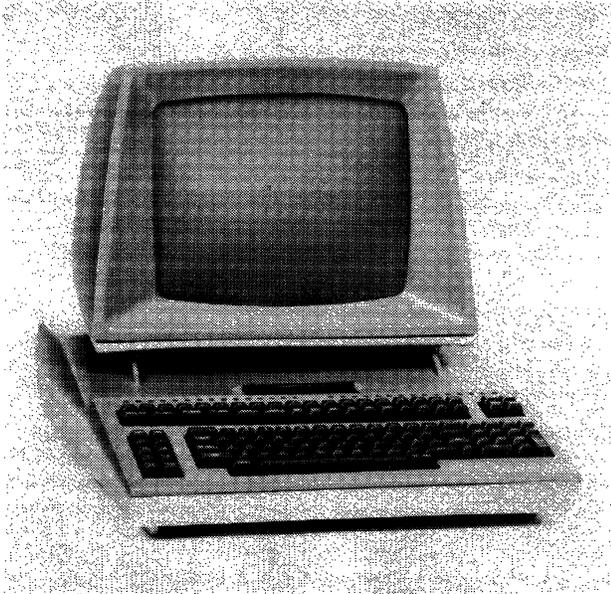


# Lear Siegler VDP-400 and VDP-1000 Display Terminals



## MANAGEMENT SUMMARY

After heavily publicizing itself as the "dumb terminal" vendor, Lear Siegler made a dramatic departure from its well-established image by introducing the VDP-1000 and the VDP-400 at the 1977 National Computer Conference. The new user-programmable display terminal products changed Lear Siegler's old image into that of a vendor with a broad range of terminals—from the low-priced ADM-3 "glass Teletype" to the sophisticated VDP-1000.

The nucleus of the new terminals is the Video Data Processor, a 16-bit processor produced by Lear Siegler from Fairchild 9400 series 4-bit slice LSI semiconductor logic. The processor architecture is compatible with the Data General Nova I/O bus and instruction set. The VDP-1000 is available with up to 32K words of memory, while the reduced VDP-400 is limited to a maximum memory capacity of 24K words. ROM-resident firmware implements almost all of the features offered on the more sophisticated terminals from competitive vendors, plus a few additional ones.

The VDP-1000 consists of a display terminal, disk storage, and an optional printer. Disk storage is available as a dual diskette drive or a 10 megabyte fixed-head disk. The display terminal itself is composed of three modules: display monitor, keyboard, and terminal control unit, which houses the Video Data Processor. The key to the VDP-1000 is VMOS, a virtual memory operating system. The significance of VMOS is that it supports larger-than-memory or virtual programs. This concept is implemented by automatic transfer of program code segments and data between disk storage and the terminal main ▷

Single-task programmable display terminals with basic intelligence.

Standard features include a dual diskette drive or 10 megabyte disk, memory capacity to 64K bytes, a choice of three programming languages (ANSI COBOL, Dartmouth BASIC, and ASGOL), and a virtual memory operating system, in addition to a host of features provided by most intelligent terminals. Printed output and synchronous communications are optional.

Prices for typical systems range from \$3,000 for a basic VDP-400 terminal to \$7,000 for a VDP-1000 with dual diskette, and printer. Quantity discounts are provided; leasing is not provided.

## CHARACTERISTICS

**VENDOR:** Lear Siegler, Inc., Electronic Instrumentation Division, Data Products Group, 714 North Brookhurst Street, Anaheim, CA 92803. Telephone (714) 774-1010.

**DATE OF ANNOUNCEMENT:** June 1977.

**DATE OF FIRST DELIVERY:** VDP-400—October 1977; VDP-1000—November 1977.

**NUMBER DELIVERED TO DATE:** —

**SERVICED BY:** Lear Siegler, Inc.

## MODELS

The VDP-400 and VDP-1000 are composed of the same three modules: the Terminal Control Unit, keyboard, and display monitor. The Terminal Control Unit contains a 16-bit minicomputer composed of Fairchild 9400 macrologic chips and memory. The VDP-400 processor is equipped with 16K words (32K bytes) of memory, expandable to 24K words (48K bytes). The VDP-1000 processor is equipped with 16K words (32K bytes) of memory, expandable to 32K words (64K bytes). The VDP-1000 can be equipped with a dual diskette drive or a 10 megabyte fixed-head disk and a hard copy printer. The VDP-400 can also be equipped with a printer, but disk storage is not provided.

## TRANSMISSION SPECIFICATIONS

Transmission is asynchronous or synchronous (optional) in the half- or full-duplex mode at selectable transmission rates of 75, 110, 150, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, and 9600 bits/second. The 8-level ASCII code is used. A 10- or 11-unit code structure is used for asynchronous transmission. The terminal is equipped with an RS-232C or 20 ma dc current loop interface.

## DEVICE CONTROL

Terminal control is performed by the integral processor under the direction of firmware-implemented functions and user programs. Firmware implemented functions respond ▷

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▷ memory. The technique is entirely transparent to the user, and its effect is that of a considerably larger main memory. The introduction of VMOS as a terminal operating technique is a significant event. It marks the first time that a virtual operating system has been used in a terminal environment (although a few minicomputer vendors have used the technique for several years), which means that terminal users can create large-scale programs without incurring the cost of additional memory.

Lear Siegler offers a choice of three programming languages: ANSI COBOL, Dartmouth BASIC, and ASGOL (an ALGOL-like assembly language). Programs written in these languages are executed under VMOS. All system software including VMOS, the language compilers, and other system software are written in ASGOL.

The VDP-400 is a lower-cost, restricted version of the VDP-1000; i.e., its memory capacity is restricted to a maximum of 24K words, and disk storage is *not* provided. A printer is optional. It includes all of the same firmware-implemented features of the VDP-1000, but user programs *cannot be* created on the VDP-400. However, user programs produced on the VDP-1000 can be run on the VDP-400.

These two new products from Lear Siegler benefit users with the need for a large number of terminals. The less-sophisticated, less-costly VDP-400 can be used at locations where the VDP-1000 is not needed, and probably will account for the majority of terminals installed. The VDP-1000 would then be used only at those locations where VMOS, program generation, and local file storage are major considerations. □

▶ to keyed or received commands in the form of an Escape code or Control sequence or keyed functions. These functions are described in the following paragraphs.

Transmission is performed in the character or block modes. The character mode, designated as the Conversational mode, is operative only when the terminal is equipped with a non-polling, asynchronous interface. In the Conversational mode, each character is transmitted as it is keyed. Three block modes are provided: Send Page, Send Line, and Send Message. A full page, line, or message (defined by STX and ETX codes) is transmitted depending on the selected mode. The STX and ETX codes that bracket a message are not transmitted.

Cursor control positions the cursor up, down, left, right, home, and to the initial position of the current line. The cursor also responds to tab, backtab, return, and line feed functions. The cursor can be controlled via keyed or received commands. Cursor addressing and sensing are standard features.

Edit functions include character and line insert and delete, page and line erase, and clear to spaces or nulls. Insert mode is established to perform insert and delete functions and can be entered and exited via a received or keyed command. Character insertion and deletion wraparound from right to left, line to line within a page. Line insertion and deletion are also page restrictive. Page erase clears all unprotected data between the cursor and the end of the page. Line erase clears all unprotected data on the line occupied by the cursor to the right of the cursor. The clear

to spaces or to nulls function erases all unprotected data on a page to null or space codes. Page control scrolls through memory to display the previous or the next page.

Program mode is established to write and display control codes in memory and disables control code recognition, except those codes that set and reset the Program mode.

Command mode is entered by the operator to key special commands, which are displayed in the Command Line, the 25th line on the screen. The Command Line also displays status information and error messages. The operator enters the Command mode to establish page parameters, set the time, insert or delete a page, and to establish visual and non-visual field attributes. When a page is created, the page line length (1 to 80 characters) and the number of lines in the page (1 to 9999) are specified. In the Insert mode, the page is assigned the page number currently displayed and all existing pages are automatically renumbered. If not in the Insert mode, the new page is assigned the number that consecutively follows the last page in memory. An error message is displayed when an attempt is made to insert a page into insufficient memory space. When a page is deleted, all the following pages are automatically renumbered. Time of day is entered in 24-hour time format. A field can be assigned any of 32 visual attributes, which are different combinations of normal and reduced intensity, reverse video, blinking, underline, and blank. Any of four non-visual attributes can be assigned to field, including protected, unprotected, alpha only, and numeric only.

The Mark function is used by the operator to identify a segment of text to be moved, copied, deleted, erased, transmitted, printed, or assigned attributes.

Printer functions are provided for printing a full page of protected and unprotected fields with or without automatic formatting and a page of unprotected fields with formatting. Automatic formatting is implemented via carriage-return and line-feed codes at the end of each line. Printing is performed off-line and the keyboard is disabled until completion of the print operation. If the print operation was computer-initiated, the terminal will automatically return to on-line mode once printing is completed.

### SOFTWARE

The VDP-1000 is equipped with a virtual memory operating system. VMOS supports programs larger than memory capacity. In addition, it provides I/O, file, task, and memory management. VMOS allocates and loads memory by segment size. Modules can be locked in. Storage memory operates as a high-speed buffer for swapping program segments in and out of working memory. Disk storage is partitioned for use by file management, virtual memory, disk directory, spooling, memory debug dump, and user-maintained areas. The file management system supports sequential or direct (by record number) access to blocked data records. Blocking can be user-defined to optimize disk use according to specific applications. Task management synchronizes the interleaved execution of user task and various system functions. Tasks are either user-initiated, I/O or external segment referenced, or non-user initiated through a real-time clock, external interrupts, or keyboard interrupts.

Three language compilers can be executed under VMOS. These include ASGOL, Dartmouth BASIC, and ANSI COBOL. ASGOL is an assembly language version of ALGOL. Programs generated on the VDP-1000 can be run on VDP-400 terminals by downline loading from the host processor or by creation of a PROM for installation in the VDP-400. User programs *cannot be* created on the VDP-400. ▶

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### ► COMPONENTS

**VIDEO DATA PROCESSOR:** A 16-bit processor composed of Fairchild 9400 series LSI logic. The processor has a 200 nanosecond cycle time, and its I/O bus architecture is Data General-compatible to provide compatibility with Data General peripherals. The processor is equipped with a Nova instruction repertoire with five enhancements. I/O channels are interrupt driven on a priority basis. The processor is equipped with four accumulators, one program counter, and three temporary registers. Memory is added in 1K-byte increments.

**CRT DISPLAY UNIT:** A 15-inch (diagonal measurement) CRT screen with a display arrangement of 24 lines of 80 characters each for a total display capacity of 1920 characters. A 25th display line is provided for status information. The character set contains 128 ASCII symbols, including upper and lower case alphabets, numerics, punctuation, and control code symbols. A 128-character alternate character set is optional. Each character is formed via a 7-by-9 dot matrix within a 10-by-12 dot cell. Data is displayed in white (P4 phosphor). Highlighting features include dual intensity, reverse video, blinking, underline, and blanking.

**KEYBOARD:** A 120-key typewriter-style, detachable keyboard with numeric pad, a cursor control pad, and 39 function keys arranged in two rows. A total of 20 program

function keys are provided; 16 are designated functions, and 4 are user programmable. The keyboard generates any of 128 ASCII character codes. Key functions within the main keygroup include Return, Line Feed, Tab, Back Tab, Rub Out, Shift, Control Shift, Shift Lock, and caps Lock. Break and Escape keys are provided within the two rows of 39 function keys which also include keys for mode control, edit, and transmit functions.

**PRINTER:** A 180-cps impact printer available with 80 or 132 print positions. The character set includes 96 printable upper and lower case ASCII characters. Each character is formed by a 9-by-7 dot matrix. The printer can accommodate continuous 6-part pin-fed forms up to 15 inches wide.

**DISKETTE AND DISK STORAGE:** Specifications had not been firmed up at press time.

### PRICING

The VDP-400 and VDP-1000 are available on a purchase basis only. Quantity discounts are provided. Maintenance and warranty coverage are the same as on other Lear Siegler terminals. Pricing has not yet been established on the VDP-1000 and its components; however, Lear Siegler provided an approximate price for the VDP-1000 with printer and dual diskette drive of \$6,995.

	<u>Purchase Price</u>
VDP-400 with 12K words of memory and an asynchronous communications interface	\$2,995
Printer Interface	130
Synchronous Communications Interface	350
Additional Memory, per 1K words	150
VDP-1000 with 16K words of memory, an asynchronous communications interface, printer, and dual-diskette drive	\$6,995*

\*Approximate price. ■

