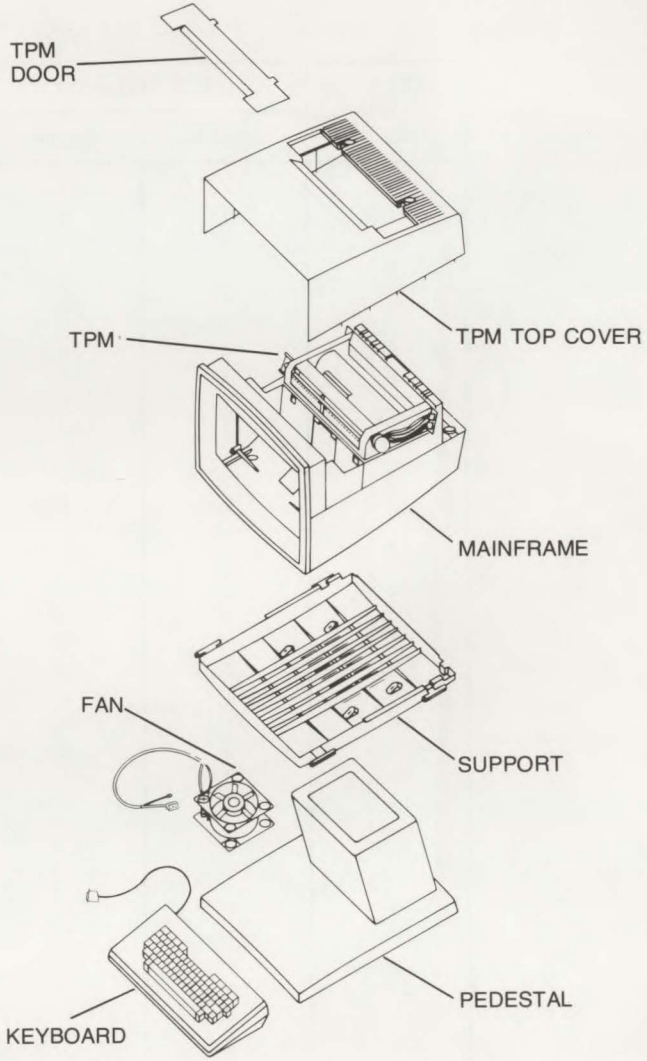


Figure 7-15. 2621P Terminal

Table 7-2. Mainframe Module Assembly

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO.	DESCRIPTION
	2621A	2621P		
7-16-				
1	1	1	4040-1486	*Chassis
				(Attaching Parts)
2	1	1	2090-0042	*Cathode Ray Tube (CRT)
3	1	1	9100-4077	*Yoke, Deflection
4	1	1	02620-60009	*CRT Base Cable Assembly
5	4	4	0624-0440	*Screw, tapping, 10-14 x 5/8
6	1	1	0360-1934	*Lug, quick disconnect
7	1	1	02620-40008	*Bezel
8	4	4	0624-0413	*Screw, tapping, 8-16 x 1/2
				— — — x — — —
9	1	1	02620-60002	*Sweep PCA
10	1	1	02620-60022	*Sweep Power Cable Assembly
11	1	1	02620-60010	*Video Cable Assembly
				— — — x — — —
12	1	1	02620-60003	*Processor PCA
				(Attaching Parts)
12a	7	10	1390-0104	*Snap Fastener Insert
12b	7	10	1390-0281	*Tall Snap Fastener
13	1	1	02620-60021	*Logic Power Cable Assembly
14	1	1	02620-60025	*I/O Panel Assembly
15	3	3	0515-0066	*Screw, machine
16	3	3	2190-0007	*Lockwasher
17	1	1	0360-1263	*Lug, quick discon, rt. angle
				— — — x — — —
18	1		02620-60006	*Power Panel Assembly
				— — — x — — —
19	1	1	1400-0965	*Battery Support
20	1	1	1420-0259	*Battery, 4.2V
				— — — x — — —
21	1		02620-60004	*Power Supply PCA
	1		2110-0043	*Fuse, 1.5A, 250V (Standard)
	1		2110-0063	*Fuse, 0.75A, 250V (used for option 013)
	1		2110-0002	*Fuse, 2A, 250V (used for option 014)
	1		2110-0001	*Fuse, 1A, 250V (used for option 015)
				— — — x — — —

Table 7-2. Mainframe Module Assembly (Continued)

FIG & INDEX NO.	UNITS PER ASSY 2621A	UNITS PER ASSY 2621P	HP PART	DESCRIPTION
22	1		02620-60015	*Transformer Assembly
				— — — X — — —
23	4	6	1600-0886	*Bracket, PC Board
24	8	8	0624-0413	*Screw, tapping, 8-16 x 1/2
25	2	2	1390-0464	*Quarter-Turn Receptacle
				— — — x — — —
26		1	02620-60019	*TPM Power Supply PCA
27		1	02620-60027	*Power Panel Assembly
28		1	02620-60013	*TPM Power Cable
29		1	8120-2805	*TPM Cable
30		3	1400-0611	*Cable Clamp
31		1	02620-60012	*Fan Assembly
32		1	02670-40003	*TPM Mainframe
				— — — x — — —
	1	1	8120-1378	*Power Cord Set, NEMA5/CEE (Standard)
Note 1	1	1	13222-60003	*13222C (RS232C) Cable
Note 1	1	1	13222-60001	*13222N US Modem Cable
Note 1	1	1	13222-60002	*13222M European Modem Cable
Note 1	1	1	13222-60007	*13222W HP 300 Cable
Note 1	1	1	13222-60005	*13222Y Three Wire Cable
Note 1	1	1	13222-60006	*13222Z Three Wire Cable

Note 1. Data Communications Cable (refer to Installation Section for fabrication and parts information).

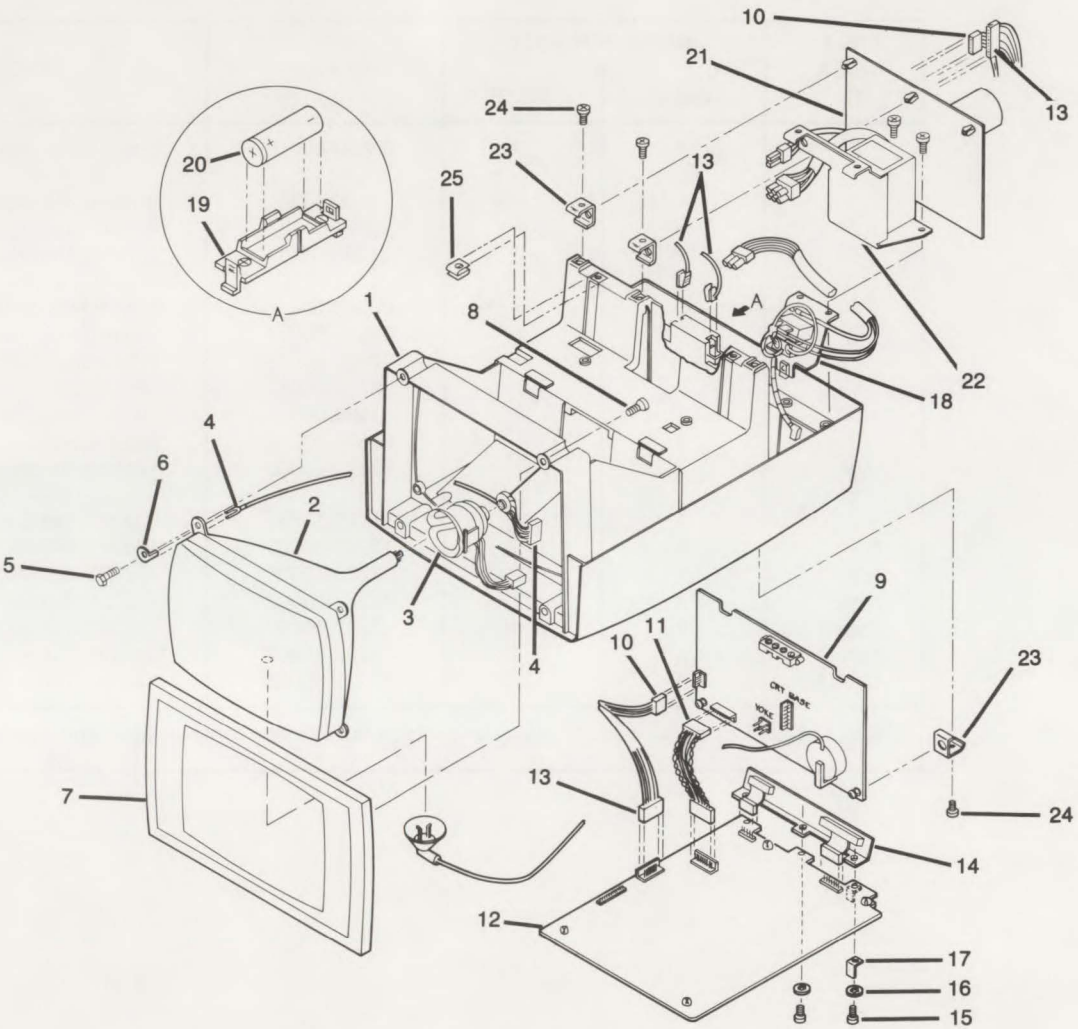


Figure 7-16A. Mainframe, Exploded View (2621A)

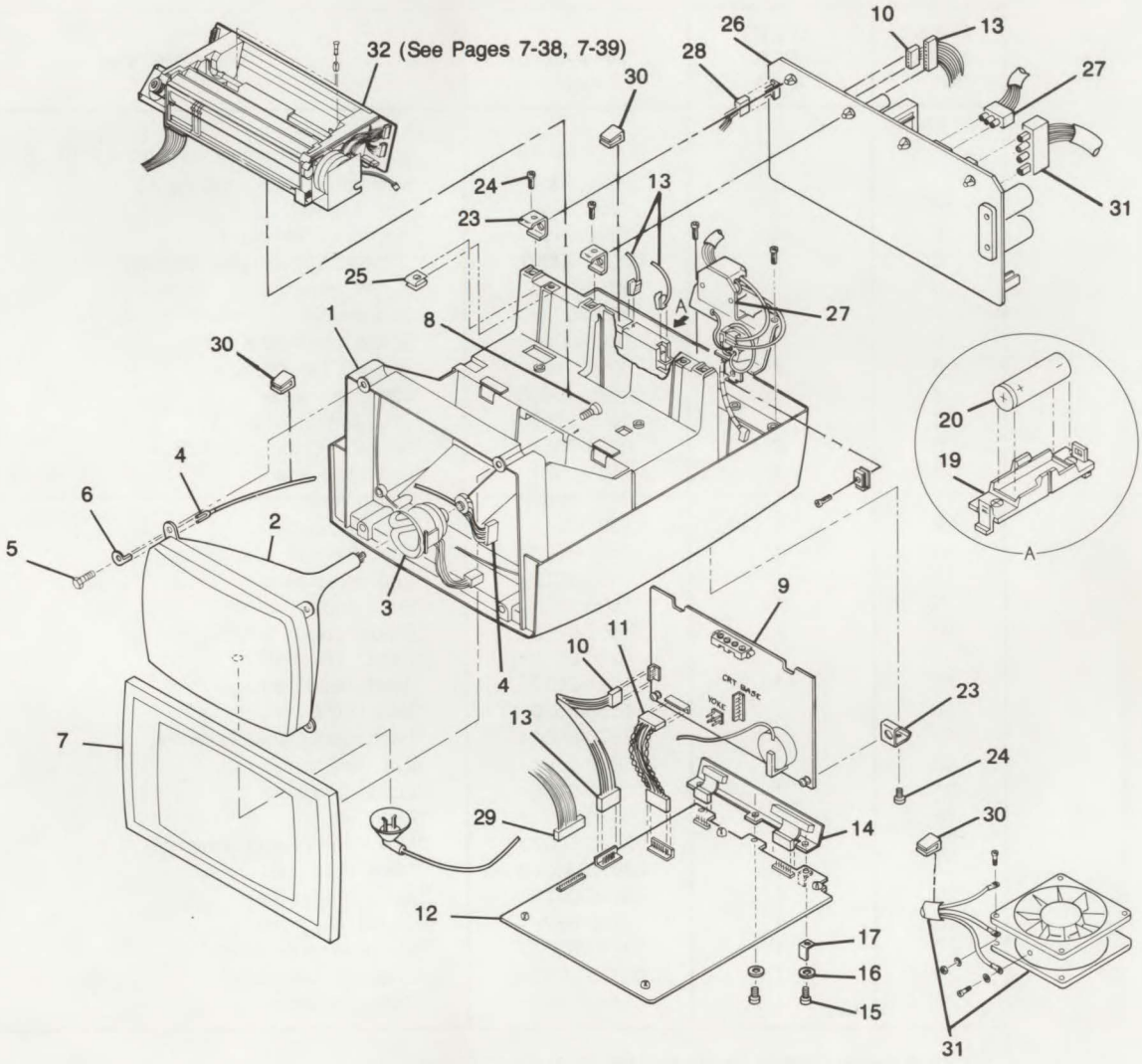


Figure 7-16B. Mainframe, Exploded View (2621P)

Table 7-3. Thermal Print Mechanism

FIG & INDEX NO.	UNITS PER ASSY.	HP PART NO.	DESCRIPTION
7-17-			
		02670-60015	**Mechanical Assembly less Items 2, 19, 26**
1	1	02670-40003	*Mainframe (Attaching Parts)
1a	2	1390-0450	Short Fastener
1b	2	1390-0104	Snap Fastener Insert
2	1	02670-60001*	* **TPM PCA (Exchange Module)**
3	3	2360-0125	*Screw, machine
4	1	1600-0758	*Door Latch
5	1	0624-0364	*Screw, no. 4-20 x .25 in.
6	1	3050-0100	*Washer, flat, no. 4
7	1	02670-40005	*Latching Frame
8	2	1600-0757	*Clip, platen holder
9	2	0624-0364	*Screw, tapping, no. 2-28
10	1	1531-0021	*Shaft, idle roller
11	1	02670-60007	*Platen Assembly
12	1	1531-0019	*Rod, paper roll
13	1	02670-40007	*Tear Window
14	1	1531-0022	*Rod, removable
15	1	1530-2154	*Shaft, rubber drive
16	1	1600-0756	*Guide, paper
	1	9270-0638	*Paper, Thermal
17	1	1531-0017	*Shaft, head carriage
18	1	1530-0520	*Belt, timing
19	1	02670-60014	*Print Head Cable Assembly
20	1	1600-0761	*Clip, head
21	1	1600-0755	*Guide, pressure
22	1	02670-40001	*Plate, left end
23	1	02670-60002	*Motor, Print Head Assembly
24	1	02670-40002	*Plate, right end
25	1	3140-0613	*Motor, Paper Step
26	1	8160-0309	*Shield, Magnetic
27	1	02670-60005	*Microswitch Assembly
28	1	02670-60004	*Solenoid Assembly
29	1	1460-1683	*Spring, Solenoid

*Note: National Options must use TPM PCA 02670-60050.

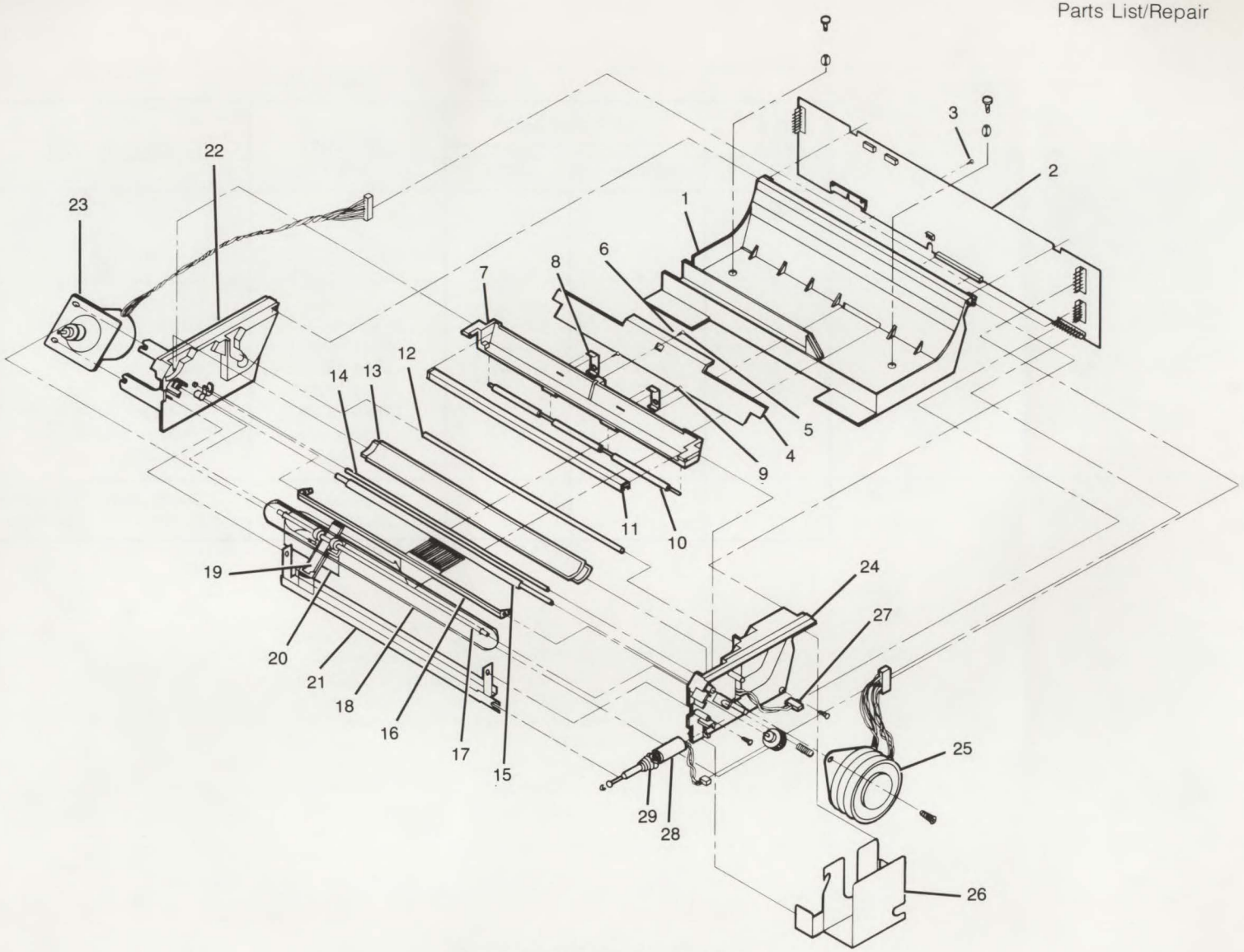


Figure 7-17. TPM, Exploded View

Table 7-4. Keyboard Assembly

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO.	DESCRIPTION
	2621A	2621P		
7-18-				
1	1	1	02620-40001	**Keyboard Top
2	1	1	02620-40002	**Keyboard Base (Attaching Parts)
3	1	1	02620-60032	**Keyboard Inner Mode
4	4	4	0624-0400	**Screw, Tapping, no. 6-19
5	4	4	0403-0324	**Rubber Bumper
6	1	1	7120-1927	**Serial Tag
7	1	1	02620-60028	**Keyboard Cable Assembly
8	1	1	1600-0767	**Retainer, Cable
9	1	1	9160-0233	**Loudspeaker
10	1	1	02620-60016	**Speaker Cable
11	1	1	3101-2337	**Switch Array, 61 Switches
12	2	2	3101-2338	**Switch Array, 4 Switches

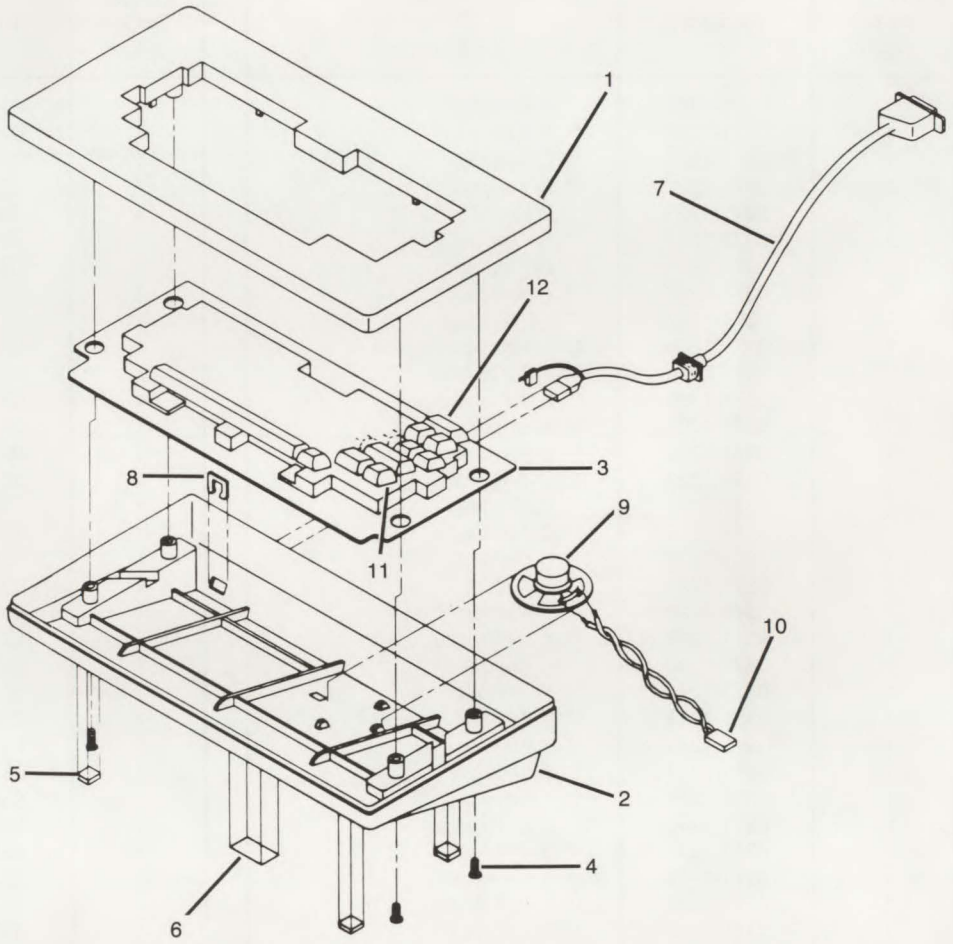


Figure 7-18. Keyboard Assembly

Table 7-5. 2621A/P Keycaps

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1219	** A Keycap
1	0371-1220	** B Keycap
1	0371-1221	** C Keycap
1	0371-1222	** D Keycap
1	0371-1223	** E Keycap
1	0371-1224	** F Keycap
1	0371-1225	** G Keycap
1	0371-1226	** H Keycap
1	0371-1227	** I 5 Keycap
1	0371-1228	** J 1 Keycap
1	0371-1229	** K 2 Keycap
1	0371-1230	** L 3 Keycap
1	0371-1231	** M 0 Keycap
1	0371-1232	** N Keycap
1	0371-1233	** O 6 Keycap
1	0371-1234	** P Keycap
1	0371-1235	** Q Keycap
1	0371-1236	** R Keycap
1	0371-1237	** S Keycap
1	0371-1238	** T Keycap
1	0371-1239	** U 4 Keycap
1	0371-1240	** V Keycap
1	0371-1241	** W Keycap
1	0371-1242	** X Keycap
1	0371-1243	** Y Keycap
1	0371-1244	** Z Keycap
1	0371-1245	** 1 ! Keycap
1	0371-1246	** 2 @ Keycap
1	0371-1247	** 3 # Keycap
1	0371-1248	** 4 $ Keycap
1	0371-1249	** 5 % Keycap
1	0371-1250	** 6 ^ Keycap
1	0371-1251	** 7 & Keycap
1	0371-1252	** 8 * Keycap

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1253	** 9 (Keycap
1	0371-1254	** 0) Keycap
1	0371-1255	** - _ Keycap
1	0371-1256	** = + Keycap
1	0371-1257	** ` ~ Keycap
1	0371-1258	** [{ Keycap
1	0371-1259	**] } Keycap
1	0371-1260	** \ | Keycap
1	0371-1261	** ; : Keycap
1	0371-1262	** ' " Keycap
1	0371-1263	** , < Keycap
1	0371-1264	** . > Keycap
1	0371-1265	** / ? Keycap
1	0371-1266	** ESC DEL Keycap
1	0371-1267	** BACKSPACE KEYCAP
1	0371-1268	** CAPS Keycap
1	1371-1269	** CTRL Keycap
1	0371-1270	** ENTER Keycap
1	0371-1271	** NUM Keycap
1	0371-1272	** BREAK Keycap
1	0371-1273	** TAB ⇆ Keycap
1	0371-1274	** SHIFT Keycap
1	0371-1275	** RETURN Keycap
1	0371-1276	** Blank (LABELS) Keycap
1	0371-1277	** Space Bar Keycap
1	0371-1278	** ↖ (Homeup) Keycap
1	0371-1279	** ↙ (Homedown) Keycap
1	0371-1280	** ROLL ^ Keycap
1	0371-1281	** ROLL v Keycap
1	0371-1282	** < Keycap
1	0371-1283	** > Keycap
1	0371-1284	** ^ Keycap
1	0371-1285	** v Keycap

The following table (Table 7-6) gives the basic keycaps which are common to all of the languages in the national option. Table 7-7 lists the keycaps which are unique to each language in the national option. Both table 7-6 and table 7-7 must be consulted if a complete list of keycaps is desired.

Table 7-6. Basic Keycaps for National Option

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1219	** A Keycap
1	0371-1220	** B Keycap
1	0371-1221	** C Keycap
1	0371-1222	** D Keycap
1	0371-1223	** E Keycap
1	0371-1224	** F Keycap
1	0371-1225	** G Keycap
1	0371-1226	** H Keycap
1	0371-1227	** I 5 Keycap
1	0371-1228	** J 1 Keycap
1	0371-1229	** K 2 Keycap
1	0371-1230	** L 3 Keycap
1	0371-1231	** M 0 Keycap
1	0371-1232	** N Keycap
1	0371-1233	** O 6 Keycap
1	0371-1234	** P Keycap
1	0371-1235	** Q Keycap
1	0371-1236	** R Keycap
1	0371-1237	** S Keycap
1	0371-1238	** T Keycap
1	0371-1239	** U 4 Keycap
1	0371-1240	** V Keycap
1	0371-1241	** W Keycap
1	0371-1242	** X Keycap
1	0371-1243	** Y Keycap
1	0371-1244	** Z Keycap
1	0371-1245	** 1 ! Keycap
1	0371-1864	** 2 " Keycap
1	0371-1248	** 4 $ Keycap

UNITS PER ASSY	HP PART NO.	DESCRIPTION
1	0371-1249	** 5 % Keycap
1	0371-1865	** 8 (Keycap
1	0371-1866	** 9) Keycap
1	0371-1867	** 0 = Keycap
1	0371-1868	** , ; Keycap
1	0371-1869	** . : Keycap
1	0371-1874	** < > Keycap
1	0371-1255	** - __ Keycap
1	0371-1266	** ESC DEL Keycap
1	0371-1267	** BACKSPACE Keycap
1	0371-1268	** CAPS Keycap
1	0371-1269	** CTRL Keycap
1	0371-1270	** ENTER Keycap
1	0371-1271	** NUM Keycap
1	0371-1272	** BREAK Keycap
1	0371-1273	** TAB ≶ Keycap
2	0371-1274	** SHIFT Keycap
1	0371-1275	** RETURN Keycap
1	0371-1276	** Blank (LABELS) Keycap
1	0371-1277	** Space Bar Keycap
1	0371-1278	** ↾ (Homeup) Keycap
1	0371-1279	** ⇂ (Homedown) Keycap
1	0371-1280	** ROLL ∧ Keycap
1	0371-1281	** ROLL ∨ Keycap
1	0371-1282	** < Keycap
1	0371-1283	** > Keycap
1	0371-1284	** ∧ Keycap
1	0371-1285	** ∨ Keycap

Table 7-7. Keycaps Unique to Each Language

UNITS PER ASSY	HP PART NO.	DESCRIPTION
Swedish/Finnish Option — Option Number 001		
1	0371-1247	** 3 # Keycap
1	0371-1870	** 6 & Keycap
1	0371-1871	** 7 / Keycap
1	0371-1872	** + ? Keycap
1	0371-1873	** É Keycap
1	0371-1875	** Å Keycap
1	0371-1876	** Ü Keycap
1	0371-1877	** ' * Keycap
1	0371-1878	** Ö Keycap
1	0371-1879	** Ä Keycap
French Option — Option Number 003		
1	0371-1871	** 7 / Keycap
1	0371-1883	** 3 § Keycap
1	0371-1884	** 6 + Keycap
1	0371-1885	** ' ? Keycap
1	0371-1886	** ^ ¨ Keycap
1	0371-1887	** ` £ Keycap
1	0371-1888	** à ç Keycap
1	0371-1889	** & * Keycap
1	0371-1890	** é è Keycap
1	0371-1891	** ù o Keycap
United Kingdom Option — Option Number 005		
1	0371-1257	** ` ~ Keycap
1	0371-1258	** [{ Keycap
1	0371-1259	**] } Keycap
1	0371-1260	** \ | Keycap
1	0371-1870	** 6 & Keycap
1	0371-1872	** + ? Keycap
1	0371-1896	** 3 £ Keycap
1	0371-1897	** 7 ^ Keycap
1	0371-1898	** ' / Keycap
1	0371-1899	** * @ Keycap

UNITS PER ASSY	HP PART NO.	DESCRIPTION
Danish/Norwegian Option — Option Number 002		
1	0371-1247	** 3 # Keycap
1	0371-1257	** \ ~ Keycap
1	0371-1870	** 6 & Keycap
1	0371-1871	** 7 / Keycap
1	0371-1872	** + ? Keycap
1	0371-1875	** Å Keycap
1	0371-1877	** ' * Keycap
1	0371-1880	** @ ^ Keycap
1	0371-1881	** Æ Keycap
1	0371-1882	** Ø Keycap
German Option — Option Number 004		
1	0371-1870	** 6 & Keycap
1	0371-1871	** 7 / Keycap
1	0371-1876	** Ü Keycap
1	0371-1878	** Ö Keycap
1	0371-1879	** Ä Keycap
1	0371-1883	** 3 § Keycap
1	0371-1892	** ß ? Keycap
1	0371-1893	** ' ` Keycap
1	0371-1894	** £ ^ Keycap
1	0371-1895	** + * Keycap
Spanish Option — Option Number 006		
1	0371-1257	** ` ~ Keycap
1	0371-1870	** 6 & Keycap
1	0371-1872	** + ? Keycap
1	0371-1898	** ' / Keycap
1	0371-1899	** * @ Keycap
1	0371-1900	** 3 ¿ Keycap
1	0371-1901	** 7 ¡ Keycap
1	0371-1902	** o { Keycap
1	0371-1903	** # } Keycap
1	0371-1904	** ñ Keycap



Figure 7-19. Swedish/Finnish Keyboard, Unique Keys

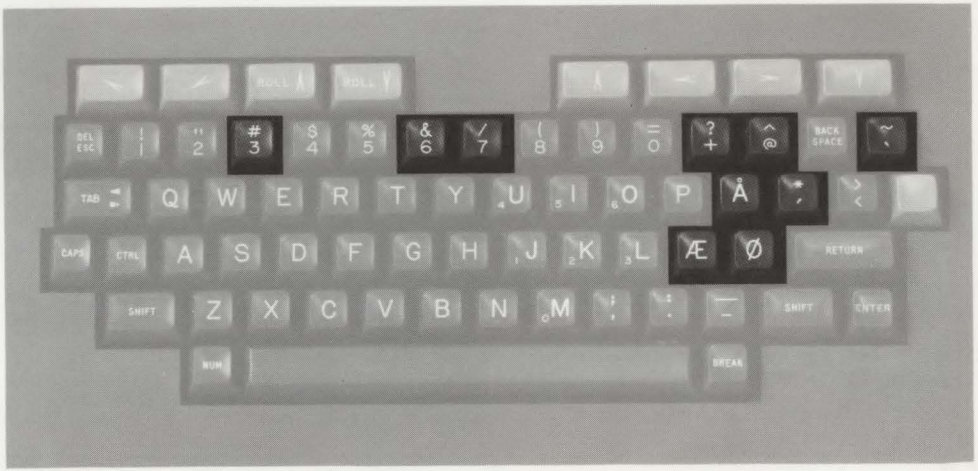


Figure 7-20. Danish/Norwegian Keyboard, Unique Keys

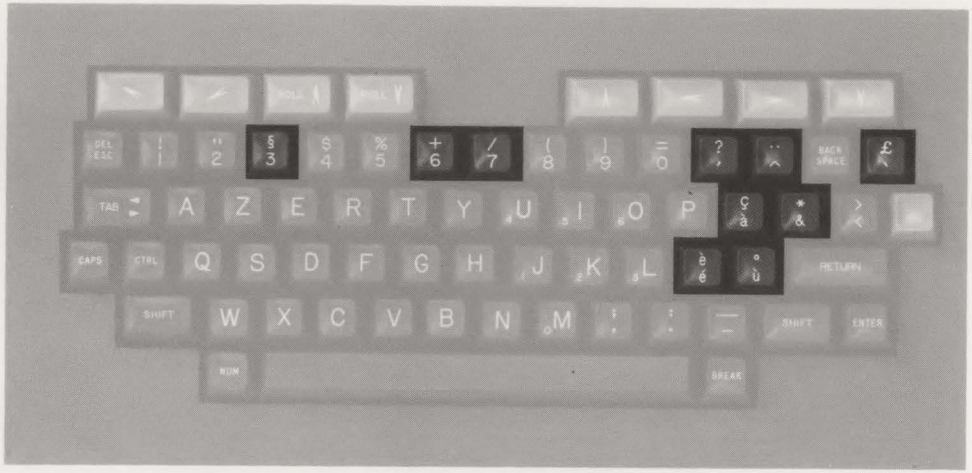


Figure 7-21. French Keyboard, Unique Keys

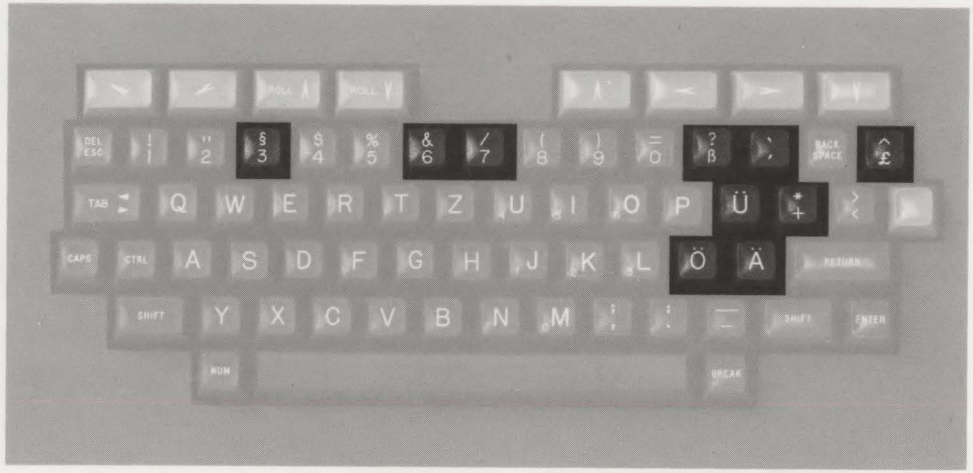


Figure 7-22. German Keyboard, Unique Keys



Figure 7-23. United Kingdom Keyboard, Unique Keys



Figure 7-24. Spanish Keyboard, Unique Keys

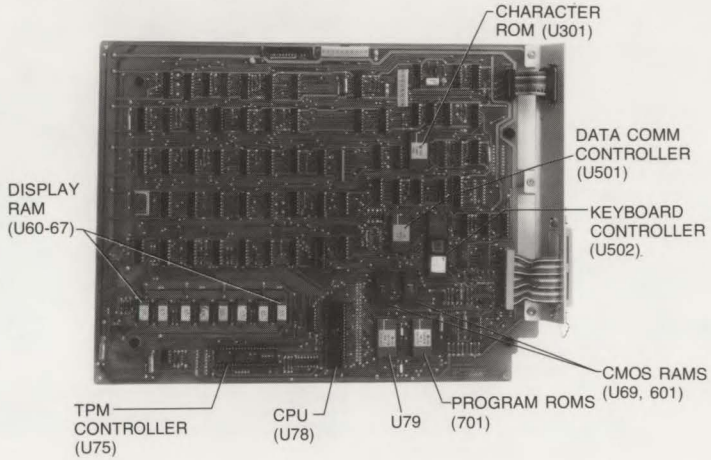


Figure 7-25. Processor PCA

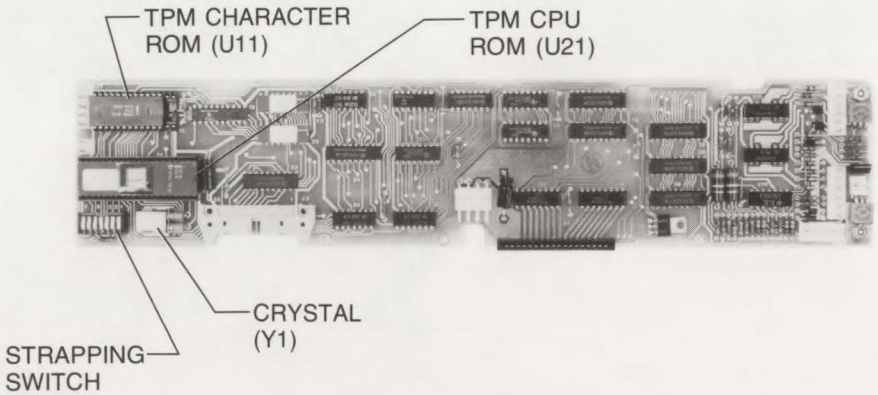


Figure 7-26. TPM PCA

Table 7-8. Removable Components Standard Terminal

REFERENCE DESIGNATOR	UNITS PER ASSY.	HP PART NO.	DESCRIPTION
Figure 7-19	1	02620-60003	*Processor PCA
			(Attaching Parts)
U69, 601	2	1818-0708	**I.C., RAM, CMOS
U301	1	1818-0709	**I.C., ROM, Character
U79[1]	1	1818-0951	**I.C., ROM, Program 5
U701[1]	1	1818-1040	**I.C., ROM, Program 7
U501	1	1820-1690	**I.C., ROM, Data Comm
U78	1	1820-2188	**I.C., CPU
U502	1	1820-2374	**I.C., ROM, Keyboard
U75	1	1820-2374[2]	**I.C., ROM, TPM Controller
U60-67	8	5090-0108	**I.C., 4K RAM, Display
			— — — x — — —
Figure 7-20	1	02670-60001[2]	*TPM PCA
			(Attaching Parts)
U11	1	1818-0981[2]	**I.C., ROM, TPM Character
U21	1	1820-2196[2]	**I.C., ROM, TPM CPU
Y1	1	0410-1189[2]	**Crystal, 6 MHz

NOTES:

1. If U79 or U701 is replaced, you must be sure that both ROMs are as listed in table 7-8. For example, if U79 and U701 are 1818-0732 and 1818-0793 respectively, and one of them fails, you must replace both ROMs. They should be replaced with 1818-0951 and 1818-1040, respectively.
2. These parts are only used on the HP 2621P.

Table 7-9. Removable Components National Option

REFERENCE DESIGNATOR	UNITS PER ASSY.	HP PART NO.	DESCRIPTION
Figure 7-19	1	02620-60003	*Processor PCA
			(Attaching Parts)
U69, 601	2	1818-0708	**I.C., RAM, CMOS
U301	1	(see Table 7-10)	**I.C., ROM, Character
U79	1	1818-0980	**I.C., ROM, Program
U701	1	1818-0982	**I.C., ROM, Program
U501	1	1820-1690	**I.C., ROM, Data Comm
U78	1	1820-2188	**I.C., CPU
U502	1	1818-2374	**I.C., ROM, Keyboard
U75	1	1818-2374	**I.C., ROM, TPM Controller
U60-67	8	5090-0108	**I.C., 4K RAM, Display
			— — — x — — —
Figure 7-20	1	02670-60050	*TPM PCA
			(Attaching Parts)
U11	1	1818-0981	**I.C., ROM, TPM Character
U21	1	1820-2196	**I.C., ROM, TPM CPU
Y1	1	0410-1189	**Crystal, 6 MHz

Table 7-10. Character ROMs for Each Language Option

DESCRIPTION	OPTION NUMBER	LANGUAGE	HP PART NO.
I.C., ROM, Character	001	Swedish/Finnish	1818-1145
I.C., ROM, Character	002	Danish/Norwegian	1818-1144
I.C., ROM, Character	003	French	1818-1143
I.C., ROM, Character	004	German	1818-1142
I.C., ROM, Character	005	United Kingdom	1818-1141
I.C., ROM, Character	006	Spanish	1818-1140

Table 7-11. Exchange Modules

HP PART NO.	DESCRIPTION	TERMINAL 2621A	TERMINAL 2621P
02620-69002	*Sweep PCA	1	1
	— — — x — — —		
02620-69003	*Processor PCA	1	1
	(Less Assembly and Components Listed Below		
02620-60021	**I/O Panel Assembly	1	1
U301***	**Character ROM	1	1
U79***	**Program ROM Code	1	1
U701***	**Program ROM Code	1	1
U502***	**TPM Interface 8041A		1
U75***	**Keyboard Interface 8041A	1	1
	— — — x — — —		
02620-69004	*Power Supply PCA, 2621A	1	
	**(Less Fuse)	1	
	— — — x — — —		
02620-69019	*Power Supply PCA, 2621P		1
	**(Less Fuse)		1
	— — — x — — —		
02620-69032	*Keyboard PCA (with keycaps)	1	1
	— — — x — — —		
02670-69001	*TPM PCA[1]		1
	(Less Components Listed Below)		
Y1***	**Crystal, 6 MHz		1
U11***	**Character ROM		1
U21***	**Processor 8048		1
	— — — x — — —		
02670-69015	*TPM Mechanical Assembly		1
	*(Less Assemblies Listed Below)		
02670-60001	**TPM PCA		1
02670-60014	**Print Head and Cable Assy		1
8160-0309	**Magnetic Shield		1

*Exchange Module.
**These components or assemblies must be removed.
***Reference Designators, see Table 7-8 or Table 7-9 for HP Part No.

[1]Note: For National Options use TPM PCA exchange module 02670-69050.

Functional Operation VIII

INTRODUCTION ..... This section contains a brief block diagram discussion of the terminal. A functional block diagram of the terminal is shown in figures 8-1 and 8-2. The terminal consists of a Processor PCA, Sweep PCA, Power Supply, and Keyboard Module.

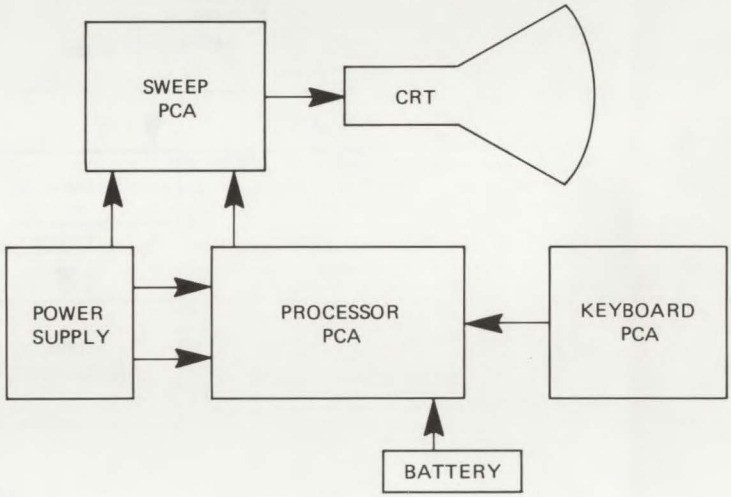


Figure 8-1. 2621A Simplified Block Diagram

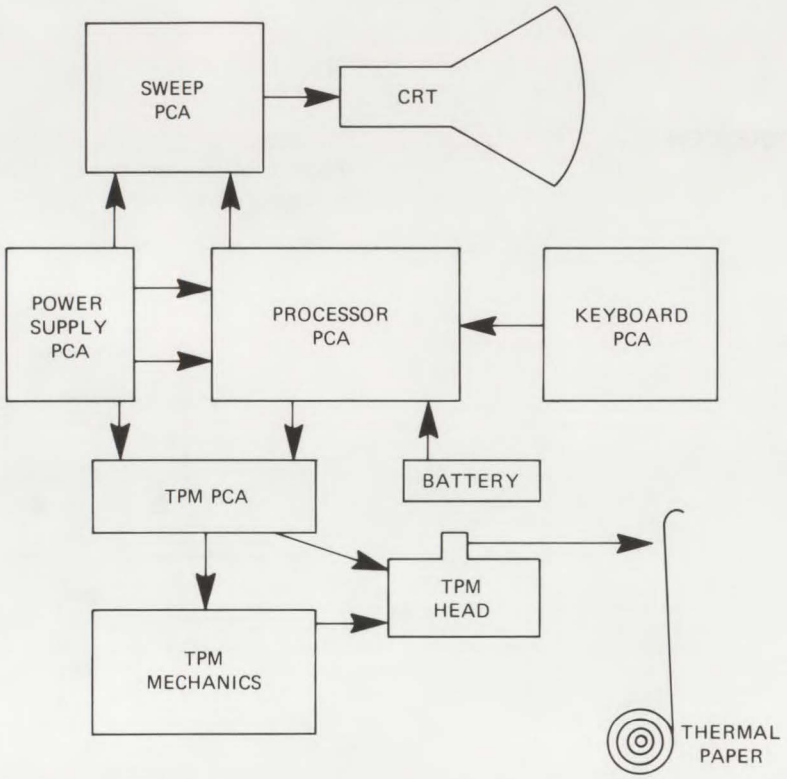


Figure 8-2. 2621P Simplified Block Diagram

Processor PCA

INTRODUCTION .....

The Processor PCA is divided into three functional sections: the Microprocessor Controller, Terminal Timing, and the Video Controller. Figure 8-3 shows a block diagram of the Processor PCA.

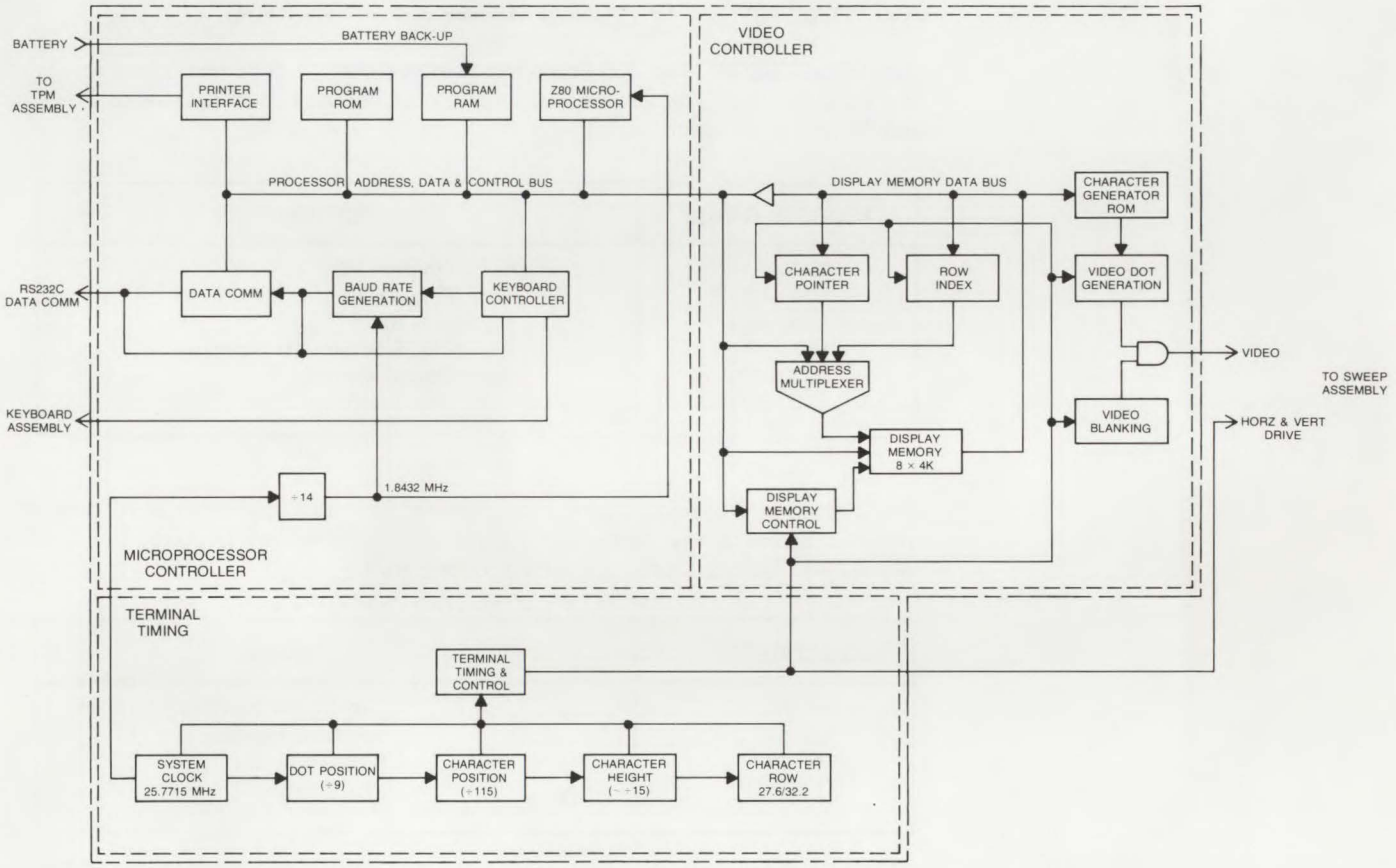


Figure 8-3. Processor PCA Block Diagram

MICROPROCESSOR CONTROLLER

The Microprocessor Controller consists of seven subsections, the Z80 Microprocessor, Program ROM, Program RAM, Keyboard Controller, Data Comm, Baud Rate Generation, and Printer Interface. Descriptions of these subsections follow:

Z80 PROCESSOR. The Z80 Processor operates with a 1.8432 MHz clock resulting in a 5.43ns cycle time. The address space of the processor is decoded into 8K byte increments and is allocated as follows:

ADDRESS RANGE	DEVICE
0000-1FFF	Program ROM 1
2000-3FFF	Program ROM 2
4000-7FFF	(Not Used)
8000-9FFF	CMOS Scratch Pad Memory
A000-DFFF	Display Memory
E000-FFFF	(Not Used)

The Z80 I/O addressing scheme is decoded by the most significant five I/O address bits (A7-A3). Each I/O device consists of eight registers which are decoded by I/O address bits A2-A0. I/O addresses are allocated as follows:

I/O ADDRESS	DEVICE
98, 99	Data Comm Interface
58, 59	Keyboard Interface
38, 39	Printer Interface
10-17/08-0F	(Not Used)

The WAIT signal synchronizes the operation of the Z80 with that of the display memory accesses (DMAs). The WAIT signal suspends a Z80 instruction during a display memory operation.

PROGRAM ROM. There are two IC sockets that hours two 4K ROMs. The ROMs receive address bits A0-A12.

PROGRAM RAM. There are two program RAMs that provide the Z80 with 256 bytes of fast RAM. These RAMs are battery backed-up to retain the terminal configuration while the terminal power is off.

The terminal uses a 4.2V mercury or 3.8V lithium battery for back-up power. The +5V and the battery are diode isolated to ensure battery usage only when the terminal power is off.

KEYBOARD INTERFACE. The Keyboard Interface is controlled by a 8041A slave microprocessor, which scans the keyboard, rings the bell, and performs general purpose I/O functions. The keyboard processor scans the entire keyboard every 24ms, and only reports the ASCII or control key functions to the Z80 processor. There are 13 I/O lines that are used for strapping the terminal (see Strapping Section for details).

The 8041A consists of two ports: PORT1 is used for keyboard control and ringing the bell, and PORT2 is used for strapping and data comm control lines.

DATA COMM INTERFACE. The data comm interface consists of an Asynchronous Communications Interface Adaptor (ACIA) integrated circuit. This ACIA performs a serial to parallel data conversion for RS-232 data transmission, detects parity, framing, and overrun errors. Data transmission is buffered, driven, and received by the ACIA's associated circuitry.

BAUD RATE GENERATION. Baud Rate values are generated from a system clock (25.7715 MHz) which is divided by 14 to generate a 1.8432 MHz clock. This frequency is used as the Z80 Microprocessor clock. The Z80 clock, rate selector, demultiplexer, and buffer generate the following Baud Rate values: EXT, 110, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, and 9600.

PRINTER INTERFACE. The Printer Interface is controlled by the I/O ports of the 8041A processor. PORT2 is used for printer data and is buffered for extended drive. PORT1 is used for printer control.

TERMINAL TIMING .....

Terminal timing consists of a system clock, dot position counter, character position counter, character height and row counters, and a DMA row decoder.

SYSTEM CLOCK. All terminal clocks are generated from the system clock (25.7715 MHz). A hybrid crystal oscillator generates a 25.7715 MHz TTL clock. In normal operation, an external clock is not used, however, if a slower clock is desired, then an external clock is applied to a buffer.

DOT POSITION COUNTER. The Dot Position Counter defines the width of a character, and generates the necessary timing signals for video character display. Such signals as dynamic memory timing, character control timing, and character data pulses are derived from the Dot Position Counter.

CHARACTER POSITION COUNTER. The Character Position Counter divides the CRT raster into 115 character positions. The first 80 characters are displayed on the screen, while the remaining 35 characters are used for horizontal retrace. A horizontal drive signal synchronizes the switching power supply to that of the horizontal sweep rate of the Sweep PCA.

CHARACTER HEIGHT AND ROW COUNTERS. The Character Height Counter provides 15 raster lines per character cell. The Character Row Counter provides 26 character rows, and extra scan lines for vertical retrace. Extra scan lines are also required to refresh the CRT at 50 or 60 Hz instead of changing the horizontal sweep frequency. This results in 415 scan lines for 60 Hz, and 498 scan lines for 50 Hz.

DMA ROW DECODE. The Z80 processor completes a display memory access (DMA) cycle only when the Video Controller relinquishes its control. This is accomplished by a character position wait (CPWAIT) signal which occurs during horizontal retrace or when a CRT refresh cycle does not occur. The DMAROW signal decodes the DMA cycle.

VIDEO CONTROLLER .....

The Video Controller fetches the ASCII characters from display memory and with basic terminal timing converts the data into a serial video dot stream.

The Video Controller consists of a Display Memory, Display Memory Control, Address Multiplexer, Character Pointer, Row Index, Character Generation ROM, Video Dot Generation, and Video Blanking.

DISPLAY MEMORY. Display Memory consists of 4K RAMs with a 349ns cycle time. Display Memory is divided into three sections: Window Pointers, Row Pointers, and Character Data.

Window Pointers. The Top-of-Screen (Window) pointer is located at A080. The value at this location points to the first row pointer. This row pointer, as well as the next 23 row pointers are used to sequentially refresh the CRT. The Soft-Key-Label (window) pointer is located at A081. This row pointer selects the data to be displayed during the 26th character row.

Row Pointers. The first 64 bytes of display memory are row pointers which are used to index the character rows. The addressing scheme of the character row permits the row pointer to select any one of 256 links in display memory, a link being 16 consecutive bytes.

Character Data. The remaining portion of display memory is used to store Z80 character data. Each character row is required to start at the link beginning, and each row uses 80 consecutive memory locations.

DISPLAY MEMORY CONTROL. Display Memory Control generates the appropriate timing signals for the dynamic RAM's. A memory cycle is initiated with either the DMA or Z80 processor requesting a display memory cycle. This memory cycle is clocked through a delay shift register resulting in timing signals for both row and column strobing and address selecting.

ADDRESS MULTIPLEXER. The display memory is addressed from three sources: the Z80 processor, the character pointer, and the row index. These three addresses and the row/column address multiplexing is controlled by the Address Multiplexer. During a non-DMA raster scan or during horizontal retrace, the Z80 address is selected. The character pointer is selected during horizontal blanking and the row index is active when the character position counter is reset. The row/column multiplexing is controlled by display memory timing.

CHARACTER POINTER. The Character Pointer is a 12-bit register containing the address of the next character to be displayed. When the counter position is reset, the character pointer is loaded with the row pointer which is addressed by the index pointer. The character pointer points to any one of the 256 links in display memory. This is the first character to be displayed. The next 80 bytes are then fetched from display memory, with the character pointer being incremented after each read.

ROW INDEX. The Row Index is a six-bit register which contains the address of the row pointer currently being used to index the displayed character row. The top-of-screen pointer points to the first row pointer to be used. The character rows are incremented until 24 consecutive row pointers are used, causing the CRT to be refreshed.

CHARACTER GENERATION ROM. The Character Generation ROM uses ASCII data and the character scan height to generate dot images. Character resolution is enhanced by half-shifting the character height. The half-shifting generates smoother character angles and curves. Each character scan line segment is stored in ROM as an 8-bit word. Seven of the bits are used character dots, and the eighth is used to specify half-shifting of the dot data.

VIDEO DOT GENERATION. Video Dot Generation creates the basic character cell. The basic character cell is a 9-dot by 15-scan line rectangle. Within this cell is the 7 x 9 character, surrounded by one dot on either side for horizontal spacing, four scan lines below for lower case character descenders, and one scan line above and below for row-to-row spacing.

VIDEO BLANKING. Video Blanking generates screen blanking from terminal timing and control signals. Video blanking occurs when character rows are not displayed, horizontal retrace, Z80 controlled blanking, and character row 24.

Sweep PCA

INTRODUCTION .....

The Sweep PCA interfaces the low level logic signals from the Processor PCA to the CRT. It generates all drive signals and specialized voltages required by the CRT display.

The Sweep PCA consists of three drive circuits: Video, vertical, and horizontal. Figure 8-4 shows a simplified block diagram of the Sweep PCA.

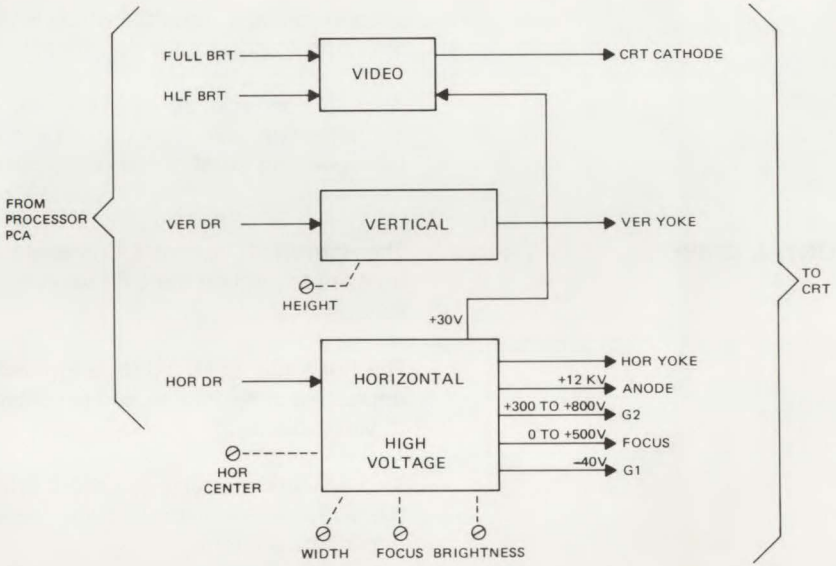


Figure 8-4. Sweep PCA, Simplified Block Diagram

VIDEO DRIVE .....

The function of the Video Drive is to interface the low level logic input signals from the Processor PCA to higher levels required to drive the cathode ray tube (CRT). The video circuitry is very fast and it typically features rise and fall times of 15ns or less.

Two video amplifiers and a current sourcing device supply 10mA continuously. This current is driven higher on positive going transitions which create a very fast rise time and low power dissipation. Half-bright (+5 volts on CRT cathode) and full-bright (0 volts on CRT cathode) levels are generated in the video drive circuitry.

VERTICAL DRIVE .....

The Vertical Drive circuit generates a vertical scanning waveform which causes the electron beam in the CRT to be moved from the top to the bottom of the screen.

A positive vertical ramp is generated and it is sampled by an integrator. The ramp is integrated into a parabola which is used to slow the deflection down at the extremes of the ramp to correct for non-linearity due to the flatness of the CRT screen.

An output amplifier converts the ramp from the integrator to a current which is applied to the deflection yoke. This current is compared to the ramp voltage by a comparator. The DC operating point of the output amplifier is stabilized.

HORIZONTAL DRIVE .....

The Horizontal Drive circuit generates a horizontal scan which sweeps the electron beam from left to right on the CRT screen. The horizontal drive also generates dedicated CRT voltages.

The horizontal drive signal is applied to two one-shot multivibrators which generate an adjustable delay that is used to center the raster by delaying horizontal reset with respect to video blanking.

This adjusted signal is fed into a flyback circuit which forms a ringing horizontal sweep circuit. Nonlinearity is improved by slowing down the sides of the deflection beam with a capacitance circuit.

The flyback circuit generates output voltages of +40V, −40V, +800V, and +12KV. The +12KV, which is used for CRT biasing, is rectified in the flyback. The other output voltages are rectified and filtered on the Sweep PCA.

2621A Power Supply

INTRODUCTION .....

The 2621A Power Supply generates the following voltages: +12V at 1.8A, +5V at 2.5A, and −12V at 0.075A. It also generates a Power On and Power Fail Warning signal.

The Power Supply consists of five sections: the +12 Volt Regulator, +5 Volt Regulator, −12 Volt Regulator, Power On/Power Fail Circuit, and the SYNC Circuit. These five sections plus a power bracket (consisting of a transformer, rectifier, and a filter) generate the necessary power and logic signals for the Processor and Sweep PCA's. Figure 8-5 shows a simplified block diagram of the Power Supply.

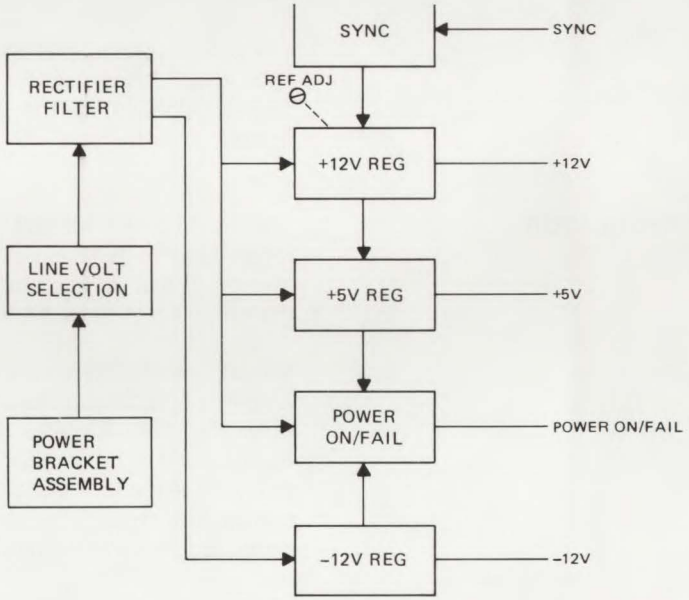


Figure 8-5. 2621A Power Supply, Simplified Block Diagram

+12 VOLT REGULATOR .....

The +12 Volt Regulator is a switching regulator which steps down and regulates the main unregulated supply voltage (25V typically at 115V line input). It also generates a ramp, +2.5V reference, and a clock pulse which are used by the +5 Volt Regulator.

The switching regulator is an integrated circuit which generates a +5V reference, 25 KHz RAMP, 25 KHz clock pulse, an output pulse which changes in width to regulate the supply, and the necessary circuitry to sense the +12V supply. The output voltage of the switching regulator is regulated by controlling the on and off time of the switching elements.

The output current is sensed by a comparator and it is protected with a current limit circuit set at 2.5A. A foldback characteristic is obtained because the +12V output forms part of the current reference, and as it decreases (due to current limit) the current limit reference decreases.

The output voltage is filtered by a smoothing filter and it is protected from overvoltaging by a zener voltage of 15V. The output voltage is adjusted by adjusting the +5V potentiometer (located on the Power Supply PCA). Since the +5V supply tracks the +12V supply, adjusting the +5V supply will adjust the +12V supply.

+5 VOLT REGULATOR .....

The action of the +5 Volt Regulator is identical to the +12 Volt Regulator except that it receives all of its timing signals and its reference voltages from the +12 Volt Regulator section. These signals synchronize the two regulators thus reducing their RFI output, and the shared reference allows them to track.

Circuit operation is identical to the +12 Volt Regulator except that it requires an error amplifier and comparator to generate the drive pulse for the power switching device. An error amplifier compares the +5V output which is divided to the +2.5V reference. The output of the error amplifier is applied to one input of the comparator which compares it to the voltage ramp received from the +12 Volt Regulator. The comparator turns on a current source until the ramp voltage exceeds the error voltage. The output voltage is protected from overvoltaging by a zener diode (6.19V).

−12 VOLT REGULATOR ..... The −12 Volt Regulator supplies the minimal 75mA requirements of the Processor PCA for a negative voltage.

The −12 Volt Regulator receives its voltage from a voltage doubler which operates from a voltage obtained across the full bridge rectifier. The doubler outputs a voltage equal to the voltage used by the positive regulators. The −12 Volt Regulator is a linear regulator which down regulates the −25V output of the doubler to −12V.

POWER ON/$\overline{\text{FAIL}}$ CIRCUIT ..... The Power On/$\overline{\text{Fail}}$ Circuit serves two functions. It senses all output voltages and it indicates to the Processor PCA when the +5V supply is in regulation. It also senses the line input voltage and it indicates a power fail condition shortly before the switching regulators go out of regulation.

An amplifier is used as a comparator to sense line input voltage. When the voltage drops to about +15V the comparator outputs a power fail signal. Another comparator senses the +5V line and outputs a signal to indicate that the +5V supply is in regulation.

SYNC CIRCUIT ..... The Sync Circuit receives a horizontal drive pulse from the Sweep PCA, and uses it to synchronize switching regulation to that of the sweep rate. This is necessary to prevent the switching rate of the Power Supply from interfering with the CRT display. CRT displays are very sensitive to noise on the power supply lines.

POWER BRACKET ASSEMBLY ..... The Power Bracket Assembly consists of a line filter, power switch, and a power transformer. The power transformer is shielded to prevent it from interfering with the CRT display. The line input voltage is selected by a combination of selecting the fuse position and by plugging the transformer input cable into the appropriate power source receptacle on the Power Supply PCA.

2621P Power Supply

INTRODUCTION .....

The 2621P Power Supply is a switching supply that provides regulated voltage supplies of ±16VDC, ±12VDC, and +5VDC. It also generates a Power On and Power Fail Warning signal.

The 2621P Power Supply consists of five basic sections: the Primary Switcher, Secondary Regulation, Protection Circuitry, Logic Signal Interface and the Bootstrap Supply. Figure 8-6 Shows a simplified block diagram of the 2621P Power Supply.

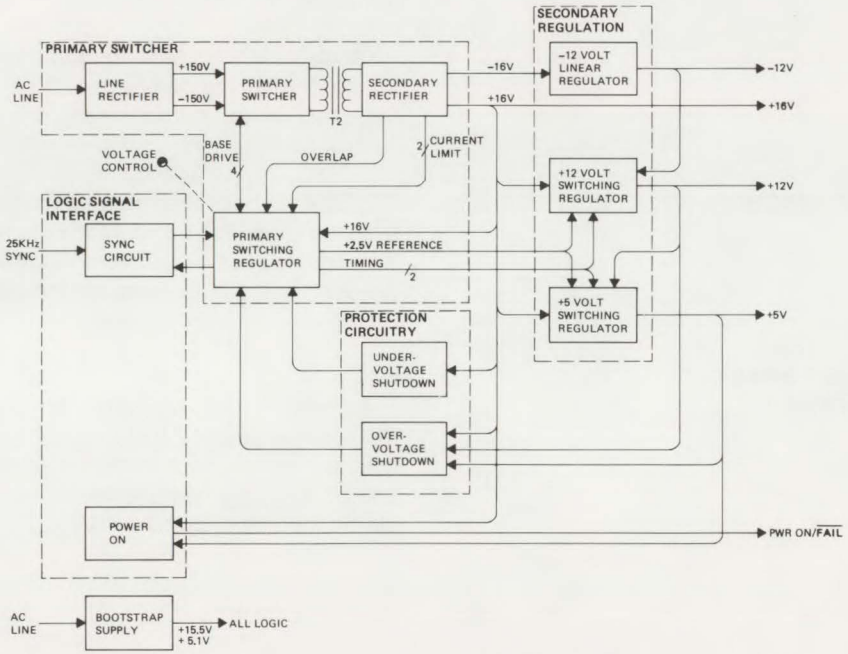


Figure 8-6. 2621P Power Supply, Simplified Block Diagram

PRIMARY SWITCHER .....

The Primary (off-line) Switcher consists of a Line Rectifier, Primary Switcher, Secondary Rectifier, and Primary Switching Regulator. These subsections transform power from the AC line to isolated ±16VDC sources.

LINE RECTIFIER. The Line Rectifier rectifies and filters the incoming AC power to an output voltage of ±150VDC at nominal line. Line voltage selection is determined by fuse location which configures the Line Rectifier as either a voltage doubler (115VAC operation) or as a full wave bridge (230VAC operation).

PRIMARY SWITCHER. The Primary Switcher uses the Primary Switching Regulator to alternately switch the primary of power switching transformer T2 between ±150VDC (outputs of the Line Rectifier). The Primary Switcher employs pulse-width modulation to ensure voltage regulation, and voltage clamping to protect the transformer primary from overvoltaging.

SECONDARY RECTIFIER. The output voltage of power transformer T2 is rectified and filtered by the Secondary Rectifier. This section also provides ±16V outputs, current limit sensing, and overlap voltage to the Primary Switching Regulator.

PRIMARY SWITCHING REGULATOR. The Primary Switching Regulator provides the controls necessary for the Primary Switcher section to operate. The main part of the Switching Regulator is a regulator IC (SG3524), which provides fixed frequency pulse-width modulated voltage regulation to the Primary Switcher.

A 2.5V reference from the internal 5V linear regulator powers the external CMOS ICs and provides voltage referencing for the +12V and +5V Switching Regulators. Adjustment of a potentiometer labeled "Voltage Control" proportionally adjusts the +5V, +12V, and +16V supplies.

Switching operation is inhibited by current limiting the secondary of power switching transformer T2.

To prevent destructive conduction overlap in the Primary Switching Regulator during low-line conditions, the overlap voltage output from the Secondary Rectifier inhibits the switching operation of the regulator IC (SG3524).

SECONDARY REGULATION ..... The Secondary Regulation section of the Power Supply consists of three subsections: −12 Volt Linear Regulator, +12 Volt Switching Regulator, and the +5 Volt Switching Regulator.

−12 VOLT LINEAR REGULATOR. The −12 Volt Linear Regulator consists of a −12V regulator IC and an output bypass capacitor. This regulator provides a fixed output voltage (−12V), and both thermal and current limit protection.

+12 VOLT SWITCHING REGULATOR. The +12 Volt Switching Regulator receives +16V from the Secondary Rectifier, and both +2.5V reference and switch timing from the Primary Switching Regulator, together they generate a +12V regulated supply.

The main component in the +12V Switching Regulator is a switching IC (Darlington transistor) that provides a switching regulated output supply of +12V.

Switching noise and power dissipation is reduced. The switching IC is protected from reverse bias breakdown by a zener diode should a short to ground occur on the +16V output from the Secondary Rectifier.

Voltage Regulation is provided by comparing the switching reference voltage to the feedback voltage. The difference is compared to a linear ramp voltage and when the ramp voltage exceeds the reference voltage, the switching action stops until regulation returns. The switching reference voltage is clamped at 4.3V to prevent overvoltaging at turn-on.

+5 VOLT SWITCHING REGULATOR. The operation of the +5 Volt Switching Regulator is identical to the +12 Volt Switching Regulator except that it is protected from overvoltaging by a 6.19V zener diode. A comparator prevents the +5 Volt Switching Regulator from operating if the +12V output from the +12V Switching Regulator drops below 10V.

PROTECTION CIRCUITRY ..... The Power Supply provides protection for both overvoltage and undervoltage conditions on the +16V, +12V, and +5V output supplies.

OVERVOLTAGE SHUTDOWN. The overvoltage threshold of the +16V, +12V, and +5V supplies is set at +17.2V, +13.4V, and +5.6V respectively. The Overvoltage Shutdown subsection monitors these supplies for abnormally high voltages.

Each output supply is compared to a reference voltage (5.1V from the Bootstrap Supply) and if any of these supplies rises above its threshold level, the switching regulator IC (SG3524) is suspended and the Primary Switcher section is disabled. Thus the Power Supply is shutdown if overvoltaging should occur.

UNDERVOLTAGE SHUTDOWN. The Undervoltage Shutdown subsection monitors the +16V output supply for undervoltage conditions. If the +16V supply drops below +13V for approximately two seconds or more, a comparator compares this voltage with a reference voltage from the Bootstrap Supply section and activates a shutdown sequence. The Primary Switching Regulator section is disabled which effectively shuts down the Power Supply.

LOGIC SIGNAL INTERFACE ..... The Logic Signal Interface section consists of two subsections: the Sync Circuit which synchronizes the Power Supply's switching rate to the video sweep rate, and a Power On circuit which provides indications for both Power On and Power Fail conditions.

SYNC CIRCUIT. The Sync Circuit synchronizes the Power Supply's switching rate to twice the video sweep rate. Synchronizing prevents switching noise from appearing on the CRT display. The Sync Circuit is a digital phase-lock-loop synchronizer limited to input sync signals ranging from 20 to 30 KHz, which corresponds to Power Supply switching rates ranging from 40 to 60 KHz.

POWER ON. The Power On circuit serves two functions. One, it senses the output of the +5 Volt Switching Regulator and it indicates when the +5V output is in regulation. Two, it monitors +16V output and generates a power fail indication when the +16V output drops below +13V.

BOOTSTRAP SUPPLY ..... The Bootstrap Supply provides the start up power for the Primary Switcher. Once the Primary Switcher is operating satisfactorily, the Bootstrap Supply receives its operating power from the +16V output.

Keyboard Module

INTRODUCTION ..... The Keyboard Module scans the keys and returns their status to the Processor PCA. The Keyboard Module consists of a decoder, multiplexer, and driver. These three subsections make up the scanning circuit of the Keyboard.

KEYBOARD SCANNING ..... Address lines from the Processor PCA are continuously scanning the Keyboard every 24ms via the Keyboard Cable, RC filter, decoder, and multiplexer. The address of a selected key is decoded by a BCD to decimal decoder, which decodes the column address of the key matrix, and a multiplexer, which scans the address row of the key matrix. The state of the addressed key is returned to the Processor PCA and decoded.

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INDEX

accessories available 1-3
address multiplexer 8-7
alignment 5-1
ASCII status characters 3-20

battery
  location 7-19
  maintenance 4-1
  ordering 7-30
  removal 4-2, 7-18
  replacement 4-1, 7-18
baud rate
  configuration 3-4
  generation 8-5
block diagram
  processor PCA 8-3
  simplified sweep PCA 8-9
  simplified (2621A) 8-1
  simplified (2621P) 8-2
  simplified 2621A power supply 8-11
  simplified 2621P power supply 8-14
bootstrap supply 8-18

cable connector, pin assignments 2-11
cable fabrication 2-18
cable wiring
  13222C (RS232C) 2-12
  13222M (European modem) 2-13
  13222N (U.S. modem) 2-14
  13222W (HP 300) 2-15
  13222Y (three wire/male) 2-16
  13222Z (three wire/female) 2-16
cabling 2-11
character data 8-7
character generation ROM 8-8
character height and row counter 8-6
character mode, long transfer 3-7
character pointer 8-8
character position counter 8-6
character ROMs for national option 7-50
closing terminal 2-5
configuration
  default selections 3-4
  function keys 3-2
  language 3-14
  lock 3-15
configuration mode
  initiation 3-3
  termination 3-15
configuring the terminal 3-1
connector locations 2-2
continuous unit self-test 6-3

D1 trigger handshake 3-9
D1/D2 handshake protocol 3-8
D1/D2 handshake protocol
  strapping effects 310
D1/D2/D1 warning handshake 3-9
Danish/Norwegian keyboard 7-45
data comm self-test 6-4
data comm interface 8-5
data comm connector, location 2-2
data speed select 3-10
data transfer selections 3-1
data trigger handshake 3-7
diagnosing problems 6-2
diagnostic error messages 6-7
display characteristics 3-1
display memory 8-7
display memory control 8-7
DMA row decode 8-6
dot position counter 8-6
dot stretch adjustment location 5-7
duplex configuration 3-5

end configuration mode 3-15
ENQ/ACK handshake 3-11
error messages, diagnostic 6-7
equipment provided 1-2
escape sequence transmission 3-6
exchange modules 7-31, 7-51

fan removal (2621P) 7-8
freeing mainframe from top prop 2-4
French keyboard 7-46
functional operation 8-1

German keyboard 7-46

handshake
  configuration 3-11
  ENQ/ACK 3-11
  protocol 3-8
  transmit 3-12
  XON/XOFF 3-12
head load assembly, usage 6-11
horizontal drive 8-10

HP 2621A/P
accessories 1-3
options 1-2
Hz configuration 3-12

initiate configuration mode 3-3
installing an IC 7-21
installing terminal 2-6
integrated circuit
removal 7-20
replacement 7-20
interfacing information 2-11

keyboard assembly 7-41
removal 7-16
replacement 7-16
keyboard connector, location 2-2
keyboard interface 8-5
keyboard module 8-18
keyboard PCA
removal 7-16
replacement 7-16
keyboard scanning 8-18
keyboards, national option ... 7-45, 7-46, 7-47
keycaps, 2621A/P 7-42
national option 7-43, 7-44
removal 7-17
replacement 7-17

language configuration 3-14
line mode, long transfer 3-7
line rectifier 8-15
loading, printer paper 2-10
location of four raster adjustments
(CENTER, HEIGHT, FOCUS, BRIGHT) . 5-5
location of raster width adjustment
and yoke collar 5-6
lock configuration 3-15

logic signal interface 8-17
long transfer
character mode 3-7
line mode 3-7

mainframe
exploded view (2621A) 7-36
exploded view (2621P) 7-37
module assembly 7-34
removal 7-2
replacement 7-4
maintenance
battery 4-1
preventative 4-1
manual overview 1-1
mating hinges to hinge openings 2-5
microprocessor controller 8-4

national option
character ROMs 7-50
keyboards 7-45, 7-46, 7-47
keycaps 7-43, 7-44
language configuration 3-14
removable components 7-50
strapping configuration 3-3

opening terminal 2-2
options available 1-2
ordering removable parts 7-31
overvoltage shutdown 8-17

paper
loading 2-10
printer 2-10
parity check 3-10
parity configuration 3-4

parts
lists 7-1
removal procedures 7-1
repair 7-1
replacement procedures 7-1
pedestal
removal 7-6
replacement 7-7
pin assignments, cable connector 2-11
power bracket assembly 8-13
power cord connector, location 2-2
power on circuit 8-17
power on/fail circuit 8-13
power supply
2621A 8-11
2621P 8-14
power supply adjustment 5-1
power supply PCA
removal 7-14
replacement 7-14
2621A 2-8
2621P 2-8
power supply test points 5-2
power switch, location 2-2
preliminary troubleshooting 6-1
preventative maintenance 4-1
primary switcher 8-15
primary switching regulator 8-15
primary terminal status 3-24
print head
removal 7-25
replacement 7-28
printer interface 8-5
printer mechanism(TPM) 3-16
printed circuit assemblies 7-9
problems, diagnosing 6-1
processor PCA 7-48
processor PCA
removal 7-9
replacement 7-10
program ROM 8-5

program RAM 8-5
protection circuitry 8-17
protocol
D1/D2 handshake 3-8
handshake strapping 3-11

raster alignment 5-4
removal and replacement procedures 7-1
removing mainframe from support 2-3
removable components
standard terminal 7-49
national option 7-50
replaceable parts 7-30
replacing mainframe on support 2-4
replacing the battery 4-1, 7-18
return key configuration 3-13
row index 8-8
row pointers 8-7
RS232C/CCITT V.24 signal
code-to-name translation 2-17

secondary rectifier 8-15
secondary regulator 8-16
self-test
continuous unit 6-3
data comm 6-4
terminal printer mechanism (TPM) 6-5
TPM local 6-5
unit 6-3
short transfer trigger handshake 3-7
signal characteristics 2-11
space overwrite (SPOW) latch 3-6
Spanish keyboard 7-47
specifications 1-3
start column configuration 3-13
strap configuration 3-5
strap descriptions 3-6
strapping 3-1
strapping configuration display 3-3
strapping for TPM 3-16
support
removal 7-5
replacement 7-5
support and pedestal 7-6
Swedish/Finnish keyboard 7-45
sweep PCA 8-8
removal 7-12
replacement 7-12
sync circuit 8-13, 8-17
system clock 8-6

terminal
(2621A) 7-33
(2621P) 7-33
terminal in half-open position 2-1
terminal installation 2-6
terminal rear view 2-2, 7-3
terminal set to the half-open position 7-4
terminal status 3-24, 3-25
terminal status example 3-22, 3-23
terminal test points and +5V
adjustment locations
2621A 5-3
2621P 5-3
terminal timing 8-6
terminal top view 7-2
terminating configuration mode 3-15
testing 6-3
test pattern 3-19
2621A/P 6-3
2621P 6-5
thermal print mechanism 7-38
strapping 3-16
thermal printer paper
loading 2-10
ordering 2-10
top cover
removal 7-1
replacement 7-1
support, and pedestal 7-32
TPM 3-16
configuration and location 3-16
exploded view 7-39
local self-test 6-5
local self-test pattern 6-6
PCA 7-48
PCA, removal 7-23
PCA, replacement 7-24
preventative maintenance 4-3
removal 7-23
self-test 6-5
transfer warning handshake 3-7
transmit handshake 3-12
troubleshooting 6-2

undervoltage shutdown 8-17
unit self-test 6-3
United Kingdom keyboard 7-47

ventilating fan
removal 7-7
replacement 7-8
vertical driver 8-10
video
blanking 8-8
controller 8-6
dot generation 8-8
drive 8-9
generator, controls 6-9
generator, installation 6-8
generator, usage 6-8
video generator installed in place
of the processor PCA 6-9
volt regulators 8-12, 8-13, 8-16

wraparound cursor, end-of-line 3-7

XON/XOFF handshake 3-12

Z80 processor 8-4

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