HEWLETT hp PACKARD

HP 2640B Interactive Display Terminal

Features

- Enhanced High-Resolution Display
- Plug-In Character Sets
- Dynamically Allocated Memory
- Pop-In Modularity and Expandability
- Microprocessor Controlled
- Character/Block Mode
- Self-Test
- Full Editing Capability
- Multi-Task Keyboard
- Off-Screen Storage with Scrolling Capability
- Programmable Protected Fields
- Inverse Video for Highlighting; and Optional Blinking, Underline, Half-Bright
- Cursor Addressability and Positioning Control: Tabulation
- MOS Circuitry, ROM/RAM
- Hard-Copy Interface
- Single Bus Architecture
- RS232C or Current Loop Capability

ENHANCED HIGH-RESOLUTION DISPLAY

The 2640B has a 5 inch by 10 inch rectangular display providing a 1,920 character capacity in 24 lines of 80 characters per line. The characters are formed by a 7 x 9 dot matrix generated in a 9 x 15 dot character cell. The high resolution of the 7 x 9 dot matrix is enhanced by dot shifting for precise character definition, and by the use of the enlarged character cell for wide character and line separation, underlining, line descenders, and inverse video. These display features are engineered to increase clarity and ease sessions at the terminal.

PLUG-IN CHARACTER SETS

Recognizing the demand for terminals that speak many languages and fill diverse sets of needs, the HP 2640B has the capacity to include up to four 128-character sets resident concurrently in the terminal. Adjacent characters on the display may be from any of the four character sets. A Math Character Set and Line Drawing Set are available with the optional Underline, Blinking and Half-Bright feature.

DYNAMICALLY ALLOCATED MEMORY

Because of the efficient linking memory organization (transparent to the user) spaces to the right of the last character typed on a line are normally not stored in memory. Consequently, the basic 2640B terminal equipped with 1024 characters of display memory can store from 8 to 50 lines of information dependent on line length. Optional memory can expand this line capacity to a maximum of over 400 lines of information. Lines are viewed 24 at a time by using the roll up, roll down, next page, and previous page keys.

POP-IN MODULARITY AND EXPANDABILITY

The modular computer-like construction of the 2640B is designed for ease of service. Digital electronics are contained on printed-circuit cards that can be exchanged within the terminal; up to 14 cards can be accommodated to allow a flexible choice of options. The combination of microprogramming and modularity means that this terminal can be expanded as new technologies and devices become available.

MICROPROCESSOR CONTROLLED

The operating characteristics of the 2640B terminal are controlled through firmware. The terminal's microprocessor manages memory allocation, data communications, keyboard scanning, and display control. This microprocessor implementation and the use of Single Bus architecture yield a terminal utilizing electronics and mechanics with a wide range of capabilities and potential for future enhancements.

CHARACTER/BLOCK MODE

The 2640B will operate character-by-character as a completely interactive terminal or is capable of operating on a block at a time. Text can be composed and edited locally thus allowing the terminal user to verify and correct data before transmission to the CPU. Editing and CPU connect times are significantly reduced by such features as: character or line insert and delete, cursor sensing and positioning control, programmable protected fields, off-screen storage with scrolling and page select capability, tabulation, transparent display control codes, 8 special function keys for user defined routines and a positionable memory protect.

SELF-TEST

The HP 2640B has been engineered for high reliability, ease of maintenance, testing, and rapid repair when needed. By depressing the TEST button on the keyboard the user receives a Go/No-Go indication from results of a memory test, firmware test, and display verification.

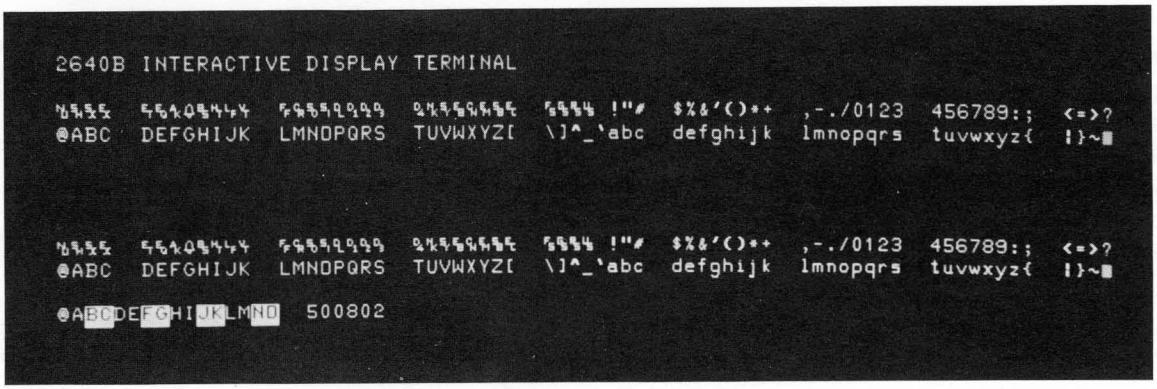
HARD-COPY INTERFACE

The 2640B accommodates most RS232C compatible serial printer or any HP-manufactured printer which uses the HP parallel interface. The serial printers are connected via the 13250A interface card, while the parallel printers use the 13238A duplex register interface card. Commands to print data can be initiated locally from the terminal keyboard or remotely from the CPU.

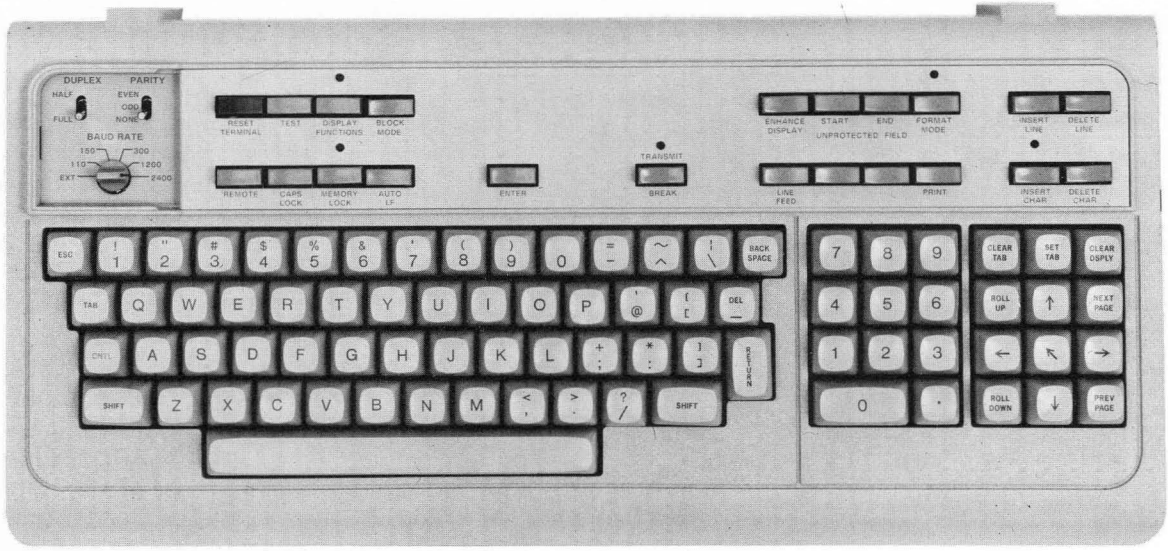
RS232C OR CURRENT LOOP COMMUNICATIONS CAPABILITY

The 2640B offers standard in the terminal RS232C asynchronous data communications capability up to 2400 Baud. Optionally, the user can get the 13250A Extended Asynchronous Communications card which provides the following features:

- Standard baud rates from 110-2400 baud
- Custom baud rates within 1% from 37.5 to 2400 baud
- Split-speed transmit/receive capability
- EIA RS232C or 20mA DC current loop capability
- Switch-selectable parity
- Transmit/receive handshake capability



Actual Photograph of 2640B Display



Multitask Keyboard

CONTROLS AND INDICATORS

KEY or SWITCH	ESCAPE or CONTROL CODE	FUNCTION
COMMUNICATIONS GROUP		
DUPLEX switch	–	HALF: typed characters are processed and transmitted to the computer. FULL: typed characters are transmitted to the computer and not processed by the terminal.
PARITY switch	–	When set to EVEN/ODD/NONE, even/odd/no parity is transmitted for each character. Incorrect parity: a "□" or "_" is displayed.
BAUD RATE switch	–	Selects data transmission rate of 110, 150, 300, 1200, 2400 baud. EXT: any rate between 110 and 2400 can be selected from an external source. The 110 baud rate uses 2 stop bits; all others use one stop bit.
EDIT AND CONTROL GROUP		
RESET TERMINAL key	ESC E	The terminal is initialized to the power-on state.
TEST key	ESC z	A diagnostic test of memory, ROM, and the display is performed. If a failure is detected an appropriate error message is displayed. If no error is detected a standard test pattern is displayed.
DISPLAY FUNCTIONS key and indicator	ESC Y [on] ESC Z [off]	All escape codes and control functions (typed or received) except ENQ, DEL, NULLS and carriage return (CR) are disabled and displayed. Carriage return is displayed but not disabled and performs both a carriage return and a line feed. ENQ, DEL and NULLS are only displayed when the terminal is set for local operation.
BLOCK MODE latching key	–	When the terminal is in Block Mode, typed data is displayed but not transmitted to the computer until requested by the computer or until the ENTER key is pressed. Otherwise, the terminal is in Character Mode and data is transmitted as typed.
REMOTE latching key	–	The terminal is in Remote (on-line) operation. Otherwise, the terminal is in Local (off-line).
CAPS LOCK latching key	–	Locks all alphabetical keys to upper-case characters; @, [,], \, ^, locked in lower-case; other numerical/symbol keys operate normally.
MEMORY LOCK key and indicator	ESC l [on] ESC m [off]	If Memory Lock is enabled when the cursor is in the top line of the display the indicator is lighted and data is prevented from rolling off the top of memory. The MEMORY LOCK indicator blinks and an audible "beep" is generated when memory is full. Additional data, typed or received is ignored. If the cursor is not in the top line of the display when Memory Lock is enabled, displayed data above the cursor is frozen on the screen. Once the display is full the bottom lines on the display roll around the frozen data as additional data lines are typed or received.
AUTO LF latching key	–	Causes a line feed from time a carriage return is generated by the terminal.
ENTER key	–	Enables block transmission
TRANSMIT indicator	–	The indicator will be lighted when clear to send is high.
BREAK key	–	Transmits a 200 ms space on the asynchronous data communication line and sets secondary channel transmit low for 200 ms.

KEY or SWITCH	ESCAPE or CONTROL CODE	FUNCTION
f_1 key f_2 key f_3 key f_4 key f_5 key f_6 key f_7 key f_8 key	ESC p ESC q ESC r ESC s ESC t ESC u ESC v ESC w	Special Function Keys. These are alternate control action keys. If these keys are pressed in conjunction with the CNTL key, the terminal transmits the corresponding escape code sequence. In Block Mode the terminal informs the computer that the key has been pressed by transmitting a DC2. The corresponding escape sequence is transmitted in response to a DC1. These escape code sequences can be used to perform any user-defined special functions by the computer. If these keys are pressed without using the CNTL key, the functions printed below the keys are performed.
ENHANCE DISPLAY key	ESC &d	Precedes a single letter (@, A through O) indicating one of the 16 combinations of Half-Bright, Underline, Inverse Video, Blinking to be displayed: **Features On (x):** @ A B C D E F G H I J K L M N O Half Bright: x x x x x x x x Underline: x x x x x x x x Inverse Video: x x x x x x x x Blinking: x x x x x x x x
START UNPROTECTED FIELD key	ESC [	Characters from the cursor position to the end of the current line or the next End Unprotected Field are unprotected in Format mode. Set while out of Format mode.
END UNPROTECTED FIELD key	ESC]	Characters from the cursor position to the end of the current line or the next Start Unprotected Field are protected. All lines are automatically protected unless otherwise specified by the use of Start Unprotected Field. Set while out of Format mode.
FORMAT MODE key and indicator	ESC W [on] ESC X [off]	Only unprotected fields are operated on. Attempting to type into a protected field will move the cursor to the next unprotected field for data entry. The cursor home position is the first unprotected field location.
LINE FEED key	LF (J^C)	Moves the cursor down one line. Disables Space Overwrite Latch. If the cursor is in the last line displayed on the monitor, a roll up is performed.
PRINT key	ESC O	The contents of the terminal's memory are printed if the printer is present.
INSERT LINE key	ESC L	The line containing the cursor and the remaining lines below the cursor line are rolled down and a blank line is inserted. The cursor is moved to the first column of the new blank line. Disabled in Format Mode.
DELETE LINE key	ESC M	The line containing the cursor is deleted and the remaining lines below the cursor line are rolled up. The cursor is moved to the first column of the first line rolled up from below and deleted line. Disabled in Format Mode.
INSERT CHAR key and indicator	ESC Q [on] ESC R [off]	Succeeding typed or received characters are inserted at the cursor position. As each character is inserted at the cursor position, the cursor and the characters to the right of the cursor are moved right one column. Control codes at the cursor position are not moved. Characters moved out of column 80 are lost. Operates on a field-by-field basis in Format Mode.
DELETE CHAR key	ESC P	The character (including control codes) at the cursor position is deleted and all characters to the right of the deleted character are moved left one column. Operates on a field-by-field basis in Format Mode.

KEY or SWITCH	ESCAPE or CONTROL CODE	FUNCTION
NUMERIC PAD AND DISPLAY CONTROL GROUP		
Ten-Key Numeric Pad	–	Functions as an adding machine format keyboard.
CLEAR TAB key	ESC 2	Clears a tab at the current cursor column.
SET TAB key	ESC 1	Sets a tab at the current cursor column.
CLEAR DSPLY key	ESC J	Clears memory (and display) from the current cursor position to the end of memory; or to the end of line if CNTL is simultaneously pressed.
ROLL UP key	ESC S	Moves the entire display up one line by displaying the next line from memory Cursor is stationary.
ROLL DOWN key	ESC T	Roll Down. Analogous in operation to Roll Up.
NEXT PAGE key	ESC U	Displays the next 24 lines of memory. The cursor is moved to the first unprotected location on the new page.
PREV PAGE key	ESC V	Previous Page. Analogous to Next Page.
↑ key	ESC A	Cursor Up. Moves the cursor up one line on the display. If the cursor is in the top line, it is wrapped around to the bottom line of the display.
↓ key	ESC B	Cursor Down. Analogous to cursor up.
→ key	ESC C	Cursor Right. Moves the cursor right one column on the display. Cursor wrap around to next line, or to the top line from the bottom.
← key	ESC D	Cursor Left. Analogous to cursor right.
↖ key	ESC H	Cursor Home. Moves the cursor to the first position of the data in the display memory.
CHARACTER SET GROUP		
Alphabetical numerical, and symbol keys	–	This group of key functions similarly to a standard typewriter keyboard. ASCII character codes are generated for upper and lower case letters, numbers and symbols.
ESC (escape) key	ESC ([C)	Generates the ASCII escape code.
TAB key	HT (IC)	The TAB key moves the cursor to the next tab position to the right; or if none, the first column of the next line. In Format Mode, the cursor is moved to the start of the next Unprotected Field, disregarding normal horizontal Tab stops.
CNTL (control) key	(C refers to CNTL key)	When pressed in conjunction with any alphabetical key or @, [, \,], ^, _, ', {, ¦, }, ~, DEL, the CNTL key converts the character code for that particular key into an ASCII control code. Control codes and functions, except RS, are not displayed unless in Display Functions mode.
BACKSPACE key	BS (HC)	The cursor is moved left one character position. If the cursor is in the first column, it remains there.
RETURN key	CR (MC)	Returns cursor to beginning of its current line. Enables Space Overwrite Latch.
–	ENQ (EC)	Enquiry signal from the computer to the terminal.
–	ACK (FC)	Acknowledge signal from the terminal to the computer in answer to an Enquiry.
–	BEL (GC)	Bell. Causes terminal to emit an audible "beep".
–	SO (NC)	Changes characters from the cursor position to the end of the line or the next OC to alternate character set G1. Refer to ESC.
	SI (OC)	Changes characters from the cursor position to the end of the line or the next NC to character set GO.

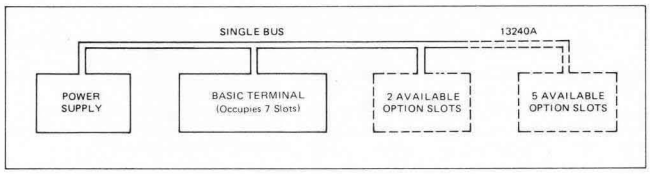
KEY or SWITCH	ESCAPE or CONTROL CODE	FUNCTION
–	DC1 (QC)	Triggers a block transfer. Note that no block transfer requested by the computer begins until triggered with a DC1.
–	DC2 (RC)	Block transfer enable from terminal.
–	CAN (XC)	A code is sent to the computer to cancel the current line.
–	RS (^C)	Record Separator. Terminates a block transfer.
–	US (_C)	Unit Separator. Separates fields in Block Mode, Format On.
–	ESC a	Cursor sensing (absolute).
–	ESC `	Cursor sensing (relative).
–	ESC b	Enables the terminal keyboard.
–	ESC c	Disables all keyboard keys except for the RESET TERMINAL key.
–	ESC d	The computer informs the terminal to begin information transmission to the computer.
–	ESC G	Moves the cursor to the first column of the current line.
–	ESC I	Performs same function as a horizontal TAB.
–	ESC K	Clears the line from the cursor position to the end of the current line or current unprotected field.
–	ESC &a	Precedes a parameter sequence used to set cursor location.
–	ESC &b	Precedes parameters making up a program which is loaded into the terminal and executed. This function is to be used by HP diagnostics only.
–	ESC ^	Transmits six bytes of terminal status as a block transfer representing memory size, lower straps, upper straps, latching keys, transfer pending flags, error condition flags, and ended by a terminator.
–	ESC)	Precedes a parameter (@, A, B, C) which indicates which of four character sets will be the alternate set G1.
–	ESC f	Modem disconnect when used with 13250A card.
–	ESC F	Cursor home-down.
MAINFRAME REAR PANEL SWITCHES		
PWR ON/OFF switch	–	Primary power to the terminal is turned ON/OFF. Initial state: display and memory clear, cursor home, programmable functions off, Transmit Mode on.

STRAPPING OPTIONS:

- Enable major function keys to transmit their respective escape sequences.
- Enable Space Overwrite Latch.★
- Disable end-of-line wrap around.
- Enable an entire block (from the cursor position to the end of memory) to be transmitted in Block Mode; otherwise, a line at a time is transmitted in Block Mode.
- Reverse the effect of the CNTL key associated with the 8 special function keys
- Enable wait for DC1 before sending a DC2 in response to pressing the enter key.
- Enable sending of a DC2 before transmission of data for all block transfers.
- Disable transmission of DC2 by terminal for character or block transfers.

★ When SPOW latch is set, the space code performs a cursor right function. When SPOW latch is reset, space codes overwrite existing characters. If the option is disabled, the latch is always reset.

NOTE: The number of control characters allowed in a single line is dependent upon memory configuration



System Specifications

GENERAL

Screen Size: 127 mm (5 inches) x 254 mm (10 inches)
Screen Capacity: 24 lines x 80 columns (1,920 characters)
Character Generation: 7 x 9 enhanced dot matrix; 9 x 15 dot character cell; non-interlaced raster scan
Character Size: 2.46 mm (.097 inches) x 3.175 mm (125 inches)
Character Set: 64 upper-case Roman
Cursor: Blinking-Underline
Display Modes: White on Black; Black on White (Inverse Video)
Refresh Rate: 60 Hz (50 Hz optional)
Tube Phosphor: P4
Implosion Protection: Bonded implosion panel
Memory: MOS; ROM: 8K bytes (program); RAM: std. 1024 bytes; 8192 bytes max
Keyboard: Full ASCII Code Keyboard, 8 special function keys, and 12 additional control and editing keys; Ten-key numeric pad; Cursor pad; Multi speed auto-repeat; N-key roll-over; Stand-alone 1.2M (4 foot) cable.

DATA COMMUNICATIONS

Data Rate: 110, 150, 300, 1200, 2400 baud, and external-switch selectable (110 selects two stop bits)
Standard Asynchronous Communications Interface: EIA standard RS232C; fully compatible with Bell 103A modems; compatible with Bell 202C/D/S/T modems. Choice of main channel or reverse channel line turn-around for half duplex operation. Use of reverse channel protocol requires Bell 202C/D/S/T compatible modems having soft carrier turn off and reverse channels. Implementation of reverse channel protocol requires software support at the computer.
Transmission Modes: Full or half duplex, asynchronous
Operating Modes: On-line; Off-line; Character, Block
Parity: Switch selectable; Even, Odd, None

POWER REQUIREMENTS

Input Voltage: 115 (+10%, -20%) at 60 Hz (±0.2%)
230 (+10%, -20%) at 50 Hz (±0.2%)
Power Consumption: 75W to 125W max.

OPERATIONAL CONSIDERATIONS

The basic 2640B comes with 1024 bytes (1K) of Random Access Memory (RAM). The terminal's microprocessor requires a portion of the RAM for buffer space and overhead. The remaining RAM supports approximately 675 displayable characters when no display enhancements, i.e. inverse video, underlining, blinking, etc. are used. This translates into approximately 8½ lines of 80 characters each, or 24 lines of approximately 22 characters each.

Use of control codes (display enhancements and format controls) in a line will decrease the number of displayable characters. For the 1K RAM, the maximum allowable control codes per line is 54.

ENVIRONMENTAL CONDITIONS

Temperature, Free Space Ambient:
Non-Operating: -40 to +75°C (-40 to +167°F)
Operating: 0 to +55°C (+32 to +131°F)
Humidity: 5 to 95% (non-condensing)
Altitude:
Non-Operating: Sea level to 7620 metres (25,000 feet)
Operating: Sea level to 4572 metres (15,000 feet)
Vibration and Shock:
Vibration .30 mm(0.012") pp, 10 to 55 Hz, 3 axis
Shock 30g, 11 ms, 1/2 sine

*Type tested to qualify for normal shipping and handling in original shipping container.

PHYSICAL SPECIFICATIONS

Display Monitor Weight: 16.8 kg (37 pounds)
Keyboard Weight: 3.2 kg (7 pounds)
Display Monitor Dimensions: 444 mmW x 457 mmD x 343 mmH (17.5"W x 18"D x 13.5"H) (648 mmD (25.5"D) including keyboard)
Keyboard Dimensions: 444 mmW x 216 mmD x 89 mmH (17.5"W x 8.5"D x 3.5"H)

PRODUCT SAFETY

Product meets:
U. L. Requirements for: EDP equipment
office appliances
teaching equipment
CSA Requirements for: EDP equipment
U.L. and CSA labels are applied to equipment shipped to the U.S. and Canada

Product Support

WARRANTY

90 day on-site parts and labor warranty

HARDWARE SUPPLIED

2640B Interactive Display Terminal

DOCUMENTATION SUPPLIED

2640B User's Manual (02640-90109)
2640B Reference Manual (02640-90110)

ADDITIONAL DOCUMENTATION AVAILABLE

2640B Service Manual (02640-90115)

HP SYSTEMS SUPPORT

Refer to appropriate HP system data sheet for use and support of 2640B in systems. If this product is used in a customer-assembled system, the overall operation responsibility of the system rests with the customer.

INSTALLATION

All product preparation can be performed by the owner/user. Refer to Reference manual supplied with unit for detailed instructions. HP assistance is provided for installation upon request and at prevailing rates.

ORDERING INFORMATION PRODUCT NO.	DESCRIPTION/NOTES
2640B	Interactive Display Terminal Block or character mode (switch selectable); 64 character upper case Roman set; 1024 bytes of storage, expandable to 8192 bytes maximum; inverse video; 110-2400 Baud; RS232; includes 2 option slots. (Does not include computer interface.) NOTE: No interface cable included.
Option 001	128 Character Set – Roman Add lower case and displayable control codes.
Option 015	50 Hz operation 220V operation is assumed with option 015. For 110V/50 Hz operation, order option 015 and specify 110V in comments section of order.
Option 020	Extended Asynchronous Communications Card (Same as 13250A.) NOTE: Interface cable must be ordered (RS232C or current loop.) Replaces standard Comm. card in terminal.
13231A	Display Enhancements Adds blinking, half-bright and underline and provides for addition of three 128 character sets. (Requires 1 option slot.)
Option 201	64 character mathematic symbol set. Adds display of integral signs, Greek letters, etc.
Option 202	64 character line drawing set. Adds display of continuous horizontal and vertical line segments for forms, histograms, etc.
13232A	103/202 Modem Cable Adds male RS232 connector. For connection to 103/202 modem. 4.57 m (15 feet).
13232C	RS232C Cable Adds female RS232 connector. 1.52 m (5 feet).
13232F	Current Loop Connector Kit. 1.52 m (5 feet).
13232G	Male RS232C Printer Cable. 4.57 m (15 feet).
13232H	Female RS232C Printer Cable. 4.57 m (15 feet).
13232J	Cable for connection to 9871A Printer.
13232K	Cable for connection of compatible Video Hardcopy Unit.
13232L	Cable for connection of compatible Video Monitor.
13232S	Cable for connection to 9866 line printer.
13234A	Terminal Memory Module (+4K) 4096 bytes of additional storage (Requries 1 option slot.)
13238A	Terminal Duplex Register For use with 2640 Interactive Display Terminals (Requires 1 option slot.)
13240A	2640 Option slot Extender Adds 5 option slots (includes fan).
13245A	Prom Character Set Accessory Aid to Production of User defined character sets.
13246A	Printer Subsystem. Includes 9866A Printer, interface and cable for connection to 2640 terminals.
13246B	Printer Subsystem. Includes 9866B Printer, interface and cable for connection to 2640 terminals.
13250A	Asynchronous Data Comm/Serial Printer Interface
13254A	Video Output Interface for 2640 Series Terminals. Provides video output for connection to compatible television monitors or compatible video hardcopy unit.
13349A	Printer Subsystem. Includes 9871 Printer, interface and cable for connection to 2640 terminals.

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