Delta Data Systems
7000 Series Display Terminals and System 700

Delta's System 700 is a multifunctional dual-microprocessor system designed for use as a stand-alone computer or as an intelligent workstation in a distributed processing environment. Hardware components include a 7000 Series keyboard/display, a 5-inch or 8-inch (pictured above) dual diskette drive, and a 60-cps dot matrix printer.

MANAGEMENT SUMMARY

Delta Data's current terminal offerings consist of the 7000 Series Intelligent Display Terminals and the System 700, which are covered in this report, and the Model 4050 and 2830 Display Terminals, which are covered in Report C25-369-101.

The 7000 Series consists of the Model 7100, a PROM-based editing/formatting terminal designed for general purpose usage; the Model 7300, a PROM-based text processing terminal designed for use in newspaper, graphic arts, and related applications; and the Model 7500, a RAM-based terminal that supports user-programming in assembly language.

Hardware components of the 7000 Series terminals are identical and include a 15-inch (diagonal measurement) CRT display with a screen capacity of 2160 characters, and a detached typewriter-style keyboard. The Delta 6761 teleprinter (a Centronics Model 761) is supplied by Delta for connection to the 7000 Series terminals, but any RS-232C-compatible I/O device may be attached.

A Terminal Development System package provides a set of development tools and a dual-diskette unit by which assembly language programs can be created and implemented on 7000 terminals.

The System 700, a "sister" product of the 7000 Series, is a small computer system based on dual TI 9900 microprocessors, and is designed for use in stand-alone or distributed processing environments. Its basic hardware component is a 7000 Series display; a dual-drive diskette or minidiskette and the Model 6761 printer are supported as peripherals. In addition to all the capabilities available to 7000 Series, the System 700 provides a set of system operations software, diskette file management support, ▷

A versatile family of intelligent display terminals and a multifunctional system which utilizes them.

Three 7000 Series models provide for general purpose editing/formatting, text processing in publications industry applications, and user programming in assembly language.

The System 700 is designed for use in stand-alone or distributed processing environments, and utilizes a 7000 Series as its basic hardware component. User programs may be written in BASIC or assembly language.

The 7000 Series terminals and the System 700 are available for purchase only. Quantity-one pricing for the 7000 Series terminals starts at $4,050. A typical 700 System, including 64K bytes of RAM, a keyboard/display, a dual-diskette drive, and a BASIC interpreter is priced at $11,900. Quantity discounts are available.

CHARACTERISTICS

VENDOR: Delta Data Systems Corporation, Woodhaven Industrial Park, Cornwells Heights, PA 19020. Telephone (215) 639-9400.

DATE OF ANNOUNCEMENT: 7000 Series—Third quarter 1977; System 700—June 1979.

DATE OF FIRST DELIVERY: Model 7500—January 1978; Models 7300 and 7100—June 1978; System 700—September 1979.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: Delta Data and Sorbus.

MODELS

Delta's 7000 Series consists of three microprocessor-based (TI 9900) terminals, which have identical cabinetry and keyboard/display componentry, but differ in the software/firmware logic provided by Delta. The family includes:

● Model 7100—A general purpose Teletype-compatible terminal that provides a full set of firmware-encoded data entry/editing functions but no user-programming capabilities. The 7100 provides storage for 6000 characters of text, optionally expandable to 28,000 characters.

● Model 7300—A text processing terminal designed specifically for the newspaper, publishing, graphic arts, and printing industries. The 7300 provides all of the capabilities of the 7100 plus a set of special text processing functions designed for use in on-line copy entry/editing, wire service copy processing, and remote copy input applications. As with the 7100, no user-programming capabilities are provided. ▶

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▷ and a BASIC interpreter. Primary usage is aimed at data entry, text processing, and general applications processing.

As with many smaller vendors, Delta's product capabilities are somewhat flexible. Although their products are certainly ready for use "off-the-shelf", many additional capabilities are potentially accessible to more sophisticated customers. Such equipment can be particularly appealing to OEM dealers and large end-users who wish to engineer the design of the product to their own requirements. Delta itself frequently acts as its own OEM dealer and provides customized equipment for its customers.

USER REACTION

In late March 1980, Datapro conducted telephone interviews with seven 7000 Series users, whose names were supplied to us by Delta Data Systems. These users reported their experience with 536 7000 Series terminals, including 159 Model 7300s, 52 Model 7100s, and 325 custom-built 7000 Series units. Four of the users have had their terminals installed for about one year; the other three users for one, two, and five months, respectively. (The user who has had his 7000 Series terminals for only one month also owns over 800 Delta 5200 Series units, which have been installed for nine years; because of his long term relationship with Delta, we felt that his ratings and comments should be included in this report.)

The organizations that these users represent include two federal government agencies, two news bureaus/wire services, a military contractor, an electronics and electrical power company, and an aircraft manufacturer. The majority of their terminals are being used for text editing and text processing, but use as a computer console, a conversational timesharing system, and a data entry station were also mentioned as applications. Only two users have utilized the program development capabilities of their terminals to implement user-written programs.

All of these users purchased their equipment directly from Delta except one, who purchased his terminals through a third party. Of those users whose terminals are no longer under warranty, only one has chosen to purchase Delta's maintenance contract; the others are performing their own maintenance and utilize Delta's mail-in service for board repair and replacement.

These users' ratings are tabulated below:

	Excellent	Good	Fair	Poor	WA*
Overall performance	4	2	0	1	3.3
Ease of operation	5	2	0	0	3.7
Display clarity	4	3	0	0	3.6
Keyboard feel and usability	5	1	0	1	3.4
Ease of programming	0	2	0	0	**
Manufacturer's software	1	0	0	0	**
Hardware reli-bility	2	2	2	1	2.7
Maintenance service	0	2	0	0	**
Technical support	3	3	1	0	3.3

*Weighted Average on a scale of 4.0 for Excellent.
**The Weighted Average is considered inappropriate if based on fewer than three responses. ▷

▶ • **Model 7500**—A RAM-loadable user-programmable terminal intended for OEM's, system designers, and large end users who wish to design their own terminal. A RAM with a capacity of 16K bytes is standard and is optionally expandable to 56K bytes in 8K- and 16K-byte increments. A 2K-byte PROM bootstrap program loader is also provided and is optionally expandable to 8K bytes.

Any 7000 Series terminal can be configured as a Terminal Development System (TDS), a turnkey program development package which includes a 7000 Series keyboard/display, a Delta Model 7008 (or equivalent) dual-diskette unit, a Delta Model 6761 serial printer, and software support consisting of a text editor, an assembler, an instant assembler, a disassembler, a debug monitor, a linking loader, a Dynamic Font Generation utility, and a PROM-burning utility. Programs developed on the 7000 TDS can be implemented on any of the 7000 Series terminals.

One, or optionally two, RS-232C interfaces are provided on 7000 Series terminals, the first for connection of the communications line, and the second for attachment of a local printer, storage unit, or other device. CCITT V.24, RS-422, or RS-423 interfacing can be substituted for either or both of the RS-232C interfaces. Delta supplies a Centronics Model 761 (Delta Model 6761), a desktop serial ASCII 60-cps teleprinter, for use with its 7000 Series terminals and the System 700.

The System 700 is a multifunctional dual-microprocessor system designed to perform data entry, word processing, and general applications processing. The System 700 can act as a stand-alone computer system or as an intelligent terminal in a distributed network. Hardware components include any 7000 Series keyboard/display, a 5-inch or 8-inch dual diskette drive, and the Model 6761 printer.

System 700's software/firmware support includes the TDS package; a multiprocessing, multiprogramming System Executive; disk access and file management modules; a BASIC interpreter; and an IBM 3780 batch transmission emulator.

Two TI 9900 16-bit microprocessors act as the System 700's System Processing Unit (SPU) and Auxiliary Processing Unit (APU). The SPU controls the keyboard, display, printer, and communications port, and directs the operation of the entire system through the System Executive. The APU is responsible for all diskette functions and for the BASIC interpreter. The System 700's dual-processor architecture provides a minimum of 16K bytes of addressable RAM, which is expandable to 96K bytes; even more processor memory is accessible through a "paging scheme" that can expand total memory capacity another 16K bytes.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous, half- or full-duplex at speeds of up to 19,200 bits per second, or optionally up to 56,000 bps. A 7-bit ASCII code is transmitted using a 10- or 11-bit unit code structure, including one start bit and one or two stop bits. Synchronous communications are supported on Model 7300 only, and utilize an 8-bit unit code structure. Odd, even, or no parity is operator-selectable.

An RS-232C interface is provided for connection to the communications line; optionally a CCITT V.24, RS-422, or RS-423 interface can be substituted.

DEVICE CONTROL

Terminal operating parameters are stored in a 512-bit electronically alterable read-only memory (EAROM). A parameter menu can be called to the display screen and the terminal reconfigured via keyed commands. ▶

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▷ "Ease of programming" and "manufacturer's software" ratings were provided only by users who have actually utilized their terminals to create user-programs. "Maintenance service" ratings were provided only by users currently covered under Delta's maintenance and/or warranty contacts.

All but one of the seven users we contacted were extremely satisfied with their 7000 Series terminals and with Delta Data as a company. Comments by these users included "we think the terminals are the best around"; "the terminals are great—just what we asked for"; "our people liked them so well, we have recommended them to other departments in our company, resulting in additional Delta purchases"; "the terminals have completely fulfilled their expected capabilities"; "they offer more sophisticated features than other vendors' terminals in the same price range"; "downtime is definitely within the acceptable range"; and "we are quite satisfied all around." The two federal agencies, who solicited proposals under the government's RFQ system, found tha   ɔ terminals not only scored highest among the competition for technical capabilities, but were also the lowest in cost.

When asked to name specific features they liked, these users' answers comprised a lengthy list. Most frequently mentioned (four users) was Delta's willingness to handle special customer requirements that involve custom-written software/firmware or custom-engineered hardware. In all cases, Delta was considered very responsive to these special needs. Two other features which impressed several users were the split screen capability and the extra large (28K byte) display/text memory. Other features mentioned as advantages included the variety of highlighting modes, the text editing features, and the display quality.

Only a few disadvantages were consistently mentioned by these users. Four of the seven users said that their terminals had arrived with an excessive number of minor defects, or that they had experienced problems during the first few months of installation. No consistent pattern of defects was perceived, but the power supply and the CRT tube seem to have caused the most problems. (Delta states that they have resolved the design bugs found in units manufactured during the first months of production of the 7000 line.) Two users found that delivery schedules were not kept: one experienced a 30-day delay; the other, a four-month delay. Two users mentioned that the terminals (especially the keyboards) could have been better human-engineered.

All-in-all, most of these users reported that their experiences with Delta have been excellent, and that they have a very high regard for the company and its products. Even after making allowances for the fact that these users were vendor-selected, we can't help but feel that Delta's 7000 Series terminals are most worthy of consideration by prospective buyers whose requirements they fulfill.□

➤ Transmission can be performed on a character-by-character basis as each character is keyed or on a block basis where a message or a full or partial page is transmitted.

Data can be entered in Regular, Format, or Enter Program Modes. Regular Mode provides for normal character-by-

character data entry. In Format Mode, data fields can be set up as protected or unprotected. Unprotected fields can be right- or left-justified. Unprotected data that has been changed by the operator can be tagged as "modified". Protected fields can be designated as transmittable or non-transmittable. Enter Program Mode permits ESCape sequences and control codes to be displayed/transmitted without the terminal acting on the commands and is used to perform hardware and software diagnostics.

Cursor control functions position the cursor up, down, left, right, and home. The cursor is also positioned by tab, back tab, return, line-feed, End-of-Text, and space functions. Cursor sending and addressing is standard. The End-of-Text function positions the cursor at the character position following the last character in memory.

Tab functions allow setting and clearing tabs, tabbing forward, and tabbing backward.

Edit functions include character and line insert and delete, partial or full memory erasure, and line erasure.

Paging functions permit the selection of the next page or previous page for display and enables paging or scrolling up or ˙own. An automatic page up mode scrolls all data up where entry continues after the last line is filled, but can be disabled.

An audible alarm sounds when a control code (Control G) is received or a character is keyed at operator-selected line position.

A split screen capability, initiated by host or keyed commands, allows the screen to be divided into up to eight independent display segments, each of which has its own cursor and scrolling memory and can perform different functions concurrently with the other segments.

Expanded Character Set options permit storage of additional special characters and symbols. Character sets can be burned into PROM or loaded into RAM by a 7000 Series Terminal Development System or by the host. On the 7100, which provides the 128 ASCII set as standard, and on the 7300, which provides a 136-character set (128 ASCII characters plus "c" and 7 fraction symbols) as standard, u˙ ˙˙ 3 additional 248-character sets may be generated. On   ˙, which provides the 128 ASCII set as standard, ι additional characters may be generated.

The Print Mode permits the operator to enable/disable a local printer or other attached device.

Eight, or optionally up to 20, program function keys are provided for generation of multiple-character strings or program command sequences. A maximum storage capacity of 256 characters is provided for storage of these   ˙am functions.

A self-test routine provides for detection of operational problems and displays diagnostic messages on the display screen.

In addition to all of the features mentioned above, Model 7300 provides a number of functions especially designed for text processing applications. These include automatic ragged right justification; margin adjustment; paragraph justification; four Search commands (Search Only, Search and Replace, Search and Replace Upon Request, and Search and Dele˙); commands for text definition and manipulation on a word, sentence, paragraph, or block (Define, Move, Copy, and Delete Copy); fraction symbols; line and word counting; discretionary hyphenation; and capitalization and decapitalization. ➤

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► SOFTWARE

Terminal Development System software is available for the System 700 and for appropriately 7000 Series terminals. Additional software modules available for the System 700 only include the *System Executive,* the *Terminal Control Program,* a *Communications Handler,* a *Floppy Disk Access Module,* an *Indexed Sequential Access Module,* and a *BASIC Interpreter.* The cost of all software modules is bundled into the price of Delta's systems.

The *Terminal Development System (TDS)* is a modular package that consists of a text editor, assembler, an instant assembler, a disassembler, a linking loader, a debug monitor, a Dynamic Font Generation utility, and a PROM-burning utility. The TDS modules require 16K bytes of memory and can be implemented in PROM or RAM. Each module is activated using English language commands, and generates its own prompts and error messages. The text editor is designed for use with large blocks of text and provides functions such as cursor movement, insertion and deletion of a character or line, paging up and down, searching for and replacing character strings, movement or deletion of a block, multiple file input/output, and printing. It also includes a keyboard translate table. The assembler converts a source file into fully relocatable object code, with or without print-out. The instant assembler allows interactive assembly of instructions and is used for patching programs. The disassembler decodes object code into mnemonic format, so that it can be checked by the programmer. The linking loader permits any number of relocatable files to be linked and loaded anywhere in the memory and produces a "load map" of the linked addresses of external symbols and program identifiers. The debug monitor provides for testing of software and hardware modules. The Dynamic Font Generation utility permits the user to create and define special characters and symbols within a 10-by-12 dot matrix, and to load them into the terminal's memory. The PROM-burning utility allows a TDS user to burn PROMs on a Data I/O PROM Burner equipped with a serial I/O interface.

The *System Executive* is the System 700's multitasking operating system and is resident in System Processing Unit firmware. It controls all system processes and establishes linkages between various processes as required by the application. The *Terminal Control Program* handles operation of the keyboard, display, printer, and the communications line when transmitting in asynchronous Teletype-emulation mode. The *Communications Handler* provides additional communications capabilities in the form of IBM 3780 (BSC) emulation.

The firmware-resident *Floppy Disk Access Module (FDAM)* handles basic diskette file management procedures and supports random and sequential file access methods and dynamic file allocation. The diskette-loaded *Indexed Sequential Access Method (ISAM)* provides more sophisticated file management capabilities by permitting more precise identification of data to be accessed.

Delta Data has provided a *BASIC Interpreter* for development of user applications programs. Delta's BASIC is an extended version of standard business BASIC that has been optimized for the TI 9900 microprocessor. Special features include integer, single precision, and double precision floating points; extended mathematical intrinsics; full string manipulation; formatted I/O; chaining capabilities; designation of variable names of any length; integration of disk subsystem functions; etc.

COMPONENTS

DISPLAY: A 15-inch (diagonal measurement) CRT display with a screen arrangement of 27 lines of 80 characters plus one line at the top of the screen for error/status information. Status information may also be provided by a set of indicator lights on the display panel via the Status Panel option. Display memory on the 7500 is limited to the screen capacity; on the 7100 and 7300, standard display memory capacity is 6000 characters (just under 3 pages) and can optionally be expanded to 28,000 characters (almost 13 pages). Operators may select from one of five cursor styles. Data is displayed in green (P31, or optionally P4, phosphor) on a dark background. Characters are formed by a 7-by-9 dot matrix in a 10-by-12 dot field. The full 128 ASCII character set is standard; in addition, Model 7300 provides eight characters ("¢" and seven fraction symbols) not included in the ASCII set. Optionally, users may generate additional characters via the Dynamic Font Generation Option: Models 7100 and 7300 can handle up to three additional 248-character sets, or 744 additional user-defined symbols; Model 7500 can accommodate up to 864 additional symbols.

Displayed data may be highlighted via any combination of four video attributes: blinking, reverse video, half intensity, and underlining. In addition keyboard-entered data may be tagged as modified, or blanked for security.

KEYBOARD: A detached, 106-key, PROM-encoded keyboard. The main keygroup contains 61 keys in a typewriter-style arrangement. To the right of and above the main keygroup are two control clusters that contain program function keys, cursor movement keys, a numeric pad (Model 7100 only), and other control keys. Eight program function keys are standard; up to 12 additional program function keys can optionally be added. Generation of the 128 ASCII character set is standard, but other character sets may optionally be substituted. Key repeatability and n-key rollover are standard keyboard features; a keyboard security lock is optional.

DISKETTE UNIT (7000 Series TDS and System 700 only): A single or dual-spindle unit that reads/records in single density on one or two sides of a standard 8-inch diskette. Storage capacity is 355K bytes per side, or a maximum of 1.4M bytes per system. Diskettes are organized into 77 tracks per side, and are soft-sectored to allow up to 512 bytes per sector. Rotational speed and rotational delay are 360 rpm and 83.3 milliseconds, respectively. The data transfer rate is 250K bits per second.

MINIDISKETTE UNIT (System 700 only): A dual-spindle unit that reads/records on 5-inch minidiskettes and provides a total of up to 180K bytes of storage.

DELTA 6761 PRINTER: A serial, impact, dot matrix teleprinter with an incremental, bidirectional, logic-seeking printhead that prints at 60 characters per second. The print buffer holds up to 256 characters, and can optionally be expanded by 7168 characters. Characters are formed by a 7-by-7 dot matrix, or optionally by a 5-by-7, 9-by-9, or 9-by-7 dot matrix. A 64-character (upper case only) ASCII set is standard, but optionally expandable to 96 or 128 characters. An adjustable tractor feed and 2-channel vertical forms mechanism are standard. Horizontal pitch and vertical spacing are 10 characters per inch and 6 lines per inch, respectively. Five-part (original plus four copies) pin-fed continuous forms of a maximum width of 17.3 inches may be printed. Communications capabilities permit operation independent of the keyboard/display and allow for receipt of asynchronous data transmissions at up to 1200 bits per second, or optionally up to 9600 bps.

PRICING

The Delta Data 7000 Series terminals and the System 700 are available for purchase only. A separate maintenance contract is available. Quantity discounts are also available. Installation is priced at $60 per terminal. ►

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	Purchase	Monthly Maint.
Model 7100 Display Terminal*	$4,600	$30
Model 7300 Display Terminal*	4,600	30
Additional Text Memory—15K characters; maximum of 2 per Model 7100; maximum of 1 per Model 7300	800	5
Additional Text Memory—7.5K characters	500	5
Printer Interface	50	2
Expanded Character Sets—		
248-Character RAM	645	8
248-Character PROM**	745	8
248-Character RAM plus 248-Character PROM**	955	10
Model 7500 Display Terminal*; includes 16K-byte RAM	4,050	25
16K-Byte RAM Increment	650	5
8K-Byte RAM Increment	450	5
Status Panel	125	2
Printer Interface	50	2
Expanded Character Sets—		
248-Character RAM	645	8
248-Character PROM**	745	8
248-Character RAM plus 248-Character PROM**	955	10
7000 Series Terminal Development System; PROM-based; includes 32K bytes of RAM, keyboard/display, and one dual-diskette drive—		
Without Model 6761 printer	11,950	75
With Model 6761 Printer	14,350	115
16K-Byte RAM Increment	650	5
7000 Series Terminal Development System; RAM-based; includes 48K bytes of RAM, keyboard/display, and one dual-diskette drive—		
Without Model 6761 Printer	11,950	80
With Model 6761 Printer	14,350	120
8K-Byte RAM Increment	450	5
System 700; typical configuration consisting of 64K bytes of RAM, 4K bytes of PROM, keyboard display, one dual-diskette drive, and BASIC interpreter	11,900	***
Model 6761 Teleprinter	2,595	42

*Certain memory options may be mutually exclusive unless custom-engineered.

**Pricing shown is for character sets available off-the-shelf from Delta Data. Custom-designed sets require an additional one-time engineering charge (consult Delta Data for pricing).

***Contact vendor for pricing.■