HEWLETT PACKARD

Display Station 2626A

service manual

Preface

This manual provides field service information for the HP 2626 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 are two other manuals associated with this Service Manual: the *HP 2626A User's Manual*, part no. 02626-90001 and the *HP 2626A/P Reference Manual*, part no. 02626-90002.

The User's Manual provides user information for operating the terminal from the keyboard. The Reference Manual provides information for installing and programming 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.

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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 — *Configuration.* This section provides configuration procedures and status information for the terminal.

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 display.

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 list 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:

1. HP 2626A Interactive Terminal with a standard 120V, 60Hz power source configuration.
2. *HP 2626A Interactive Terminal User's Manual,* part no. 02626-90001.
3. *HP 2626A Reference Manual,* part no. 02626-90002.
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 table 1-1.

Table 1-1. Options

OPTION	DESCRIPTION
001	Finnish/Swedish character set and keyboard
002	Danish/Norwegian character set and keyboard
003	French character set and keyboard
004	German character set and keyboard
005	United Kingdom character set and keyboard
006	Spanish Language character set and keyboard
013	240V, 50 Hz operation
014	100V, 60 Hz operation
015	220V, 50 Hz operation
016	100V, 50 Hz operation
050	Integral thermal printer.
201	Math and Large Character sets. (Standard with language options)

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 cable accessories are listed in table 1-2. Note that the HP 13222 accessories are used for terminal port 1 and the HP 13242 accessories are used for terminal port 2.

Table 1-2. Terminal Accessories

MODEL	HP PART NO.	DESCRIPTION
13222C	13222-60003	RS232C DATA COM Female RS-232C 25-pin connector. Length: 6.6 feet (2 meters)
13222M	13222-60002	EUROPEAN MODEM CABLE Male RS-232C 25-pin connector for interfacing the terminal to the European telephone system via 103 or 202C type European modems. Length: 16.7 feet (5 meters)
13222N	13222-60001	U.S. MODEM CABLE Male RS-232C 25-pin connector for interfacing the terminal to an HP 1000, 2000, or 3000 Multiplexer; to a 103A, 202C/D/S/T, 212A, or VADIC 3400 modem; or to an acoustic coupler (signal compatible only). Length 16.7 feet (5 meters)
13222W	13222-60007	HP 300 CABLE Female RS-232C 25-pin connector for interfacing the terminal to an HP 300 Computer System. Length: 16.7 feet (5 meters)

13222Y	13222-60005	EMP PROTECT (MALE) Male RS-232C 25-pin connector for interfacing the terminal to an HP 1000, 2000, or 3000 Multiplexer. Provides protection from lightning-induced transients. For use in hardwired configurations only. Length: 16.7 feet (5 meters)
13232U	5061-2403	Modem bypass cable with a female RS-232C 25-pin connector on both ends. It crosses the signals so that two terminals (DTE devices) can communicate with one another. Length: 5 feet (1.5 meters)
13242G	13242-60008	RS232 PRINTER CABLE (MALE) Male RS-232C 25-pin connector for interfacing the terminal to RS-232C compatible printers such as the HP 2631 and 2635. Length: 15 feet (4.5 meters)
13242H	13242-60009	RS232 PRINTER CABLE (FEMALE) Female RS-232C 25-pin connector for interfacing the terminal to RS-232C compatible printers such as the HP 2631 and 2635. Length: 15 feet (4.5 meters)
13242M	13242-60002	EUROPEAN MODEM CABLE Male RS-232C 25-pin connector for interfacing the terminal to the European telephone system via 103 or 202C type European modems. Length: 16.7 feet (5 meters)

13242N	13242-60001	U.S. MODEM CABLE Male RS-232C 25-pin connector for interfacing the terminal to an HP 1000, 2000, or 3000 Multiplexer; to a 103A, 202C/D/S/T, 212A, or VADIC 3400 modem; or to an acoustic coupler (signal compatible only). Length 16.7 feet (5 meters)
13242Y	13242-60005	EMP PROTECT (MALE) Male RS-232C 25-pin connector for interfacing the terminal to an HP 1000 2000, or 3000 Multiplexer. Provides protection from lightning-induced transients. For use in hardwired configurations only. Length: 16.7 feet (5 meters)
	02620-60056	Port #1 Data Communications test hood. Male 50-pin connector for use in Data Comm Self-Test.
	02620-60062	Port #2 Data Communications test hood. Male RS232C connector for use in Data Comm Self-Test.
	02645-60004	Data Communications test hood. Female RS232C connector for use with HP 13222 or HP 13242 data comm cable.

Notes: 1. EMP = Electromagnetic Pulse.
2. When cable gender is given, it refers to the computer or equipment end of the cable.

SPECIFICATIONS ..... For terminal specifications, refer to the 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.

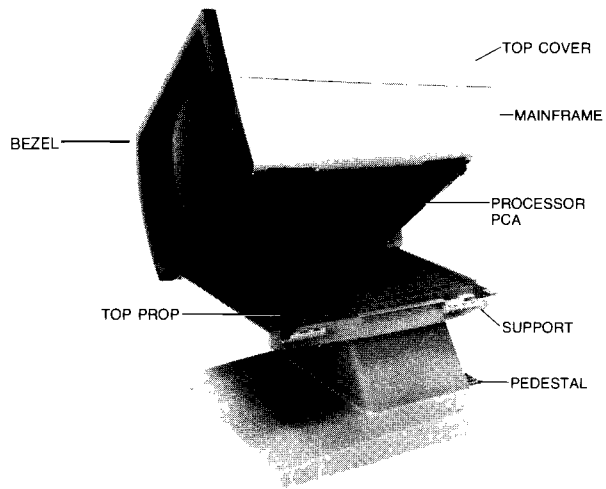

Figure 2-1. Terminal in Half-Open Position

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.

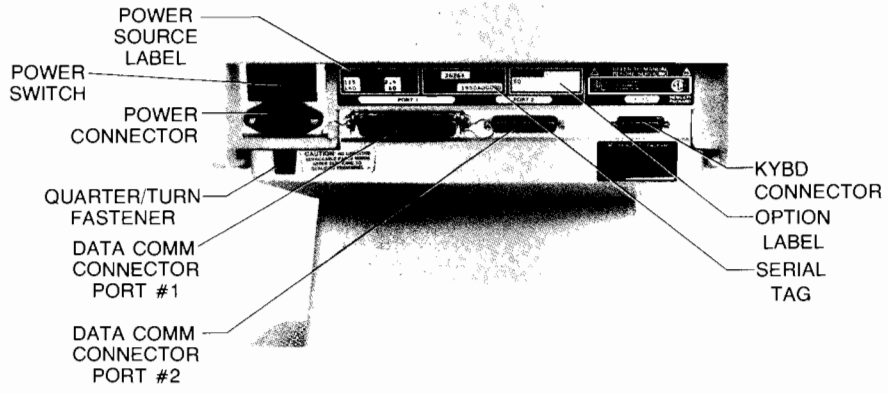

Figure 2-2. Terminal Rear View

REMOVING THE MAINFRAME FROM THE SUPPORT .....

Removal procedures for the terminal mainframe are as follows:

1. 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. Lower the Processor PCA by unsnapping the four corner snap fasteners which hold it in place.
5. 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.

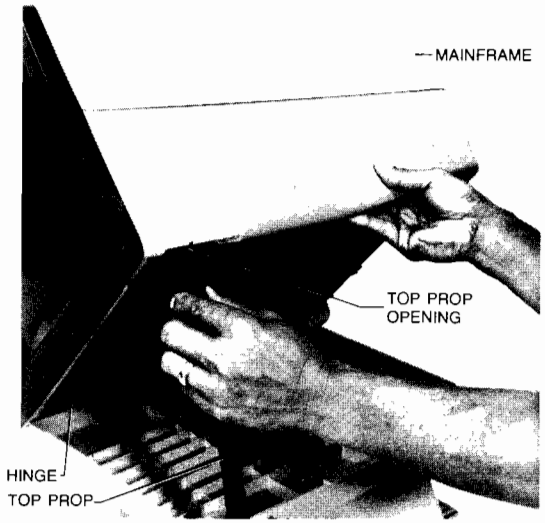

Figure 2-3. Freeing Mainframe from the Top Prop

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 terminals with the printer option, 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.

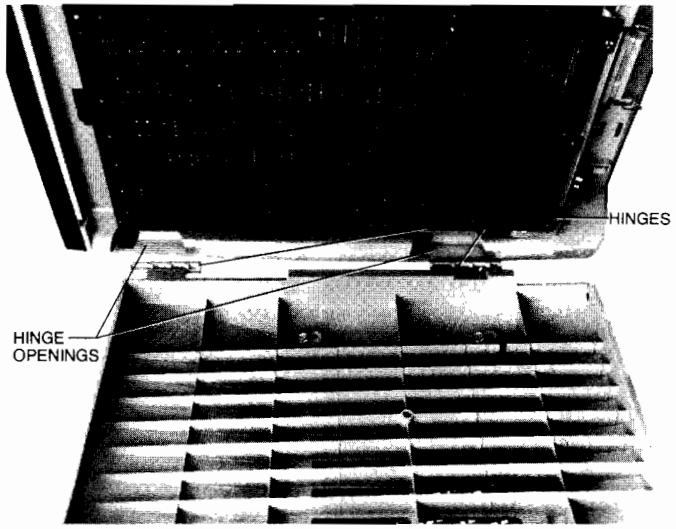

Figure 2-4. Mating the Hinges to the Hinge Openings

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).

Terminals Equipped with 65 Watt Power Supply (02620-60060)

OPTION	POWER SOURCE	FUSE PART NUMBER	FUSE SOCKET	FUSE SIZE
STD	120V, 60 Hz	2110-0002	120V, 2A	250V, 2.0A
013	240V, 50 Hz	2110-0001	240V, 1A	250V, 1.0A
014	100V, 60 Hz	2110-0083	100V, 2.5A	250V, 2.5A
015	220V, 50 Hz	2110-0001	220V, 1A	250V, 1.0A
016	100V, 50 Hz	2110-0083	100V, 2.5V	250V, 2.5A

Terminals Equipped with 120 Watt Power Supply (02620-60019)

OPTION	POWER SOURCE	FUSE PART NUMBER	FUSE SOCKET	FUSE SIZE
STD	120V, 60 Hz	2110-0010	X1	250V, 5.0A
013	240V, 50 Hz	2110-0083	X1	250V, 2.5A
014	100V, 60 Hz	2110-0010	X2	250V, 5.0A
015	220V, 50 Hz	2110-0083	X1	250V, 2.5A
016	100V, 50 Hz	2110-0010	X2	250V, 5.0A

2. Remove the top cover by loosening the two quarter-turn fasteners at the top of the terminal. Do not overturn the fasteners.

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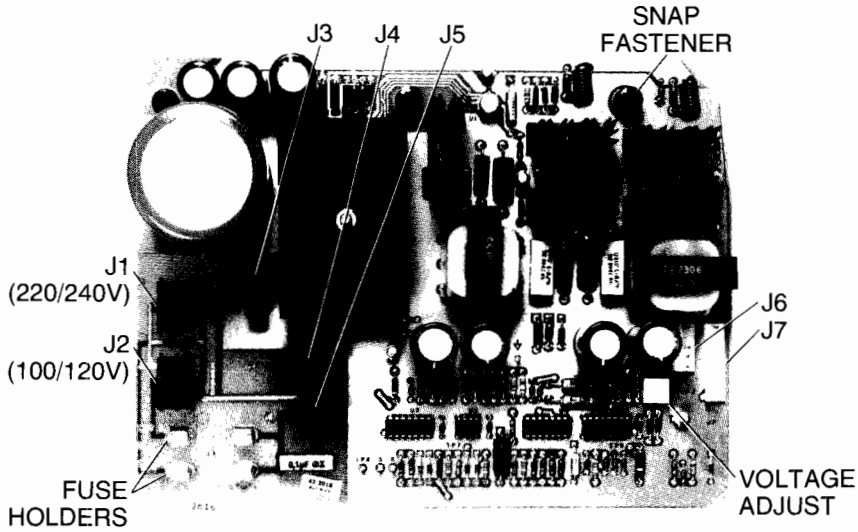


Figure 2-5. Standard 65 Watt Power Supply PCA

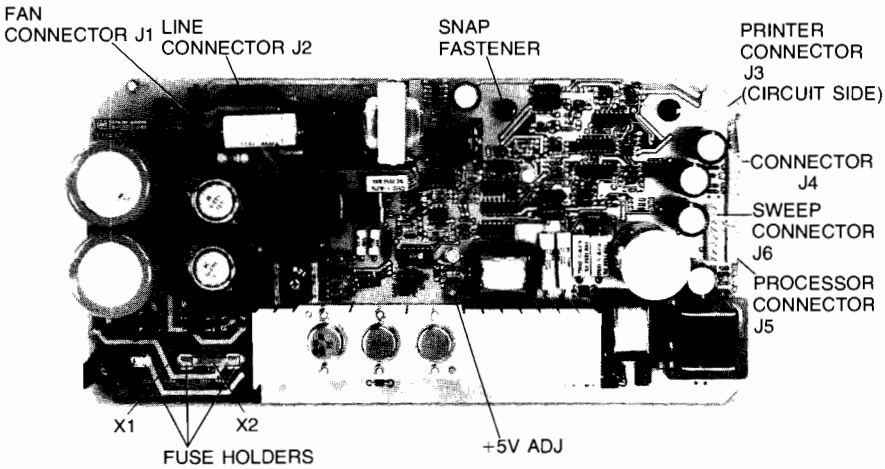


Figure 2-6. Optional 120 Watt Power Supply PCA

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.
4. Check that the power supply cables are properly connected.
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 terminal printer 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 92160A (box of 24), black printing 92160B (box of 24).

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 data communication cables is shown in figures 2-7 to 2-16. Table 2-1 translates the RS232C/CCITT V.24 (European equivalent) signal identification code for each signal to the name of the signal.

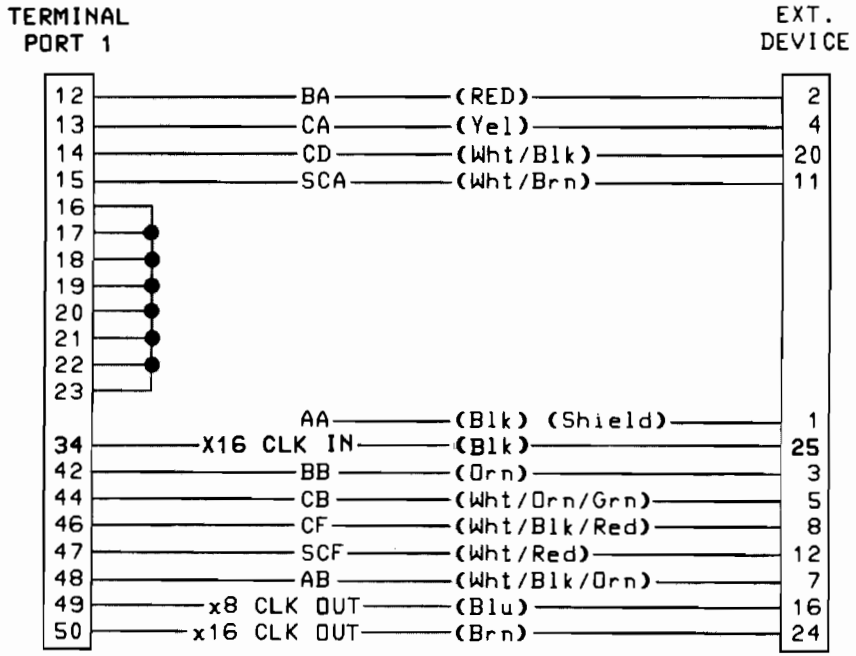


Figure 2-7. 13222C (RS232C) Cable Wiring

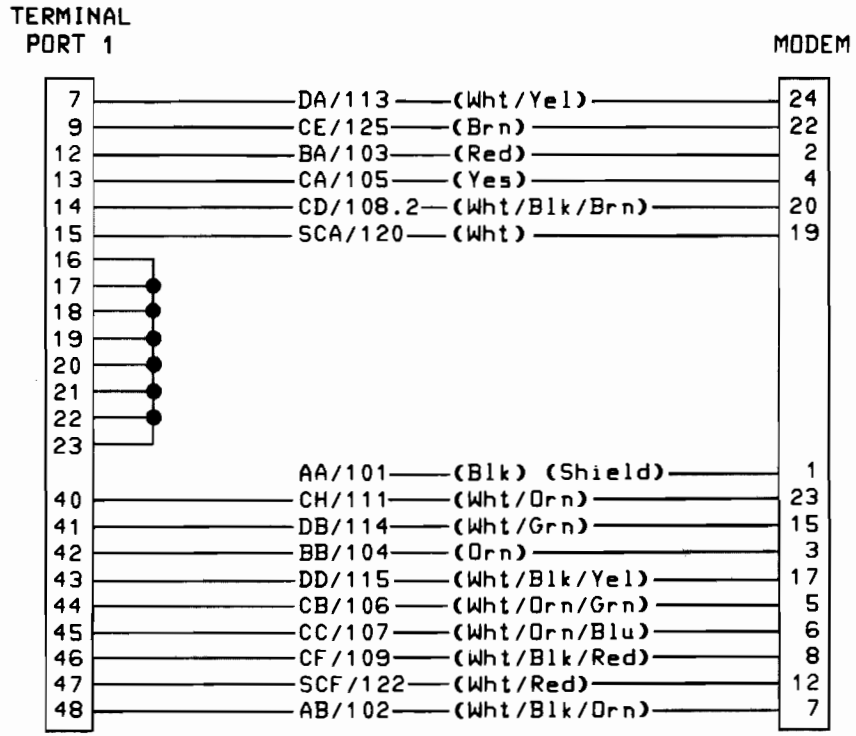


Figure 2-8. 13222M (European Modem) Cable Wiring

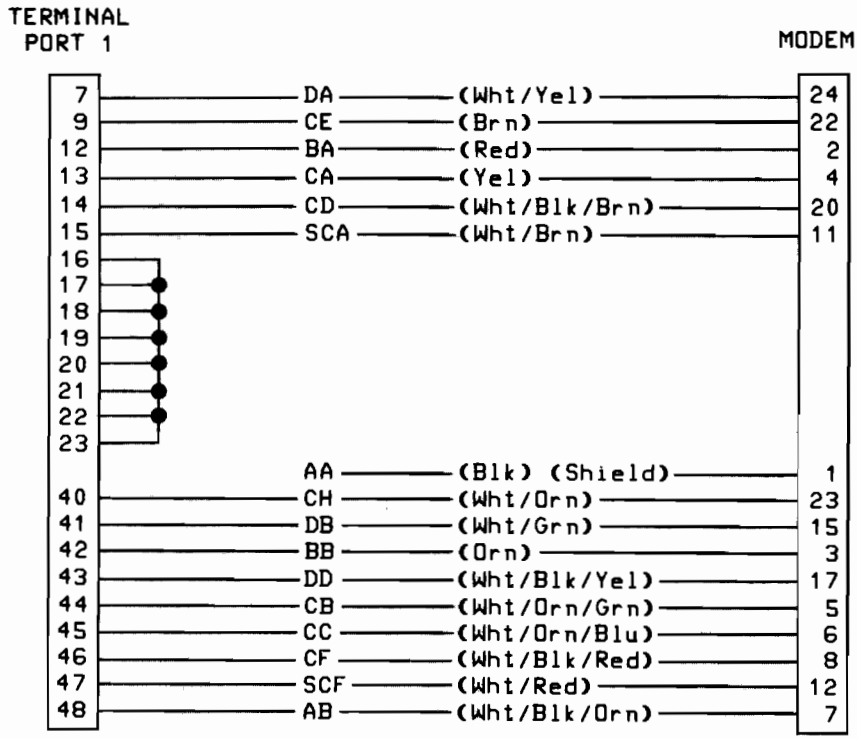


Figure 2-9. 13222N (U.S. Modem) Cable Wiring

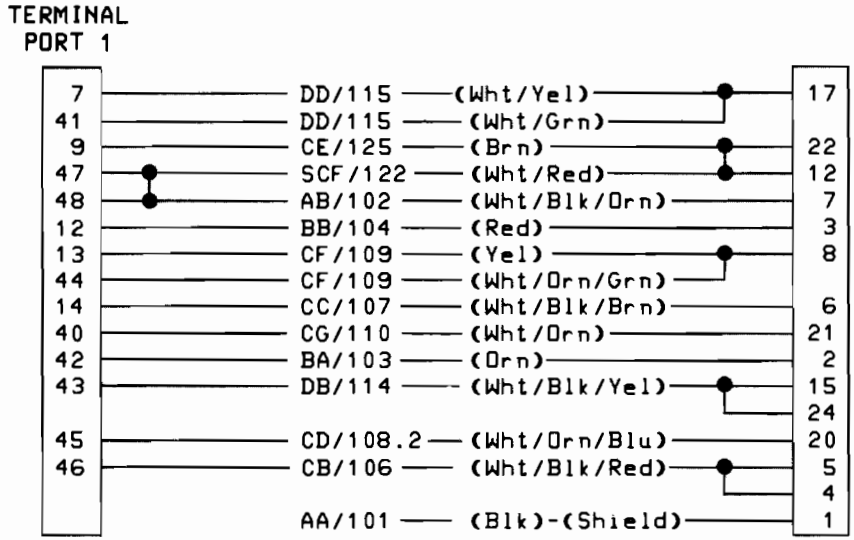


Figure 2-10. 13222W (HP 300) Cable Wiring

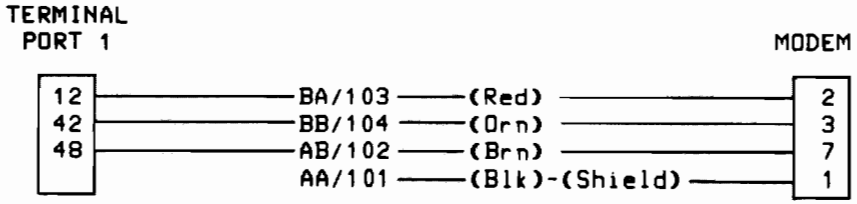


Figure 2-11. 13222Y (Three Wire/Male) Cable Wiring

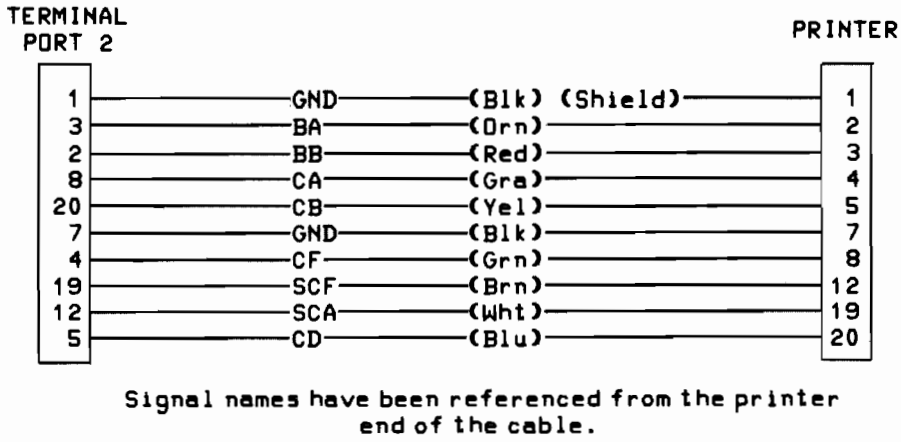


Figure 2-12. 13242G RS232C Printer Cable (Male) Wiring

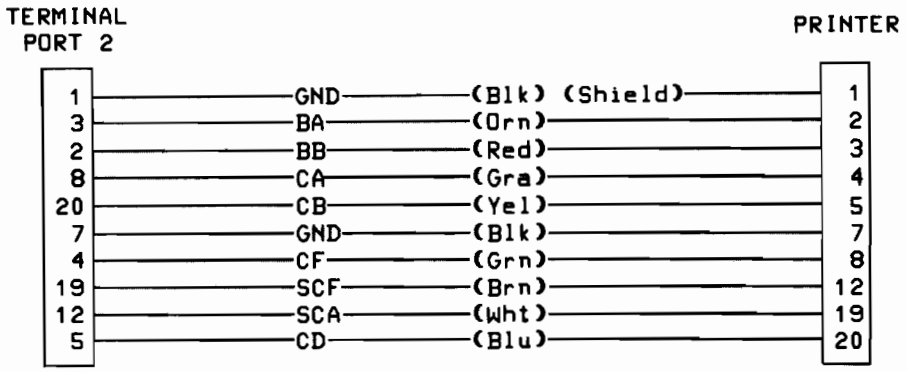


Figure 2-13. 13242H RS232C Printer Cable (Female) Wiring

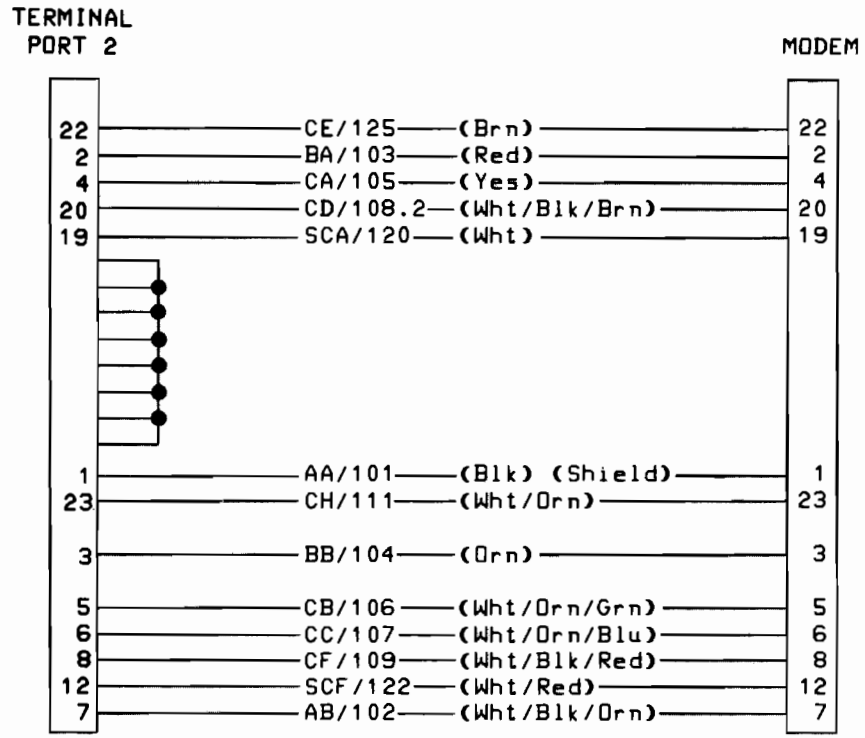


Figure 2-14. 13242M (European Modem) Cable Wiring

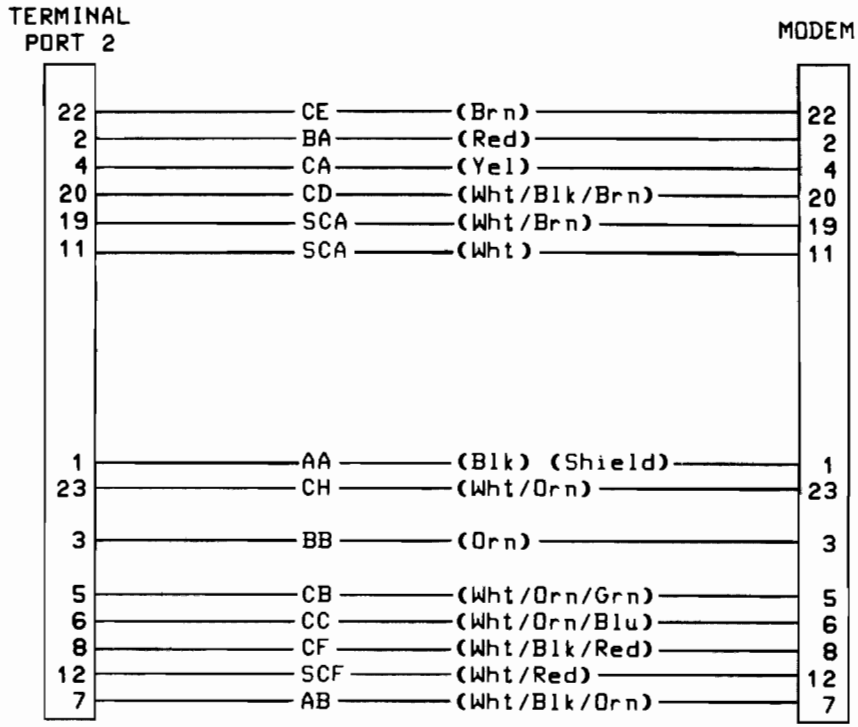


Figure 2-15. 13242N (U.S. Modem) Cable Wiring

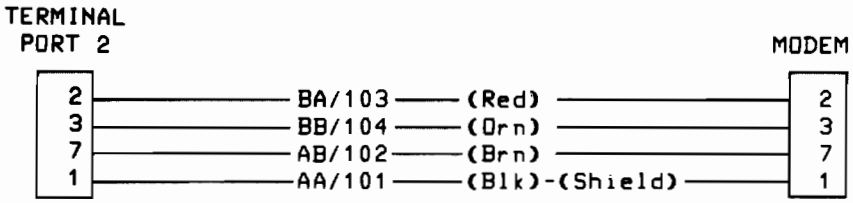


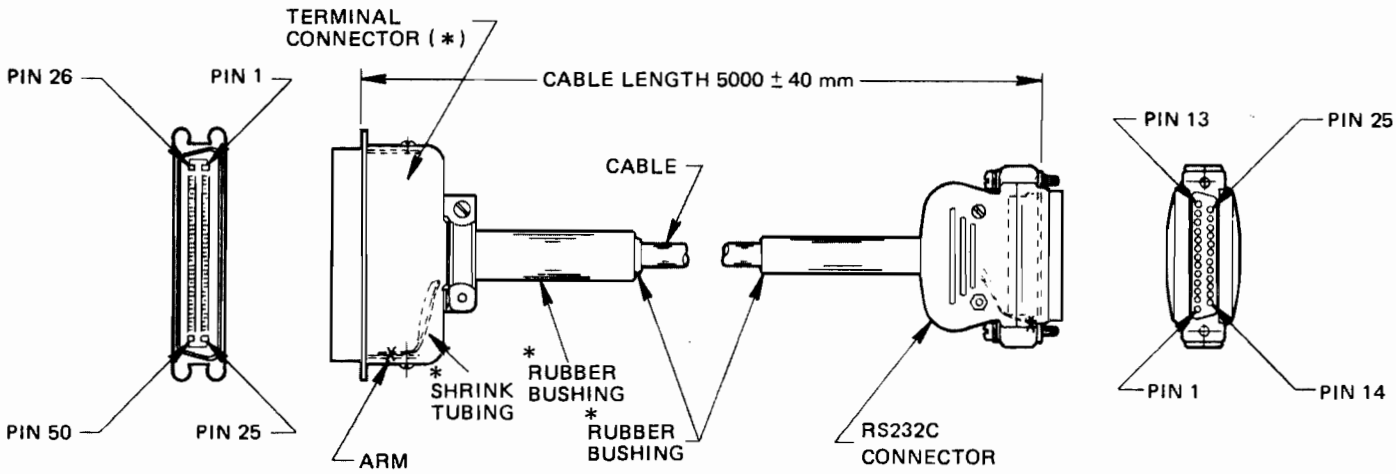
Figure 2-16. 13242Y (Three Wire/Male) Cable Wiring

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 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 figures 2-17 and 2-18.



** Item included in 50-Pin Connector Kit*

Figure 2-17. 13222 Series Cable Fabrication (Port 1)

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

** Cable 13222Y is male.*

INSTRUCTIONS .....

Instructions for fabricating an HP 13222 series cable are as follows:

1. Solder a bare wire, size 24 AWG, between the pins connected together in figures 2-7 through 2-11.
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.

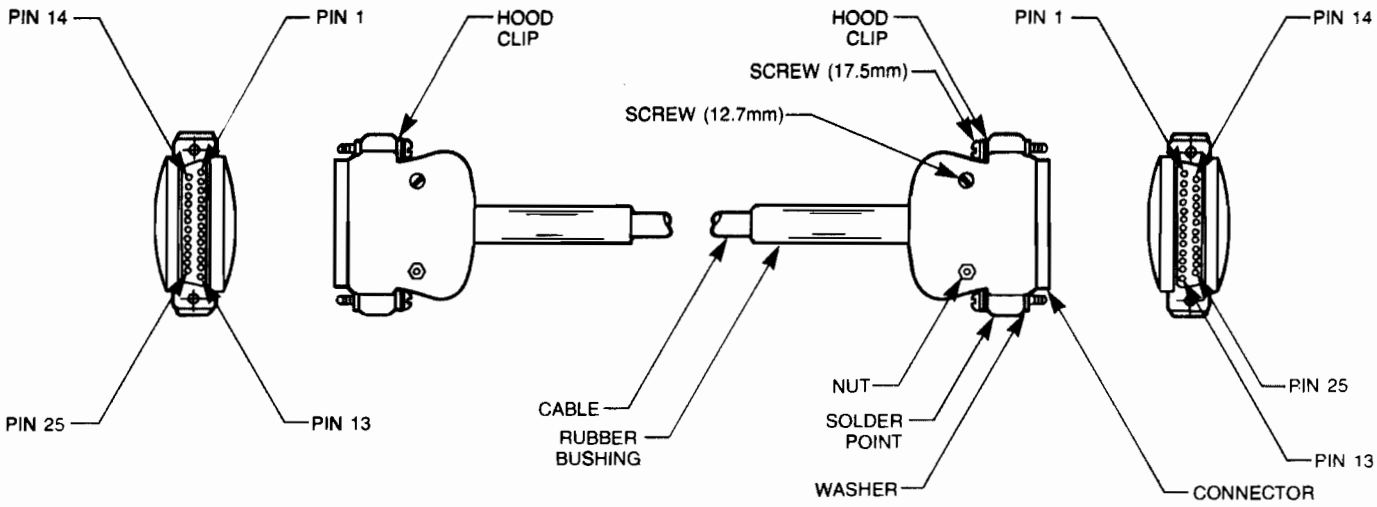


Figure 2-18. 13242 Series Cable Fabrication (Port 2)

ITEM	13242G (RS232C CABLE)	13242H (RS232C CABLE)	13242M EUROPEAN MODEM CABLE	13242N U.S. MODEM CABLE	13242Y THREE WIRE CABLE
Cable	8120-1950	8120-1950	8120-2398	8120-2398	8120-2849
RS232C Connector Kit	5061-2405 (2)	5061-2405 (2)	5061-2405 (2)	5061-2405 (2)	5061-2405 (2)
Shrink Tubing	0890-0311	0890-0311	0890-0311	0890-0311	0890-0311
Rubber Bushing (7.9mm)	1251-0352 (2)	1251-0352 (2)	1251-0352 (2)	1251-0352 (2)	1251-0352 (2)

INSTRUCTIONS .....

Instructions for fabricating an HP 13242 series cable are as follows:

1. Strip the outer jacket from each end of the cable for distance of 30 mm. Separate the braided shield from the wires.

2. Strip the ends of the cable wires to be used (see figures 2-12 through 2-16) for insertion into pins and clip off all wires which will not be used at the termination of the outer jacket.

3. Insert each wire to be used into a pin, crimp the pin, and insert each pin into the correct hole in the connector (figure 2-18).

4. Strip one end of the 100 mm section of wire (part no. 8150-0447), insert it into a pin and insert the pin into pin hole 1 of the connector.

5. Solder the other end of the 100 mm section of wire to the braided shield at the point where the shield exits from the outer jacket of the cable.

6. Break off the cable guide pin to provide more room for the following operation. Then slide the 50 mm section of heat shrink tubing (part no. 0890-0732) over the shield, solder the end of the shield flat to the connector, and shrink the tubing.

7. After performing the above operations on each end of the cable, test the cable from the pins on one end to the pins on the other end for continuity and short circuits.

8. Lay the connector and cable end in place on a connector half shell, lay two of the longer (17.5 mm) 4-40 screws (each with a hood clip and lockwasher threaded on it) in place at each side of the half shell, then place another connector half shell over it, and secure them together with the two shorter (12.7 mm) 4-40 screws.

Configuration III

INTRODUCTION ..... This section describes terminal configuration. Most configuration is done at the keyboard. In addition, there are a few switch settings that are made on the Thermal Print Mechanism (TPM). Terminal status information is included in this section.

WHY ..... You can select a variety of display, communication, and language characteristics.

DISPLAY

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

DATA COMMUNICATIONS

1. Terminal/computer handshakes:
   - Short transfer trigger handshake.
   - Long transfer warning handshake.
   - ENQ/ACK handshake.
   - Transmit handshake.
   - XON/XOFF handshake.
   - Multipoint.
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 ..... Configuration selections are entered and maintained in the terminal software with the current selections displayable on the screen by pressing the **[AIDS]** and **[config]** function keys. A set of function key labels are also displayed along the bottom of the screen which correspond to the function keys. The selections are changed using these keys after the configuration fields are selected with the cursor. These keys are also used to end the configuration mode.

WHEN ..... The terminal 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 the Users Manual, part no. 02626-90001, for details.

Refer to the User and Reference manuals for detailed descriptions of the configuration menus and the configuration process. The following pages provide sample menus and sample data communication configurations for various computer applications. Included are tables that define the various fields in the menus.

Table 3-1. Summary of HP 2626A Configuration Menus

Window Configuration	This menu defines the physical appearance of the screen (how many display windows, what size they are, and where each appears on the screen), the number of workspaces and the size of each, and the relationship between the various windows, workspaces, and data communications ports.
Global Configuration	This menu contains configuration parameters that apply to the terminal at all times (regardless of which window is active or which data communications port is being used).
Datacom1 Configuration Datacom2 Configuration	The terminal includes two data communications ports. The two datacom menus allow you to specify two separate sets of parameters, each capable of governing the operation of a data communications port. Note that the menu titles "Datacom1" and "Datacom2" do not imply a fixed relationship with either port. Both ports may use the same configuration menu or each may have its own. You may, if you wish, configure the terminal such that the Datacom1 menu applies to port 2 and the Datacom2 menu to port 1.
Term #1 Configuration Term #2 Configuration Term #3 Configuration Term #4 Configuration	The four terminal configuration menus make it possible for you to define up to four separate sets of configuration parameters that are functionally related to individual workspaces. Again the menu titles do not imply a fixed relationship (the Term # 1 menu can apply to workspace #3, for example). Two or more workspaces may share the same set of parameters or each workspace may have its own distinct set.

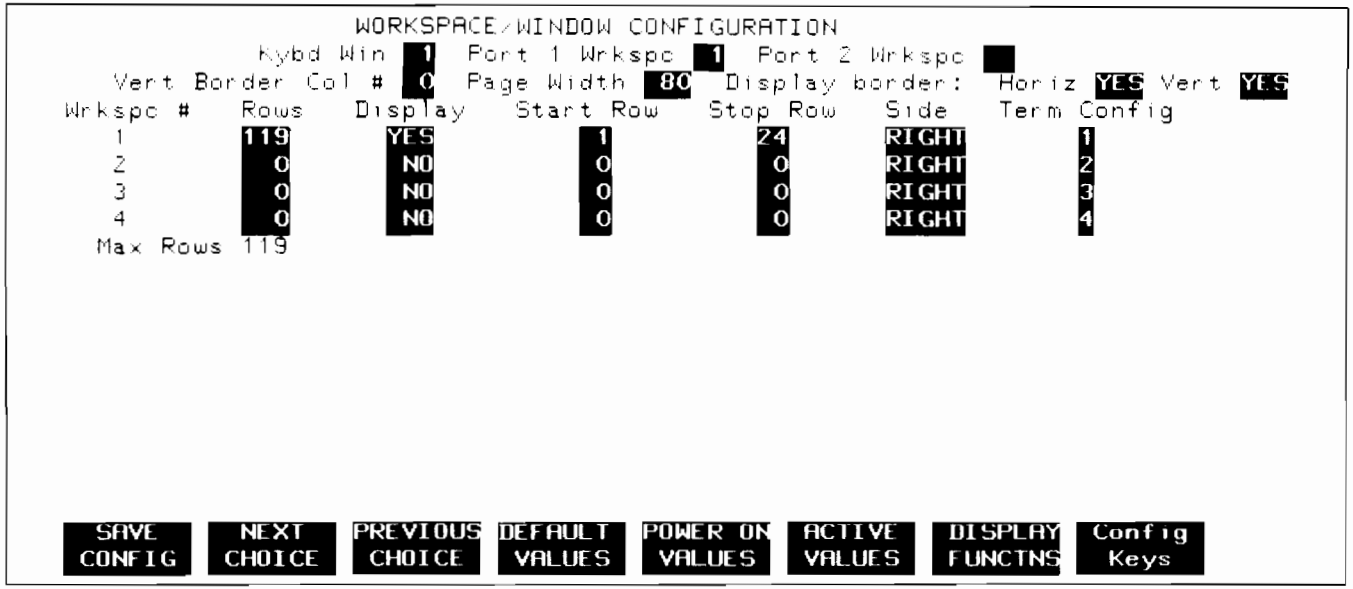


Figure 3-1. Workspace/Window Configuration Menu

Table 3-2. Workspace/Window Configuration Menu Fields

Kybd Win	This field specifies which defined window is to be the cursor active window. Default = 1.
Port1 Wrkspc	This field specifies which defined workspace is to be attached to data comm port 1. Default = 1.
Port2 Wrkspc	This field specifies which defined workspace is to be attached to data comm port 2. Default = none.
Vert Border Col #	This field specifies the screen relative character position (0-80) at which the vertical border is to occur. A zero specifies that there be no vertical border. Default = 0.
Page Width	This field specifies the desired line length for all of display memory (80-160). The value in this field must be a multiple of four (such as 80, 88, 92, etc.); if it is not, the parameter will be rejected and an error message will appear across the bottom of the screen (you remove the message from the screen by pressing RETURN).
Horiz	This field specifies whether or not you want the horizontal borders between adjacent windows to be displayed (if YES, they are represented by a fine dotted line). Default = YES.
Vert	This field specifies whether or not you want the vertical border, if there is one, to be displayed (if YES, it is represented by a fine dotted line). Default = YES.
Rows	This field specifies the number of lines of display memory allocated to each defined workspace.
Display	This field specifies whether or not you want the associated workspace to be initially displayed in a window.
Start Row	For each defined window (YES in the associated Display field), this field specifies the screen relative number (1-24) of the first row in the window.
Stop Row	For each defined window (YES in the associated Display field), this field specifies the screen relative number (1-24) of the last line in the window.
Side	If a vertical border is defined, this field specifies whether the particular window will be positioned to the left or to the right of that border. Default = Right.
Term Config	For each defined workspace, this field specifies which terminal configuration (Term # 1-4) is to be attached to the workspace. Default = 1 for workspace #1, 2 for workspace #2, 3 for workspace #3, or 4 for workspace#4.

Table 3-3. Workspace/Window Configuration Function Keys

f4 DEFAULT VALUES	Pressing this key causes all fields in the menu on the screen to be filled with their default values.
f5 POWER ON VALUES	Pressing this key causes all fields in the menu on the screen to be filled with the values that are currently stored in non-volatile memory.
f5 ACTIVE VALUES	Pressing this key causes all fields in the menu on the screen to be filled with the currently active values. Note that whenever you display the workspace/window configuration menu on the screen it automatically contains the currently active values. You use this function key only if you have changed any of the menu fields and then wish to change them all back to the currently active values.
f7 TEMPRARY SAVE	Pressing this key causes display memory and the screen to be reconfigured according to the parameters specified in the menu WITHOUT saving the values in non-volatile memory (whatever values are in the displayed menu become, in effect, the active values).
f8 config keys	Pressing this key removes the menu from the screen (WITHOUT activating it or saving it in non-volatile memory) and returns the function key labels to the following:

f1 global config | f2 window config | f3 datacom1 config | f4 datacom2 config | f5 term #1 config | f6 term #2 config | f7 term #3 config | f8 term #4 config

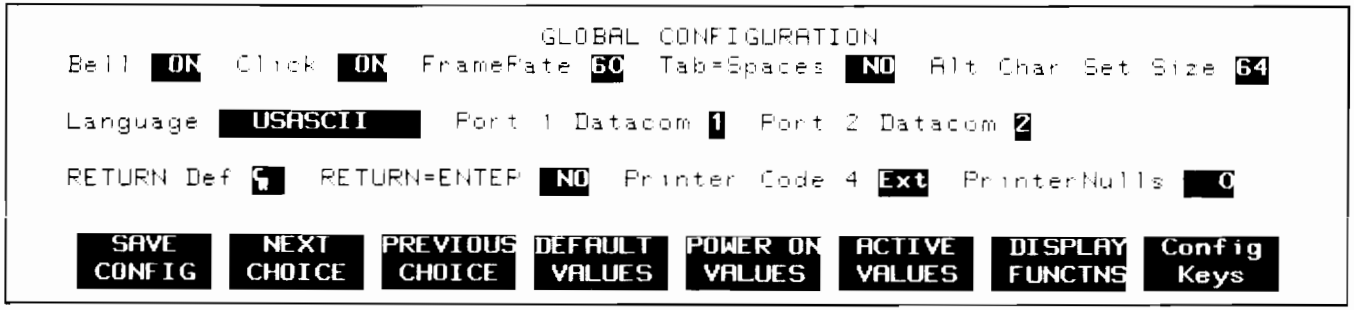


Figure 3-2. Global Configuration Menu

Table 3-4. Global Configuration Menu Fields

Bell	This field specifies whether the terminal's bell speaker is enabled or disabled. When disabled, the terminal still accepts the bell control code and escape sequences but no audible tone(s) occur. Values: ON (bell enabled) OFF (bell disabled)
Click	The terminal is capable of producing an audible "click" as each key is pressed. This field specifies whether that feature is enabled or disabled. Values: ON (click enabled) OFF (click disabled)
FrameRate	This field specifies what line frequency (50 or 60 Hz) the terminal is designed to operate at. The screen refresh rate is then synchronized to the specified frequency. If this field is set to the wrong value the images on the screen will pulsate visibly. Values: 50 (for 50 Hz power source) 60 (for 60 Hz power source)
Tab=Spaces	When this feature is enabled, pressing the TAB► key generates the number of ASCII space codes required to move the cursor forward to the next tab stop. If no tab stops exist between the current cursor position and the end of the line, the bell sounds and no spaces are generated. Similarly, pressing the TAB◄ key generates the number of ASCII backspace codes required to move the cursor backward to the preceding tab stop (if the cursor is already located at the left margin when the backtab is attempted, the bell sounds and no backspaces are generated). Note that when operating in local mode this function actually changes data characters within the workspace to spaces. In remote mode, the spaces are transmitted over the data comm port and the data characters within the workspace are NOT changed unless the spaces are echoed back (either locally or from the host computer). Values: YES (Tab=Spaces enabled) NO (Tab=Spaces disabled)

Table 3-4. Global Configuration Menu Fields (continued)

Alt Char Set Size	This parameter specifies the size (64 or 96 characters) of the alternate character sets. The HP 2626A has extended the size of the alternate character sets from 64 to 96 characters. For HP 264x compatibility, select 64 (the lowercase alphabetic character codes will then generate the same alternate characters as the associated uppercase codes). Values: 64 96
Language	As will be described in Appendix B, Keyboards and Character Sets, of this manual, the HP 2626A can be ordered with any of the following keyboards: United States (standard) Swedish/Finnish (option 001) Danish/Norwegian (option 002) French (option 003) German (option 004) United Kingdom (option 005) Spanish (option 006) With any of the optional keyboards the terminal automatically includes an extended character set that supports the special characters associated with all of the international languages. With the United States keyboard, however, it includes the extended character set only if you have specifically ordered it. When the extended character set is present you may configure the terminal so that the various keys are interpreted (and displayed) in any desired language regardless of which physical keyboard is being used. For example, with a United States keyboard you could configure the terminal so that it responds to the keys as though they were on a German or French or Danish/Norwegian keyboard. This field specifies which national keyboard format is to be used in interpreting keystrokes.

Table 3-4. Global Configuration Menu Fields (continued)

	Values: USASCII (United States) SVENSK/SUOMI (Swedish/Finnish) DANSK/NORSK (Danish/Norwegian) FRANCAIS azM (French AZERTY layout with mutes) FRANCAIS qwM (French QWERTY layout with mutes) FRANCAIS az (French AZERTY layout) FRANCAIS qw (French QWERTY layout) DEUTSCH (German) UK (United Kingdom) ESPANOL M (Spanish with mutes) ESPANOL (Spanish) For the French keyboard layouts, the AZERTY and QWERTY designations refer to the location of the A, Z, Q, and W keys as follows: AZERTY: Row 3 = A Z E R T Y Row 2 = Q S D (etc.) Row 1 = W X C (etc.) QWERTY: Row 3 = Q W E R T Y Row 2 = A S D (etc.) Row 1 = Z X C (etc.) For the French and Spanish keyboard layouts, the mutes designation refers to the manner in which certain accent character keystokes are handled(^ and ¨ on the French layout and ´ on the Spanish). If the mutes are enabled, those keystrokes will generate the particular accent character but will NOT move the cursor. If you then type an applicable vowel, the vowel will appear in the same character position as the accent and the cursor then moves to the next column (if you type any character other than an applicable vowel, however, the character will replace the accent character).

Table 3-4. Global Configuration Menu Fields (continued)

Port 1 Datacom	This field specifies which data communications configuration menu applies to port 1. Values: 1 (Datacom1 menu) 2 (Datacom2 menu)
Port 2 Datacom	This field specifies which data communications configuration applies to port 2. Values: 1 (Datacom1 menu) 2 (Datacom2 menu)
RETURN Def	This field specifies the definition of the RETURN key following power-on or a hard reset (in either case, the definition contained in the User Keys menu is destroyed). The default definition is an ASCII CR. The definition may consist of up to two characters. If the second character is a space it is ignored. NOTE: If the terminal is configured for half duplex main channel operation and you are going to use it in character mode, then you should include the configured <XmitEOD> code as the final character in the RETURN key definition. Having done so, pressing RETURN will then also trigger a line turnaround (in addition to transmitting a <CR> or whatever other character precedes the <XmitEOD> code in the key definition).
RETURN=ENTER	This field specifies whether or not you want the RETURN key to function as though it were the ENTER key. The value "YES" causes both keys to function in the manner currently defined for the ENTER key when the workspace is in remote mode (the RETURN key definitions in both the Global configuration menu and the user keys menu are ignored). The value "NO" causes each key to function according to its own definition. Values: YES NO
Printer Code 4	This field specifies which printer (an external printer or the integral printer) will respond to device code "4" when the terminal receives a device control escape sequence from the host computer. Device code "4" is ordinarily used only for selecting an external printer. Through the use of this configuration parameter, however, you can redirect the device control operations to the integral printer without altering the host computer program. Values: Ext (external printer) Int (integral printer)

Table 3-4. Global Configuration Menu Fields (continued)

PrinterNulls	This field specifies the number of ASCII null codes (0-255) to be transmitted to an external printer after each ASCII control code. Note that when this parameter is set to zero, one null code is always transmitted following each ASCII CR code (this is for compatibility with Centronics printers); if this parameter is set to a value greater than one then the specified number of null codes are transmitted following each ASCII CR code (if auto line feed mode is enabled a single null code is sent following the CR and the number of null codes specified by this field are then sent following the associated LF.)

Computer Museum

Table 3-5. Global Configuration Function Keys

f4 DEFAULT VALUES	Pressing this key causes all fields in the menu on the screen to be filled with their default values.
f5 POWER ON VALUES	Pressing this key causes all fields in the menu on the screen to be filled with the values that are currently stored in non-volatile memory.
f6 ACTIVE VALUES	Pressing this key causes all fields in the menu on the screen to be filled with the currently active values.
f7 DISPLAY FUNCTNS	Pressing this key alternately enables and disables display functions mode. When enabled, an asterisk appears in the function key display. You use display functions mode for entering ASCII control characters in the RETURN Def field. Note that this implementation of display functions mode is separate from that which is enabled/disabled via the mode selection keys. Enabling or disabling display functions mode using this function key does NOT alter the effect of the "DISPLAY FUNCTNS" mode selection key (and vice versa).
f7 config keys	Pressing this key removes the menu from the screen (WITHOUT activating it or saving it in non-volatile memory) and returns the function key labels to the following:

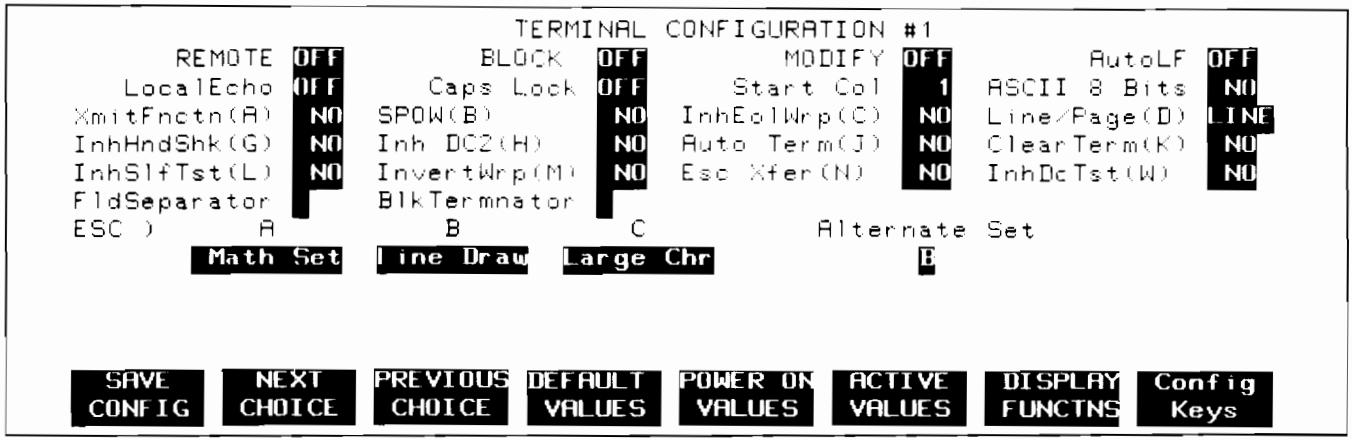


Figure 3-3. Term #1 Configuration Menu

Table 3-6. Term #1-4 Configuration Menu Fields

REMOTE	This field maintains the state of the "REMOTE MODE" (f4) mode selection key. ON = Remote mode OFF = Local Mode The remote/local status can be changed by altering this field (and then saving the configuration menu), by using the "REMOTE MODE" (f4) mode selection key, or by issuing an appropriate escape sequence.
BLOCK	This field maintains the state of the "BLOCK MODE" (f3) mode selection key. ON = Block mode OFF = Character mode The character/block mode status can be changed by altering this field (and then saving the configuration menu), by using the "BLOCK MODE" (f3) mode selection key, or by issuing an appropriate escape sequence.

Table 3-6. Term #1-4 Configuration Menu Fields (continued)

MODIFY	This field maintains the state of the "MODIFY ALL" (f2) mode selection key. ON = "modify all" mode enabled OFF = "modify all" mode disabled. The "modify all" mode status can be changed by altering this field (and then saving the configuration menu), by using the "MODIFY ALL" (f2) mode selection key, or by issuing an appropriate escape sequence.
AutoLF	This field maintains the state of the "AUTO LF" (f8) mode selection key. ON = auto line feed mode enabled OFF = auto line feed mode disabled. The auto line feed mode status can be changed by altering this field (and then saving the configuration menu), by using the "AUTO LF" (f8) mode selection key, or by issuing an appropriate escape sequence.
LocalEcho	This field is the functional equivalent of the HALF/FULL DUPLEX toggle switch on an HP 2645 terminal. ON = Characters entered through the keyboard are both displayed on the screen and transmitted to the host computer. OFF = Characters entered through the keyboard are transmitted to the host computer only (if they are to appear on the screen, the host computer must "echo" them back to the terminal).
Caps Lock	This field is the functional equivalent of the CAPS LOCK latching key on an HP 2645 terminal. ON = The terminal generates only Teletype-compatible codes: uppercase ASCII (00-5F, hex) and DEL (7F, hex). Unshifted alphabetic keys (a-z) generate the codes for their uppercase equivalents, the {, |, and } keys generate the codes for [, \ , and] (respectively). The key for generating ~ and is disabled. OFF = The terminal generates the full 128-character ASCII set of codes.
Start Col	Under a very specific set of circumstances, when you enter data through the keyboard the terminal remembers, for each line, which character was the leftmost one that you entered. This is accomplished through the use of a logical start-of-text pointer that is maintained with the line in display memory.

Table 3-6. Term #1-4 Configuration Menu Fields (continued)

	The logical start-of-text pointer is generated only when all three of the following conditions are true: 1. The workspace associated with the cursor active window is in remote mode, is NOT in block mode, and is attached to an active data comm port. 2. Format mode is disabled. 3. The line in which you are entering data is the bottommost used line in the workspace (there are no printing or non-printing characters following the current line in the workspace). When you are operating in MODIFY LINE or MODIFY ALL mode and you press ENTER or RETURN, the data transmission from the terminal normally begins at the logical start-of-text pointer in the particular line. If the line has no logical start-of-text pointer, however, the data transmission begins at the designated start column. This designated start column can be defined and saved in non-volatile memory using the StartCol field of the Term #1-4 configuration menu. The active value of this field can also be temporarily redefined using one of the "margin/tab/col" function keys. Value: 1-160
ASCII 8 Bits	When this operating mode is enabled (=YES), the terminal transmits 8-bit ASCII codes in which the eighth (high-order) bit, when set (=1), indicates that the character is from the alternate character set. This is a Hewlett-Packard convention and you will ordinarily use it only when communicating with an HP 300 Computer System or in conjunction with certain HP line printers (such as the HP 2635A Printing Terminal). Values: YES = 8-bit codes NO = Standard 7-bit codes.
XmitFnctn(A)	This field is the functional equivalent of keyboard interface strap A on an HP 2645 terminal. YES = The escape code sequences generated by control keys such as ROLL ▲ and ROLL ▼ are transmitted to the host computer. If local echo is ON, the function is also performed locally. NO = The escape code sequences for the major function keys are executed locally but NOT transmitted to the host computer.

Table 3-6. Term # 1-4 Configuration Menu Fields (continued)

SPOW(B)	This field is the functional equivalent of keyboard interface strap B on an HP 2645 terminal. NO = Spaces entered through the keyboard will overwrite existing characters. YES = Enable SPace OverWrite (SPOW) latch. When the SPOW latch is off, overwriting occurs as normal. When the SPOW latch is on, spaces entered through the keyboard move the cursor forward but do not overwrite existing characters. The SPOW latch is turned on by a carriage return and is turned off by a line feed, home up, or tab. It may also be turned on and off programmatically through the use of an Esc&k sequence as follows: ON: Esc&k 1N OFF: Esc&k 0N
InhEolWrp(C)	This field is the functional equivalent of keyboard interface strap C on an HP 2645 terminal. NO = When the cursor reaches the right margin, it automatically moves to the left margin in the next lower line (a local carriage return and line feed are generated). YES = When the cursor reaches the right margin, it remains in that screen column until an explicit carriage return or other cursor movement function is performed (succeeding characters overwrite the existing character in that screen column).
Line/Page(D)	This field is the functional equivalent of keyboard interface strap D on an HP 2645. Line = When operating in block mode, the terminal will transmit data a line at a time. Page = When operating in block mode, the terminal will transmit data a page at a time. For a detailed description of the differences between block line and block page mode, refer to "The ENTER Key" in section IV of this manual.

Table 3-6. Term #1-4 Configuration Menu Fields (continued)

InhHndShk(G) and Inh DC2(H)	These fields are the functional equivalents of keyboard interface straps G and H on an HP 2645 terminal. Together they determine what type of handshaking is to be used when transferring blocks of data from the terminal to the host computer. The various types of block transfers that may occur are as follows: • A data transfer initiated by pressing the ENTER key in character, block line, or block page mode. • A data transfer initiated by pressing the ENTER or RETURN key in modify mode. • A data transfer initiated by pressing a transmit only (T) user key (f1 - f8). • The terminal's response to a cursor sense, terminal ID status, window status, primary status, secondary status, or device status request issued from the host computer. • The device control completion code (S, F, or U) transmitted by the terminal in conjunction with a device control operation initiated by the host computer. When performing block transfers, there are three possible handshakes: 1. No handshake; terminal merely transmits block of data. 2. Computer sends <DC1>; terminal transmits block of data. 3. Computer sends <DC1>; terminal responds with <DC2>; computer responds with another <DC1>; terminal transmits block of data. In general, the InhHndShk(G) and Inh DC2(H) fields have the following effects: InhHndShk(G) = YES eliminatesthe use of the DC1 handshake (terminal will either use the DC1/DC2/DC1 handshake or no handshake at all) Inh DC2(H) = YES eliminatesthe use of the DC1/DC2/DC1 handshake (terminal will either use the DC1 handshake or no handshake at all) Both = YES No handshake.0

Table 3-6. Term #1-4 Configuration Menu Fields (continued)

	Specifically, however, the type of handshaking used for block transfers is determined by a combination of the following factors: **1. The type of block transfer to be performed.** **2. What mode the terminal is currently operating in (character, block line, block page, or modify mode).** **3. The setting of the `InhHndShk(G)` and `Inh DC2(H)` fields.** **If your terminal is connected to a Hewlett-Packard computer system, you will find that the default settings for these fields (both OFF) are usually adequate for your purposes. If you are concerned about the specific type of handshake to be used for one or more of the particular types of block transfers, however, you should use the following summary to verify (or alter) the settings of the `InhHndShk(G)` and `Inh DC2(H)` fields:** **1. ENTER key in block mode; or** **ENTER or RETURN key in modify mode; or** **Transmit only (T) user key in block page mode.** `InhHndShk(G) (ignored)` `Inh DC2(H) = NO ---> DC1/DC2/DC1` `Inh DC2(H) = YES ---> no handshake` **2. ENTER key in character mode.** `InhHndShk(G) = YES` `Inh DC2(H) = NO ---> DC1/DC2/DC1` `Any other combination ---> no handshake`

Table 3-6. Term #1-4 Configuration Menu Fields (continued)

	3. Transmit only (T) user key in block line or character mode; or Cursor sense, terminal ID status, window status, primary status, secondary status, or device status request; or Device control completion code. `InhHndShk(G) = NO ---> DC1` `InhHndShk(G) = YES` `Inh DC2(H) = NO ---> DC1/DC2/DC1` `InhHndShk(G) = YES` `Inh DC2(H) = YES ---> no handshake`
`Auto Term(J)` and `ClearTerm(K)`	These fields are the functional equivalents of keyboard interface straps J and K on an HP 2645 terminal. The `Auto Term(J)` parameter only has an effect when the ENTER key is pressed in block mode. The `ClearTerm(K)` parameter only has an effect when the terminal is in block mode. `Auto Term(J) = YES` Insert a non-displaying terminator at the current cursor position and then move the cursor backward to the previous displaying or non-displaying terminator (if none is found, the cursor moves back to the "home" position). `Auto Term(J) = NO` Do NOT insert a non-displaying terminator and do NOT move the cursor backward. `ClearTerm(K) = YES` If the display transfer operation is terminated by encountering a non-displaying terminator, clear the terminator. `ClearTerm(K) = NO` Do NOT clear any non-displaying terminators.

Table 3-6. Term #1-4 Configuration Menu Fields (continued)

InhSlfTst(L)	This field is the functional equivalent of keyboard interface strap L on an HP 2645 terminal. YES = The terminal self-test is enabled. NO = The terminal self-test is disabled. Pressing the "TERMINAL TEST" (f5) function key (in the "service keys" or MODES set) or issuing an ESC z results in the "FUNCTION LOCKED" error message; the terminal operator clears the message by pressing RETURN. The data comm self test is not affected by this field.
InvertWrp(M)	This parameter is the functional equivalent of keyboard interface strap M on an HP 2645 terminal. YES = Reverse the effects of the SHIFT, INS CHAR, and DEL CHAR keys. When INS CHAR or DEL CHAR is pressed, the particular edit operation is performed with wraparound; when the SHIFT key is pressed simultaneously with either key, the particular edit operation is performed without wraparound. NO = SHIFT, INS CHAR, and DEL CHAR have their normal effects.
Esc Xfer(N)	This field is the functional equivalent of keyboard interface strap N on an HP 2645 terminal. YES = When transferring data between a terminal workspace and an external printer, escape sequences relating to the display (such as those specifying display enhancements, format mode fields, and alternate character sets) are sent to the external printer if encountered within the data. NO = Escape sequences relating to the display are not sent to the external printer. NOTE: The Esc Xfer(N) field only affects data transfers between display memory and an external printer. It does NOT affect <ESC>&pW data transfers that go directly from the host computer to the external printer.
InhDcTst(W)	This field is the functional equivalent of keyboard interface strap W on an HP 2645 terminal. YES = The data comm self-test is enabled. NO = The data comm self-test is disabled. Pressing the "DATACOMM TEST" (f7) function key (in the "service keys" set) results in the "FUNCTION LOCKED" error message; the terminal operator clears the message by pressing RETURN.

Table 3-6. Term #1-4 Configuration Menu Fields (continued)

FldSeparator	When you press the ENTER key while the terminal is in block page mode and the active window contains a formatted display, the terminal automatically transmits the specified field separator character at the end of each unprotected field (except the final one). Value: Any ASCII character Default: ↳
BlkTermnator	For data transfers between the terminal and a host computer, the terminal (under certain circumstances) transmits the specified block terminator character at the end of the transfer operation. For details, see "The ENTER Key" in section IV. This character, when encountered in display memory, terminates a data transfer ("copy" device control operations and ENTER key transmissions). Value: Any ASCII character Default: ↳
ESC) A B C	These three fields specify which physical alternate character set is to correspond to each of the logical character set names A, B, and C in the alternate character set selection escape sequences ↳)A , ↳)B , and ↳)C . Values: Base Set Line Draw Math Set Large Chr Roman Ext
Alternate Set	This field specifies which logical character set (@, A, B, or C) is currently enabled as the alternate character set. @ specifies the base set. In response to an ASCII ↳ code (control N) the terminal switches from the base set to the enabled alternate character set; in response to an ASCII ↳ code (control O) the terminal switches from the alternate character set back to the base set.

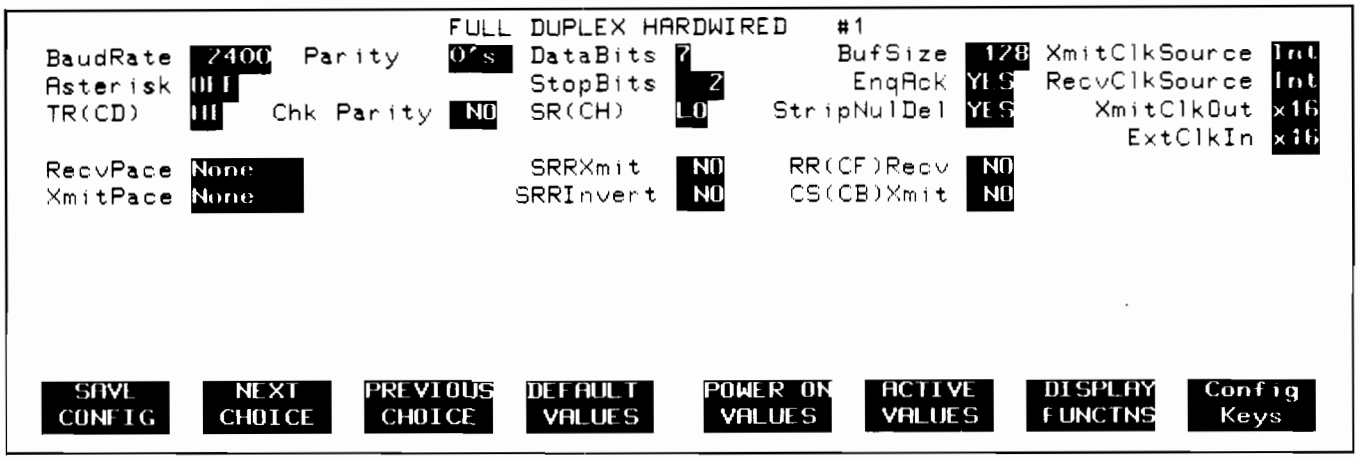


Figure 3-4. Full Duplex Hardwire Configuration Menu

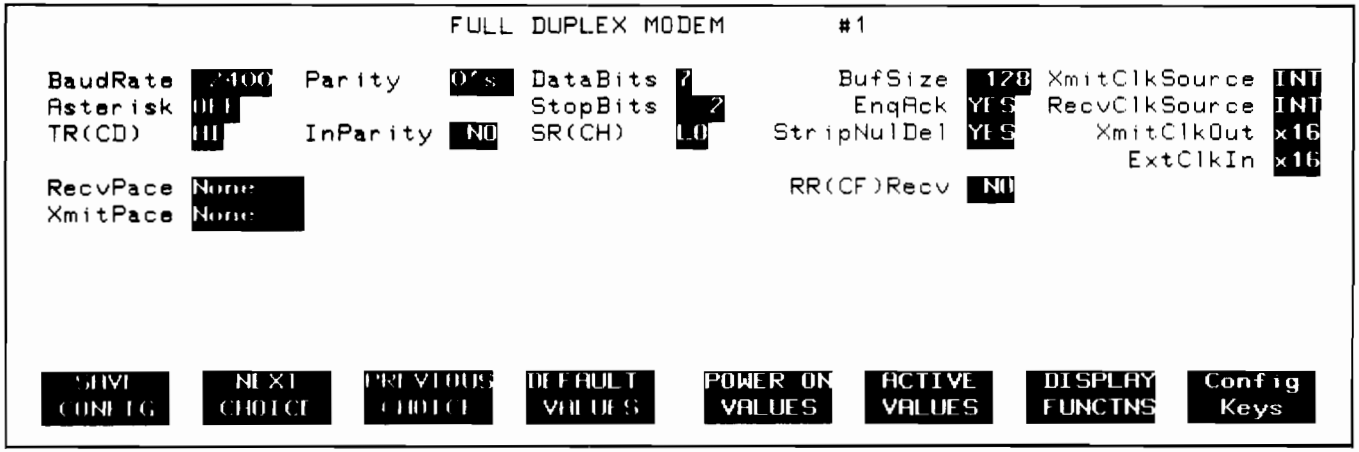


Figure 3-5. Full Duplex Modem Configuration Menu

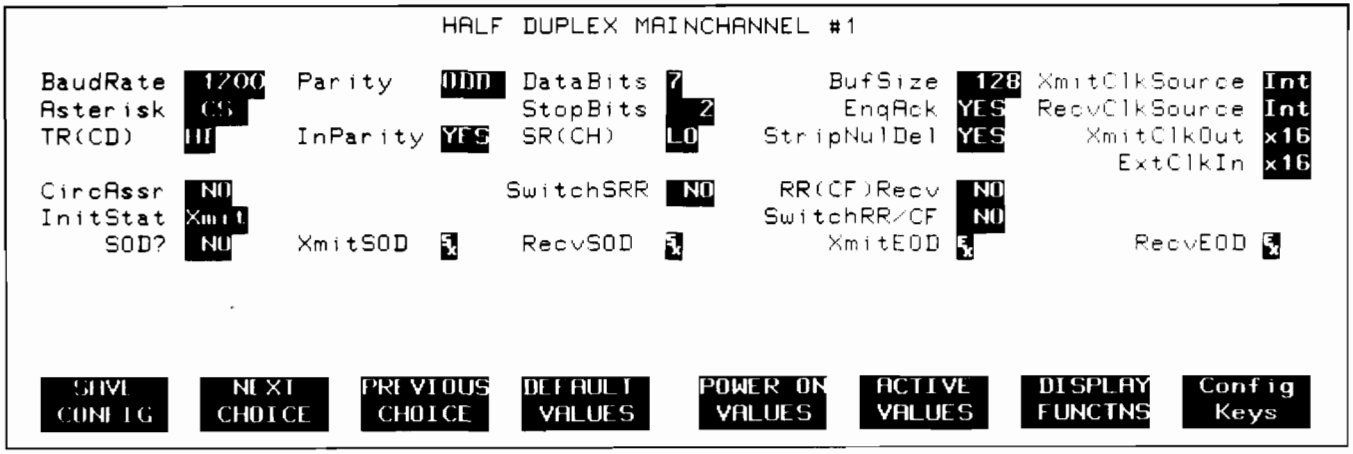


Figure 3-6. Half Duplex Main Channel Configuration Menu

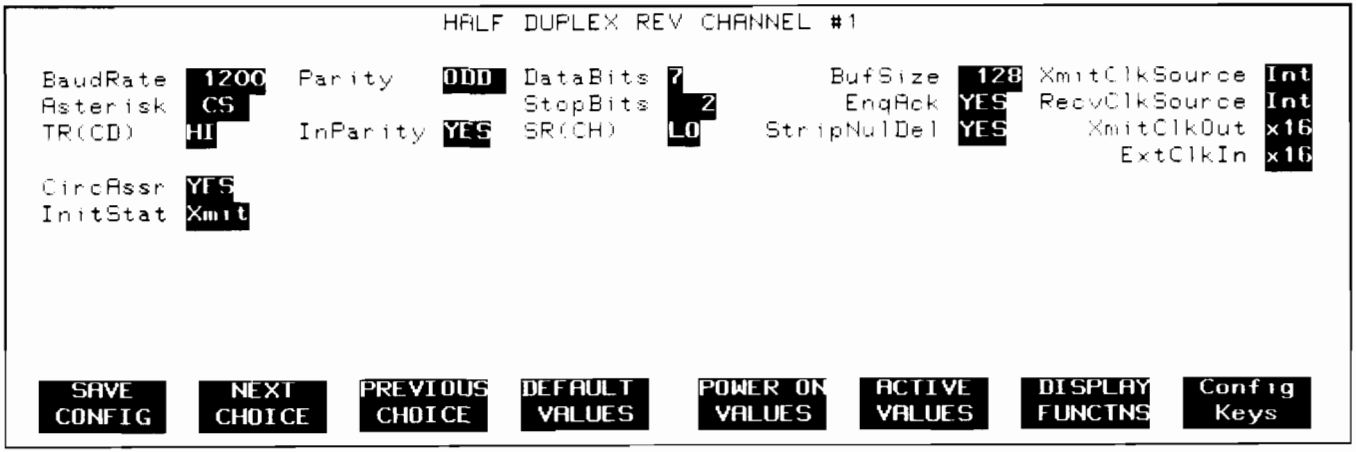


Figure 3-7. Half Duplex Reverse Channel Configuration Menu

Table 3-7. Point-to-Point Configuration Menu Fields

BaudRate	This field specifies at what speed you want the data transmission to take place (in bits per second). Values: 110 300 2000 134.5 600 2400 150 1200 4800 200 1800 9600
Parity	This field specifies what type of parity generation and checking you wish used with each data character. Values: **None** (no parity bit) **0's** (parity bit always zero) **ODD** (odd parity) **1's** (parity bit always one) **EVEN** (even parity)
ChkParity	This field is used for enabling or disabling the parity check feature for data characters received over the data comm line. Note that if the **Parity** field (above) is set to **NONE**, then this field is ignored. Values: **YES** (enable) **NO** (disable)
DataBits	This field specifies what number of data bits you want in each character (for both transmitting and receiving). ASCII characters are normally passed as 7-bit data codes. Note that if you specify 8-bit data codes than NO parity generation or checking is done (regardless of what you specified in the **Parity** and **ChkParity** fields described above). Values: 7 **8**
StopBits	This field specifies the number of "stop bits" you wish appended to each data character transmitted by the terminal (received data is accepted with one or more stop bits regardless of the setting of this field). Values: 1 1.5 2

Table 3-7. Point-to-Point Configuration Menu Fields (continued)

XmitClkSource and **RecvClkSource**	These two fields specify where the clock source for transmitting and receiving data will come from. When internal clocking (**INT**) is selected, the HP 2626A provides the clock pulse at the specified baud rate; when external clocking (**EXT**) is selected, the modem or computer interface provides the clock pulse. Note that if external clocking is specified for both clocks, then the **BaudRate** field no longer has any effect. WARNING: Do not specify external clocking if there is no clock being provided by an external source. Values: **INT** (internal clocking) **EXT** (external clocking)
XmitClkOut and **ExtClkIn**	These two fields specify the multiplication factor to be used for outputting an internal transmit clock or interpreting an external clock source, respectively. As a general rule you can assume that **x16** applies to asynchronous transmission and **x01** applies to synchronous. Values: **x01** **x16**
Asterisk	The HP 264x family of terminals all have a TRANSMIT indicator (LED). On the HP 2626A two asterisks, one on each side of the workspace number in the bottom line on the screen, serve this function. The left asterisk applies to port #1 and the right asterisk applies to port #2. When an asterisk is present, the TRANSMIT indicator for the particular port is on; when the asterisk is missing, the TRANSMIT indicator is off. This field specifies whether the transmit indicator should be enabled or disabled and, if enabled, which RS-232C control line it should reflect. The value "**NONE**" disables the TRANSMIT indicator altogether (this is only permitted when using a full duplex hardwired data link). The value "**CS**" specifies that the TRANSMIT indicator should reflect the state of the RS-232C Clear to Send (CS) control line (asterisk=HI; no asterisk=LO). The value "**DM**" specifies that the TRANSMIT indicator should reflect the state of the RS-232C Data Mode (DM) or Data Set Ready (CC) control line (asterisk=HI; no asterisk=LO). Values: **NONE** **CS** **DM**

Table 3-7. Point-to-Point Configuration Menu Fields (continued)

EnqAck	This field enables or disables the use of the Hewlett-Packard ENQ-ACK handshake. This type of handshaking is described under "Pacing Mechanisms" in the "Point-to-Point Programming Information" portion of this section. Values: YES (enable) NO (disable)
StripNulDel	This field specifies whether all <NULL> and <DEL> codes are to be deleted from the input data stream without being processed. With 7-bit data the codes are hexadecimal 0 and 7F, respectively, and with 8-bit data they are 0 and FF. Values: YES (delete NULLs and DELs) NO (treat NULLs and DELs as data) The default value for this field is "YES". In most point-to-point data comm configurations you will typically want NULL and DEL codes deleted.
SR(CH)	This field specifies the desired state of the RS-232C SR line when the terminal's power is first turned on or when the terminal is reset. The SR line, RS-232C pin number 23, is defined as the Data Signal Rate Detector (DTE Source). It is normally used on dual speed modems to select the appropriate speed (single speed modems merely ignore this line). Values: HI LO
TR(CD)	This field specifies the desired state of the RS-232C TR line when the terminal's power is first turned on or when the terminal is reset. The TR line, RS-232C pin number 20, is defined as Data Terminal Ready. Whenever the terminal performs a disconnect it also returns the TR line to the state specified by this field. Values: HI LO

Table 3-7. Point-to-Point Configuration Menu Fields (continued)

RecvPace	Receive pacing is a mechanism by which the terminal automatically controls (halts and resumes) the transmission of data from the remote device. There are two means of performing receive pacing: by manipulating the state of the RS-232C Data Terminal Ready (TR) control line or by using XON and XOFF control codes. If this field is set to "**NONE**", then the terminal will NOT perform receive pacing. If this field is set to "**TR<CD>**", then the terminal will automatically perform receive pacing using the Data Terminal Ready (TR) control line. With this type of receive pacing, the terminal causes the remote device to halt transmission by lowering the TR line and to resume transmission by raising the TR line. For this type of receive pacing to work, the remote device must of course be configured to start and stop transmission based on the state of the TR control line from the terminal. If this field is set to "**XonXoff**", then the terminal will automatically perform receive pacing using XON (ASCII **<DC1>**) and XOFF (ASCII **<DC3>**) control codes. With this type of receive pacing, the terminal causes the remote device to halt transmission by sending an XOFF code and to resume transmission by sending an XON code. For this type of receive pacing to work, the remote device must of course be configured to start and stop transmission in response to XON and XOFF codes. Note that if the remote device recognizes XON and XOFF codes and your terminal is operating in character mode, you can issue them through the keyboard regardless of the setting of this field. The CTRL and Q keys (when pressed simultaneously) generate an XON code and the CTRL and S keys generate an XOFF. Values: **NONE** **TR<CD>** **XonXoff**
XmitPace	Transmit pacing is a mechanism by which the remote device can control (stop and resume) the transmission of data from the terminal. If enabled, transmit pacing is performed using XON and XOFF control codes. When the terminal receives an XOFF code (ASCII **<DC3>**) it stops transmitting data. When the terminal subsequently receives an XON code (ASCII **<DC1>**) it resumes transmitting data. If this field is set to "**NONE**", the terminal does NOT recognize the ASCII **<DC1>** and **<DC3>** codes as XON and XOFF. For other forms of transmit pacing refer to the descriptions of the **SRRXmit** and **CS<CB>Xmit** fields below. Values: **NONE** **XonXoff**

Table 3-7. Point-to-Point Configuration Menu Fields (continued)

SRRXmit	This field specifies whether or not a true state (−12 V) on the RS-232C Secondary Receiver Ready (SRR) or Secondary Carrier Detect (SCF) control line is required condition for transmitting data. This mechanism is primarily used in conjunction with printers which must be able to control the transmission of data from other devices. The SRR/SCF control line is connected to RS-232C pin number 12. Note that this line does not exist on port #1 and this field should therefore be set to "NO" when configuring that port. Values: **YES** **NO**
SRRInvert	This field applies only when the **SRRXmit** field is set to "**YES**". When both the **SRRXmit** and **SRRInvert** fields are set to "**YES**", the true state of the RS-232C Secondary Receiver Ready (SRR) or Secondary Carrier Detect (SCF) control line is inverted from −12 V to +12 V. Values: **YES** **NO**
BufSize	This field specifies the size (in characters) of the receive buffer. The allowable range is 128 to 2048. Note that the space for data comm buffers is taken from display memory. The greater the **BufSize**, the less memory is available for workspaces. Also note that if you increase the data comm buffer size when subsequently reconfiguring the port, all of display memory is automatically reconfigured resulting in the loss of all data in the existing workspaces. Values: Any integer from 128 to 2048.

Table 3-7. Point-to-Point Configuration Menu Fields (continued)

RR(CF)Recv	This field specifies whether or not a true state (−12 V) on the RS-232C Receiver Ready (RR) or Data Carrier Detect (CF) control line is a required condition for receiving data. Values: YES NO
CS(CB)Xmit	This field specifies whether or not a true state (−12 V) on the RS-232C Clear to Send (CS/CB) control line is a required condition for transmitting data. For a modem configuration it is recommended that you set this field to "YES". Also, if the **Asterisk** field is set to "CS" then **CS(CB)Xmit** should be set to "YES". Values: YES NO
SwitchRR/CF	This field specifies whether or not the terminal should automatically switch from receive mode to transmit mode when the state of the RS-232C Receiver Ready (RR) or Data Carrier Detect (CF) control line changes from true (HI) to false (LO). Values: YES NO
SOD?	If half duplex Main Channel protocol is being used this field specifies whether or not a Start-Of-Data control character will be used. If this field is set to "YES" then the specified Start-Of-Data control character (see the **XmitSOD** and **RecvSOD** fields below) will automatically be supplied by the terminal at the beginning of all transmitted text blocks and be required at the beginning of all received text blocks. Values: YES NO
XmitSOD	If half duplex Main Channel protocol is being used and the **SOD?** field is set to "YES" this field defines the Start-Of-Data control character that the terminal will use when transmitting data (normally an ASCII <STX>). Note that you must enable display functions mode to enter an ASCII control code into this field.
RecvSOD	If half duplex Main Channel protocol is being used and the **SOD?** field is set to "YES" this field defines the Start-Of-Data control character that the terminal will be looking for when receiving data (normally an ASCII <STX>). Note that you must enable display functions mode to enter an ASCII control code into this field.

Table 3-7. Point-to-Point Configuration Menu Fields (continued)

XmitEOD	If half duplex Main Channel protocol is being used this field defines the End-Of-Data control character that the terminal will use when transmitting data (normally an ASCII **<ETX>**). Note that you must enable display functions mode to enter an ASCII control code into this field. NOTE: If the terminal is configured for half duplex main channel operation and you are going to use it in character mode, then you should include the configured **<XmitEOD>** code as the final character in the RETURN key definition. Having done so, pressing RETURN will then also trigger a line turnaround (in addition to transmitting a **<CR>** or whatever other character precedes the **<XmitEOD>** code in the key definition).
RecvEOD	If half duplex Main Channel protocol is being used this field defines the End-Of-Data control character that the terminal will be looking for when receiving data (normally an ASCII **<ETX>**). Note that you must enable display functions mode to enter an ASCII control code into this field.
SwitchSRR	If this field is set to "**YES**", a transition from true (HI) to false (LO) on the RS-232C Secondary Receiver Ready (SRR) or Secondary Carrier Detect (SCF) control line will cause the terminal to switch from transmit mode to receive mode. Values: **YES** **NO**
CircAssr	For half duplex protocols this field specifies whether or not you want circuit assurance. If circuit assurance is enabled, the RS-232C Secondary Receiver Ready (SRR) or Secondary Carrier Detect (SCF) control line must be true (HI) in order for the terminal to be able to switch from receive mode to transmit mode. Note that if **CircAssr=YES**, then the **SwitchSRR** field must also be set to "**YES**". Values: **YES** **NO**
InitStat	This field specifies whether the terminal should be initialized in transmit mode or receive mode. Values: **XMIT** **RECV**

Table 3-8. Datacom1 and Datacom2 Configuration Function Keys

f4 DEFAULT VALUES	Pressing this key causes all fields in the menu on the screen to be filled with their default values.
f5 POWER ON VALUES	Pressing this key causes all fields in the menu on the screen to be filled with the values that are currently stored in non-volatile memory. If a data comm menu other than the one displayed on the screen is saved in non-volatile memory then pressing this key will cause the menu from non-volatile memory to appear on the screen. Note that if you have not yet saved a data comm configuration in non-volatile memory, pressing this key causes the **FULL DUPLEX HARDWIRED** menu (with its default field values) to appear on the screen.
f6 NEXT CONFIG	Pressing the key causes the next data comm configuration menu (with its default field values) to be displayed on the screen.
f7 DISPLAY FUNCTNS	Pressing this key alternately enables and disables display functions mode. When enabled, an asterisk appears in the function key display. You use display functions mode for entering ASCII control characters in the **XmitSOD**, **RecvSOD**, **XmitEOD**, and **RecvEOD** fields. Note that this implementation of display functions mode is separate from that which is enabled/disabled via the mode selection keys. Enabling or disabling display functions mode using this function key does NOT alter the effect of the "**DISPLAY FUNCTNS**" mode selection key (and vice versa).
f8 Config Keys	Pressing this key removes the menu from the screen (WITHOUT activating it or saving it in non-volatile memory) and returns the function key labels to the following: f1 global config f2 window config f3 datacom1 config f4 datacom2 config f5 term #1 config f6 term #2 config f7 term #3 config f8 term #4 config

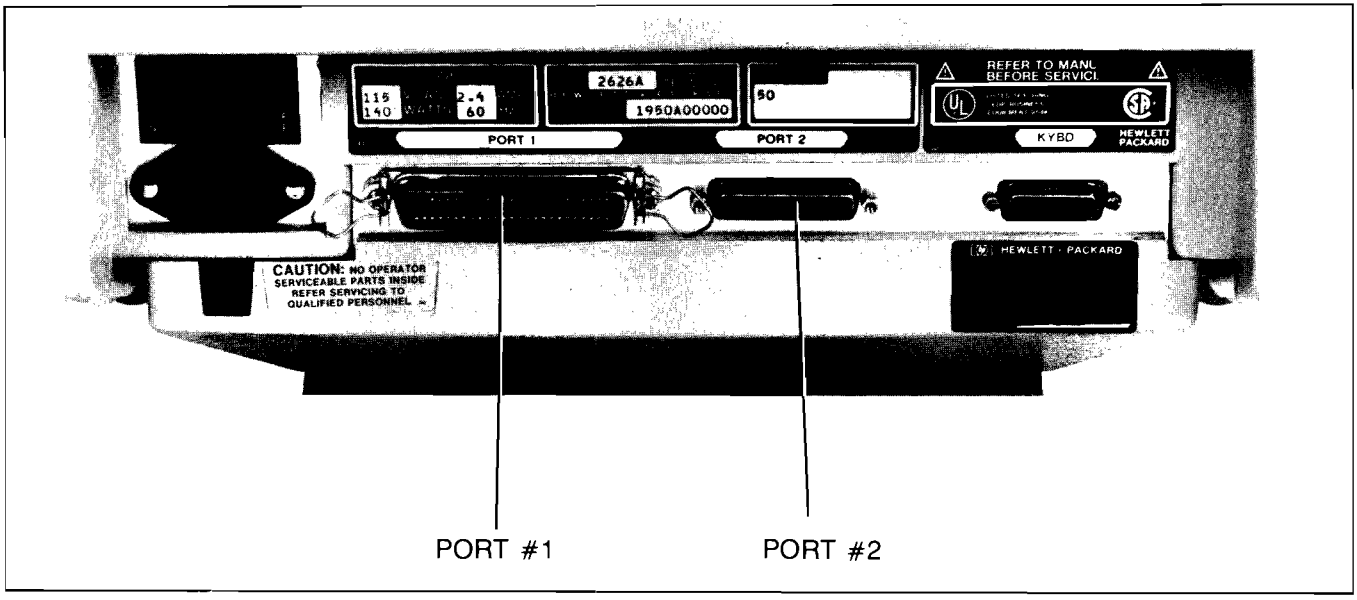


Figure 3-8. HP 2626A Display Terminal, Rear View

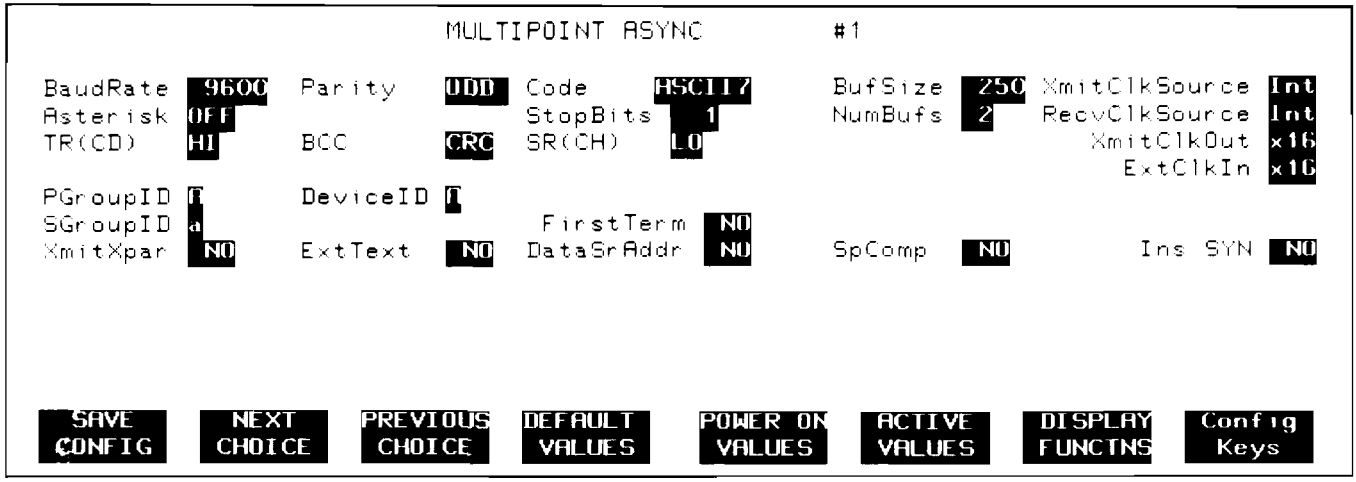


Figure 3-9. Asynchronous Multipoint Configuration Menu

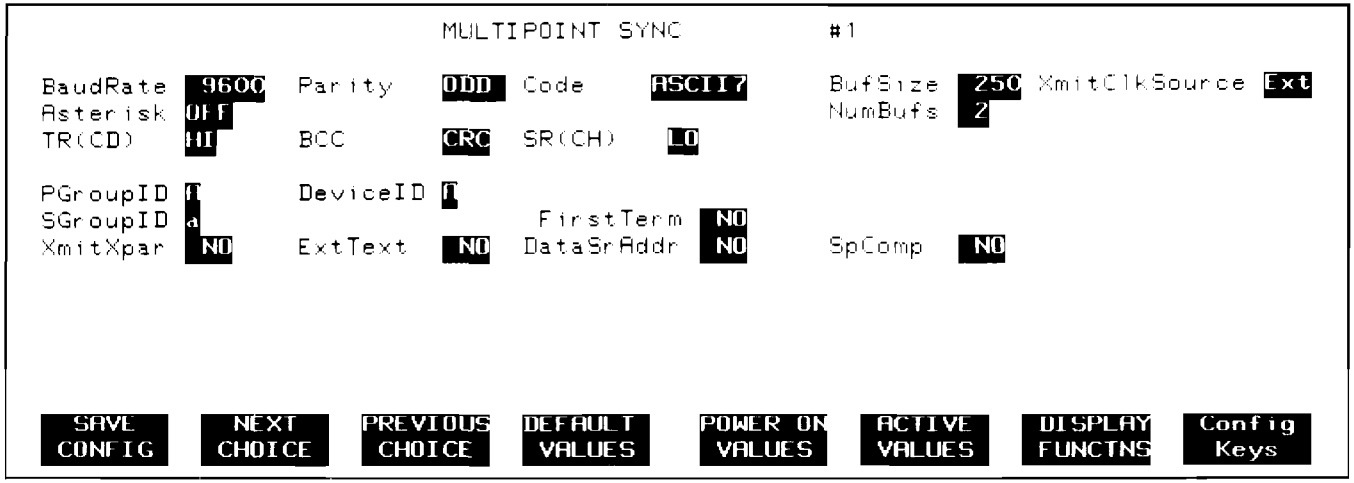


Figure 3-10. Synchronous Multipoint Configuration Menu

Table 3-9. Multipoint Configuration Menu Fields

BaudRate	This field specifies at what speed you want the data transmission to take place (in bits per second). Values: 300 1800 4800 600 2000 9600 1200 2400
Parity	This field specifies what type of parity generation and checking you wish used with each data character. This type of parity is referred to as a Vertical Redundancy Check (or VRC, for short). Note that a parity is only used with 7-bit data codes. If the terminal is configured for 8-bit codes (**Code=ASCII8** or **Code=EBCDIC**, as described below), this field is ignored. Values: **0's** (parity bit always zero) **ODD** (odd parity) **EVEN** (even parity)
Code	This field specifies what size (7 or 8 bits) and type (ASCII or EBCDIC) of data codes the terminal should transmit and expect to receive. **ASCII7** specifies that you wish to use 7-bit ASCII codes with parity. **ASCII8** specifies that you wish to use 7-bit ASCII code without parity, where the parity bit is used to indicate whether or not the character is from the alternate character set. The designation "**ASCII8**" should be used in conjunction with the "**ASCII 8 Bits**" field of the appropriate Term #1-4 configuration menu. **EBCDIC** specifies that you wish to use 8-bit EBCDIC codes without parity and that you want the terminal to automatically handle the ASCII/EBCDIC and EBCDIC/ASCII conversions. Values: **ASCII7** **ASCII8** **EBCDIC**

Table 3-9. Multipoint Configuration Menu Fields (continued)

StopBits	This field specifies the number of "stop bits" you wish used for terminating each data character. Values: 1 1.5 2
SR(CH)	This field specifies the desired state of the RS-232C SR line when the terminal's power is first turned on or when the terminal is reset. The SR line, RS-232C pin number 23, is defined as the Data Signal Rate Select (DTE Source). It is normally used on dual speed modems to select the appropriate speed. Values: HI LO
XmitClkSource and **RecvClkSource**	These two fields specify where the clock source for transmitting and receiving data will come from. When internal clocking (INT) is selected, the HP 2626A provides the clock pulse at the specified baud rate; when external clocking (EXT) is selected, the modem or computer interface provides the clock pulse. Note that with both fields set to external clocking the **BaudRate** field no longer has any effect. In synchronous transmission mode the receive clock source is always external. Values: INT (internal clocking) EXT (external clocking)
XmitClkOut and **ExtClkIn**	These two fields specify the multiplication factor to be used for outputting an internal transmit clock or interpreting an external clock source, respectively. As a general rule you can assume that **x16** applies to asynchronous transmission and **x01** applies to synchronous. Values: **x01** **x16**

Table 3-9. Multipoint Configuration Menu Fields (continued)

Asterisk	The HP 264x family of terminals all have a TRANSMIT indicator (LED). On the HP 2626A two asterisks, one on each side of the workspace number in the bottom line on the screen, serve this function. The left asterisk applies to port #1 and the right asterisk applies to port #2. When an asterisk is present, the TRANSMIT indicator for the particular port is on; when the asterisk is missing, the TRANSMIT indicator is off. This field specifies whether the transmit indicator should be enabled or disabled and, if enabled, which condition it should reflect. The value "**NONE**" disables the TRANSMIT indicator altogether. The value "**LINE**" specifies that the TRANSMIT indicator should reflect the line activity on the multipoint link (when the asterisk is present the CPU is polling or selecting the terminal; when the asterisk is absent the CPU is not polling or selecting the terminal). The value "**DM**" specifies that the TRANSMIT indicator should reflect the state of the RS-232C Data Mode (DM) or Data Set Ready (CC) control line (asterisk=HI; no asterisk=LO). Values: **NONE** **LINE** **DM**
TR(CD)	This field specifies the desired state of the RS-232C TR line when the terminal's power is first turned on or when the terminal is reset. The TR line, RS-232C pin number 20, is defined as Data Terminal Ready. Whenever the terminal performs a disconnect it also returns the TR line to the state specified by this field. Values: **HI** **LO**
BCC	This field specifies what type of block checking you want performed. There are two choices: CRC (cyclic redundancy check) and LRC (longitudinal redundancy check). You should select whichever one the data comm driver in the host computer will be using. The HP 1000 and 3000 computers use CRC. The LRC is a 7-bit checksum (one character), each bit of which is obtained by exclusive "OR"ing the associated bits of all characters included in the text block. If **Code=ASCII7**, then a VRC bit is then added to this character when it is transmitted. If **Code=ASCII8** or **EBCDIC**, then the eighth (high-order) bit is obtained in the same manner as the other seven bits since VRC is not used with 8-bit codes. The CRC is a 16-bit checksum (two characters) that is compatible with the CRC16 used by IBM in their Binary Synchronous Communications protocol.

Table 3-9. Multipoint Configuration Menu Fields (continued)

	Note that, of the two, CRC is the more reliable in that it can detect errors that an LRC would not. Values: CRC LRC
PGroupID	This field specifies the group identification code to be used by the host computer for polling individual terminals. "Polling" is the mechanism the host computer uses to allow a terminal to transmit data. The group ID for polling may be any of the following ASCII characters, the only limitation being that it must be a different character than the one used for the group ID for selecting (see **SGroupID**, below): SPACE ! " # $ % & ' ( ) * + , - . / 0 through 9 : ; < = > ? @ A through Z [/] ^ _ a through z ` { | Note that for compatibility with the HP 1000 and 3000 computers the group ID for polling should be limited to the following: A through Z SPACE @
SGroupID	This field specifies the group identification code to be used by the host computer for polling individual terminals. "Selecting" is the mechanism the host computer uses to transmit data to a terminal.

Table 3-9. Multipoint Configuration Menu Fields (continued)

	The group ID for selecting may be any of the following ASCII characters, the only limitation being that it must be a different character than the one used for the group ID for polling (see **PGroupID**, above): SPACE ! # $ % & ' ( ) * + , - . / 0 through 9 : ; < = > ? @ A through Z [/] ^ _ a through z ` { | Note that for compatibility with the HP 1000 and 3000 computers the group ID for selecting should be limited to the following: . (if @ is the **PGROUPID**) _ (if SPACE is the **PGroupID**) a through z (lowercase of **PGroupID** if **PGroupID** is A through Z)
DeviceID	This field specifies the device identification code for the terminal. The specified device ID is used by the host computer (in conjunction with a group ID) in both poll and select sequences. The device ID may be any of the following ASCII characters: SPACE ! # $ % & ' ( ) * + , - . / 0 through 9 : ; < = > ? @ A through Z [/] ^ _ a through z ` { | The quotation mark (") is used for group polling and should never be assigned as the **DeviceID**. Note that for compatibility with the HP 1000 and 3000 computers the device ID should be limited to the following: A through Z SPACE @

Table 3-9. Multipoint Configuration Menu Fields (continued)

ExtText	This field enables or disables the Extended Text feature of the terminal. This feature, when enabled, causes the terminal to automatically delete the first three characters from all input blocks received from the host computer and to automatically insert three characters at the beginning of the first output block of each message being sent to the host computer. This feature is described under "Block Mode Transfers" in the "Multipoint Programming Information" portion of this section. Values: YES (enable Extended Text) NO (disable Extended Text)
XmitXpar	This field is the functional equivalent of the Z strap on the Keyboard Interface PCA of an HP 2645 terminal. It specifies whether you want the terminal to transmit data blocks in transparent or non-transparent mode. Transparent mode allows you to send 8-bit binary data. In non-transparent mode, the multipoint firmware within the terminal automatically strips the following ASCII control codes from the data before sending the data block to the host computer: <SYN> <ETB> <ETX> <ENQ> <US> If the data to be sent contains any of these codes and you wish them to be transmitted, then you should select transparent mode by specifying "YES" in this field. Note that the terminal can always receive either transparent or non-transparent mode data regardless of how this field is set. Values: YES (transparent mode) NO (non-transparent mode)

Table 3-9. Multipoint Configuration Menu Fields (continued)

DataSrAddr	This field specifies whether or not you want the terminal to automatically place the absolute screen address (row/column position) of the first character in the message at the beginning of the first block of each message transmitted to the host computer. For a more detailed description of this feature refer to "Data Source Address" in the "Multipoint Programming Information" portion of this section. Value: YES NO
SpComp	This field specifies whether or not you want consecutive ASCII space codes to be compressed to a single space code. Value: YES NO
NumBufs	This field specifies the desired number of data comm buffers. The permissable values are 2 through 16 (your actual choice, however, is affected by the selected buffer size; see BufSize, below). The designated buffers will be used for both receiving and transmitting data.
BufSize	This field specifies the desired data comm buffer size. The range of permissable values is 128 bytes (characters) through 2048 bytes. There is a total of 4096 bytes available for data comm buffers. The NumBufs and BufSize parameters, when multiplied by each other, must not exceed 4096. When receiving input from the host computer the terminal will automatically concatenate two or more of the allocated buffers, if necessary, to accommodate a particularly large block of data.
FirstTerm	If the terminal is the first one after an HP 30037A Asynchronous Repeater then this field MUST be set to "YES". If the terminal is the first one after a modem or a modem bypass cable then this field may be set to either "YES" or "NO". If neither of these cases applies then this field should be set to "NO". Values: YES NO
Ins SYN	This field specifies whether or not you want SYN control characters (16 hex for ASCII or 32 hex for EBCDIC) to preceed all data transfers and to be inserted in the transmit data stream at < 1 second intervals. SYN insertion is not required in the receive data stream. Values: YES NO

TO END CONFIGURATION MODE

To end Configuration mode and return to normal operation, press **SAVE CONFIG**. The configuration data is stored in nonvolatile memory.

CONFIGURATION LOCK

Once configuration is locked, nothing in the configuration can be changed. When configuration is unlocked, the terminal can be reconfigured.

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

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

PROCESSOR PCA

Processor PCA switches S1-1 through S1-6 are used in troubleshooting and are described in Section 6. S1-7 and S1-8 are used for configuration. These switches are used when operating in Multipoint (S1-7) and operating in Monitor Mode (S1-8). Switches S1-7 and S1-8 are normally open. Their functions are as follows:

S1-7 Multipoint — When this switch is closed, the terminal will send all WACK and TTD transmissions immediately (HP 2645 compatible).

When this switch is closed, the terminal will send the first WACK or TTD in a series immediately, but will wait 2 seconds before sending each of the other WACK's or TTD. The delay begins following the response of the computer to the terminal's first WACK or TTD (ENQ for WACK or NAK for TTD).

S1-8 Monitor Mode — When this switch is closed, Monitor Mode is disabled.

When this switch is open, Monitor Mode is enabled.

THERMAL PRINT MECHANISM (TPM)

To Change the TPM Strapping. In addition to the configuration performed at the Keyboard, you should check the TPM PCA strapping configuration after replacing the PCA. Normally 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 (TPM PCA part no. 02670-60050).

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.

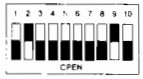
Computer Museum

NOTE

There are two printer configurations. Set the printer switch block as follows:

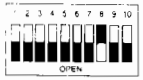
U21 = 1820-2271
U11 = 1818-1160

Switch 2, 9 closed



U21 = 1820-2432
U11 = Not Present

Switch 8 closed



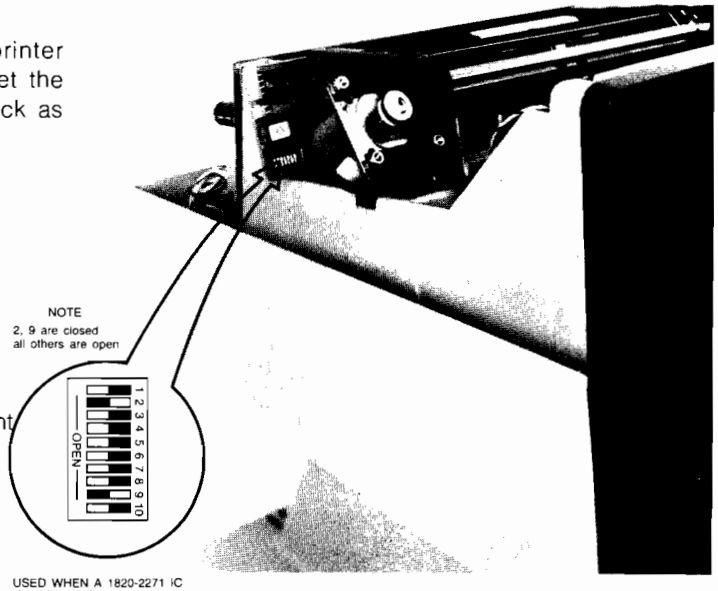


Figure 3-11. TPM Configuration and Location

Terminal Status

WHY ..... Terminal status provides a quick check of the terminal's configuration and operating condition.

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 14 status bytes (bytes 0-13) which are displayed below the terminal self-test pattern (figure 3-12). 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 3-10).

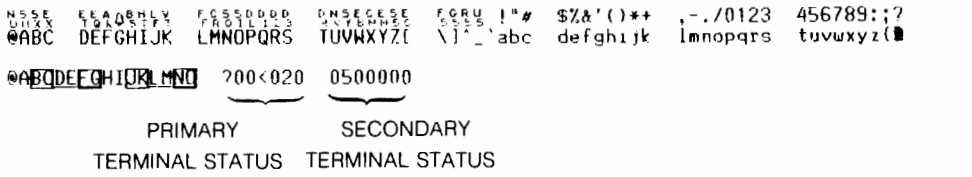


Figure 3-12. Test Pattern

The terminal can return additional status information to the computer in response to escape sequences. See the reference manual for a detailed description of terminal status.

Table 3-10. 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

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. Interpret terminal status (test pattern or status response). Make sure that terminal status matches terminal configuration. Figures 3-13 and 3-14 show how to interpret terminal status.

PRIMARY STATUS BYTES

BYTE 0 DISPLAY MEMORY SIZE

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

16K words

The Hp 2626A has 16K words of display memory and has approximately 9K of displayable characters.

BYTE 1 CONFIGURATION STRAPS A-D

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

Strap D
Page/Line
1 = Page
0 = Line

Strap C
(End-of-Line Wraparound)
1 = yes (Disabled)
0 = no (Enabled)

Strap A
(Function Key Transmission)
1 = yes (Transmitted)
0 = no (Not transmitted)

Strap B
(Space Overwrite Latch)
1 = yes (Enabled)
0 = no (Disabled)

Refer to Section III for a detailed description of configuration straps A-D.

BYTE 2 CONFIGURATION STRAPS E-H

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

Strap H (Inhibit DC2)
1 = yes (Enabled)
0 = no (Disabled)

Strap G (DC2 Handshake)
1 = yes (Enabled)
0 = no (Disabled)

Strap E

Strap F

Refer to Section III for a detailed description of configuration straps G and H (straps E and F do not apply to the HP 2626A).

BYTE 3 LATCHING KEYS

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

Terminal sends
secondary status

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

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

BLOCK MODE Key
1 block mode
0 character mode

Figure 3-5. Primary Terminal Status Bits

PRIMARY STATUS BYTES

BYTE 4 TRANSFER PENDING FLAGS

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

Secondary Status Pending
1 yes
0 no

ENTER Key Pending
1 yes
0 no

Cursor Sense Pending
1 yes
0 no

Function Key Pending
1 yes
0 no

BYTE 5 ERROR FLAGS

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

Device Error
1 error
0 no error

Loader Checksum
1 no error
0 error

Data Comm
1 parity or buffer overflow error
0 no error

Self Test
1 no error
0 error

BYTE 6 DEVICE TRANSFER PENDING FLAGS

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

Device Status Pending
1 yes
0 no

Device Operation Status Pending
1 yes
0 no

SECONDARY STATUS BYTES

BYTE 7 BUFFER MEMORY (always zero)

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

The HP 2626A has no additional buffer memory.

BYTE 8 TERMINAL FIRMWARE CONFIGURATION (always five)

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

0 = Non-programmable terminal
1 = Terminal identifies self

1 = I/O firmware installed

0 = No APL Firmware

The device support firmware is required before tape units or printers can be used with the terminal

BYTE 9 CONFIGURATION STRAPS J-M

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

Strap M (Alternate Operation—INSERT and DELETE CHARACTER Keys)
1 = yes (Invert wrap sense)
0 = no (normal)

Strap L (Self Test Inhibit)
1 = yes (Inhibit test)
0 = no (Allow test)

Strap J (Auto Terminate
1 = yes (Enabled)
0 = no (Disabled)

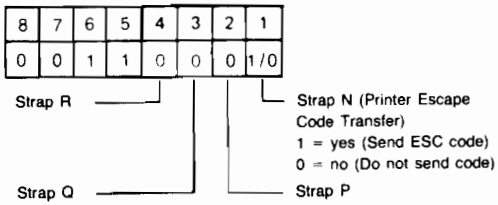
Strap K (Clear Terminator)
1 = yes (Enabled)
0 = no (Disabled)

Refer to Section III for a detailed description of configuration straps J-M.

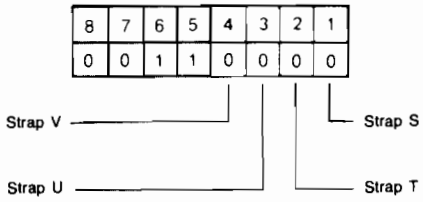
Figure 3-6. Primary and Secondary Status Bytes

SECONDARY STATUS BYTES

BYTE 10 CONFIGURATION STRAPS N-R

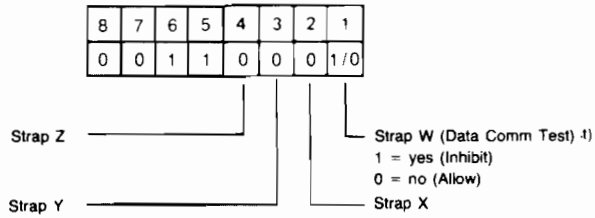


BYTE 11 CONFIGURATION STRAPS S-V (always zero)



Straps S-V do not apply to the HP 2626A.

BYTE 12 CONFIGURATION STRAPS W-Z



Straps X, Y, and Z do not apply to the HP 2626A.

BYTE 13 MEMORY LOCK MODE

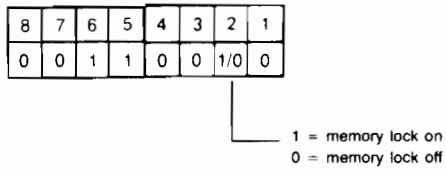


Figure 3-7. Secondary Status Bytes (Cont.)

DEVICE STATUS BYTES

BYTE 0

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

Print Error (varies with printer)
1 = yes
0 = no

BYTE 2

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

Printer Connected
1 - yes
0 - no

BYTE 1

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

Command Execution
1 last command performed
0 last command aborted

Printer Busy
1 yes
0 no

Figure 3-8. Device Status Bytes

User 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, procedures for maintaining the printing option 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.

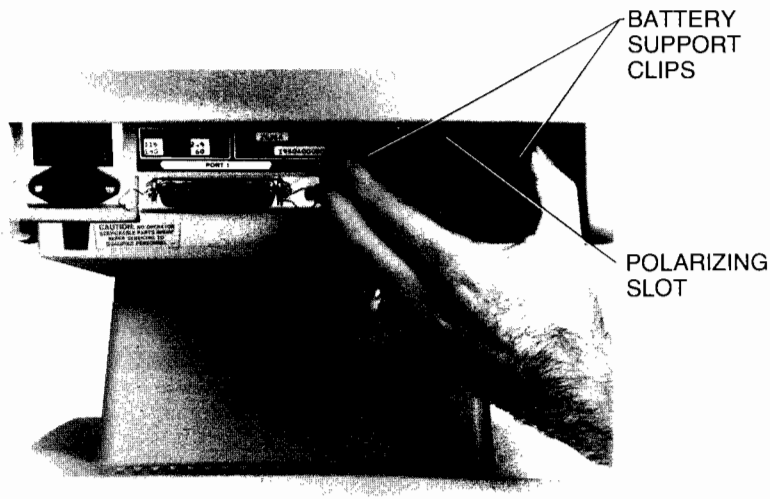


Figure 4-1. Battery Removal

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. 92160A (blue printing) or part no. 92160B (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 terminals equipped with the printer option, 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 terminals with the printer option) 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 POINTS		SIGNAL	VOLTAGE
65 WATT SUPPLY	120 WATT SUPPLY		
J7-1	J5-1	+5V	+5(±0.2)VDC
NO PIN	NO PIN	--	—
J7-3	J5-3	+5V	+5(±0.2)VDC
J7-4	J5-4	+12V	+12(±0.3)VDC
J7-5	J5-5	RETURN	—
J7-6	J5-6	RETURN	—
J7-7	J5-7	PWR ON/FAIL	+4.5(+0.5,−1)VDC
J7-8	J5-8	−12V	−12V(+0.5)VDC
—	J4-1	+16.1V	+16.1(±0.5)VDC

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

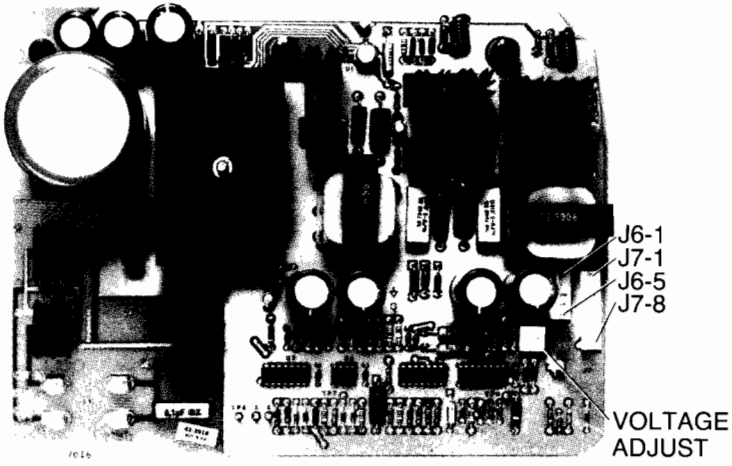


Figure 5-1. Standard Terminal Test Points and +5V Adjustment Locations

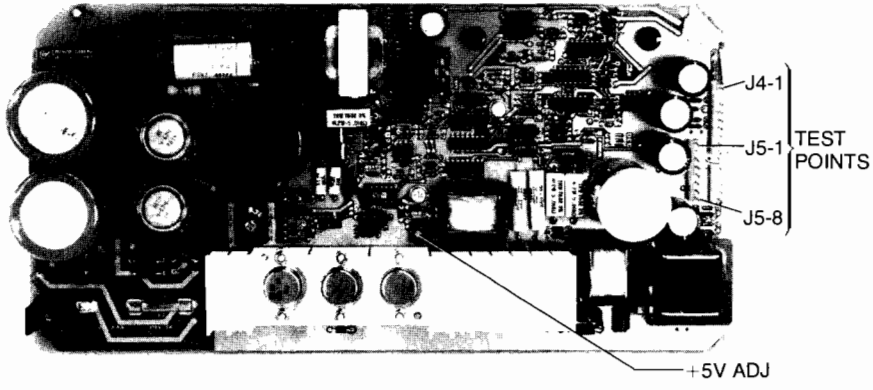


Figure 5-2. Test Points for Terminals with the Printer Option and +5V Adjustment Locations

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 "@".

NOTE

The terminal can generate its own test patterns for video alignment if the video generator is not available. Refer to Section 6 under Self-Tests for procedures for generating screen patterns.

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.

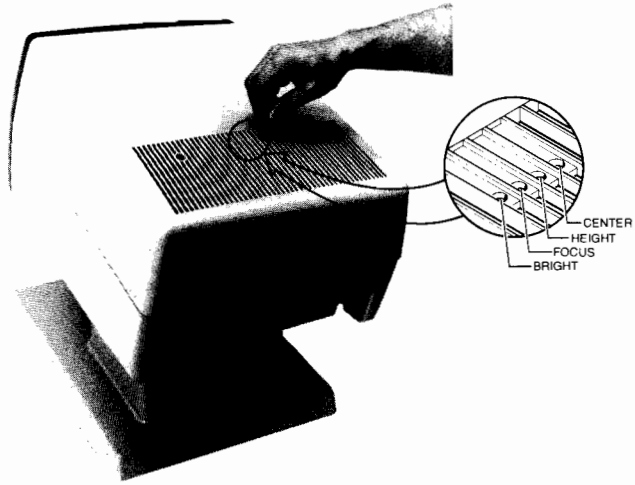


Figure 5-3. Location of Four Raster Adjustments (CENTER, HEIGHT, FOCUS, and BRIGHT)

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 disconnect the ground strap from the Processor PCA ground lug. Lower the Processor PCA to expose the component side of the PCA by pulling on the four snap fasteners which hold it in place.

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.

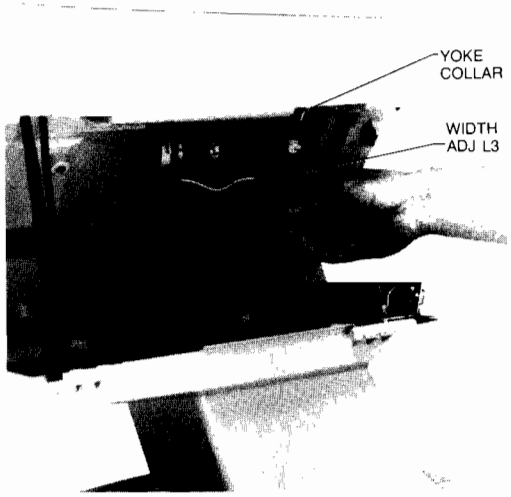


Figure 5-4. Location of Raster Width Adjustment and Yoke Collar

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.

8. 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.

9. 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.

10. 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 self-tests to determine the malfunction and to isolate the malfunction to a replaceable assembly or component. There are several self-tests available:

- Power-On Self-Test
- Terminal Self-Test
- Identify ROMS
- Manufacturing Self-Test
- Data Comm Self-Test
- Printer Self-Test

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

PROCEDURE .....

POWER-ON TEST. This test is performed automatically each time the terminal is turned on. It checks most of the terminal functions. The Power-On test can also be initiated from the keyboard using the function keys (**[AIDS]**, **[Service Keys]**, **[Power-On Test]**). At the end of the test the keyboard bell is beeped. No message is displayed if the test is successful. The cursor should be blinking in the upper left corner of the screen. The Power-On test can be also generated by shorting test points 18 and 19 together on the Processor PCA.

The Power-On test consists of the following:

— Microprocessor check

— RAM check (program and display)

— ROM check (character and program)

— Keyboard controller check

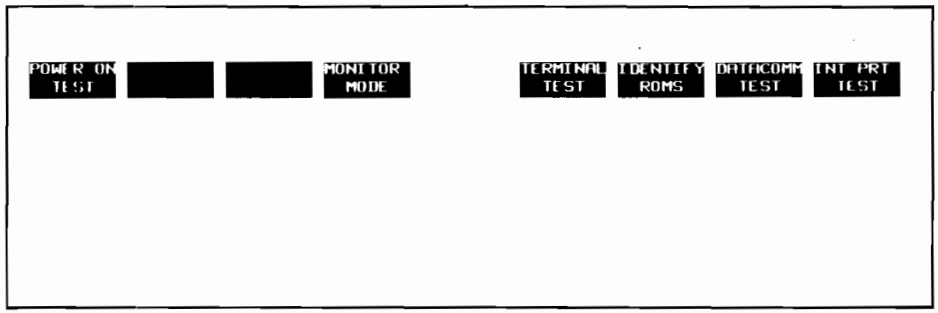
— Data comm controller check (both ports)

— TPM controller check if present (print head moves across and back)

— Non-volatile RAM check (valid configuration only)

— Bell beeps on completion

All of the other tests must be initiated using the "service keys" functions (except the Terminal Test, which can also be initiated programmatically or by using a "MODES" function key).



The test of the microprocessor, RAM memory, and ROM memory takes approximately 12 seconds. The message "TESTING" is displayed at the bottom of the screen. Next the terminal performs an internal loop-back test to verify that the two data communications ports are capable of transmitting data, receiving data, and interrupting properly. This test is performed at the configured baud rate for each port. At the end of this test, the bell is rung (if enabled), and the terminal returns to the normal screen display.

TERMINAL TEST. The Terminal Test is selected by pressing **[AIDS]**, service keys, TERMINAL TEST or **[MODES]**, TERMINAL TEST. This test does the following:

— Keyboard beeps at the start of the test.

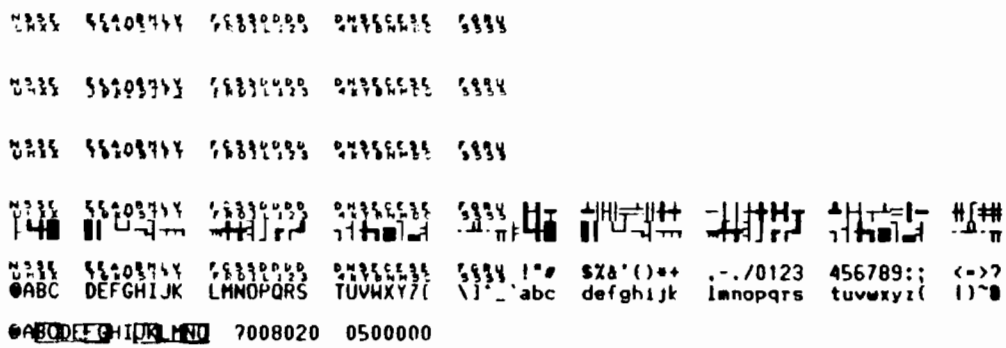
— Displays the message "TESTING" at the bottom of the screen (where the function key labels normally reside).

— Verifies the integrity of all ROM chips within the terminal.

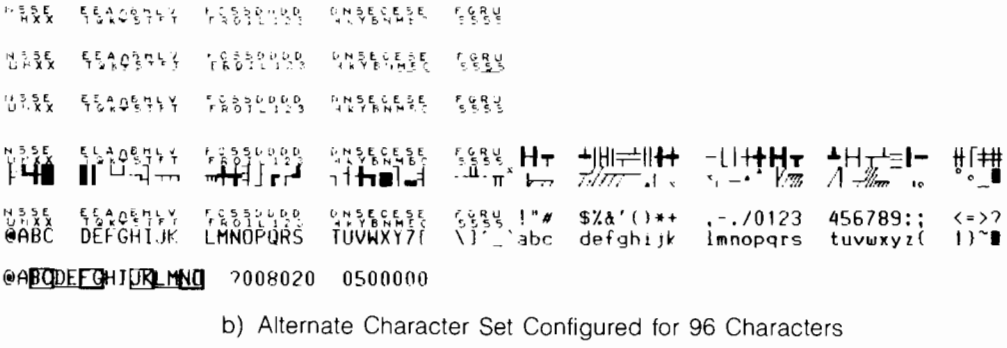
— Non-destructively verifies the integrity of all RAM chips within the terminal (including the one used for non-volatile memory).

— Displays the test patterns shown in figure 6-1 or 6-2 (depending upon whether or not the terminal includes the optional extended character set) in the cursor active window on the screen.

This test is similar to the Power-On test except that in addition a test pattern is displayed.



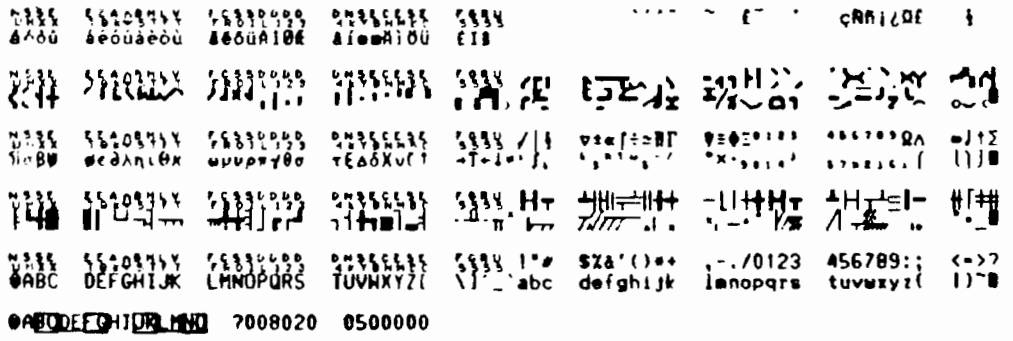
a) Alternate Character Set Configured for 64 Characters



b) Alternate Character Set Configured for 96 Characters

Figure 6-1. Test Pattern

a) Alternate Character Set Configured for 64 Characters



b) Alternate Character Set Configured for 96 Characters

Figure 6-2. Test Pattern (With Optional Extended Character Set Present)

IDENTIFY ROMS. The Identify ROMs function lists the identification labels stored in the character and program ROMs. This test will tell you the part numbers and date codes for each of the ROMs installed in the terminal. The function is accessed by **[AIDS]**, service keys, IDENTIFY ROMS. A typical display is shown in figure 6-3.

```
Character ROMs
1AC1-6021 ROMAN & EXTENDED LINE DRAWING (UPPER BYTE) REV B
1AC1-6022 ROMAN & EXTENDED LINE DRAWING (LOWER BYTE) REV B
1AC1-6025 EXTENDED MATH, EXTENDED LARGE, & ROMAN EXTENSION (UPPER BYTE)
1AC1-6026 EXTENDED MATH, EXTENDED LARGE, & ROMAN EXTENSION (LOWER BYTE)

Firmware ROMs
1818-1255 2004
1818-1256 2004
1818-1257 2004
1818-1258 2004
1818-1259 2004
1818-1260 2004
1818-1261 2004
1818-1262 2004
1818-1263 2004
1818-1264 2004
```

Computer Museum

Figure 6-3. Typical Identify ROMs Display.

MANUFACTURING SELF-TESTS. The Manufacturing Self-Tests provide test patterns for display adjustment and also allow you to perform continuous testing to help isolate intermittent errors. The Manufacturing tests are not intended for customer use. They are accessed by special key sequences. The types of tests included in the Manufacturing Self-Test are:

— Inverse screen

— Screen of "@" characters

— Continuous self-test

— Data Comm tests of both ports

— Displays test patterns (character sets and alignment patterns)

CAUTION

The Manufacturing Self-Test clears all configuration information previously stored in the terminal. In addition the contents of display memory will be lost. Any configuration information will have to be re-entered following the test. If the terminal is equipped with a printer you can display each menu and then use **[ESC] [Ø]** to copy the contents of the display to the printer to preserve a record of the menus.

The manufacturing test sequence is started by the following key sequence:

[CTRL][SHIFT][SHIFT][ENTER]

The first test in the sequence displays the entire screen in inverse video. This pattern can be used in the video alignment procedure.

The second test is accessed by pressing the **[RETURN]** key. This test displays a full screen of "@" characters. These characters are used to aid alignment of the terminal video circuits.

Continuous Test. This test causes the terminal to repeat the Terminal Self-Test until an error is detected or the test is deliberately halted. The continuous portion of the test is accessed by pressing the **[RETURN]** key again. The continuous testing will continue until stopped by **[CTRL][SHIFT][RESET]**. The continuous test requires that a data comm loopback hood connector be used on each port. If the loopback connectors are not used, data comm error messages will be displayed. If an error message is displayed the testing stops. You can clear the message and resume testing by **[CTRL][SHIFT][RESET]**. If the terminal is equipped with a printer, a test pattern will be printed approximately every 15 minutes.

Before the terminal returns to normal operation it will display the message "DEFAULT CONFIG(S) USED — PRESS RETURN". You must press the **[RETURN]** key to return to normal operation, then re-enter the customer's configurations using the **CONFIG** function.

DATA COMM TESTS. The Data Comm tests are used to verify proper operation of the terminal's data communication functions and to help isolate problems when a malfunction occurs. The data communications self-tests are accessed by **[AIDS]**, service keys, DATA COMM TEST. This will cause the menu in figure 6-4 to be displayed.

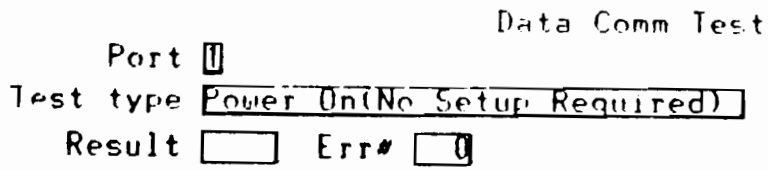


Figure 6-4. Data Comm Test Menu

The menu allows you to specify which port you want to test and which type of test you wish to perform. You select both parameters by positioning the cursor within the desired field (using the [TAB] key) and then pressing the "NEXT CHOICE" ([F2]) or "PREVIOUS CHOICE" ([F3]) function keys. When the menu contains the proper parameters you initiate the test by pressing the "EXECUTE TEST" ([F5]) function key. The various types of data comm tests that can be selected are:

— Power On

— Loopback (with hood or cable and hood)

— Loopback (with modem)

— All configurations (with hood, no cable)

The Result field of the Data Comm Test menu tells whether the terminal passed or failed the test. While the test is in progress, the message "WAIT" will be displayed in this field. At the end of the test the Err# field will contain an error code. The error codes are listed in table 6-1.

Table 6-1. Data Comm Self Test Error Codes

CODE	MEANING
0	OK (no error).
1	No Clear to Send.
2	Unable to synchronize.
3	No characters were returned.
4	Wrong character returned.
5	Framing error.
6	Parity error.
7	Not used.
8	Baud rate too fast.
9	Baud rate too slow.
10	Character error during baud rate test.
11	Error during control line test.
12	Transmitter did not interrupt.
13	Extra transmitter interrupt.
14	Receiver did not interrupt.
15	Extra receiver interrupt.
16	Not used.
17	External clock error.

Table 6-1. Data Comm Self Test Error Codes (Continued)

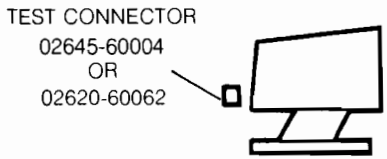
100	Wrong loop back device. This code is returned only for the loopback tests. It indicates that the test was successful except that the loop-back device was different than expected.
100+n	Wrong loopback device. N is one of the 17 error codes listed above. For example, code 111 means that the wrong loopback device was used and that an error was detected during the control line test.
116	The wrong loopback device was used in the "All configs" test and the test could not be performed. The "All configs" test requires that a test hood be installed (without cable or modem).

Power On (No Setup Required). This is an internal loopback test identical to that which is performed as part of the Power-On Test, the only difference is that it is performed only on the selected port. No external connection (test hood or modem cable) is used. Upon completion of this test the data comm port is automatically reconfigured according to the parameters stored in non-volatile memory.

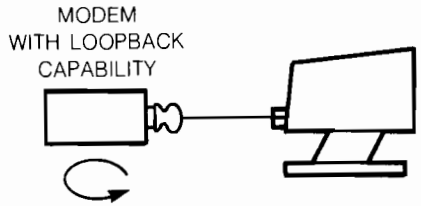
Loopback (Hood or Cable and Hood). This is a set of tests that requires the use of a test hood or a cable with a test hood. It consists of a data loopback test, a baud rate test (which verifies that the baud rate mechanism is functioning properly within + or – 6% of the configured baud rate), a modem control line test, and (if port #1 is being tested) a test that verifies that the port can be driven by external clocking. The data loopback portion of the test is performed using an asynchronous or synchronous configuration (as specified by the data comm configuration stored in non-volatile memory). The other tests are always performed using an asynchronous configuration. If "EXT" is specified for either of the clock sources, internal clocking is used and the test is performed at a reserved baud rate. Upon completion, the data comm ports are automatically reconfigured according to the parameters stored in non-volatile memory.

Loopback (Local/Remote Modem). This is an external loop-back test that requires the use of a modem with local and/or remote data loopback capability. The test is performed using the configuration parameters stored in non-volatile memory.

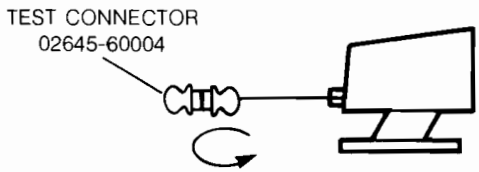
All Configurations. This test checks both ports and each of the data comm protocols. Each baud rate and parity setting is checked for both synchronous and asychronous operation.



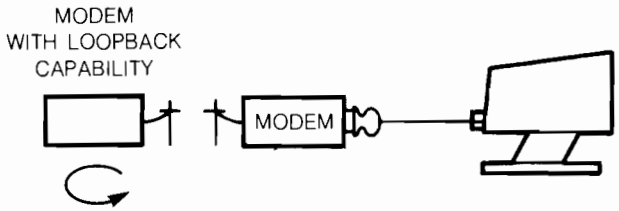
TERMINAL TEST SETUP



LOCAL MODEM TEST SETUP



CABLE TEST SETUP



REMOTE MODEM TEST SETUP

Figure 6-5. Data Communications Test Setups

Video Tests

WHY ..... To verify the proper operation of the video subsystem.

HOW ..... Using internal tests that are accessible through escape sequences or by using the Video Generator.

WHEN ..... Video testing should be performed whenever the video subsystem is not operating properly or requires adjustment.

PROCEDURE .....

You can access the following internal video tests from the keyboard:

— Inverse Video

— Dot Pattern

— Cross Hatch

NOTE

If the Manufacturing Self-Test functions are used to obtain test patterns, the current terminal configurations are lost.

INVERSE VIDEO. An inverse video pattern can be obtained by pressing **[AIDS]**, **[enhance video]**, **[BACK GRND INVERSE*]**, and then **[SHIFT][AIDS]**. The inverse video screen is used to adjust the yoke tilt, display height, and display width.

DOT PATTERN. A dot pattern can be obtained by the following escape sequence entered from the keyboard:

<ESC> & m 4 0 1 3 1 1 W

This pattern can be used to test and adjust the terminal for focus. The test pattern can be cancelled by entering **<ESC> & m 4 0 1 3 1 0 W.**

CROSS HATCH. A cross hatch pattern can be obtained by the following escape sequence from the keyboard:

<ESC> & m 4 0 1 3 1 2 W

This pattern can be used to test and adjust the terminal for linearity. The test pattern can be cancelled by entering **<ESC> & m 4 0 1 3 1 0 W.**

ERROR MESSAGES

There are two classes of error messages that may appear:

— Test errors

— Normal operating errors

If a ROM error is detected a message beginning with the phrase "ROM ERROR" is displayed across the bottom of the screen. The message contains information identifying the bad ROM chip and describing the nature of the detected error condition.

If a RAM error is detected a message beginning with the phrase "RAM ERROR" is displayed across the bottom of the screen. The message contains information identifying the bad RAM chip(s) and describing the nature of the detected error condition.

If an error message does appear, make a note of it so you can accurately relate it to your HP Service Representative over the telephone (this allows him to arrive prepared with the proper replacement parts). To clear the message from the screen, press **[CNTL][SHIFT][RESET]**. RAM errors cannot be cleared.

If the ROM and RAM chips all pass the test but the test pattern on the screen is malformed, the problem may be in the video subsystem of the terminal (the video controller, sweep PCA, or yoke alignment).

The terminal may use either 24-pin or 28-pin ROM chips. However these chips must both be inserted into the same 28-pin socket. Make sure that the ROMs are inserted as shown in figure 6-6.

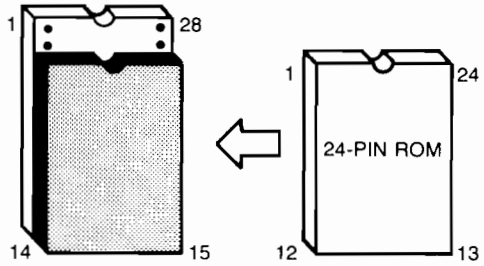


Figure 6-6. ROM IC Socket

Test Errors

The various self tests can generate error messages. Table 6-2 contains a list of self test error messages.

Table 6-2. Self Test Error Messages

MESSAGE	MEANING
DEFAULT CONFIG(S) USED	This message indicates that there was no configuration information stored in the configuration memory. It will normally occur after Manufacturing self test or when the non-volatile RAM or battery is replaced. It will also occur if the RAM or battery has failed. The message indicates that the terminal has tried to store default configuration values. If the terminal is working properly message should not appear the next time the terminal is powered on. You can use the manufacturing test to verify proper operation. If either the non-volatile RAM or the backup battery is bad, this test will display U616 ERROR.
INTEGRAL PRINTER ERROR	The Printer self test has failed.
KEYBOARD ERROR	The 8041 keyboard controller has failed during self test.
NO INTEGRAL PRINTER	The PRINTER TEST or TO INT PRINT functions were accessed but the printer option is not installed.
PORT1 ERROR xyz	There has been an error in the data comm test for port 1. "xyz" indicates the type of error. Refer to the description of data comm errors.
PORT2 ERROR xyz	Same as for PORT1 errors.

RAM ERROR

The RAM test has detected a failure. The information displayed, together with table 6-7 indicates the reference designation of the failing RAM chip(s). Since the display RAMs are used to display the error message, it may be necessary to use the switches and light emitting diodes on the Processor PCA as an alternate means of displaying test results. Figure 6-8 shows the location of RAM chips.

```
RAM ERROR       EXPECTED    WWWW        DIFFERENCE
ADDRESS XXXX    ACTUAL      YYYY        ZZZZZZZZZZZZZZZZ
                                        2^15          2^0
```

where:

WWWW	Expected data (HEX)
XXXX	Address of error
YYYY	Actual data (HEX)
Z···Z	Difference between EXPECTED and ACTUAL in binary. Bits set to "1" indicates an error.

ROM ERROR Uxx

The ROM test has detected a failure. "Uxx" indicates the reference designation of the failing ROM chip. Since the ROMs are used to control the self-test routines, it may be necessary to use the light emitting diodes on the Processor PCA as an alternate means of obtaining test results. Figure 6-8 shows the location of ROM chips.

TEST LOCKED

The test strap in the configuration menu is set to lock.

TEST PASSES

The CONF MEM TEST passed.

U616 ERROR

The destructive non-volatile RAM test failed during the Manufacturing test.

Normal Operating Errors

When the terminal detects a parameter inconsistency or error condition it locks the keyboard and displays an appropriate error message across the bottom of the screen (replacing the function key labels). Press **[RETURN]** to unlock the keyboard, clear the message, and reinstate the current function key labels. See the Reference and User manuals for additional information on operational errors.

The various operating error messages and their meaning are given in table 6-3.

Table 6-3. Normal Operating Errors

MESSAGE	DESCRIPTION
ALPHA ONLY FIELD	With format mode enabled, you attempted to enter non-alphabetic data into a field defined as "alphabetic only". Press **[RETURN]** and then enter the proper type of data.
DEFAULT CONFIG(S) USED	This message is displayed when the terminal attempts to read the content of non-volatile memory but detects a checksum error (e.g., at power-on time, during a hard reset, or when the "POWER ON VALUES" function key is pressed). To determine whether the problem is a bad battery or a bad RAM chip, run the Terminal Test described later in this section. If the RAM chip used for non-volatile memory is bad the Terminal Test will fail and generate an appropriate "RAM ERROR" message identifying the faulty chip. If the test passes, then the "DEFAULT CONFIG(S) USED" power-on message indicates that the battery needs to be changed. Instructions on how to change the battery are provided in Section X, "Terminal Maintenance Procedures." After clearing the message (by pressing **[RETURN]**), you may then reconfigure the terminal as you desire.

DEVICE TRANSFER IN PROGRESS

You attempted to perform a device-to-device data transfer while one is currently in progress. Press **[RETURN]** and then try again later.

DEVICE TRANSFER IN PROGRESS
LOGGED DATA LOST

With data logging enabled, data that should have been directed to a printer ("logged") was NOT because a device-to-device data transfer was in progress.

"FROM" = "TO" DEVICE

You attempted to perform a device-to-device data transfer but one of the defined "to" devices is the same as the "from" device. Clear the message (by pressing **[RETURN]**), correct the "to" device specification, and then reinitiate the data transfer.

FUNCTION LOCKED

The function you have attempted to perform has been "locked" programmatically.

INTEGRAL PRINTER ERROR

Something is wrong with the integral printer. It may just be out of paper or the metal latch (under the plastic printer lid) may not be pressed down securely.

KYBD WORKSPACE DOES NOT EXIST

The workspace number specified in the "Kybd Win" field of the Workspace/Window Configuration Menu is not associated with a defined workspace.

KYBD WORKSPACE NOT OPEN

The window specified in the "Kybd Win" field of the Workspace/Window Configuration Menu is not currently displayed (its "Display" field is set to "NO").

MONITOR MODE INVALID

You attempted to enable monitor mode but the cursor active window is not attached to a data comm port.

MONITOR MODE LOCKED

Monitor mode is disabled (you cannot enable it from the keyboard).

MULTIPOINT INVALID ON PORT 2

You have attempted to attach a multipoint configuration menu to port #2. This is not allowed. Only port #1 can support a multipoint configuration.

NO PORT ATTACHED TO WORKSPACE

Both character mode and remote mode are enabled but the workspace associated with the cursor active window is not currently attached to an active data comm port. In such a case this error message is displayed every time you attempt to enter a data character through the keyboard. If local echo is enabled the data character is entered into the workspace.

NO "TO" DEVICE

You are attempting to perform a device-to-device data transfer without having first defined a "to" device.

NOT MULTIPLE OF 4

The value specified in the "Page Width" field of the Workspace/Window Configuration Menu is not a multiple of four.

NUMERIC ONLY FIELD

With format mode enabled, you attempted to enter non-numeric data into a field defined as "numeric only". Press **[RETURN]** and then enter the proper type of data.

PORTS ATTACHED TO SAME WORKSPACE

You have specified the same workspace number in both the "Port 1 Wrkspc" and "Port 2 Wrkspc" fields of the Workspace-Window Configuration Menu. This is not allowed.

RANGE ERROR

The configuration menu field marked by the cursor contains a value that is not within the allowed range.

ROWS EXCEED MAX

The total number of rows assigned to workspaces exceeds the "Max Rows" value shown at the bottom of the Workspace/Window Configuration Menu.

SCREEN ROWS EXCEED WORKSPACE ROWS

In the Workspace/Window Configuration menu you are attempting to define a display window with more screen rows than there are memory rows in the associated workspace. You must either increase the size of the workspace or decrease the size of the display window.

SCREEN ROWS WOULD EXCEED WORKSPACE ROWS

Using the "BORDR UP" or "BORDR DN" window control function keys, you have attempted to increase the size of a display window beyond that of the associated workspace.

START < STOP ROWS

The "Start Row" value (in the Workspace/Window Configuration Menu) marked by the cursor is greater than the associated "Stop Row" value.

VERTICAL BORDER INVALID

On the Workspace/Window Configuration Menu, one or more display windows are designated as existing:

a. To the left of the vertical border but the vertical border is set to column zero; or

b. To the right of the vertical border but the vertical border is set to column 80.

WINDOWS OVERLAP

Two or more display windows on the same side of the vertical border are defined such that they would overlap. The cursor is positioned in the offending "Start Row" field (of the Workspace/Window Configuration Menu). If more than two windows overlap, the cursor is positioned in the first offending "Start Row" field; when you correct that field and then try to save the menu the cursor moves to the next offending "Start Row" field.

WORKSPACE DOES NOT EXIST

The workspace number specified in either the "Port 1 Wrkspc" or "Port 2 Wrkspc" field of the Workspace/Window Configuration Menu is not associated with a defined workspace.

USING THE DIAGNOSTIC DIODES

In some cases the terminal will be unable to display an error message on the screen. This can occur if the malfunction is severe or affects display memory. The Processor PCA is equipped with LEDs (Light Emitting Diodes) to allow you to obtain the information normally present in an error message.

The diodes and a bank of switches are located on the edge of the Processor PCA (see figure 6-7).

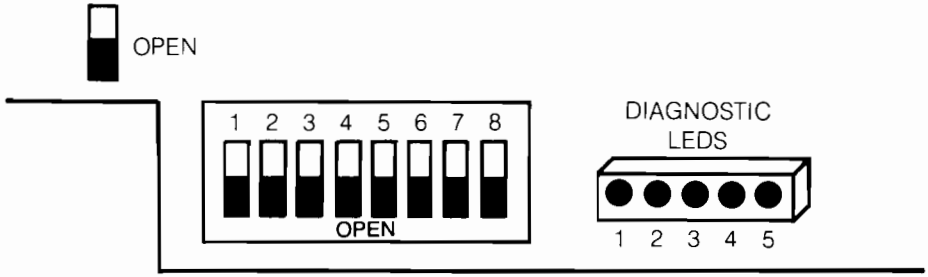


Figure 6-7. Diagnostic LEDs

To use the LEDs, open the terminal and lower the Processor PCA leaving all of the cables connected. The diagnostic switches are used to select the test type and to enable error information.

Power-On Self Test

The LEDs may display terminal status during the power-on self test depending on the position of switch S1-1. Initially the LEDs are all on. If switch S1-1 is closed, one LED is turned off and moved through all five positions. The pattern is reversed with one LED on. When this test is complete the LEDs are used to display the feature about currently being tested. If a failure occurs, the LEDs will halt displaying the last test performed. When the test is complete all diodes should be off.

Selecting LED Functions

The LEDs are controlled by setting switch S1. The various functions that can be selected are described in table 6-4.

Table 6-4. Diagnostic Switch Settings

SWITCH	DESCRIPTION
1	When closed the LEDs can be used to display error data.Note that this is not the normal position. If the switch was closed when an error occured, it may be toggled to display error data.
2-6	Not used
7	WACK/TTD delay for System 1000.
8	When opened Monitor Mode is enabled.

Displaying Errors

If the LEDs have been enabled (switch 1 closed) and an error occurs, the code for the error will be displayed on the diodes. Table 6-5 lists the error codes. The error codes are shown in binary from left to right (LED1 is MSB). Off = 0, On = 1.

Table 6-5. LED Error Codes

ERROR CODE					DESCRIPTION
1	2	3	4	5	
0	0	0	0	0	Self test passed
0	0	0	0	1	The MC5 microprocessor failed
0	0	0	1	0	U121 keyboard controller failed
0	0	0	1	1	U821 port1 controller failed
0	0	1	0	0	U322 port2 controller failed
0	0	1	0	1	Program RAM error*
0	0	1	1	0	Display RAM error*
0	0	1	1	1	RAM address decoding error
0	1	0	0	0	U11 character ROM failed
0	1	0	0	1	U17 character ROM failed
0	1	0	1	0	U15 character ROM failed
0	1	0	1	1	U18 character ROM failed
0	1	1	0	0	U61 program ROM failed
0	1	1	0	1	U81 program ROM failed
0	1	1	1	0	U63 program ROM failed
0	1	1	1	1	U83 program ROM failed
1	0	0	0	0	U65 program ROM failed
1	0	0	0	1	U85 program ROM failed
1	0	0	1	0	U67 program ROM failed
1	0	0	1	1	U87 program ROM failed
1	0	1	0	0	U68 program ROM failed
1	0	1	0	1	U88 program ROM failed
1	0	1	1	0	U69 program ROM failed
1	0	1	1	1	U89 program ROM failed
1	1	0	0	0	Not Used
1	1	0	0	1	Not Used
1	1	0	1	0	U216 Video chip error
1	1	0	1	1	U616 Non-volatile RAM error
1	1	1	0	0	Battery or U616 Non-volatile RAM error
1	1	1	0	1	Re-displayed error
1	1	1	1	0	TPM failed
1	1	1	1	1	Self test not run

*If a RAM error occurs you may use switch 1 to obtain the entire error message using the LEDs.

Obtaining RAM Error Information

To identify the failing chip when a RAM error occurs you must step the LEDs by toggling switch 1. Each time you open and then close switch 1 a new four bit "nibble" of the error message will be displayed. The message is in the following format:

2	3	4	5		
<A15	A14	A13	A12>	1 st nibble	Address of error
<A11	A10	A9	A8 >	2nd nibble	
<A7	A6	A5	A4 >	3rd nibble	
<A3	A2	A1	A0>	4th nibble	
<D15	D14	D13	D12>	5th nibble	Expected data
<D11	D10	D9	D8>	6th nibble	
<D7	D6	D5	D4 >	7th nibble	
<D3	D2	D1	D0>	8th nibble	
<D15	D14	D13	D12>	9th nibble	Actual data
<D11	D10	D9	D8 >	10th nibble	
<D7	D6	D5	D4 >	11th nibble	
<D3	D2	D1	D0>	12th nibble	
<D15	D14	D13	D12>	13th nibble	Difference
<D11	D10	D9	D8 >	14th nibble	
<D7	D6	D5	D4 >	15th nibble	
<D3	D2	D1	D0>	16th nibble	

You must toggle the switch a total of 16 times to get the entire error message. The data is in hexadecimal form (O-P). Table 6-6 gives the binary to hexadecimal conversion.

Table 6-6. Binary to Hexadecimal Conversion

BINARY					HEX	BINARY					HEX
1	2	3	4	5		1	2	3	4	5	
X	0	0	0	0	0	X	1	0	0	0	8
X	0	0	0	1	1	X	1	0	0	1	9
X	0	0	1	0	2	X	1	0	1	0	A
X	0	0	1	1	3	X	1	0	1	1	B
X	0	1	0	0	4	X	1	1	0	0	C
X	0	1	0	1	5	X	1	1	0	1	D
X	0	1	1	0	6	X	1	1	1	0	E
X	0	1	1	1	7	X	1	1	1	1	F

The first four nibbles give the address of the failing word. Program RAM takes up addresses 0000-03FF. Display RAM takes up addresses 4000-7FFF. Display RAM data is stored in a 16 bit wide array with 1 bit stored in each RAM. Program RAM data is stored in a 4-bit wide array. The DIFFERENCE bits indicate the RAM chip(s) that failed. Table 6-7 indicates which RAM to replace for a given failing (difference) bit.

Troubleshooting Example

The following example shows how to use the Diagnostic LEDs to isolate a failing memory component.

Symptoms: No display

Procedure: The lack of display could be due to a malfunction in the power supply, display circuits, microprocessor, or display memory. You can verify that the power supply is working by measuring the output voltages on the test pins. The display can be tested using the display test pattern commands. But normally you can proceed to the LED test procedure.

1. Turn off the terminal.

2. Open the terminal and drop the processor PCA. Be sure and remove the ground strap.

3. Close switch S1-1. This will allow you to display the error data.

4. Make sure that no electrical contacts are shorted and then power on the terminal.

5. Read the display on the diodes. In this example the diodes are 0 0 1 1 0 (0=off, 1=on). Table 6-5 lists diode error codes. The problem is a Display RAM error.

6. Toggle switch S1-1 slowly open and then closed. Each time this is done write down the diode states. After all 16 nibbles of message were read the results in this example were as follows:

<A15-A12>	1	0	0	0	0	0200 HEX	Address of error
<A11-A8>	1	0	0	1	0		
<A7-A4>	1	0	0	0	0		
<A3-A0>	1	0	0	0	0		
<D15-D12>	1	0	0	0	0	0000 HEX	Expected data
<D11-D8>	1	0	0	0	0		
<D7-D4>	1	0	0	0	0		
<D3-D0>	1	0	0	0	0		
<D15-D12>	1	0	0	0	0	0080 HEX	Returned data
<D11-D8>	1	0	0	0	0		
<D7-D4>	1	1	0	0	0		
<D3-D0>	1	0	0	0	0		
<D15-D12>	1	0	0	0	0	0080 HEX	Difference data
<D11-D8>	1	0	0	0	0		
<D7-D4>	1	1	0	0	0		
<D3-D0>	1	0	0	0	0		

The first LED normally blinks as you toggle each set of data. When the last nibble of error data is obtained this diode will not go out. This indicates that you have read all of the data.

7. Table 6-7 indicates that if bit 8 is in error that IC U55 is the failing circuit.

8. Power down the terminal and replace the circuit.

9. Power on the terminal. The Power On Self-Test should indicate that the terminal is functioning properly. In the case of multiple component failures, you should be able to use the same technique to find and replace most other failing components.

Table 6-7. RAM Replacement Table

BIT	DISPLAY RAM	PROGRAM ROM
0	U51	U94
1	U41	U94
2	U52	U94
3	U42	U94
4	U53	U96
5	U43	U96
6	U54	U96
7	U44	U96
8	U55	U98
9	U45	U98
A	U56	U98
B	U46	U98
C	U57	U910
D	U47	U910
E	U58	U910
F	U48	U910

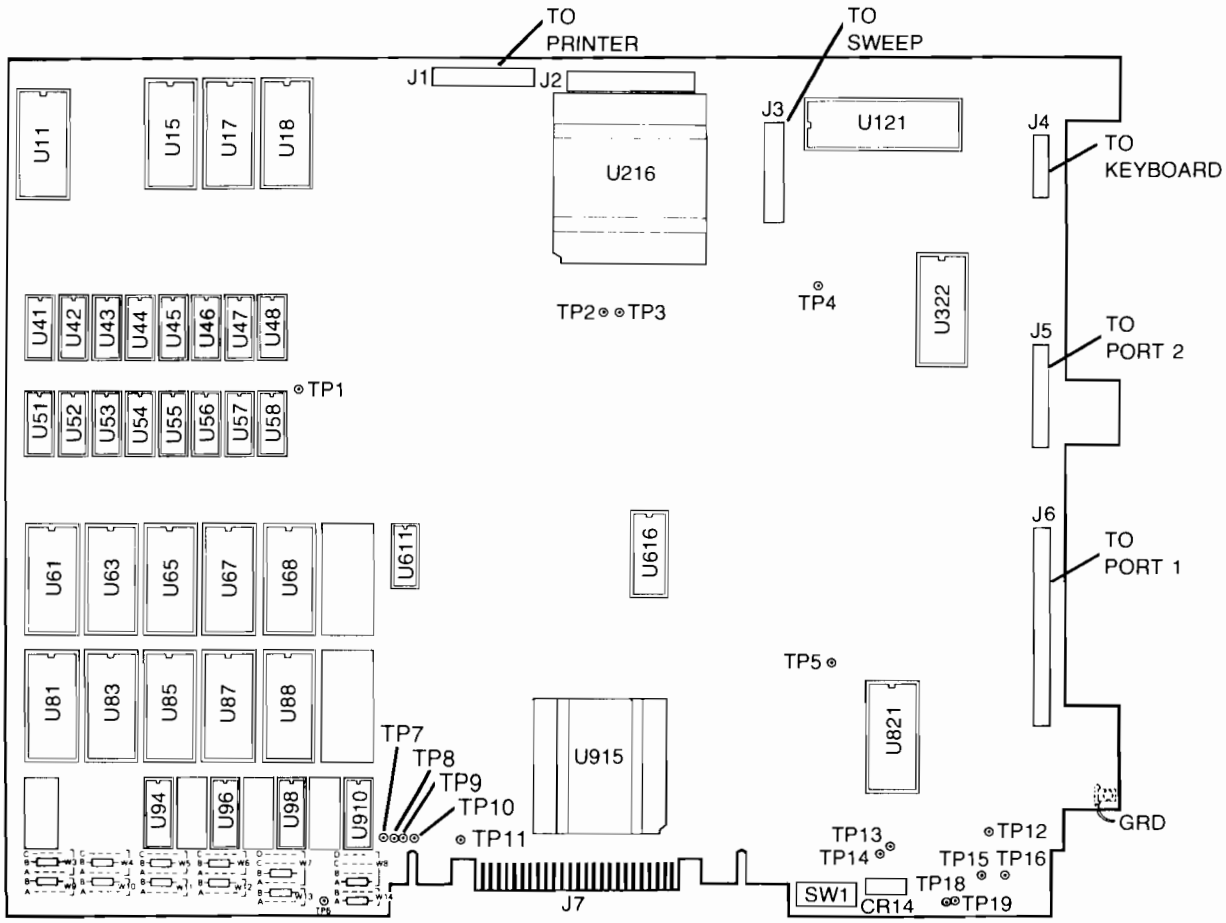


Figure 6-8. Processor PCA

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.

Note

If the Processor PCA is functioning properly the HP 2626 Terminal has a built-in Video test and does not require the Video Generator. Refer to 2626 Video Test.

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 6-9) 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 6-8.

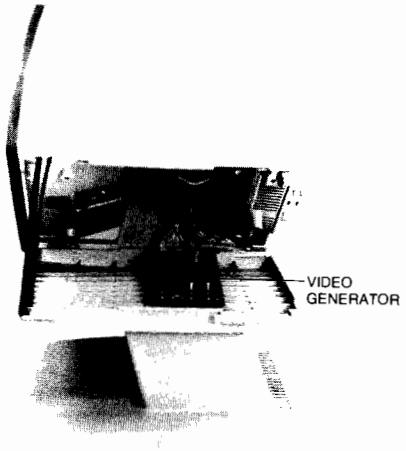


Figure 6-9. Video Generator Installed in Place of the Processor PCA

CONTROLS ..... Displays are produceable using the Video Generator (figure 6-10) and the switch positions listed in table 6-9.

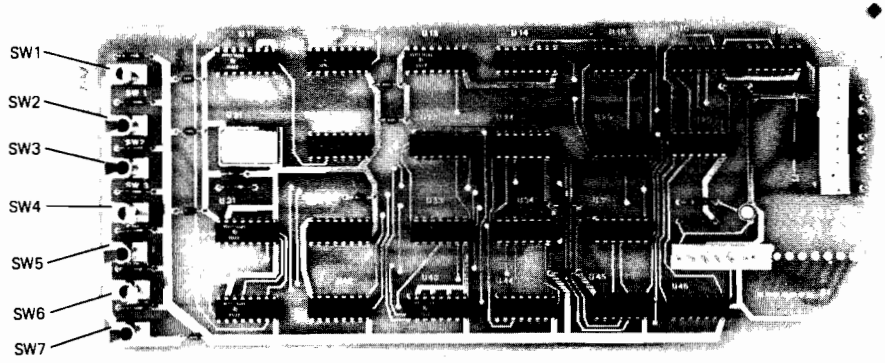


Figure 6-10. Video Generator

Table 6-8. 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 6-11) 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.

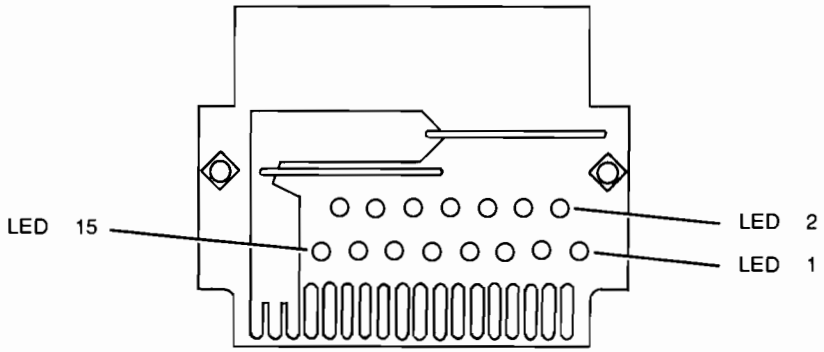


Figure 6-11. Head Load Assembly

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.

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.

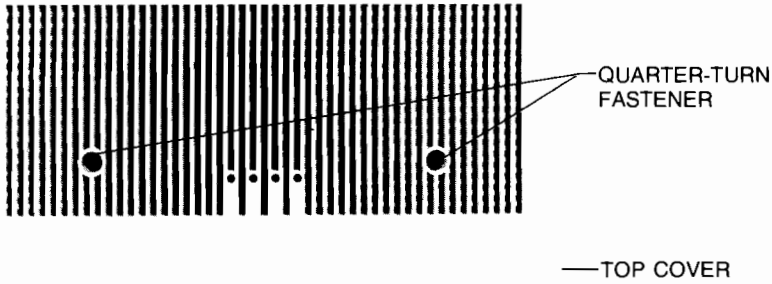


Figure 7-1. Terminal Top View

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. 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.

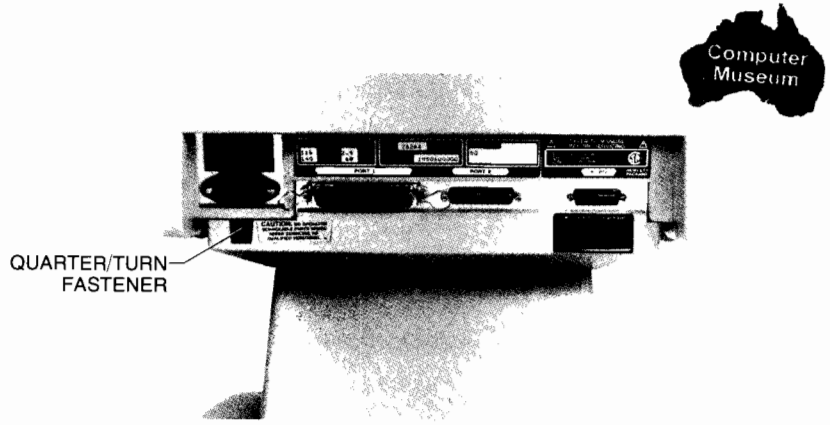
CAUTION

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. Lower Processor PCA onto the support (refer to "PROCESSOR PCA"), 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.



Computer Museum

Figure 7-2. Terminal (Rear View)

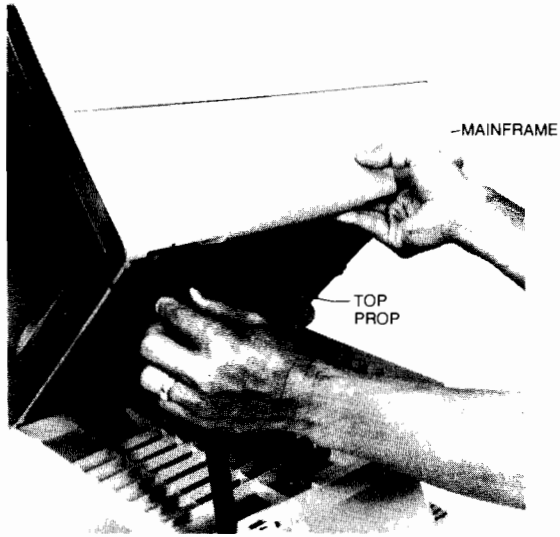


Figure 7-3. Terminal Set to the Half-Open Position

REPLACEMENT. Replace mainframe as follows:

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

2. 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. 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. Pull fan cable assembly through opening in support.

REPLACEMENT. Replace support as follows:

1. Position support onto pedestal.

2. 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.

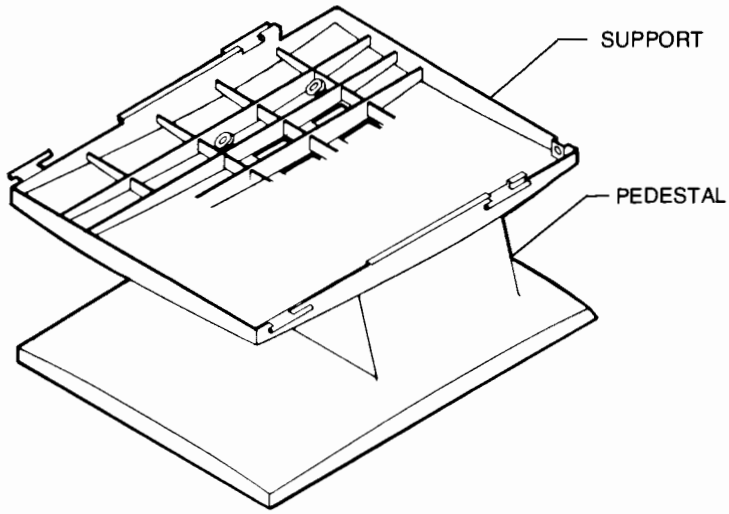


Figure 7-4. Support and Pedestal

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. Remove the two screws and washers securing fan assembly to pedestal.

REPLACEMENT. Replace pedestal as follows:

1. 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. 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 .....

The terminal 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.

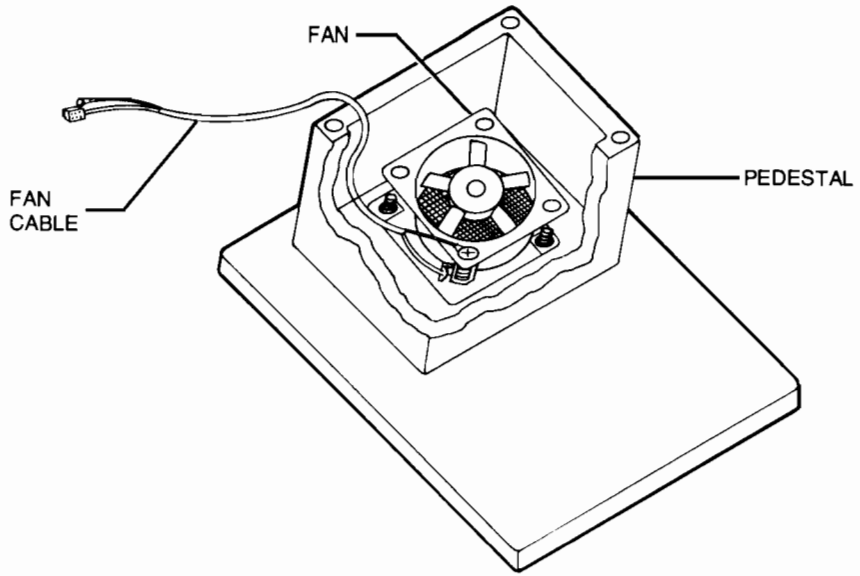


Figure 7-5. Fan Removal

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 terminals with printers, disconnect the thermal print cable assembly from connector J1.

5. Carefully remove the Processor PCA.

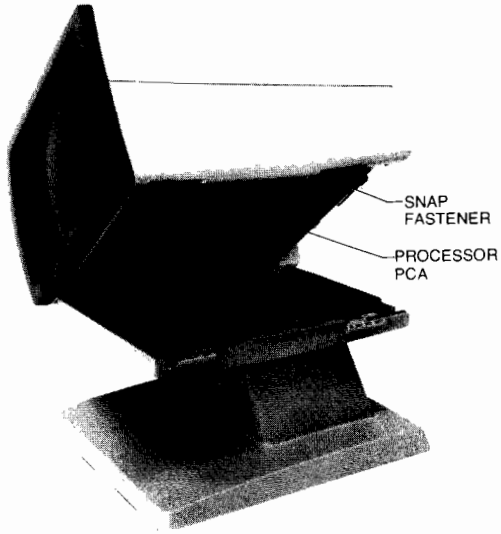


Figure 7-6. Processor PCA Removal

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 7-12).

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 terminals with printers, 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.

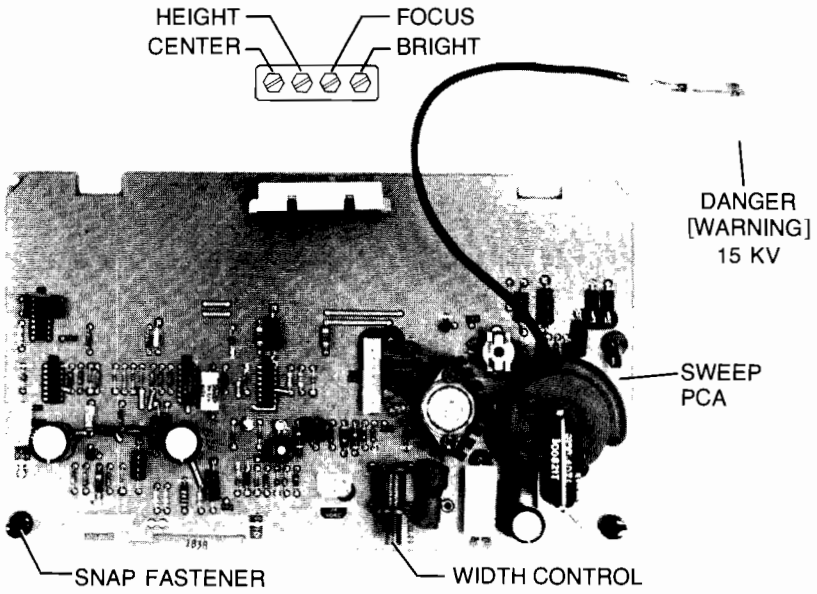


Figure 7-7. Sweep PCA

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 terminals with printers (120 watt power supply), 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 terminals with printers, 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 terminals with printers, there are four snap fasteners.

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

Note

For standard terminals, 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.

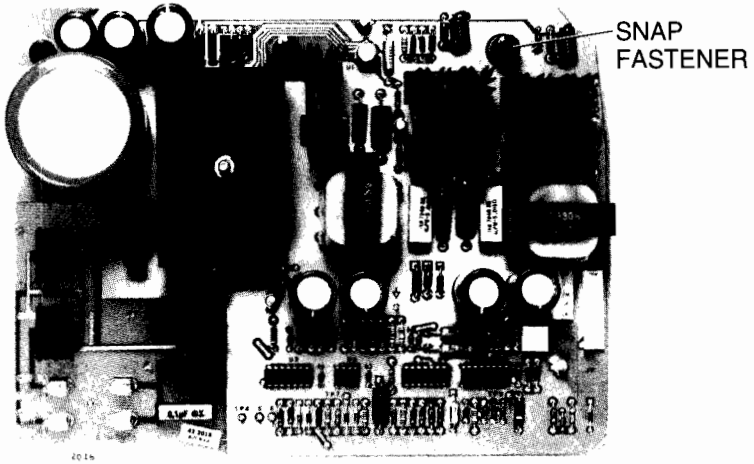


Figure 7-8. Power Supply PCA (Standard)

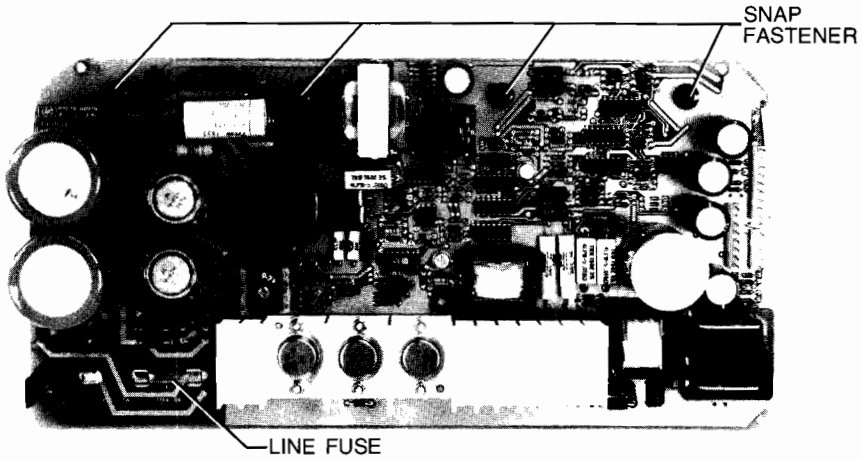


Figure 7-9. Power Supply PCA (Terminals with Printers)

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).

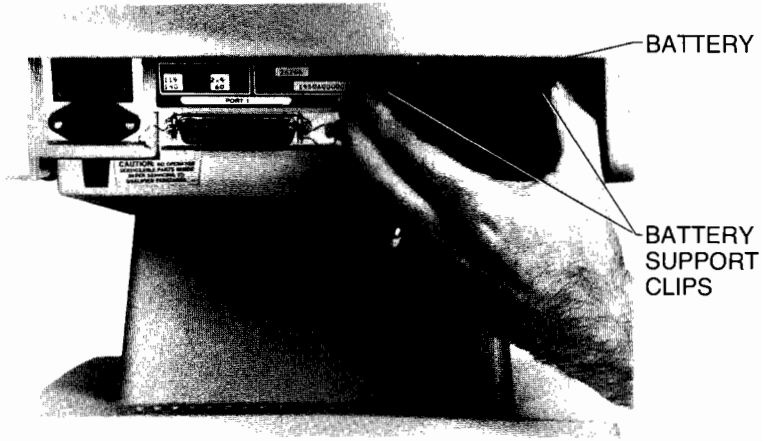


Figure 7-11. Battery Removal

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.

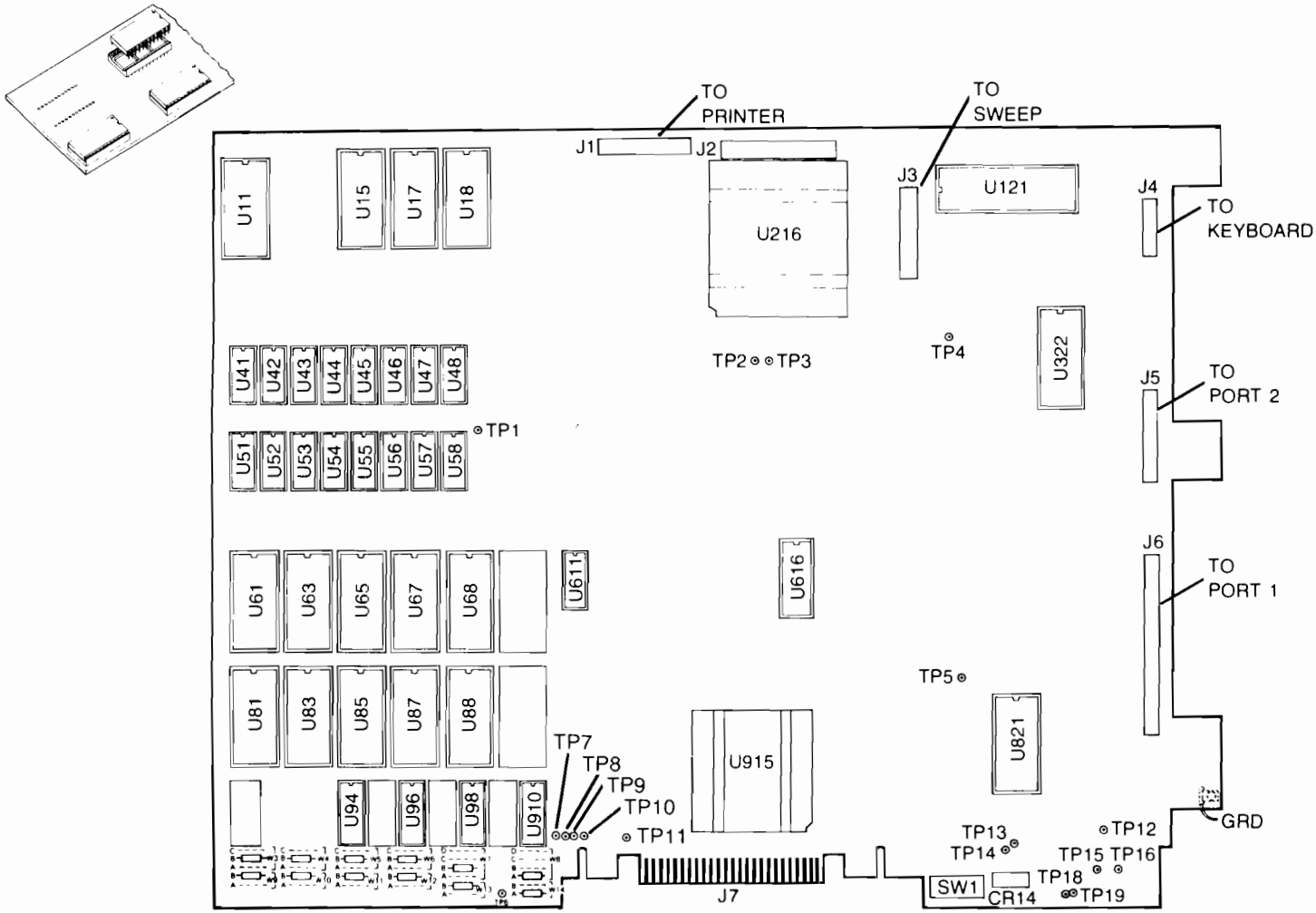


Figure 7-12. Installing an IC

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.

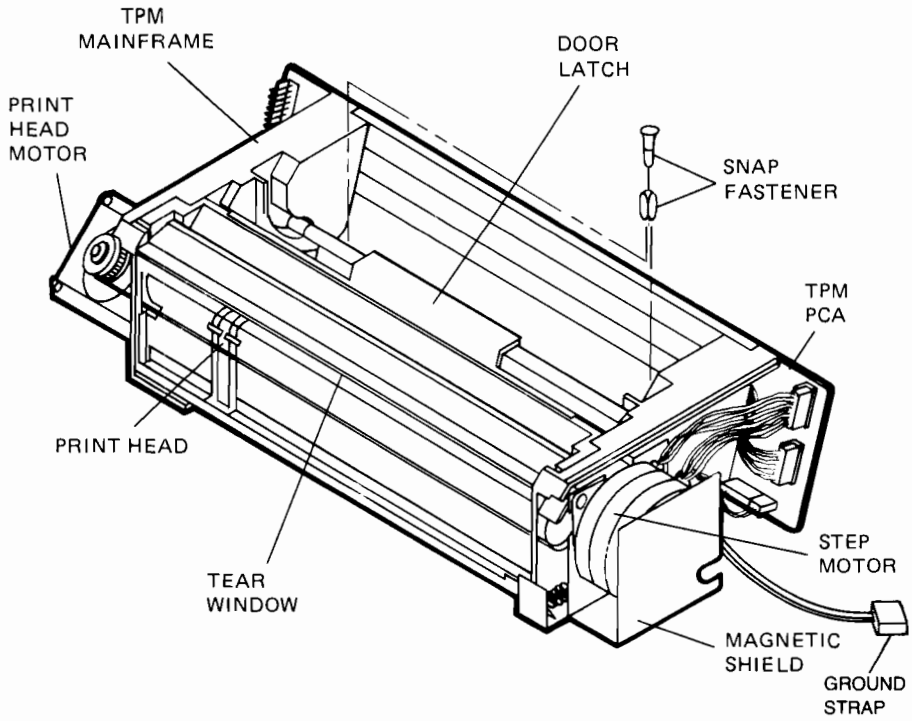


Figure 7-13. TPM Removal

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.

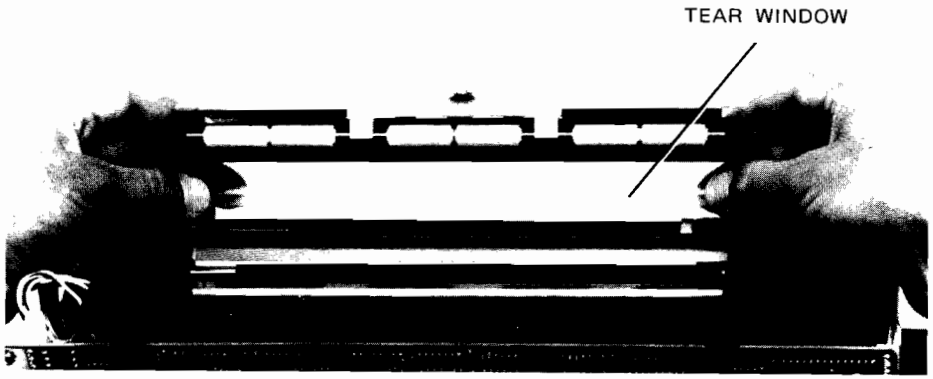


Figure 7-13A. Tear Window

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

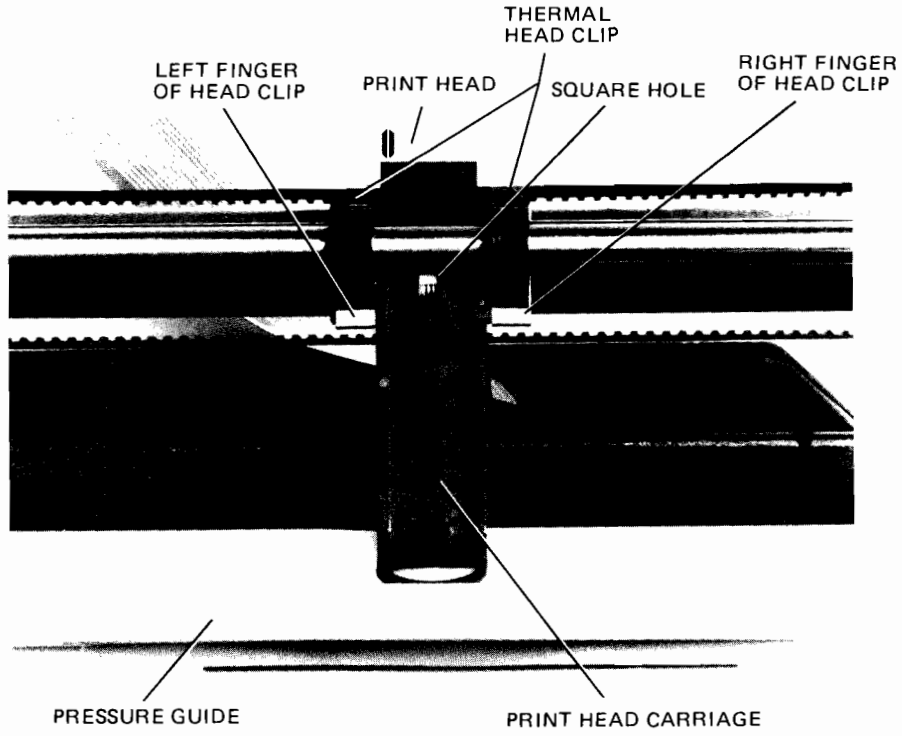


Figure 7-13B. TPM Front View

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.

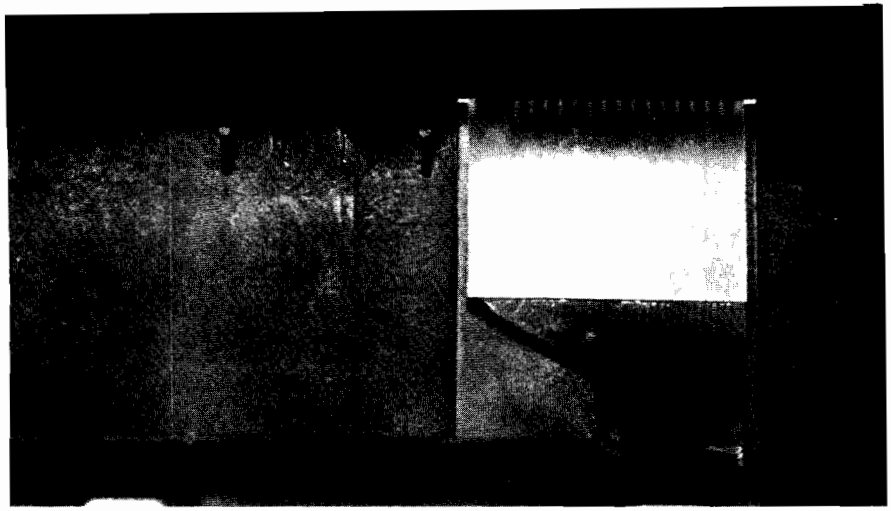
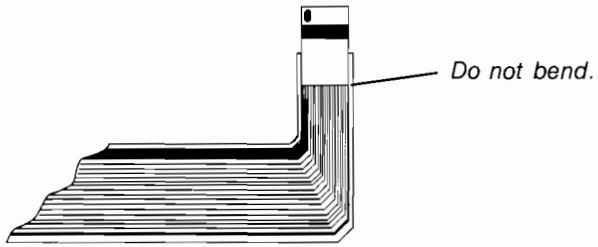


Figure 7-13C. Print Head Assembly Connector

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.

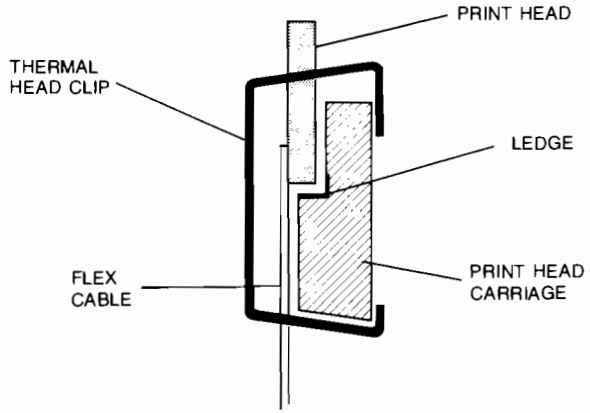


Figure 7-13D. Ledge Inside Print Head Carriage

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.

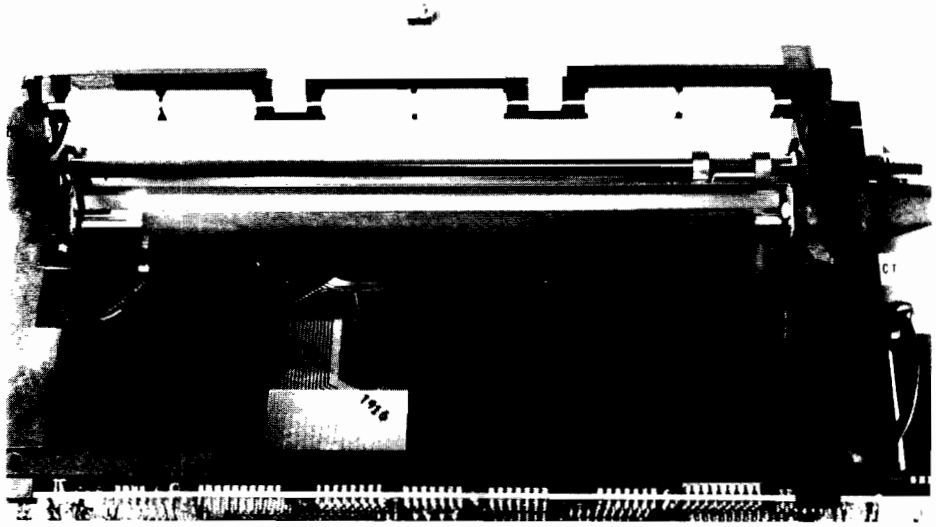


Figure 7-13E. Print Head Assembly in Place

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 7-25 and 7-26. 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 7-9 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 "Exchange Board 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
	STANDARD	OPTION 050		
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	1	02620-60012	*Fan
				(Attaching Parts)
	2	2	2360-0127	*Screw, machine, 6-32 x 7/8
	2	2	3050-0066	*Washer, flat, no. 6

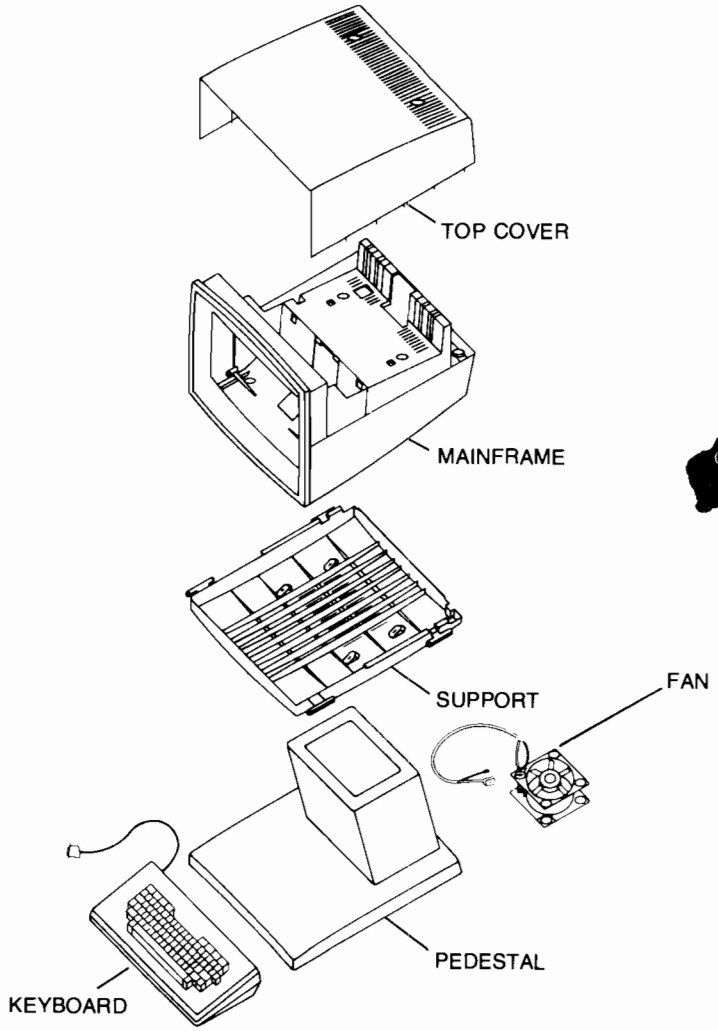


Figure 7-14. Standard Terminal

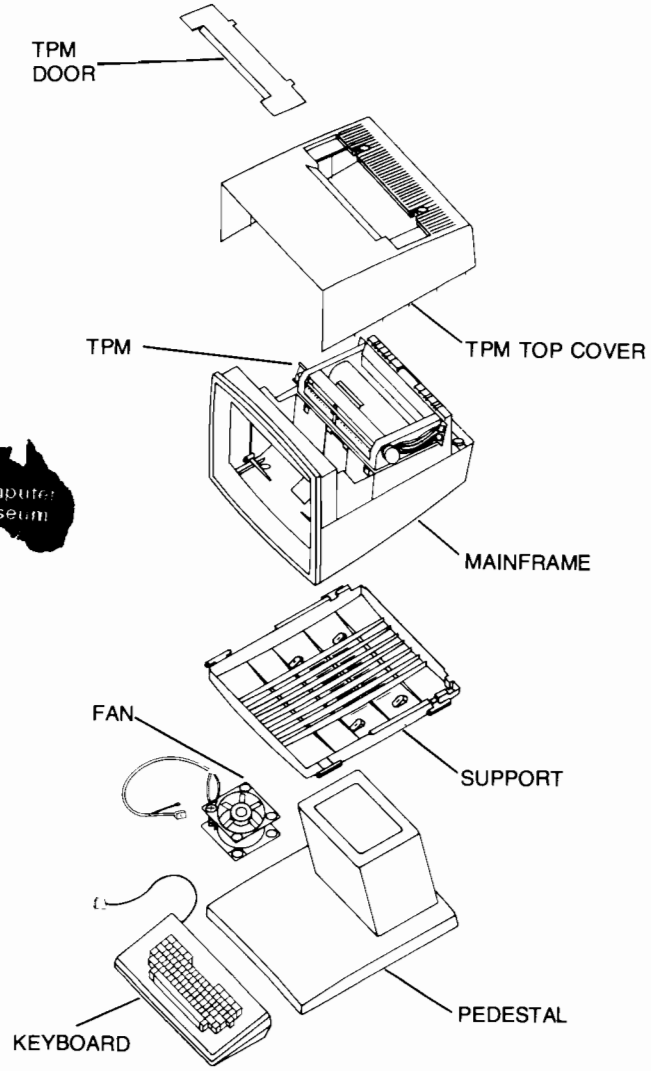


Figure 7-15. Option 050 Terminal

Computer Museum

Table 7-2. Mainframe Module Assembly

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO.	DESCRIPTION
	STANDARD	OPTION 050		
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	4040-1478	*Bezel
7a	1	1	7120-8323	*Nameplate (2626A)
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	02620-60005	*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	02620-60040	*I/O Panel Assembly
14a	1	1	7120-8324	*I/O Panel Label
14b	1	1	7120-7852	*European Safety Label (options 015, 016)
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	1	02620-60006	*Power Panel Assembly-Filter
				— — — x — — —
19	1	1	1400-0965	*Battery Support
20	1	1	1420-0259	*Battery, 4.2V
				— — — x — — —

Table 7-2. Mainframe Module Assembly (Continued)

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO.	DESCRIPTION
	STANDARD	OPTION 050		
21	1		02620-60060	*65 Watt Power Supply PCA
	1		2110-0002	*Fuse, 2.0A, (Standard)
	1		2110-0001	*Fuse, 1.0A, (option 013)
	1		2110-0083	*Fuse, 2.5A (option 014)
	1		2110-0001	*Fuse, 1.0A (option 015)
	1		2110-0002	*Fuse, 2.0A (option 016)
				— — — x — — —
22	1		02620-60079	*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	*120 Watt Power Supply PCA
		1	2110-0010	*Fuse, 5.0A (Standard)
		1	2110-0083	*Fuse, 2.5A (option 013)
		1	2110-0010	*Fuse, 5.0A (option 014)
		1	2110-0083	*Fuse, 2.5A (option 015)
		1	2110-0010	*Fuse, 5.0A (option 016)
27		1	02620-60027	*Power Panel Assembly
28		1	02620-60013	*TPM Power Cable
29		1	8120-2805	*TPM Cable
30	2	3	1400-0611	*Cable Clamp
31	1	1	02620-60012	*Fan Assembly

Table 7-2. Mainframe Module Assembly (Continued)

FIG & INDEX NO.	UNITS PER ASSY		HP PART	DESCRIPTION
	STANDARD	OPTION 050		
32		1	02670-40003	*TPM Mainframe
33			02620-60081	Ground Strap Assembly
	1	1	8730-0016	*Tuning Wand
	1	1	8120-1378	*Power Cord Set, NEMA5/CEE (Standard)
	1	1	8120-1351	*Power Cord, BS1363/CEE (option 900)
	1	1	8120-1369	*Power Cord, ASCII2/CEE (option 901)
	1	1	8120-1689	*Power Cord, CEE7-VII (option 902)
	1	1	8120-2104	*Power Cord, SEV/CEE (option 906)
	1	1	8120-2956	*Power Cord, DEMKO 86 (option 912)
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	13242-60008	*13242G RS232 Printer Cable, Male
Note 1	1	1	13242-60009	*13242H RS232 Printer Cable, Female
Note 1	1	1	13242-60002	*13242M European Modem Cable
Note 1	1	1	13242-60001	*13242N US Modem Cable
Note 1	1	1	13242-60005	*13242Y E.M.P. Protection Cable, Male

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

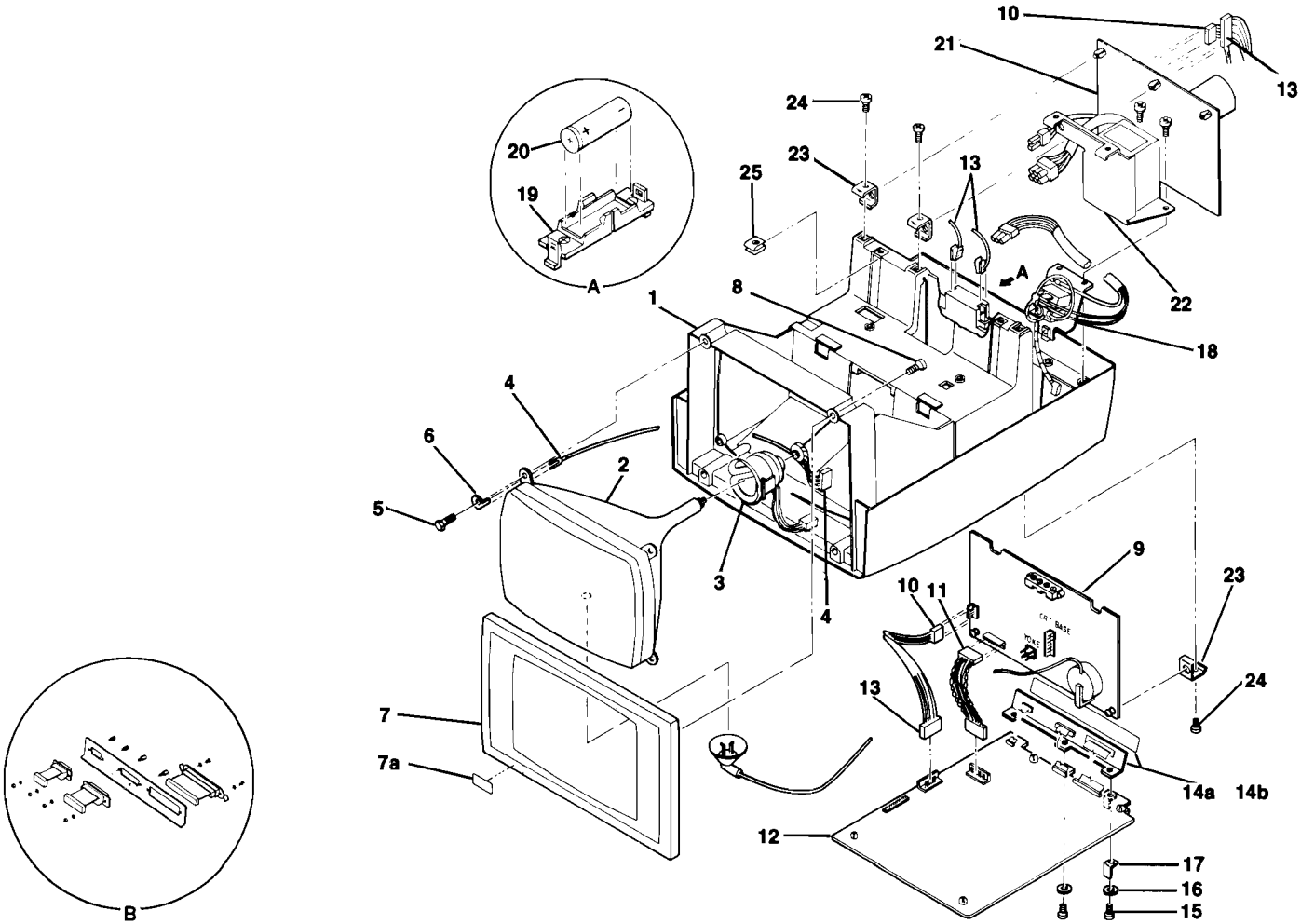


Figure 7-16A. Mainframe, Exploded View (Standard)

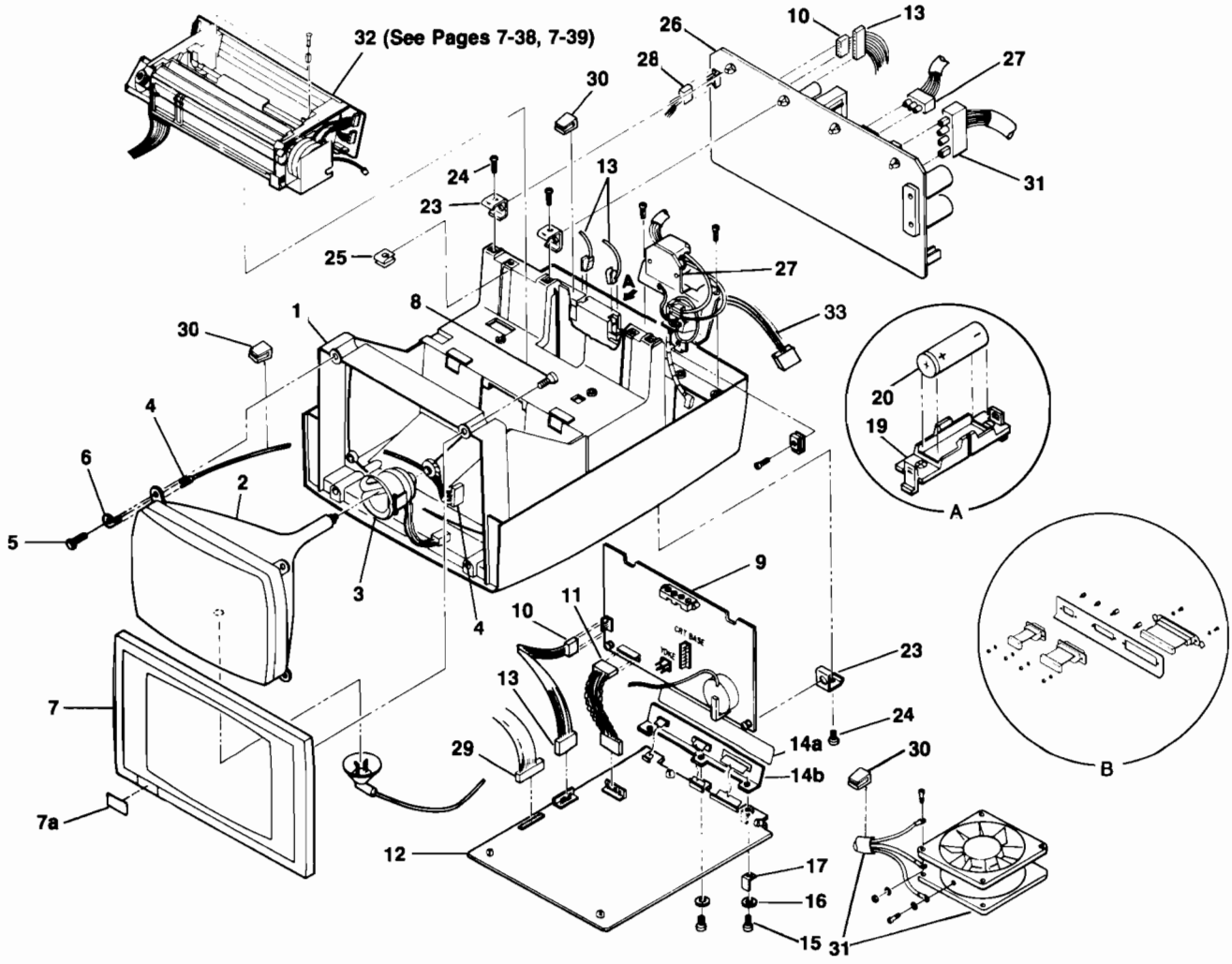


Figure 7-16B. Mainframe, Exploded View (Option 50)

Table 7-3. Thermal Print Mechanism (Printer Option)

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	02670-60050*	* 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	02670-60055	*Rod, paper roll
13	1	02670-40007	*Tear Window
14	1	1531-0022	*Rod, removable
15	1	1530-2154	*Shaft, rubber drive
16	1	02670-60052	*Paper Guide Gnd Strap Assembly
	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.

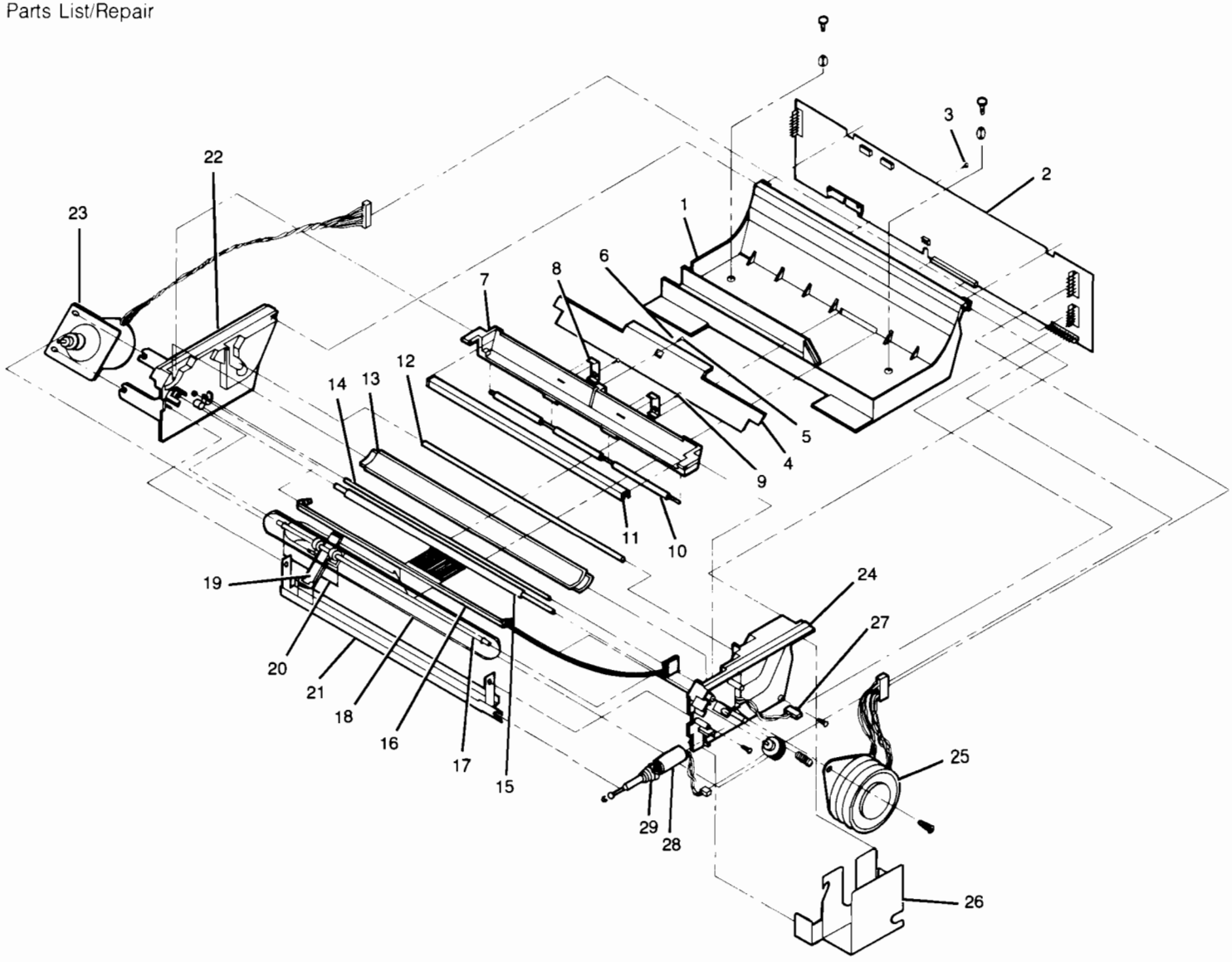


Figure 7-17. TPM, Exploded View

Table 7-4. Keyboard Assembly

FIG & INDEX NO.	UNITS PER ASSY		HP PART NO.	DESCRIPTION
	STANDARD	OPTION 001-006*		
7-18-				
1	1	1	02620-40012	**Keyboard Top
2	1	1	02620-40011	**Keyboard Base (Attaching Parts)
3	1	1	02620-60061	**Extended Keyboard PCA
4	4	4	0624-0400	**Screw, Tapping, no. 6-19
5	4	4	0403-0285	**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	02620-60016	**Loudspeaker Assembly
10	1	1	3101-2337	**Switch Array, 61 Switches
11	2	2	3101-0464	**Switch Array, 10 Switches
12	1	1	3101-0465	**Switch Array, 8 Switches
13	1	1	3101-0466	**Switch Array, 14 Switches

*National Language Options.

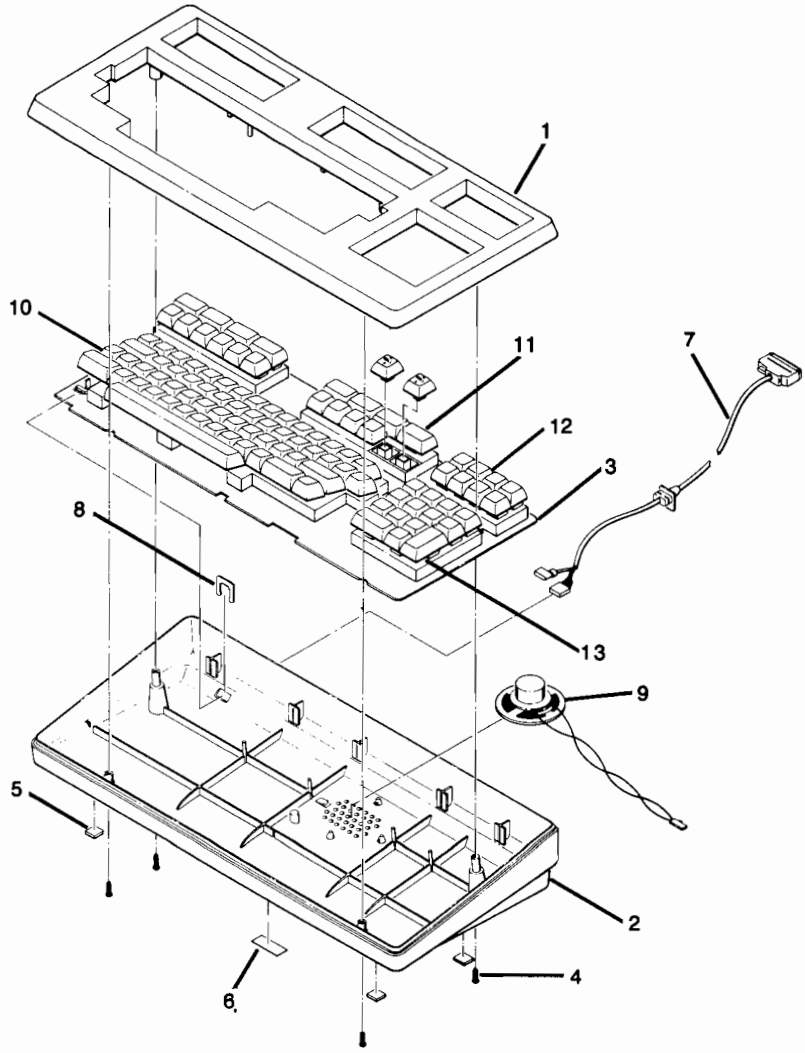


Figure 7-18. Keyboard Assembly

Table 7-5. Standard 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	0371-2016	** I Keycap
1	0371-2017	** J Keycap
1	0371-2018	** K Keycap
1	0371-2019	** L Keycap
1	0371-2020	** M Keycap
1	0371-1232	** N Keycap
1	0371-2021	** O 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	0371-2022	** U 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
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	0371-1267	** BACKSPACE Keycap
1	0371-1268	** CAPS Keycap
1	0371-1269	** CTRL Keycap
1	0371-1270	** ENTER Keycap
1	0371-1995	** BREAK Keycap
1	0371-1273	** TAB Keycap
1	0371-1274	** SHIFT Keycap
1	0371-1275	** RETURN Keycap
1	0371-1277	** Space Bar Keycap
1 •	0371-1971	** ↱ (Homeup) Keycap
1	0371-2031	** ROLL ∧ > Keycap
1	0371-2032	** ROLL ∨ < Keycap
4	0371-1970	** Cursor Keycap
1	0371-1973	f1
1	0371-1974	f2
1	0371-1975	f3
1	0371-1976	f4
1	0371-1977	f5
1	0371-1978	f6
1	0371-1979	f7
1	0371-1980	f8
1	0371-1981	ESC
1	0371-1982	DEL
1	0371-1983	TAB LEFT
1	0371-1984	TAB RIGHT
1	0371-1985	0
1	0371-1986	NEXT PAGE
1	0371-1987	PREV PAGE
1	0371-1990	INS LINE
1	0371-1991	DEL LINE
1	0371-1992	INS CHAR
1	0371-1993	DEL CHAR
1	0371-1994	CLEAR DSPLY
1	0371-1996	RESET
1	0371-1997	1
1	0371-1998	2
1	0371-1999	3
1	0371-2000	4
1	0371-2001	5
1	0371-2003	7
1	0371-2004	8
1	0371-2006	– (MINUS)
1	0371-2007	. (PERIOD)
• 1	0371-2013	AIDS
1	0371-2015	CLEAR LINE
1	0371-2029	MODES
1	0371-2030	USER KEYS
2	0371-2081	6 and 9

The following table (Table 7-6) gives the basic keycaps which are common to all of the national options. Table 7-7 lists the keycaps which are unique to each 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 Options

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	0371-2016	** I Keycap
1	0371-2017	** J Keycap
1	0371-2018	** K Keycap
1	0371-2019	** L Keycap
1	0371-2020	** M Keycap
1	0371-1232	** N Keycap
1	0371-2021	** O 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	0371-2022	** U 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
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	0371-1267	** BACKSPACE Keycap
1	0371-1268	** CAPS Keycap
1	0371-1269	** CTRL Keycap
1	0371-1270	** ENTER Keycap
1	0371-1273	** TAB Keycap
1	0371-1274	** SHIFT Keycap
1	0371-1275	** RETURN Keycap
1	0371-1277	** Space Bar Keycap
1	0371-1971	** Home Keycap
1	0371-2031	** ROLL ^ > Keycap
1	0371-2032	** ROLL V < Keycap
4	0371-1970	** Cursor Keycap
1	0371-1973	f1
1	0371-1974	f2
1	0371-1975	f3
1	0371-1976	f4
1	0371-1977	f5
1	0371-1978	f6
1	0371-1979	f7
1	0371-1980	f8
1	0371-1981	ESC
1	0371-1982	DEL
1	0371-1983	TAB LEFT
1	0371-1984	TAB RIGHT
1	0371-1985	0
1	0371-1986	NEXT PAGE
1	0371-1987	PREV PAGE
1	0371-1990	INS LINE
1	0371-1991	DEL LINE
1	0371-1992	INS CHAR
1	0371-1993	DEL CHAR
1	0371-1994	CLEAR DSPLY
1	0371-1995	BREAK
1	0371-1996	RESET
1	0371-1997	1
1	0371-1998	2
1	0371-1999	3
1	0371-2000	4
1	0371-2001	5
1	0371-2003	7
1	0371-2004	8
1	0371-2006	– (MINUS)
1	0371-2007	. (PERIOD)
1	0371-2013	AIDS
1	0371-2015	CLEAR LINE
1	0371-2029	MODES
1	0371-2030	USER KEYS
2	0371-2081	6 and 9

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

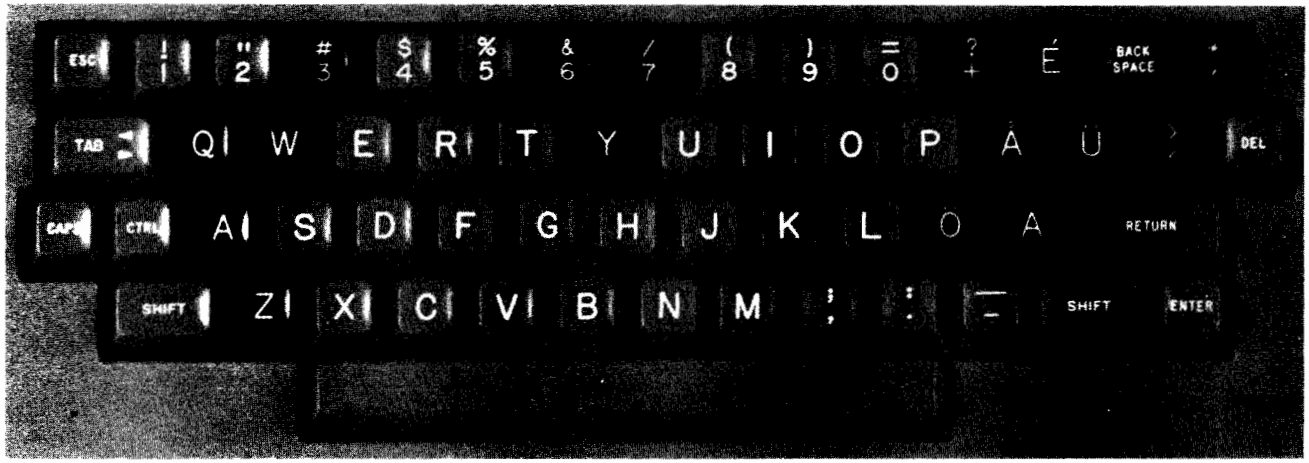


Figure 7-19. Swedish/Finnish Keyboard, Unique Keys (Option 001)

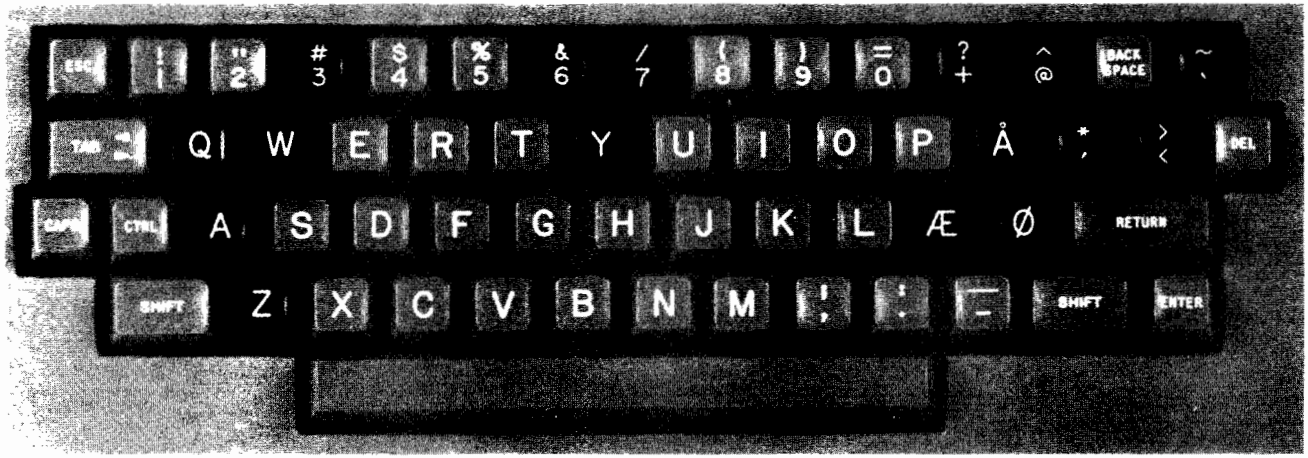


Figure 7-20. Danish/Norwegian Keyboard, Unique Keys (Option 002)

The French keyboard can be configured to the following layout:

When this optional key layout is used, "qw" must be selected during the language configuration process. (Refer to the User and Reference manuals for additional configuration information.

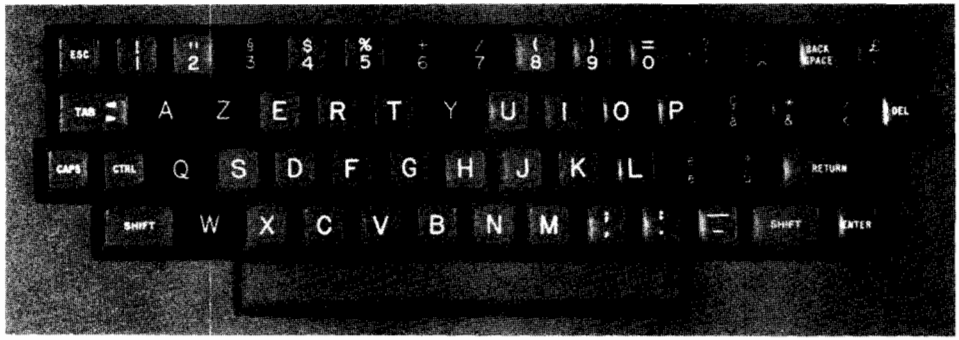


Figure 7-21. French Keyboard, Unique Keys (Option 003)

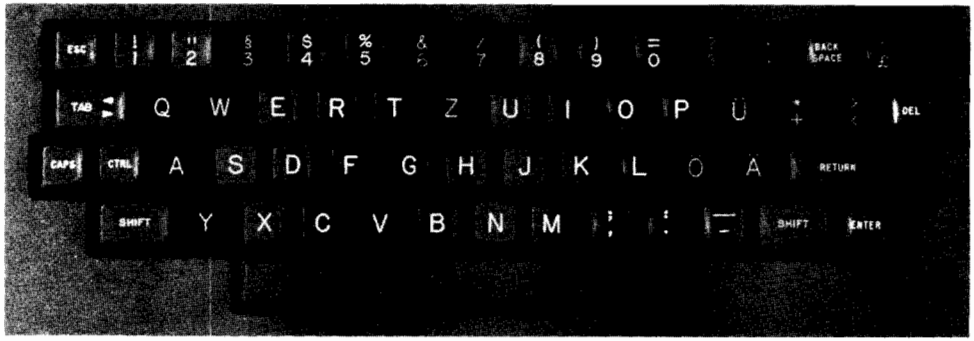


Figure 7-22. German Keyboard, Unique Keys (Option 004)

Figure 7-23. United Kingdom Keyboard, Unique Keys (Option 005)

Figure 7-24. Spanish Keyboard, Unique Keys (Option 006)

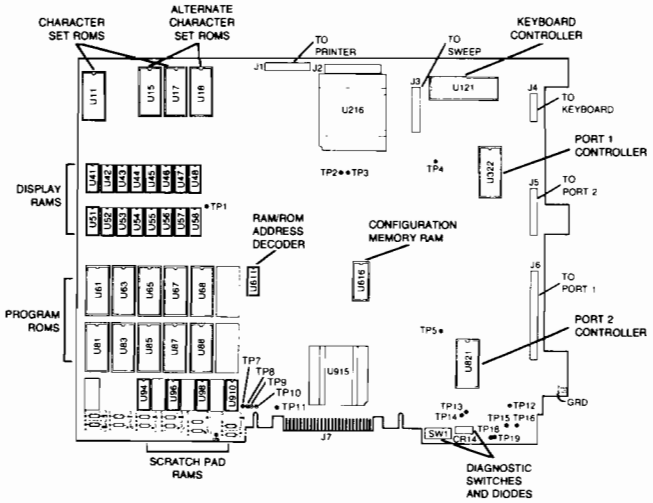


Figure 7-25. Processor PCA

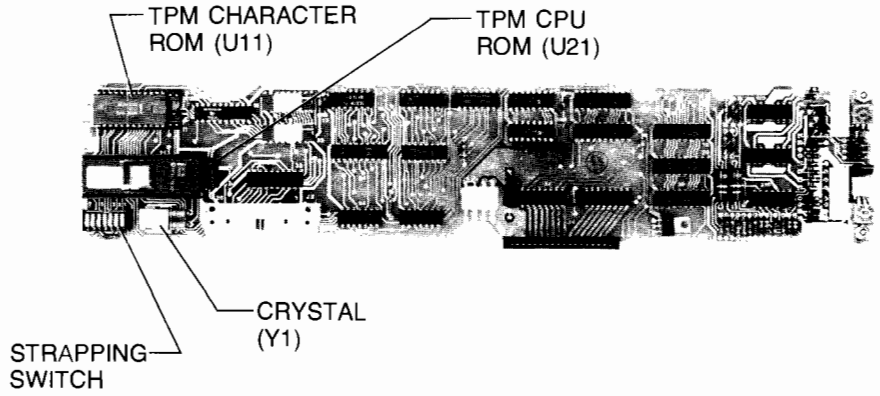


Figure 7-26. TPM PCA

Table 7-8. Removable Components

REFERENCE DESIGNATOR	UNITS PER ASSY.	HP PART NO.	DESCRIPTION
Figure 7-19	1	02620-60005	*Processor PCA
			(Attaching Parts)
U11	1	1AC1-6022	**I.C., ROM Character (Std)[1]
U17	1	1AC1-6021	**I.C., ROM Character (Std)[1]
U15	1	1AC1-6026	**I.C., ROM Character (Opt)[1]
U18	1	1AC1-6025	**I.C., ROM Character (Opt)[1]
U41-48, 51-58	16	5090-0581	**I.C., RAM, 16K
U61	1	1818-1255	**I.C., ROM, Program
U63	1	1818-1257	**I.C., ROM, Program
U65	1	1818-1259	**I.C., ROM, Program
U67	1	1818-1261	**I.C., ROM, Program
U68	1	1818-1263	**I.C., ROM, Program
U81	1	1818-1256	**I.C., ROM, Program
U83	1	1818-1258	**I.C., ROM, Program
U85	1	1818-1260	**I.C., ROM, Program
U87	1	1818-1262	**I.C., ROM, Program
U88	1	1818-1264	**I.C., ROM, Program
U94, 96, 98, 910	4	1818-0562	**I.C., RAM
U121	1	1820-2379	**I.C., Keyboard Controller
U322, 821	2	1820-2328	**I.C., Data Comm Controller
U611	1	1816-1387	**I.C., RAM Address Decoder
U616	1	1818-0708	**I.C., Configuration RAM
			— — — x — — —
Figure 7-20	1	02670-60050[3]	*TPM PCA
			(Attaching Parts)
U21	1	1820-2432[3]	**I.C., TPM CPU
Y1	1	0410-1190[3]	**Crystal, 11 MHz

NOTES:

1. Note that U11 and U17 must both be present for proper operation. Also, U15 and U18 must both be present for proper operation of optional characters. Earlier versions of the terminal use the following part numbers:

   1AC1-6017 (Std) U17
   1AC1-6018 (Std) U11
   1AC1-6019 (Opt) U18
   1AC1-6020 (Opt) U15

Character ROMs are in sets of two ROMs each. You cannot mix new and old ROMs within a set.

2. The standard character set includes the ASCII and Line Drawing characters. The National Language options (001-006) or the Alternate Character option (201) include the Extended Roman character set (which includes all National Language characters) as well as the Math and Large Character sets.
3. These parts are only used on the Thermal Printer Option. Earlier versions of the TPM PCA use an 1820-2271 Controller as U21 and an additional ROM IC 1818-1160 as U11. The strap settings on the TPM PCA vary depending on the version used. See Section 3, Configuration, for more information.

Table 7-9. Exchange Modules

HP PART NO.	DESCRIPTION	TERMINAL	
		STANDARD	OPTION 050
02620-69002	*Sweep PCA	1	1
	— — — x — — —		
02620-69005	*Processor PCA	1	1
	(Less Assembly and Components Listed Below)		
	**U11,17,15,18 Character ROMs		
	**U61,63,65,67,68 Program ROMs		
	**U81,83,85,87,88 Program ROMs		
	**U121 Keyboard Controller		
	**I/O Panel Assembly		
	— — — x — — —		
02620-69060	*Power Supply PCA, 65 Watt	1	
	**(Less Fuse)	1	
	— — — x — — —		
02620-69019	*Power Supply PCA, 120 Watt Option 50		1
	**(Less Fuse)		1
	— — — x — — —		
02620-69061	*Keyboard PCA (Less ROLL UP 0371-1988 and		
	ROLL DOWN 0371-1989 Keycaps)	1	1
	— — — x — — —		
02670-69050	*TPM PCA		1
	(Less Components Listed Below)		
	Early version TPM's		
Y1***	**Crystal, 11 MHz		1
U11***	**Character ROM		1
U21***	**Processor 8039		1
	Later version TPM's		
Y1***	**Crystal, 11 MHz		1
U21***	**Processor 8049		1
	— — — x — — —		
02670-69015	*TPM Mechanical Assembly		1
	(Less Assemblies Listed Below)		
02670-60050	**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.

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.

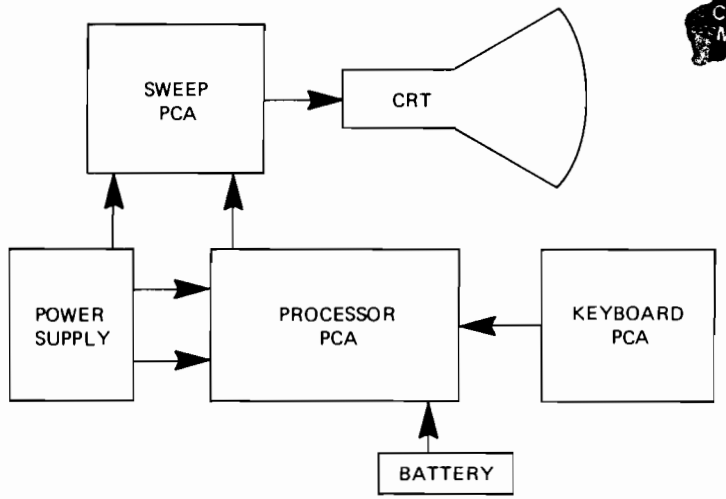


Figure 8-1. Terminal Simplified Block Diagram

Computer Museum

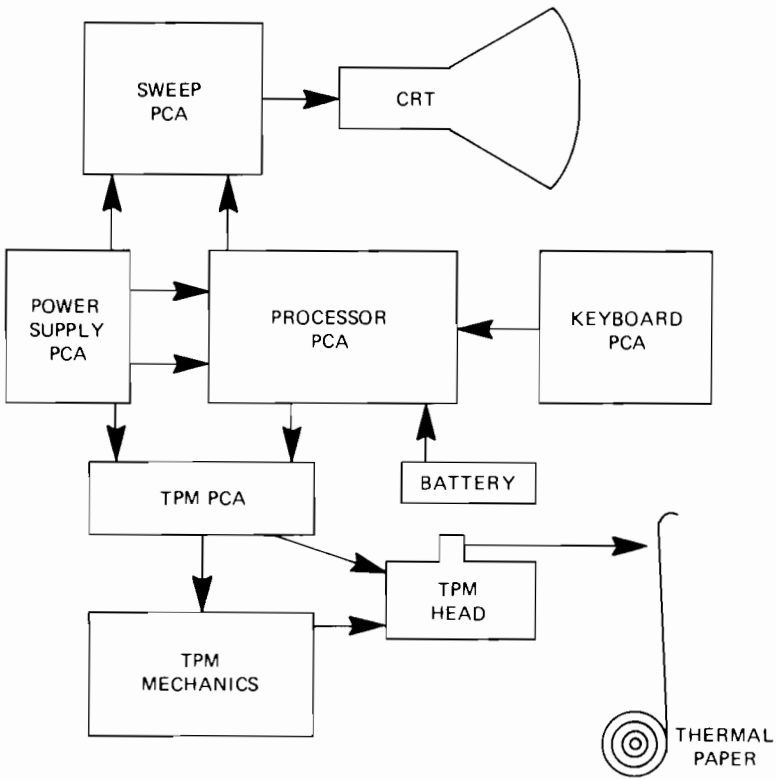


Figure 8-2. Simplified Block Diagram for Terminals with a Printer

Processor PCA

INTRODUCTION .....

The Processor PCA consists of nine subsections; the Microprocessor, Program ROM, Program RAM, Non-volatile RAM, Display Subsystem, Keyboard Controller, Data Comm Port 1, Data Comm Port 2, and Printer Interface. Figure 8-3 shows a block diagram of the Processor PCA.

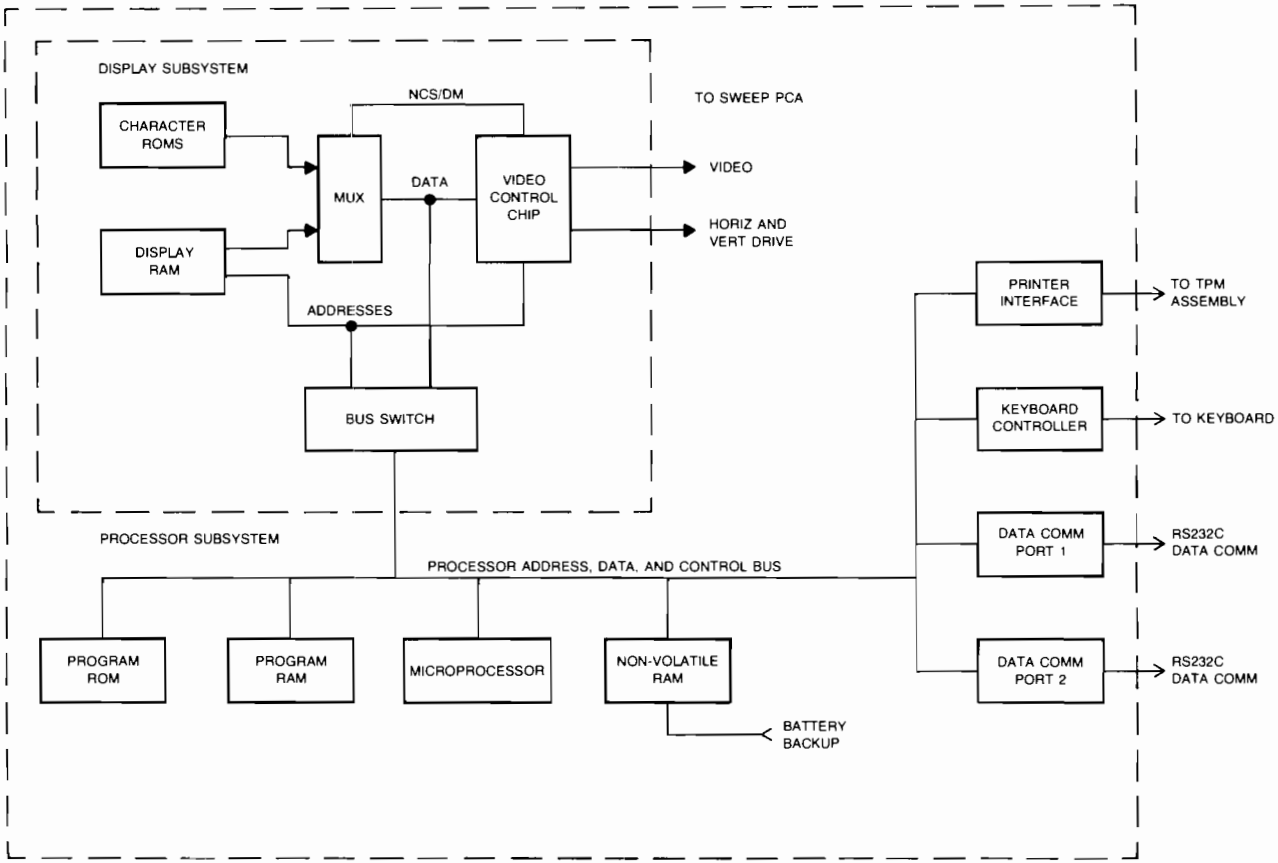


Figure 8-3. Processor PCA Block Diagram

PROCESSOR SUBSYSTEM .....

The processor subsystem includes the microprocessor, program ROMs and RAMs, and the various I/O and data comm interfaces.

MICROPROCESSOR. The Microprocessor is a 16 bit SOS-CMOS microprocessor with a 200 ns cycle time. The processor address space is allocated as follows:

ADDRESS RANGE	FUNCTION
0000-03FF	Program RAM 1
0400-1FFF	(not used)
2000-3FFF	Program ROM 1
4000-7FFF	Display Memory RAM
8000-9FFF	Program ROM 2
A000-BFFF	Program ROM 3
C000-DFFF	Program ROM 4
E000-FFFF	Program ROM 5

The microprocessor uses address bits A0 through A7 for I/O device addressing. Each I/O device consists of eight registers which are addressed by bits A13 through A15. The device addresses are allocated as follows:

I/O ADDRESS	DEVICE
E8	LEDs (Processor PC)
E9	DIP switches (Processor PCA)
EA	Non-Volatile Memory
EB	Data Comm Port 2
EC	Printer Interface
ED	Keyboard Controller
EE	Display Subsystem
EF	Data Comm Port 1

PROGRAM ROM. There are ten IC sockets that hold the 8K program ROMs. The ROMs are addressed with bits A3-A15.

PROGRAM RAM. There are four program RAMs that provide a total of 1K words of fast RAM storage.

NON-VOLATILE RAM. A 1K bit CMOS RAM is used to store terminal configuration information. This RAM uses a battery backup to retain the terminal configuration while the terminal power is off.

The terminal uses a 4.2V mercury or 2.8V lithium battery for backup power. The +5V supply and the battery are isolated by a diode to ensure that the battery is only used when the terminal power is off.

KEYBOARD INTERFACE. The Keyboard Interface is controlled by an 8014A slave microprocessor which scans the keyboard and rings the bell. The keyboard controller scans the entire keyboard every 15 milliseconds, and transfers character and Control functions to the microprocessor.

DATA COMM INTERFACES. The data comm ports are Programmable Communications Interfaces (PCIs). These PCIs perform parallel to serial data conversion for RS-232 data transmission, handle framing, and detect parity and overrun errors. Data transmission is buffered, driven, and received by the PCIs and associated circuitry. Baud rate timing is also generated by the PCIs.

PRINTER INTERFACE. The printer interface function is performed by the microprocessor. The microprocessor sends data to the TPM over the bus lines.

DISPLAY SUBSYSTEM .....

The display subsystem is made up of four major blocks: Display Memory, Character ROMs, Video Controller Chip, and Memory Bus Switch.

DISPLAY MEMORY. The display memory is a block of memory shared by the processor and the Video Controller Chip (VCC). The processor uses display memory to hold configuration information, display row pointers, and ASCII data. Data comm buffers are also maintained in display memory. Display memory provides all of the display information required by the VCC.

CHARACTER ROMS. The character ROMs contain the dot patterns for each character. The standard terminal uses two 32K ROMs in a 4K by 16 format to hold the patterns for 256 characters (two sets of 128 characters). The standard character sets are USASCII and Line Drawing. Two optional ROMs contain Math, Large Character, and Roman Extension (National Language characters) sets.

The ROMs are addressed by scan line (0-14), ASCII code (0-127), and character set (0-3). The ROM then outputs one scan line of dots. Note that shifted and unshifted dots can occur on the same line (full interstitial spacing). Access time of the character ROMs is less than 225 nsec. Character data can be accessed by either the VCC or the processor.

VIDEO CONTROLLER CHIP (VCC). The Video Controller Chip (VCC) controls the Memory Bus Switch, accesses display memory and the character ROMs, and provides all of the necessary video control signals to the Sweep PCA. The VCC reads display configuration data from the display memory and also interprets all display enhancement codes.

MEMORY BUS SWITCH. The bus switch uses address lines from both the processor and the VCC. These address lines are tristate allowing them to be OR-tied. The VCC controls the switch and only one device at a time is allowed to output address data. The address is used to route data to and from display memory.

The bus switch contains a bidirectional data buffer. The buffer separates the VCC data lines from the processor data bus. This allows the VCC to access data in display memory while the processor is sending or receiving data over its data bus.

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.

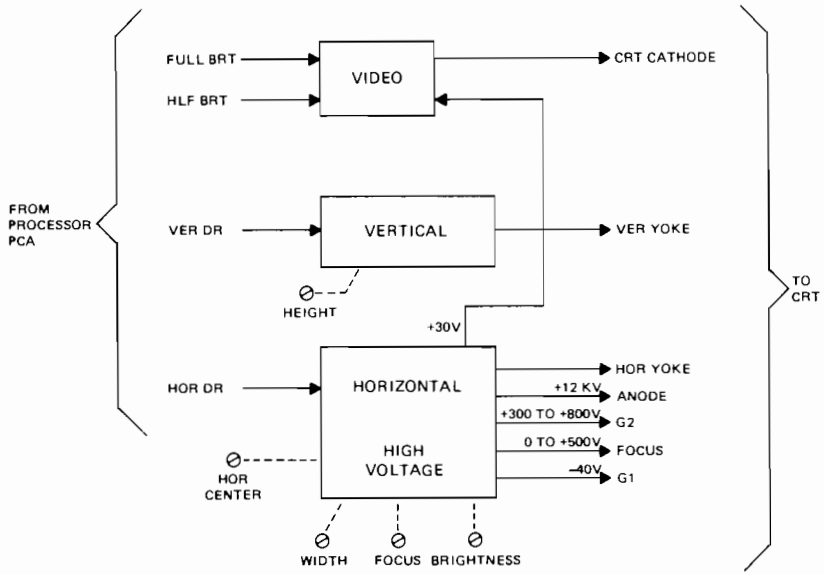


Figure 8-4. Sweep PCA, Simplified Block Diagram

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.

65 Watt Power Supply

INTRODUCTION .....

The 65 Watt Power Supply generates the following voltages: +12V at 3.0A, +5V at 5.5A, and −12V at 0.25A. 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.

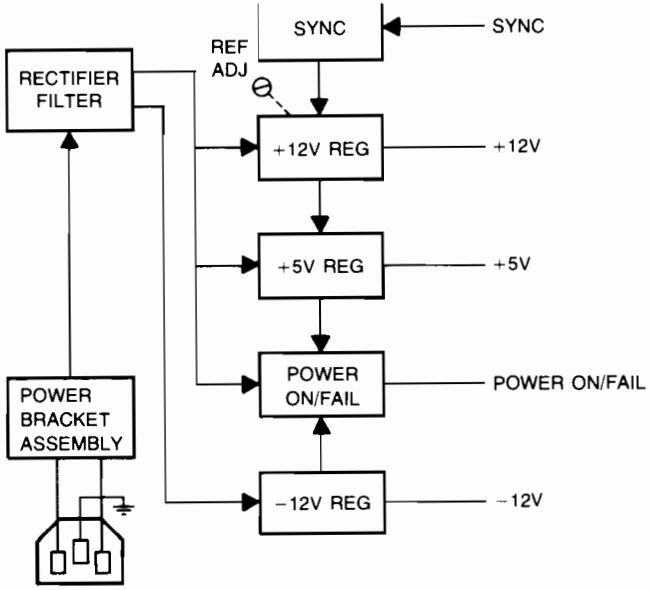


Figure 8-5. 65 Watt Power Supply, Simplified Block Diagram

+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 5.0A. 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 (6.00V).

–12 VOLT REGULATOR ..... The – 12 Volt Regulator supplies the minimal 250mA requirements of the Processor PCA and the Data Comm Pods for a negative voltage.

The – 12 Volt Regulator receives its input voltage from a diode-capacitor circuit. The diode-capacitor circuit operates from a voltage obtained across the AC input of the bridge rectifier for the positive voltage regulators. This circuit outputs a negative voltage equal to the input voltage of the positive regulators.

The – 12 Volt Regulator is a linear series-pass regulator and regulates the – 25V input down to – 12V by controlling the voltage drop across a series-pass transistor.

The output current is limited to 350mA. The output voltage is limited by a 15V zener diode.

POWER ON/FAIL CIRCUIT ..... The Power On/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.

120 Watt Power Supply

INTRODUCTION .....

The 120 Watt Power Supply provides the increased power required by terminals with the printer option. It 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 120 Watt 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 120 Watt Power Supply.

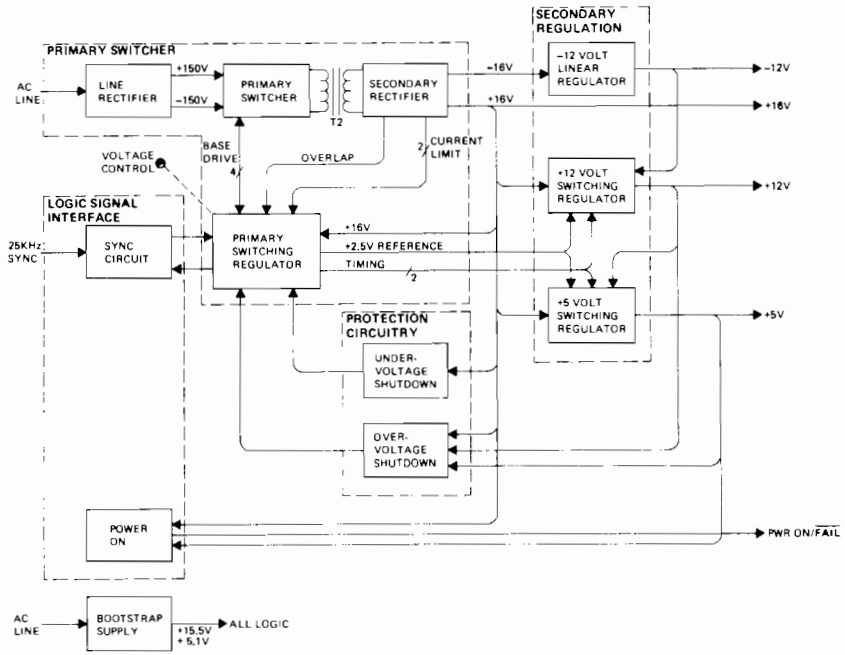


Figure 8-6. 120 Watt Power Supply, Simplified Block Diagram

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 15ms 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.