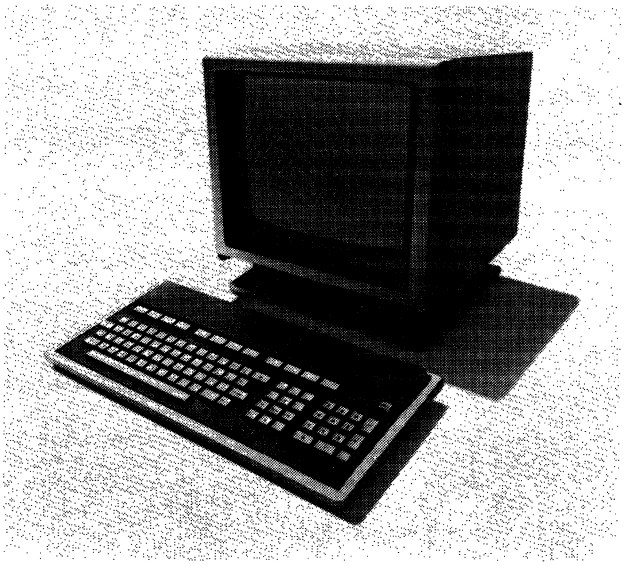
Ontel Series 15 DisplayComputers



Model 1503, the entry-level member of the Series 15 family, is designed to operate as an on-line remote terminal or as a slave system. As with the 1505 and 1507, the 1503 contains a 15-inch display and a detachable keyboard.

A family of intelligent terminals ranging from a remote on-line unit to a multi-function programmable system.

The Series 15 consists of the Model 1503, a low-end programmable terminal; the Model 1505, a mid-range programmable terminal; and the Model 1507, the top-of-the-line multi-function terminal. All models feature a 15-inch integral CRT, a detached keyboard, and up to 64K of RAM. A variety of mass storage peripherals are available for use with the 1505 and 1507, including Winchester hard disk, and diskette drives. A full range of software programs are provided, including the MDOS/80 and HDOS/80 operating systems (CP/M is optional), Ontel's OPL programming language, Basic, CIS-Cobol, Fortran, and word processing. Communications terminal emulators include IBM 2780/3780, 3270 SDLC, Burroughs, DEC, and TTY.

The Ontel Series 15 are marketed on an OEM basis only. Typical purchase prices for the family range from $1,395 to $5,500, with all prices based on quantities of 100 or more.

MANAGEMENT SUMMARY

The Series 15 is Ontel's successor to the OP–1 family of intelligent terminals. The OP–1 terminals were based on the Intel 8080 microprocessor; the Series 15 processor utilizes the newer Intel 8085. Ontel has also introduced new peripherals for use with the Series 15, including a 5.5MB 5¼-Winchester disk. All of the OP–1 software is upward-compatible with the Series 15 software.

The Series 15 consists of three models: the 1503, 1505, and 1507. The 1503 is the low-end model, designed for use as a local or remote slave terminal to a 1505 or 1507 system. The 1505 and 1507 provide processing capability as stand-alone or clustered terminal systems. All models feature a 15-inch display integrated into the system console, and a 93-key detached keyboard. The Series 15 is marketed by Ontel exclusively to OEMs, and provides word processing and terminal emulation capabilities in addition to data processing functions.

A variety of storage devices are available for configuration with the 1505 and 1507 systems. These include: dual 5¼-inch mini diskette units, containing 500K bytes of storage per drive; dual 8-inch diskettes, with 1.2MB of storage per diskette; a 5¼-inch Winchester drive containing 5.5MB of storage; a 14-inch hard disk drive (Control Data Hawk) with 10MB of storage; a 14-inch hard disk drive (Control Data Phoenix) with 96MB of storage; and 800/1600-bpi magnetic tape drives. A variety of printers are also supplied for use with the Series 15.

CHARACTERISTICS

VENDOR: Ontel Corporation, 250 Crossways Park Drive, Woodbury, NY 11797. Telephone (516) 364–2121.

DATE OF ANNOUNCEMENT: Information not available.

DATE OF FIRST DELIVERY: Models 1503 and 1505—December 1980; Model 1507—June 1982.

NUMBER DELIVERED TO DATE: Over 20,000 (all models).

SERVICED BY: Standard Register.

CONFIGURATION

The Series 15 consists of three models: the 1503, 1505, and 1507. All are 8-bit machines, based on an Intel 8085A processor, and contain either 16K or 64K bytes of RAM. Up to 16K bytes of EPROM is also available. All models feature a 15-inch display and detached keyboard.

Model 1503 is a low-end programmable terminal designed to function as a local or remote slave to an Ontel 1505 or 1507 system or other compatible system, such as the Ontel OP–1. The 1503 is designed primarily for use in a multi-terminal cluster or remote I/O application.

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Both the MDOS/80 and HDOS/80 operating systems are supported by the Series 15. In addition, support for the popular CP/M operating system is provided as an option. The range of software supported on the Series 15 includes: OPL, Ontel's high-level programming language; Basic; CIS-Cobol; and Fortran. Word processing applications are supported through the addition of Ontel's Word 6.30 package. Communication terminal emulators available for the Series 15 include IBM 2780/3780, IBM 3270 SDLC, DEC VT100/VT52, Burroughs TC 3500, and TTY.

In addition to its intelligent terminal products, Ontel also manufacturers the Z-80-based Amigo personal computer. In January 1983, it was announced that Visual Technology, a Tewksbury, Massachusetts-based manufacturer of smart alphanumeric and graphics display terminals, had acquired Ontel Corporation from its previous owner, Caesar's World, Inc. The Ontel product line is a logical extension of Visual's; no immediate changes in the manufacturing or distribution methods of the Ontel products are planned.□

Model 1505 is the mid-range member of the Series 15 family. The 1505 provides a DMA controller and a single-channel I/O microprocessor. It is designed to operate as a stand-alone programmable terminal or as the controller of a cluster terminal system containing Model 1503s as slave terminals. Although the physical capacity of the 1505 cluster capability is 16 slave stations, the system is designed primarily for smaller-cluster applications.

Model 1507 is the top-of-the-line member of the Series 15 family. The 1507 may operate as a stand-alone terminal or as the controller of a large cluster system containing up to 16 Model 1503 and 1505 slave terminals.

The Model 1505 features a single channel input/output microprocessor, allowing the interfacing of one DMA controller. The Model 1507 features a four channel input/output microprocessor, which can interface up to four DMA controllers. DMA controllers include: Disk Controller III, Mini Diskette Controller, Winchester Controller, Asynchronous Controller, SDLC Controller, Bisynchronous Controller II, and Micro Programmable Diskette Controller III.

Peripherals supported by the 1505 and 1507 include: dual 5¼-inch 500K mini diskette units; 5¼-inch 5.5MB Winchester disk with 500K diskette back-up; dual 1.2MB 8-inch diskettes; 10MB CDC Hawk cartridge disks (the 1505 supports one drive; the 1507 supports up to four drives); 96MB CDC Phoenix disks (the 1505 supports one drive; the 1507 supports one or two drives); character printers (up to 40 cps); and line printers (up to 600 lpm).

An asynchronous RS-232-C interface is standard, upgradeable to a 2-wire direct interface on all models. A synchronous RS-232-C interface is optional.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous (standard) or synchronous (optional), in half- or full-duplex modes. Transmission rates up to 19,200 bits per second are accommodated during asynchronous operation, and up to 50,000 bits per second during synchronous operation. The standard RS-232-C interface may be field-upgraded to provide a 2-wire direct interface through internal switch settings.

SOFTWARE

The Series 15 DisplayComputers feature full software-compatibility with the Ontel OP-1 Series of intelligent terminals. The Series 15 has superseded the OP-1 in Ontel's product line.

The Series 15 supports Ontel's operating systems, MDOS/80, HDOS/80, and MFT/VHM. Optionally, the Series 15 can also support the CP/M operating system. Other software supported includes OPL, Ontel's high-level language; Basic (interpreter); CIS-Cobol (ANSI Cobol 74 Level 1); and Fortran.

The MDOS/80 and HDOS/80 operating systems provide support for a single task. The MFT/VHM operating system provides support for up to 16 tasks per terminal. HDOS/80 supports shared and private cataloging on hard disks. All operating systems provide for I/O device independence and device drivers for all peripherals marketed by Ontel.

The Ontel Programming Language (OPL) is a high-level programming language which requires run time support. Two versions of OPL are offered: single-task (OPLST) and multi-tasking (OPLMFT). OPLMFT provides for a fixed number of tasks (up to 16).

A variety of utilities are available under OPL, including the Dearform and Deardata programs (Dear is an acronym for Data Entry and Retrieval). These programs permit the user to create forms directly on the CRT, edit the data, and transmit them for use with OPL.

Ontel also provides the Word 6.30 word processing package. Word 6.30 includes a file management system that supports the creation or modification of text files on disk or diskette.

A complete set of diagnostics capabilities is also available for the Series 15.

Optional communications emulators available for the Series 15 include: IBM 2780/3780; IBM 3270 SDLC; Burroughs TC 3500; DEC VT100/VT52; and TTY.

COMPONENTS

PROCESSOR: An Intel 8085 8-bit microprocessor is the standard processor for the Series 15. Any Series 15 model may be configured with either 16K or 64K bytes of RAM, which can be allocated for display, program storage, or I/O buffering under software control. In addition, EPROM memory of up to 16K bytes is provided in 2K-, 4K-, or 8K-byte increments.

DISPLAY UNIT: A 15-inch (diagonally measured) nonglare CRT is integrally packaged into the Series 15 console. Display capacity is 2000 characters, displayed in a 25-line by 80-character format. Characters are formed utilizing a 7-by-9 dot matrix (upper case) or 7-by-11 dot matrix (lower case). The 128-character ASCII set is displayable; a 256-character set, including graphics, is optional. Visual attributes available include underline, reverse video, blink, blank, and half or double intensity.

KEYBOARD: A 93-key detachable keyboard. The keyboard is arranged in four functional sections: a 55-key main array, 12-key control pad, 13-key numeric pad, and 13-key function pad (four of which are lighted). The keyboard features N-key rollover, automatic repeat (at 15 characters per second), and an audible alarm.

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DISKETTE DRIVES: Two types of diskette storage are available. Dual 5¼-inch mini diskette units provide 500K bytes of storage per drive. Dual 8-inch diskettes provide up to 1.2MB of storage per diskette.

DISK DRIVES: Three types of disk storage are available. The Control Data Hawk cartridge disk drive provides 10MB (5MB fixed, 5MB removable) of storage; up to four Hawk drives may be configured on the 1507. The Control Data Phoenix provides 96MB of unformatted disk storage; one or two Phoenix drives may be configured with the 1507. Also available is a 5¼-inch mini Winchester disk with 5.5MB of storage, plus a mini floppy with 500K bytes of back-up storage.

TAPE DRIVES: In addition to disk storage, 800/1600 bpi tape drives are available for use with the Series 15.

PRINTERS: A variety of printers are available for use with the Series 15, including character printers operating at speeds up to 40 cps, and line printers printing at speeds up to 600 lpm.

PRICING

The Series 15 DisplayComputers are available for purchase on an OEM basis only. Quantity discounts are provided. The investment tax credit is passed on to the customer. There are no installation charges since the equipment is shipped to, and installed by, the customer. Ontel's customers are distributors, OEMs, large end-users, and systems houses, which must assume the responsibility for maintenance. The Series 15 is covered under a 90-day warranty which includes time and material for any failures. Training consists of courses in the operating systems, Ontel hardware operation, and the OPL programming language. Below are several sample configurations. Pricing is based on quantities of 100 or more.

	Purchase Price*
Model 1503; 64K RAM	$1,395
Model 1505; 64K RAM; dual 5¼-inch mini diskette drives	3,500
Model 1505; 64K RAM; 5.5-inch Winchester disk drive	4,650
Model 1507; 64K RAM; dual 5¼-inch mini diskette drives	4,375
Model 1507; 64K RAM; 5.5-inch Winchester disk drive	5,500

*Purchase prices are based on quantities of 100 or more. ■

Ontel OP-1 Series Intelligent Terminals

The OP-1/50 pictured above is available with either 32K or 64K bytes of main memory and optional built-in dual minidiskette drives.

A stand-alone or clustered terminal system designed for remote data entry, word/text processing, distributed processing, or other user-defined applications.

A single, multiprocessor station can contain up to 64K bytes of memory. Clusters of up to 32 display stations can be configured. Peripherals include up to four diskette drives, up to four disk drives, up to two magnetic tape drives, and serial or line printers. Communications may be either asynchronous or synchronous. BSC or SDLC protocol support is available, as well as IBM 2780/3780, Burroughs, and DEC VT52A emulation.

The OP-1 Series is available only on an OEM basis. Basic system prices range from $1,650 (Model OP-1/R) to $3,670 (Model OP-1/70) per unit, based on a 100-unit purchase quantity. No lease terms or maintenance are available.

MANAGEMENT SUMMARY

First introduced in October 1974, Ontel's OP-1 has undergone numerous enhancements to both hardware and software. Terminal models with 4K and 8K bytes of memory have since given way to models with up to 64K bytes of memory. The Intel 8085 became the standard OP-1 processor in 1979, replacing the earlier 8008 and 8080 processor models.

Vendor software has likewise been enhanced. Ontel currently offers several operating systems, including the recently announced MFT/VHM, a real-time, multitasking operating system capable of handling 16 tasks simultaneously. High-level languages, including Basic/2, Fortran/5, Pascal, Cobol, and Ontel's own OP/L programming language, are available for user program development. Several available application programs include data entry, word processing/text editing, and business and financial accounting.

The OP-1 Series of products can be configured according to user requirements. Any model may act as a stand-alone keyboard/display terminal or as the primary (master) or secondary workstation of a clustered terminal. In configuring a clustered system, specific functions may be shared by all appropriate workstations, or allocated to specific workstations. For instance, in a system used primarily for word processing applications, only the master station needs to contain the Word Display microprocessor; the word processing logic may be down loaded to all other workstations from the master. Similarly, only the master station needs the Word Move controller with the printer interface; printing requirements for all secondary stations can be handled through the master on a single word processing printer. In a system ➢

CHARACTERISTICS

VENDOR: Ontel Corporation, 250 Crossways Park Drive, Woodbury, New York 11797. Telephone (516) 364-2121.

DATE OF ANNOUNCEMENT: OP-1—October 1974; OP-1/R—October 1978; OP-1/50 and OP-1/70—June 1979; OP-1/15—June 1980.

DATE OF FIRST DELIVERY: OP-1 with 8008 microprocessor—November 1974; OP-1/R—November 1978; OP-1/70—June 1979; OP-1/50—October 1979; OP-1/15—(tentatively) December 1980.

NUMBER DELIVERED TO DATE: Over 20,000.

SERVICED BY: End-user vendors.

CONFIGURATION

The OP-1 Series includes six models: OP-1/70, OP-1/50, OP-1/15, OP-1/R, OP-1/RW, and OP-1/RS. Depending on its configuration, any model may act as a stand-alone keyboard/display terminal, or as the primary (master) or a secondary workstation of a clustered terminal system. Each model is provided with multiple microprocessors, each of which supports a specific function: display, I/O, or central processing. The display microprocessor, which is standard on all models except the OP-1/15, controls all display functions. On the OP-1/15, the Word Display microprocessor is standard and controls both display and word processing functions. The I/O microprocessor is standard on the OP-1/50 and OP-1/70 and optional on the other models. It supports one to four (depending on the model) DMA device controllers, which are used to attach additional devices to the basic system. The standard microprocessor used for central processing is an Intel 8085 on all models. It supports the ➤

Ontel OP-1 Series Intelligent Terminals

used primarily for data processing applications, a single workstation may be loaded with all word processing functions, leaving the remainder of the system free to handle the data processing workload. (The OP-1's MFT/VHM operating system is capable of handling concurrent data processing and word processing operations.) These features can provide considerable cost savings to users of multiple-workstations or multi-purpose systems.

Ontel provides interfaces for several I/O devices from independent vendors and will build special interfaces for peripherals or communications on a negotiated basis. Ontel currently supports Diablo, Okidata, and Printronix printers; Pertec half-inch magnetic tape drives; CDC disk drives; and Shugart and CDC standard and Tandon mini diskette drives.

Ontel markets the OP-1 on an OEM basis to other vendors, distributors, and large end-users. No leasing program is available for the end-user.

USER REACTION

In mid-September 1980, Datapro conducted telephone interviews with six Ontel OP-1 end-users. Three of the users' names were provided to us by Ontel, one was a secondary reference from a systems house that incorporates Ontel's equipment into the systems they sell, and two were respondents to Datapro surveys on terminal equipment. These users reported their experience on a total of 883 Ontel OP-1 display stations, which included OP-1/R, OP-1/64, and OP-1/32 models. Three of the users had over 200 units each, one user had 150 units, one user had five units, and one user had three units. Most of the units were configured as stand-alone workstations; only two of these users utilized some of their units in clustered arrangements. The number of years their units had been installed ranged from 1½ to five years, with 2½ years being the average. Three of the users had purchased their OP-1's directly from Ontel; the other three had purchased them from a third party. Except for unusual circumstances requiring Ontel's direct involvement, maintenance service was performed either by the user's in-house staff (4 users) or by the third party who had supplied the system (2 users).

These OP-1's were being used in a wide variety of applications, including order entry, inventory control, accounting, word processing, advertising and editorial text entry, directory assistance operations for a telephone company, software development, customer service, and sales. Three of the users were programming some of their own applications; all three programmmed primarily in assembler language, although one also used Ontel's OP/L language, and one other had developed various programs using OP/L, Cobol, Fortran, and Basic. The other three users were using applications programs and/or emulators provided by Ontel or by the third party from which they purchased their systems.

interrupt controller, an asynchronous I/O adapter, the keyboard, data switches, and a real-time clock, and contains the main and bootstrap memories.

Specific details of each model are described below:

OP-1/70—The top-of-the-line, the OP-1/70 can provide 32K or 64K bytes of memory and can support four device controllers, allowing a theoretical maximum of 32 workstations (including the master station) and 16 disk drives to be configured.

OP-1/50—Similar in architecture to the OP-1/70, the OP-1/50 can also provide 32K or 64K bytes of memory but supports only two device controllers, allowing a maximum of 16 workstations (including the master station) and 8 disk drives to be configured. The OP-1/50 can be equipped with an integral dual drive minidiskette unit, which requires the minidiskette device controller as an occupant of one of the OP-1/50's two device controller slots.

OP-1/R—A single-board system, the OP-1/R can provide 16K or 32K bytes of memory. Its optional I/O microprocessor provides a single channel that supports one device controller, allowing a maximum of 8 workstations (including the master station) and 4 disk drives to be configured.

OP-1/RS—The OP-1/RS is identical to the OP-1/R except that a synchronous I/O adapter is substituted for the asynchronous I/O adapter used in the OP-1/R.

OP-1/RW—This is an enhanced version of the OP-1/R packaged for word processing applications. It includes the Word Display microprocessor in place of the standard display microprocessor and the Word Processing Keycaps set in lieu of the standard keycaps.

OP-1/15—This is an updated version of the OP-1/R that provides an expanded memory, and modernized cabinet and keyboard styling. The Word Display microprocessor is standard in lieu of the normal display microprocessor. As with the OP-1/R, one device controller can be accommodated. Main memory capacity can be 16K, 32K, 48K, or 64K bytes. An external dual-drive minidiskette unit, featuring a cabinet designed to match the OP-1/15's styling, is optional; the minidiskette device controller is required for its attachment to the system.

Various device controllers permit attachment of minidiskette, 8-inch diskette, or hard disk units, serial or line printers, half-inch magnetic tape drives, and clusters of 4 to 8 additional workstations to the basic system. They also provide for a variety of data communications modes (see Transmission Specifications) and implementation of word processing functions.

On the OP-1/50 and OP-1/70, each of the system's microprocessors and device controllers is contained on its own PC board, which occupies a separate slot in the card cage; boards can easily be swapped in and out to reconfigure the system or to make repairs. On the other models, the two standard microprocessors are contained on a single board; separate boards for the I/O microprocessor and for the device controller are attached directly to the main board "piggy-back" style.

Full word processing functions can be implemented on any OP-1 using the Word Display microprocessor, the Word Move Controller, and the Word Processing Keycap set. The Word Display microprocessor includes the word processing logic and a 128- or 256-character word processing character set. The Word Move Controller permits the operator to move variable-length blocks of data through memory, perform word wrap-around for retaining content integrity on the screen, and other operator funcitons. The Word Move option comes with or without an interface to either of the Diablo

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These users' ratings are tabulated below:

	Excellent	Good	Fair	Poor	WA*
Overall performance	3	3	0	0	3.5
Ease of operation	3	2	0	0	3.6
Display Clarity	4	1	1	0	3.5
Keyboard feel and usability	3	3	0	0	3.5
Ease of programming	0	2	1	0	2.6
Manufacturer's software	0	2	1	0	2.6
Hardware reliability	2	4	0	0	3.3
Technical support	2	2	1	0	3.2

*Weighted Average on a scale of 4.0 for Excellent.

For the most part, these users were very satisfied with their OP-1 systems. Ontel's willingness to accommodate special customer requirements, especially involving the hardware, but also to a lesser degree with their software, was mentioned by several of these users. One user, who had purchased his systems directly from Ontel, felt that the company was very easy to get along with, and that it was "willing to do things that a larger company won't." Another felt that Ontel's dedication to terminals as their primary line business resulted in stronger attention to terminal design improvements and a more positive relationship with terminal customers, compared to his experience with other companies whose terminal products are simply peripherals to larger mainframes or one of many diverse types of equipment offered.

Concerning the hardware itself, three users reported that flexibility was the system's most important advantage. As one of these users put it, "almost any application can be programmed in exactly the way we want it." Another user pointed out the excellent reliability record of his hardware. Ease of maintenance, and easy access to and replacement of parts, were also mentioned as advantages.

According to these users, it is not unusual for Ontel to incorporate improved features developed for a particular customer into all subsequently produced models and to offer to field-upgrade installed units of existing customers. Although this policy certainly benefits Ontel from a product development point of view, in that the costs of developing and testing new features are passed on directly to the customer, who also serves as the "guinea pig", these users seemed to feel that it was also to their advantage, in that Ontel has been willing to listen to their ideas and to share with them improvements resulting from other user's ideas.

No major disadvantages were consistently reported. One user, who was programming in assembler and OP/L, felt that the languages required too sophisticated a programmer and were hard to debug. A second felt that Ontel's software had an unsatisfactory number of "bugs" in it that seemed to pop up whenever new releases were implemented. A third felt that the range of I/O devices supported by Ontel is too limited. Another user stressed the need for users to be sure to make their own arrangements for system maintenance and repairs, since Ontel's response to calls for service, on the few occasions

word processing printers offered by Ontel. The Word Processing Keycap set provides specialty keycaps for certain keys that have functions under the word processing software that are different from their standard key functions.

On the OP-1/R, the Word Display microprocessor and Word Processing Keycaps replace the standard display microprocessor and keycaps, creating the OP-1/RW. On the OP-1/15, the Word Display microprocessor is standard and the Word Processing Keycaps can optionally be ordered to replace the standard ones. For both the OP-1/RW and the OP-1/15, the Word Move Controller must be ordered separately and occupies the system's only device controller slot.

On the OP-1/50 and OP-1/70, the Word Display microprocessor and Word Move Controller boards can be added as options to the basic system; no basic system boards are removed. Each of the optional boards occupies one device controller slot. The Word Processing Keycaps can be optionally substituted for the OP-1/50's or OP-1/70's standard keycap set.

TRANSMISSION SPECIFICATIONS

The communications parameters of each of the four communications controllers are presented as follows:

- Asynchronous controller—supports half- or full-duplex, asynchronous transmission at rates of 110 to 38,400 bits/second using ASCII. Point-to-point or multipoint operation is supported. The line protocol is programmable.
- Synchronous controller—supports half-duplex synchronous transmission at rates up to 50,000 bits/second.ASCII code is used, and the line protocol is programmable.
- Synchronous controller—supports binary synchronous transmission to 9600 bits/second. The line protocol is programmable.
- SDLC controller—supports SDLC protocols.

Like other device controllers, each communications controller occupies one device controller slot, except for the synchronous controller on the OP-1/RS, which replaces the asynchronous controller used on the OP-1/R on the main PC board.

An Asynchronous I/O Adapter, supported by the central processor, is provided as standard on all models except the OP-1/RS. The adapter equips the terminal with an RS-232-C interface for communications and supports data rates from 110 to 9600 bits/second in the half or full duplex mode. Data can be transmitted by character or by block. The 8-level 10- or 11-unit ASCII code (including parity) is used. On the OP-1/RS, a synchronous I/O adapter is provided in lieu of the asynchronous I/O adapter.

When 2-wire direct connections are required, such as in a cluster configuration containing secondary stations connected to a master station, an Alternate Asynchronous I/O Adapter can be used to provide the direct connect interfacing for each station. Unlike the standard I/O Adapter, the Alternate Adapter requires one device controller slot.

SOFTWARE

The OP-1 Series terminals are user-programmable. Programs are created via an Ontel assembler, OP/L, or one of several available program languages. In addition, Ontel provides applications programs for data entry, word processing, and business and financial accounting; emulators for IBM 2780/3780, Burroughs, and Digital Equipment's VT52A terminals; and diagnostic testing routines.

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when it was needed, was very slow. (Ontel provides no routine maintenance service for its customers.) One user had experienced delays in shipment on his OP-1/R order.

In terms of the hardware itself only two negative comments were made: one user felt that the system consumed a high amount of power; the other mentioned that the display screen is sensitive to glare, which sometimes interferes with its clarity.□

OP/L, Ontel's own language, provides an extensive set of utility programs that use a disk- or diskette-based operating system. The OP/L package includes the assembler, and copy, edit, debug, assign, print, and examine routines. Subroutines provide communication protocols, peripheral handlers, and arithmetic operations.

Other program development languages available include Basic/2, Fortran/5, Cobol, and Pascal. Compilers for Basic, Fortran, Cobol, and PASCAL require 64K bytes of memory. Programs can be downline-loaded, either from the primary station in a cluster, or from a remote host.

Ontel's data entry package, called DEAR (an acronym for Data Entry and Retrieval), is composed of three separate programs: DEAR FORMS, DEAR FILES, and DEAR DATA. These programs permit the user to create forms directly on the CRT, then to edit and transmit the created data for use with OP/L. Forms are composed of protected and unprotected fields defined by attribute codes. Attributes delimit fields and specify field completion, duplication, protection, or tabulation to the next field. Fields can be restricted to be alphabetic, numeric, alphanumeric, special numeric (numeric plus minus sign, decimal point, comma, and back slash), and special alphabetic/numeric (includes alphabetic and special numeric symbols).

Attributes can also specify left or right justification, zero fill (from the right or left), and the next form to be accessed, which can be automatically linked. Display attributes can specify full or half intensity, reverse or normal video, upper case only or upper and lower case, and cursor blinking or non-blinking.

Field arithmetic functions permit a field's content to be the result of an arithmetic operation (add, subtract, multiply, divide, or percentage) and rows and columns to be summed.

When transmitting or printing a display page, unprotected fields only or the entire page can be transmitted or printed.

The word processing program, called WORD, includes a file management system that supports the creation or modification of text files on disk or diskette. Files are structured on a file/page basis and any page of a file can be accessed, altered, and returned to its original location within the file or to any location in any file. Besides file and text handling, WORD features include document assembly, form creation, an abbreviation glossary, list processing, a semi-automatic math mode, print spooling, file sharing, and compatibility with the OP-1 system's data processing capabilities. The WORD program requires 48K bytes of memory.

COMPONENTS

PROCESSOR: An Intel 8085 is now the standard processor implemented in the OP-1 series. The 8085 has an instruction set of 80 instructions, is byte-oriented, and provides an 8-level interrupt system. A 4K- to 16K-byte bootstrap loader is provided.

DISPLAY STATION: All models except the OP-1/15 provide a 14-inch (diagonal measurement) non-glare screen with a viewing area 7 inches high by 10 inches wide. The OP-1/15 provides a 15-inch screen. The display arrangement is 24 lines by 80 characters, for a total screen capacity of 1920 characters.

The standard displayable character set is 64 upper case characters. Optional Extended Text Editing character sets provide 128 or 256 displayable characters for data processing environments; the Word Display microprocessor includes a 128- or 256-character set for use in word processing operations.

Each character is formed within a dot matrix. Upper case characters are displayable within a 5-by-7 dot matrix. Lower case characters are displayed within a 5-by-9 or 5-by-10 dot matrix. The text editing option displays upper case characters within a 7-by-9 dot matrix, while lower case characters are displayed within a 7-by-11 dot matrix.

Data is displayed in white characters on a dark background or in dark characters on a white background. Display attributes include reverse video, full or half intensity, blinking, and underscore.

All models include a 93-key keyboard arranged in four functional sections: a standard ASCII keygroup, a 12-key control pad, a 13-key numeric pad, and a 13-key function keygroup with four status lights.

DISKETTE DRIVES: Ontel currently offers a choice of three models: the Shugart Model 800/801 single-sided, single or double density 8-inch diskette drives; the Control Data Model 9406 double-sided, quad density 8-inch diskette drives; and the Tandon Model TM100 double-sided, double density 5¼-inch minidiskette drives. A maximum of 2.4 megabytes of storage is possible using two CDC 9406 drives. An Ontel diskette or minidiskette controller is required for attachment of the diskette drives to the OP-1 system.

DISK DRIVES: Ontel currently offers a choice of three models: Control Data Models 9427H (Hawk), 9414 (Falcon), and 9448 (Phoenix). The 9427H and 9414 each provide a total unformatted capacity of 12 megabytes of storage. The 9427H has 5 megabytes of fixed storage and 5 megabytes of removable storage. The 9414 has 2 fixed 5-megabyte platters. The 9448 provides 96 megabytes of unformatted disk space. Interfacing disk drives to the OP-1 system involves both Ontel's disk controller and file controller. In stand-alone configurations, one disk controller per drive and one file controller are required. In multiple-workstation configurations, one disk controller per workstation and one file controller per cluster are required. Depending on the file controller selected, clusters may contain a maximum of 4 Falcon or Hawk disk drives and 4 or 8 workstations (including the master station), or 2 Phoenix drives and 8 workstations. Once the cluster is established, any disk drive contained within the cluster can be accessed by any of that cluster's workstations.

PRINTERS: Ontel currently offers a choice of six models for use in data or word processing environments. The Diablo Hytype II Models 1345 and 1355WP are full-character printers used mainly for word processing. Either model provides a 132-column print width. Model 1345 prints at a rate of 30 cps and uses an interchangeable plastic daisy wheel. Model 1355WP prints at 45 cps and uses a metal daisy wheel. Two Okidata models are rated at 65 lpm and 160 lpm, and print a 132-column print line using dot matrix character formation. Two Printronix high-speed line printers are rated at 300 lpm and 600 lpm; these are also dot matrix printers that print a 132-column print line.The Diablo printers are attached to the system via the Word Move Controller with the

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printer interface; the Okidata and Printronix printers are attached via the Printer Controller.

TAPE DRIVES: Ontel currently offers ten different Pertec 9-track half-inch magnetic tape drive models. The various models accommodate either 7-inch or 10½-inch tape reels, provide a choice of either 800, 1600, or 800/1600 bits per inch, and come with or without a tape formatter. One tape formatter per system is required to control read/write operations between the OP-1 system and the tape units. Each drive operates at 25 inches per second. An Ontel tape controller is required and can attach up to two drives to the OP-1 system.

PRICING

The OP-1 terminal is available for purchase on an OEM basis only. Quantity discounts are provided. The investment tax credit is passed on to the customer. There are no installation charges since the equipment is shipped to, and installed by, the customer. Ontel's customers are distributors, OEM's, large end-users, and systems houses, which must assume the responsibility for maintenance. The OP-1 is covered under a 90-day warranty which includes time and material for any failures. Training consists of courses in the operating systems, Ontel hardware operation, and the OP/L programming language. New software releases and engineering changes are also passed on to the customer when appropriate.

	Purchase Price*
Model OP-1/R	
With 16K-byte memory	$1,650
With 32K-byte memory	1,965
OP-1/RW Option; includes Word Display microprocessor with 16K-bit character generator and Word Processing Keycaps	210
OP-1/RS Option; includes synchronous controller in lieu of asynchronous controller	160
Single Channel I/O Microprocessor	235
Model OP-1/15	
With 16K-byte memory	
With 32K-byte memory	Contact vendor
With 48K-byte memory	for pricing
With 64K-byte memory	
Dual Minidiskette Drives; separately housed; double-sided, double density; Tandon Model TM100	Contact vendor
Single Channel I/O Microprocessor	235
N-Key Rollover	55
Lighted Shift Lock	30
Anti-Static Package	135
Model OP-1/50	
With 32K-byte memory	3,145
With 64K-byte memory	3,670
Dual Integral Minidiskette Drives; double-sided, double-density; manufactured by Tandon	840
Memory Parity Checking Option	105
Model OP-1/70	
With 32K-byte memory	3,670
With 64K-byte memory	4,195
Memory Parity Checking Option	105
Display and Keyboard Options	
Extended Text Editing Display Microprocessor; for OP-1/50 and OP-1/70 only	
128-character set	105
256-character set	160
Word Display Microprocessor; for OP-1/50 and OP-1/70 only	
128-Character Set	210
256-Character Set	290
Custom Character Set	
One-time Engineering Charge	265
Per-Unit Charge; 128-Character Set	80
Per-Unit Charge; 256-Character Set	210
Word Processing Keycaps	120
Device Controllers	
Synchronous Communications Controller; up to 50,00 bps	355
Bisynchronous Communications Controller; up to 9600 bps	370
Asynchronous Communications Controller; up to 38,400 bps	225
SDLC Communications Controller	Contact Vendor
Alternate Asynchronous I/O Adapter	2,302
Disk Controller II; for attachment of CDC Falcon and Hawk drives	365
Disk Controller III; for attachment of CDC Phoenix disk drives	365
Micro Program Diskette Controller I; for attachment of Shugart diskette drives	625
Micro Program Diskette Controller II; for attachment of CDC diskette drives	625
Minidiskette Controller; for attachment of Tandon minidiskette drive	625

*Purchase prices of OP-1 models are based on quantities of 100 or more. Purchase prices of options and peripherals are not subject to quantity discounts.

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	Purchase Price*
Device Controllers (Continued)	
Nine-track Tape Controller; handles up to two half-inch magnetic tape drives	475
Printer Controller; provides parallel interface to Okidata and Printronix matrix printers	190
Word Move Controller; special purpose controller for word processing configurations	370
Word Move Controller with interface to Diablo full-character printer	455
File Controller I; handles up to 4 Hawk or Falcon disk drives and 4 OP-1 workstations	1,885
File Controller II; handles up to 4 Hawk or Falcon disk drives and 8 OP-1 workstations	2,360
File Controller III; handles up to 2 Phoenix disk drives and 8 OP-1 workstations	Contact Vendor
Peripherals	
Dual Diskette Drive; single-sided, single or double density; Shugart Models 800/801	2,305
Dual Diskette Drive; double-sided, quad density; Control Data Model 9406	2,830
Disk Drive; 5MB fixed plus 5MB removable; Control Data Model 9427H (Hawk)	5,245
Disk Drive; 10MB fixed; Control Data Model 9414 (Falcon)	3,880
Disk Drive; 96MB; Control Data Model 9448 (Phoenix)	Contact Vendor
Diablo Hytype II 1345 Printer; full character; 30 cps; plastic daisy wheel	2,620
Diablo Hytype II 1355 WP Printer; full character; 45 cps; metal daisy wheel	2,830
Okidata 65 lpm Matrix Printer	1,460
Okidata 160 lpm Matrix Printer	2,865
Printronix 300 lpm Line Printer	5,880
Printronix 600 lpm Line Printer	8,495
Pertec Tape Drives—	
Model 7840-9-25; 7-inch reel; 800 bpi; includes tape formatter	3,540
Model F849-20; 7-inch reel; 800 bpi	2,280
Model 7640-9-25; 7-inch reel; 1600 bpi; includes tape formatter	3,840
Model F649-40; 7-inch reel; 1600 bpi	3,530
Model 8840-9-25; 10.5-inch reel; 800 bpi; includes tape formatter	4,660
Model F849-20; 10.5-inch reel; 800 bpi	2,280
Model 8640-9-25; 10.5-inch reel; 1600 bpi; includes tape formatter	5,160
Model F649-40; 10.5-inch reel; 1600 bpi	3,530
Model 8640-98-25; 10.5-inch reel; 800/1600 bpi; includes tape formatter	5,800
Model F6484; 10.5-inch reel; 800/1600 bpi	5,020

*Purchase prices of OP-I models are based on quantities of 100 of more. Purchase prices of options and peripherals are not subject to quantity discounts.

	One-Time License Fee	Annual Maint. Charge
Software		
OP/L Programming Language	$2,100	$265
Fortran/5	2,625	265
Basic/2	1,050	265
Pascal	Contact vendor for pricing	
Cobol	Contact vendor for pricing	
DEAR (Data Entry and Retrieval)	1,050	265
WORD (Word Processing Program)	2,100	525
Business Accounting Package	5,250	630
Financial Accounting Package	2,625	525■

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The OP1/R pictured above represents the latest (and low-end) model of the OP1 family. It is available with either 16K or 32K bytes of main memory.

A truly user-programmable terminal system designed for remote data entry, word/text processing, distributed processing, or other user-defined applications. Peripherals may include up to four diskette drives, up to four cartridge disk drives, and serial or line printers.

A single, multiprocessor station can contain up to 64K bytes of memory. Clusters of up to 16 display stations can be configured. Communications may be either asynchronous or synchronous. BSC or SDLC protocol support is available, as well as IBM 2780/3780 emulation.

The OP1 series is available only on an OEM basis. Terminal prices range from $1,570 to $9,395 per unit, based on a 100-unit purchase quantity. No lease terms or maintenance are available.

MANAGEMENT SUMMARY

First introduced in October 1974, Ontel's OP1 has undergone numerous enhancements to both hardware and software. Terminal models with 4K and 8K bytes of memory have since given way to models with 16K bytes and more. The Intel 8080 has become the standard OP1 processor, replacing the earlier 8008, and Ontel has stated that newer models featuring the 8085 processor are forthcoming.

Vendor software has likewise been enhanced. Ontel currently offers several operating systems, including the recently announced MFTOS, a real-time, multitasking operating system capable of handling 16 tasks simultaneously. High-level languages including Basic 2, Fortran 4, and PASCAL are available for user program development. Several available application programs include data entry, word processing/text editing, and business accounting.

The OP1 series of products can be configured according to user requirements and are available in three basic configurations that include two or three microprocessors. Each supports a specific function: display, I/O, and processing. Ontel used the Intel 8008 microprocessor in early models, but in March 1976 switched to the newer and more powerful Intel 8080; about 90 percent of its installed terminals now contain the Itel 8080. The OP1 configurations can support a primary, or master, station and up to 16 secondary stations. The master can alternately support up to four peripheral device controllers, each of which supports up to four devices.

CHARACTERISTICS

VENDOR: Ontel Corporation, 250 Crossways Park Drive, Woodbury, New York 11797. Telephone (516) 364-2121.

DATE OF ANNOUNCEMENT: OP/1—October 1974; OP/1R — October 1978.

DATE OF FIRST DELIVERY: OP/1 with 8008 microprocessor — November 1974; with 8080 microprocessor—March 1976; OP1/R — November 1978.

NUMBER DELIVERED TO DATE: Over 15,000.

SERVICED BY: End-user vendors.

CONFIGURATION

The OP-1 Series includes three models: OP1/64, OP1/16, and OP1/R. The model designations indicate maximum memory capacities of 16K and 64K bytes, which are composed of combinations of ROM (Read Only Memory), PROM (Programmed Read Only Memory), and RAM (Random Access Memory) units.

The models are available in three basic configurations: a three-microprocessor arrangement and two two-microprocessor arrangements. Each is based on the Intel 8080 microprocessor. Ontel has stated that a forthcoming model, OP1/50, will be based on an 8085 microprocessor.

Several basic configurations are described as follows:

- **OP1/64 and OP1/16 three-microprocessor configuration — includes a display microprocessor that controls all display functions; an input/output microprocessor that supports up to four device controllers; and a microprocessor (acting as a central processor) that supports the interrupt controller, asynchronous I/O adapter, keyboard, data switches, and real time clocks. The I/O microprocessor is optional for the OP1/16.**

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Ontel provides interfaces for several I/O devices from independent vendors and will build special interfaces for peripherals or communications on a negotiated basis. Ontel currently supports Centronics, Diablo, and Qume printers; Diablo, CDC and Winchester cartridge disk drives; and Shugart standard and mini diskette drives.

The OP1 offers a wide range of display formats from 480 to 1920 characters. A special 20-line format (1600-character display) and extended character sets of 128 or 256 characters are available for text editing applications. Display clarity can be enhanced via user-specified dot matrix parameters.

Ontel markets the OP1 on an OEM basis to other vendors and distributors. No leasing program is available for the end user. The majority of its installations include the OP1/16, but current orders are shifting toward the OP1/64 as a result of requirements for larger memory.□

- OP1/R single-microprocessor, low-cost, user-programmable terminal. The OP1/R is available in either a 16K- or 32K-byte model. The OP1/R can be configured in a cluster, or as a single on-line system. It can execute its own applications, and concurrently share a data base with a cluster or host.

- OP1/16 two-microprocessor configuration—includes a display microprocessor that supports the display unit only and a second microprocessor (acting as a central processor) that supports the interrupt controller, asynchronous I/O adapter, keyboard, data switches, and real time clock.

Device controllers support up to four magnetic tape drives, up to four cartridge disk drives, up to four diskette drives, a serial or line printer, and asynchronous, synchronous, or bisynchronous communications. Device controllers also support a cluster of OP1 terminals and block transfers through memory.

The display cluster device controller has a transfer rate of 25,000 bytes/second, handles variable-length records, and provides an 8-bit parallel interface with parity checks.

The Word Mover controller moves variable-length data blocks through memory at 15 or 30 microseconds per byte and features word wrap-around for retaining content integrity on the display. A printer interface is included with this controller.

TRANSMISSION SPECIFICATIONS

The communications parameters of each of the three communications controllers are presented as follows:

- Asynchronous controller—supports half- or full-duplex, asynchronous transmission at rates of 110 to 38,400 bits/second using ASCII. Point-to-point or multipoint operation is supported. The line protocol is programmable. Serial interface options are available including the RS-232C interface and 20 ma dc current loop.

- Synchronous controller — supports half-duplex synchronous transmission at rates up to 9600 bits/second. ASCII code is used, and the line protocol is programmable. An RS-232C interface is provided.

The Asynchronous I/O Adapter (supported by the central processor) supports data rates from 110 to 9600 bits/second in the half- or full-duplex mode. Data can be transmitted by character or by block. The 8-level 10- or 11-unit ASCII (including parity) code is used.

DEVICE CONTROL

The OP1 series terminals are user-programmable. Programs are created via an Ontel assembler, OP/L, or with one of several available program languages. OP/L provides an extensive set of utility programs that use a diskette-based operating system and include the assembler, copy, edit, three debug routines, assign, print, and examine programs. Subroutines provide communication protocols, peripheral handlers, and arithmetic operations. In addition to these, Ontel provides application programs for data entry and word processing/test editing and emulation programs for IBM 2780/3780 emulation. Other development languages available include Basic 2, Fortran 4, and PASCAL. The OP/1 assembler requires 8K bytes of memory. Compilers for Basic, Fortran and PASCAL require 22K, 58K, and 64K bytes of memory, respectively. Programs can be downline-loaded, either from a primary, or master station in a cluster, or from a remote host.

Ontel's data entry programs, called DEAR (an acronym for Data Entry and Retrieval) is composed of two separate programs; Formedit and Dataedit. Formedit is used to create new forms and to modify existing ones. Dataedit is used to enter data within a displayed form, to edit, and to transmit the entered data. Forms are composed of protected and unprotected fields defined by attribute codes. Attributes delimit fields and specify field completion, duplication, protection, or tabulation to the next field. Fields can be restricted to be alphabetic, numeric, alphanumeric, special numeric (numeric plus minus sign, decimal point, comma, and back slash), and special alphabetic/numeric (includes alphabetic and special numeric symbols).

Attributes can also specify left or right justification, zero fill (from the right or left), and the next form to be accessed, which can be automatically linked. Display attributes can specify full or half intensity, reverse or normal video, upper case only or upper and lower case, and cursor blinking or non-blinking.

When transmitting or printing a display page, unprotected fields only or the entire page can be transmitted or printed.

The word processing program, called WORD, includes a file management system that supports the creation or modification of text files on diskette. Files are structured on a file/page basis and any page of a file can be accessed, altered, and returned to its original location within the file or to any location in any file. Besides its basic editing functions and file management system, WORD supports printed output from diskette as a background operation or from the screen. Three communication modes include: response to commands from the host computer, block, or character transmission. WORD program requirements are a minimum of 24K bytes of memory, the Extended Text Editing Display or Text Editing Display feature, a Byte String Controller, a dual diskette drive, and a serial printer.

COMPONENTS

PROCESSOR: An Itel 8080 is now the standard processor implemented in the OP/1 series. Ontel has stated, however, that new models soon be delivered will feature an Intel 8085. The 8080 has an instruction set of 78 instructions. Both are byte-oriented and provide an 8-level interrupt system. A 256- or 512-byte bootstrap loader is provided.

DISPLAY STATION: The 14-inch (diagonal measurement) non-glare screen provides a viewing area 7 inches high by 10

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inches wide. The display arrangement is 6, 12, 20, or 24 lines or 80 characters for a total screen capacity of 480, 960, 1600, or 1920 characters. The 20-line display is available on Models OP1/16 and OP1/64 only and is featured as a text-editing option.

The standard displayable character set is 64 upper case characters for models with display arrangements of 6, 12, or 24 lines. A character set of 112 displayable characters is standard for models with display arrangements of 20 or 24 lines. Optional text editing character sets provide 128 or 256 displayable characters.

Each character is formed within a dot matrix. Upper case characters are displayable within a 5-by-7 dot matrix. Lower case characters are displayed within a 5-by-9 or 5-by-10 dot matrix. The text editing option displays upper case characters within a 7-by-9 dot matrix while lower case characters are displayed within a 7-by-11 dot matrix.

Data is displayed in white or green (optional). Display attributes include reverse video, full or half intensity, blinking, underscore, and dotted underscore.

Models OP1/R, OP1/16 and OP1/64 contain a 93-key detachable keyboard that consists of the basic keyboard with all options including 12 cursor control keys; a row of 12 program function keys, and a 13-key numeric pad.

DISKETTE DRIVE: A dual-drive unit (Shugart 801) organized into 77 tracks of 20 256-byte sectors providing a per diskette capacity of 394,240 bytes. Head positioning time is 10 (track-to-track) and 760 (across all tracks) milliseconds. The head settling time is 8 milliseconds. The average rotational delay and data transfer rate are 83 milliseconds and 31,250 bytes/second, respectively.

DISK DRIVE (supplied by user): A single or dual cartridge disk drive (Diablo Model 44). Each drive contains one fixed and one removable disk in an IBM 5440 style arrangement. Each disk provides two recording surfaces; there are four surfaces per drive. A disk is organized into 256-byte sectors and 408 tracks per surface to provide a per-drive capacity of 12 million bytes. Head positioning time is 10 (track-to-track), 38 (average),and 70 (all tracks) milliseconds. The average rotational delay and data transfer rate are 12.5 milliseconds and 312,000 bytes/second, respectively.

PRINTERS: Three printers are available. The Centronics 101A provides 102 print positions and is rated at 165 char./second. The Centronics 306 provides 80 print positions and is rated at 120 char./second. The Diablo HyType II (a full-character printer) provides 132 print positions and is rated at 30 to 45 char./second.

TAPE DRIVE: A single- or dual-drive unit (Mohawk 2021/2022). The unit uses the 3M tape cartridge, which contains 300 feet of 0.25-inch wide magnetic tape. The recording density is 800 or 1600 bits/inch recorded via the NRZI technique. The tape speed is 30 to 90 inches/second and the rewind time is 40 seconds. The total unblocked storage capacity is 2.8 million bytes and the data transfer rate is 64K bytes/second.

PRICING

The OP1 terminal is available for purchase on an OEM basis only. Quantity discounts are provided. The investment tax credit is passed on to the customer. There are no installation charges since the equipment is shipped to, and installed by, the customer. Ontel's customers are distributors, large OEM's, large end-users, and systems houses, which must assume the responsibility for maintenance. The OP1 is covered under a 90-day warranty which includes time and material for any failures. Training consists of manuals that contain engineering and customer documentation. New software releases and engineering changes are also passed on to the customer.

	Unit (1) Purchase Price
Model OP1/R	
16K bytes	$1,570
32K bytes	1,870
Model OP1/16 (2)	
8K bytes	2,535
12K bytes	2,785
16K bytes	3,035
Model OP1/64 (3)	
24K bytes	3,850
32K bytes	4,200
40K bytes	4,555
48K bytes	4,900
56K bytes	5,250
64K bytes	5,600

	Purchase Price (4) Per Unit
Options	
256 Byte Bootstrap	$40
512 Byte Bootstrap	80
EPROM, per 1024 bytes	100
I/O Microprocessor (supports 4 Device Controllers; OP1/16 only)	220

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Options (Continued)	Purchase Price (4) Per Unit
Text Editing Display, 20 lines (OP1/16 & OP1/64 only)	40
Extended Text Editing Display (OP1/16 & OP1/64 only):	
128 characters	200
256 characters	350
Green Phosphor (P31)	25
ROM Tooling per 2048 bytes	3,400
Customer Character Set	75
	(plus $250 one-time engineering charge.)
Device Controllers	
Synchronous	355
Bisynchronous	350
Asynchronous	210
Universal Asynchronous	380
Multiprocessor	310
Disk (for Diablo 44) Controller	345
Diskette Controller	395
Printer Controller	180
Magnetic Tape Controller	450
Word Mover Controller	350
with Printer Interface	430
File Controller, handles up to four disk drives	1,795
SIDD; Single IBM and Double-Density Diskette Controller	595
Peripherals	
Magnetic Tape Drive; 800 bps, 7 inch	3,370
Mini-Diskette Drive	1,095
Printers:	
Centronics 101A Matrix Printer	4,660
Centronics 306 Matrix Printer, 300 lpm	2,580
Diablo HyType II Printer	2,495
Dual Diskette Drive	2,195

(1) Based on purchase quantity of 100 or more units.

(2) Includes a 2.0 μsec CPU, Display Microprocessor, Asynchronous I/O Adapter, 256-byte bootstrap memory, display,a 93-key keyboard, and fixed data switches.

(3) Includes a 2.0 μsec CPU, 256-byte bootstrap memory, Display Microprocessor, Asynchronous I/O Adapter, I/O Microprocessor that supports 4 Device Controllers, a display, a 93-key keyboard, and fixed data switches.

(4) No discounts on options or peripherals quantity purchases.■

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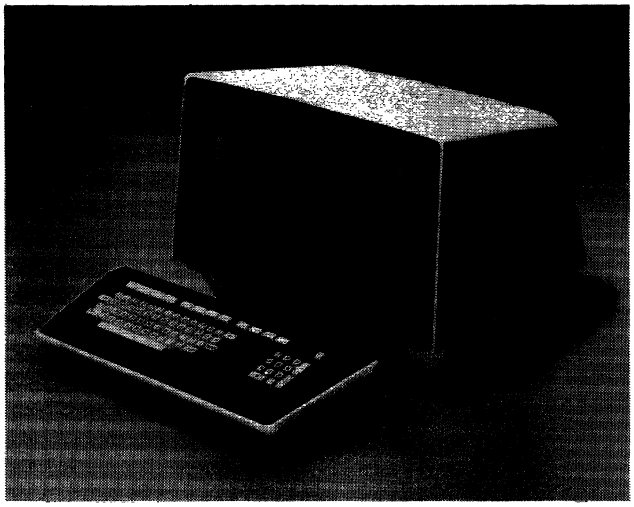

Multiprocessor, programmable display terminal for remote data entry, word processing, or distributed processing applications. Emulation provides compatibility with the Teletype Model 33 and IBM 3270.

Features include two or four diskette drives, one to four cartridge disk drive interfaces, serial printers, and asynchronous or synchronous (including BSC) communications.

Standard configurations include two or three microprocessors, 4K to 64K bytes of memory and one to four display units.

Basic terminal pricing ranges from $2,660 to $9,395 in unit quantities. Quantity discounts are available. No lease terms are available.

MANAGEMENT SUMMARY

Ontel introduced its OP1 intelligent terminal in October 1974 as a stand-alone or clustered, user-programmable display terminal. The terminal features multiprocessor control and from 4K to 64K bytes of memory depending on models. Memory is composed of user-defined combinations of ROM, PROM, and RAM semiconductor units. Ontel currently offers two application programs (data entry and word processing/text editing) and two emulation programs (Teletype 33 and IBM 3270). User programs are created via Ontel's assembler and Ontel-provided utilities and subroutines. A bootstrap loader is provided.

The OP1 can be configured according to user requirements and is available in three basic configurations that include two or three microprocessors. Each supports a specific function: display, I/O, and processing. Ontel used the Intel 8008 microprocessor in early models, but in March 1976 switched to the newer and more powerful Intel 8080; about 70 percent of its installed terminals now contain the Itel 8080. The OP1 configurations can support a master and three slave display terminals (OP1/S) or up to four peripherals including diskette or cartridge disk drives, magnetic tape drives, and printers. Although support for magnetic tape drives is still provided, Ontel no longer actively markets the capability. Ontel provides interfaces for several I/O devices from independent vendors and will build special interfaces for peripherals or communications on a negotiated basis. Ontel currently supports Centronics, Diablo, and Qume printers; Diablo cartridge disk drives; Mohawk tape cartridge drives; and Shugart and Orbus diskette drives.

The OP1 offers a wide range of display formats from 480 to 1920 characters. A special 20-line format ▷

CHARACTERISTICS

VENDOR: Ontel Corporation, 250 Crossways Park Drive, Woodbury, New York 11797. Telephone (516) 364-2121.

DATE OF ANNOUNCEMENT: October 1974.

DATE OF FIRST DELIVERY: November 1974 with 8008 microprocessor; March 1976 with 8080 microprocessor.

NUMBER DELIVERED TO DATE: Over 1000.

SERVICED BY: Ontel and end-user vendors.

CONFIGURATION

The OP-1 Series includes three models: OP1/64, OP1/16, and OP1/8. The model designations indicate maximum memory capacities of 8K, 16K, and 64K bytes, which is composed of combinations of ROM (Read Only Memory), PROM (Programmed Read Only Memory), and RAM (Random Access Memory) units.

The models are available in three basic configurations: a three-microprocessor arrangement and two two-microprocessor arrangements. Each is based on the Intel 8080 microprocessor. The OP1/8 and OP1/16 are still available with the Intel 8008.

The three basic configurations are described as follows:

- OP1/64 and OP1/16 three-microprocessor configuration – includes a display microprocessor that controls all display functions; an input/output microprocessor that supports up to four device controllers; and a microprocessor (acting as a central processor) that supports the interrupt controller, asynchronous I/O adapter, keyboard, data switches, and real time clocks. The I/O microprocessor is optional for the OP1/16.

- OP1/8 two microprocessor configuration – includes an I/O and display microprocessor that supports the display unit and up to three I/O devices and a second ▶

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(1600-character display) and extended character sets of 128 or 256 characters are available for text editing applications. Display clarity can be enhanced via user-specified dot matrix parameters.

Ontel markets the OP1 on an OEM basis to other vendors and distributors. No leasing program has been established for the end user. The majority of its installations include the OP1/16, but current orders are shifting toward the OP1/64 as a result of requirements for larger memory. □

microprocessor (acting as a central processor) that supports the interrupt controller, asynchronous I/O adapter, keyboard, data switches, and real time clock.

- OP1/16 two microprocessor configuration – includes a display microprocessor that supports the display unit only and a second microprocessor (acting as a central processor) that supports the interrupt controller, asynchronous I/O adapter, keyboard, data switches, and real time clock.

Device controllers support up to four magnetic tape drives, up to four cartridge disk drives, up to four diskette drives, a serial or line printer, and asynchronous, synchronous, or bisynchronous communications. Device controllers also support a cluster of OP1 terminals and block transfers through memory.

The display cluster device controller has a transfer rate of 25,000 bytes/second, handles variable-length records, and provides an 8-bit parallel interface with parity checks.

The Byte String controller moves variable-length data blocks through memory at 15 or 30 microseconds per byte and features word wrap-around for retaining content integrity on the display. A printer interface is included with this controller.

TRANSMISSION SPECIFICATIONS

The communications parameters of each of the three communications controllers are presented as follows:

- Asynchronous controller – supports half- or full-duplex, asynchronous transmission at rates of 110 to 38,400 bits/second using ASCII. Point-to-point or multipoint operation is supported. The line protocol is programmable. Serial interface options are available including the RS-232C interface and 20 ma dc current loop.

- Binary Synchronous controller – supports half-duplex bisynchronous transmission at rates up to 9600 bits/second. ASCII code is used, and the line protocol is programmable. An RS-232C interface is provided.

The Asynchronous I/O Adapter (supported by the central processor) supports data rates from 110 to 9600 bits/second in the half- or full-duplex mode. Data can be transmitted by character or by block. The 8-level 10- or 11-unit ASCII (including parity) code is used.

DEVICE CONTROL

The OP1 series terminals are user-programmable. Programs are created via an Ontel assembler. Ontel provides an extensive set of utility programs that use a diskette-based operating system and include the assembler, copy, edit, three debug routines, assign, print, and examine programs. Subroutines provide communication protocols, peripheral handlers, and arithmetic operations. In addition to these, Ontel provides application programs for data entry and word processing/text editing and emulation programs for Teletype compatible terminals and IBM 3270-compatible terminals.

Ontel's data entry program called DEAR (an acronym for Data Entry and Retrieval) is composed of two separate programs: Formedit and Dataedit. Formedit is used to create new forms and to modify existing ones. Dataedit is used to enter data within a displayed form, to edit, and to transmit the entered data. Forms are composed of protected and unprotected fields defined by attribute codes. Attributes delimit fields and specify field completion, duplication, protection, or tabulation to the next field. Fields can be restricted to be alphabetic, numeric, alphanumeric, special numeric (numeric plus minus sign, decimal point, comma, and back slash), and special alphabetic/numeric (includes alphabetic and special numeric symbols).

Attributes can also specify left or right justification, zero fill (from the right or left), and the next form to be accessed, which can be automatically linked. Display attributes can specify full or half intensity, reverse or normal video, upper case only or upper and lower case, and cursor blinking or non-blinking.

When transmitting or printing a displayed page, unprotected fields only or the entire page can be transmitted or printed.

The word processing program, called WORD, includes a file management system that supports the creation or modification of text files on diskette. Files are structured on a file/page basis and any page of a file can be accessed, altered, and returned to its original location within the file or to any location in any file. Besides its basic editing functions and file management system, WORD supports printed output from diskette as a background operation or from the screen. Three communication modes include: response to commands from the host computer, block, or character transmission. WORD program requirements are a minimum of 24K bytes of memory, the Extended Text Editing Display or Text Editing Display feature, a Byte String Controller, a dual diskette drive, and a serial printer.

COMPONENTS

PROCESSOR: An Intel 8008 or 8080. The Intel 8008 has a cycle time of 12.5 microseconds while the Intel 8080 has a 2.0 microsecond cycle time. The Intel 8008 has an instruction set of 48 instructions; the 8080 has an instruction set of 78 instructions. Both are byte oriented and provide an 8-level interrupt system. A 256- or 512-byte bootstrap loader is provided.

DISPLAY STATION: The 14-inch (diagonal measurement) non-glare screen provides a viewing area 7 inches high by 10 inches wide. The display arrangement is 6, 12, 20, or 24 lines of 80 characters for a total screen capacity of 480, 960, 1600, or 1920 characters. The 20-line display is available on Models OP1/16 and OP1/64 only and is featured as a text-editing option.

The standard displayable character set is 64 upper case characters for models with display arrangements of 6, 12, or 24 lines. A character set of 112 displayable characters is standard for models with display arrangements of 20 or 24 lines. Optional text editing character sets provide 128 or 256 displayable characters.

Each character is formed within a dot matrix. Upper case characters are displayed within a 5-by-7 dot matrix. Lower case characters are displayed within a 5-by-9 or 5-by-10 dot

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matrix. The text editing option displays upper case characters within a 7-by-9 dot matrix while lower case characters are displayed within a 7-by-11 dot matrix.

Data is displayed in white or green (optional). Display attributes include reverse video, full or half intensity, blinking, underscore, and dotted underscore.

The standard detachable keyboard provided by the OP1/8 contains 68 keys in a typewriter arrangement and includes a separate cluster of 12 keys for cursor control and user-defined functions. Cursor controls are provided for up, down, left, right, and home.

Options include a 13-key numeric pad that includes plus and minus functions, and a row of 12 program function keys located over the main keygroup. The numeric keypad is located to the right of the main keygroup.

Models OP1/16 and OP1/64 contain a 93-key detachable keyboard that consists of the basic keyboard with all options.

DISKETTE DRIVE: A dual-drive unit (Shugart 801) organized into 77 tracks of 20 256-byte sectors providing a per diskette capacity of 394,240 bytes. Head positioning time is 10 (track-to-track) and 760 (across all tracks) milliseconds. The head settling time is 8 milliseconds. The average rotational delay and data transfer rate are 83 milliseconds and 31,250 bytes/second, respectively.

DISK DRIVE (supplied by user): A single or dual cartridge disk drive (Diablo Model 44). Each drive contains one fixed and one removable disk in an IBM 5440 style arrangement. Each disk provides two recording surfaces; there are four surfaces per drive. A disk is organized into 256-byte sectors and 408 tracks per surface to provide a per drive capacity of 12 million bytes. Head positioning time is 10 (track-to-track), 38 (average), and 70 (all tracks) milliseconds. The average rotational delay and data transfer rate are 12.5 milliseconds and 312,000 bytes/second, respectively.

PRINTERS: Three printers are available. The Centronics 101A provides 102 print positions and is rated at 165 char./second. The Centronics 306 provides 80 print positions and is rated at 120 char./second. The Diablo HyType II (a full-character printer) provides 132 print positions and is rated at 30 to 45 char./second.

TAPE DRIVE: A single- or dual-drive unit (Mohawk 2021/2022). The unit uses the 3M tape cartridge, which contains 300 feet of 0.25-inch wide magnetic tape. The recording density is 800 or 1600 bits/inch recorded via the NRZI technique. The tape speed is 30 to 90 inches/second and the rewind time is 40 seconds. The total unblocked storage capacity is 2.8 million bytes and the data transfer rate is 6K bytes/second.

PRICING

The OP1 terminal is available for purchase on an OEM basis only. Quantity discounts are provided. The investment tax credit is passed on to the customer. There are no installation charges since the equipment is shipped to, and installed by, the customer. Ontel's customers are distributors, large OEM's, large end-users, and systems houses, which must assume the responsibility for maintenance. The OP1 is covered under a 90-day warranty which includes time and material for any failures. Ontel provides its own service with respect to repairing parts received from its customers, primarily logic boards, which are serviced for $50 each. Training consists of manuals that contain engineering and customer documentation. New software releases and engineering changes are also passed on to the customer.

	Purchase Prices					
	1-4 Units	5-9 Units	10-19 Units	20-39 Units	40-99 Units	100 & Over Units
Model OP1/8 (1)						
4K bytes	$2,660	$2,265	$2,110	$1,960	$1,810	$ 1,655
6K bytes	2,955	2,520	2,350	2,180	2,010	1,840
8K bytes	3,255	2,770	2,585	2,400	2,210	2,025
Model OP1/16 (2)						
4K bytes	3,670	3,125	2,915	2,705	2,495	2,285
8K bytes	4,250	3,620	3,385	3,145	2,895	2,655
12K bytes	4,700	4,075	3,810	3,525	3,250	2,985
16K bytes	5,155	4,535	4,235	3,905	3,605	3,320
Model OP1/64 (3)						
24K bytes	6,185	5,270	4,910	4,560	4,200	3,850
32K bytes	6,825	5,815	5,425	5,035	4,640	4,250
40K bytes	7,470	6,360	5,935	5,505	5,080	4,650
48K bytes	8,110	6,910	6,445	5,980	5,515	5,050
56K bytes	8,755	7,455	6,955	6,450	5,950	5,450
64K bytes	9,395	8,000	7,465	6,930	6,390	5,850

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	Purchase Prices					
	1-4 Units	5-9 Units	10-19 Units	20-39 Units	40-99 Units	100 & Over Units
Options (4)						
Microprocessor with 2.0 μsec. cycle (OP1/8 & OP1/16 only)	225					
Audible Alarm (OP1/8 only)	15					
Data Switch (OP1/8 only)	25					
Function Pad (OP1/8 only)	40					
Numeric Pad (OP1/8 only)	35					
N-Key Roll-over	50					
256 Byte Bootstrap	40					
512 Byte Bootstrap	80					
EPROM, per 1024 bytes	100					
I/O Microprocessor (supports 4 Device Controllers; OP1/16 only)	220					
Text Editing Display, 20 lines (OP1/16 & OP1/64 only)	40					
Extended Text Editing Display (OP1/16 & OP1/64 only):						
128 characters	200					
256 characters	350					
Green Phosphor (P31)	25					
ROM Tooling per 2048 bytes	3,400					
Device Controllers						
Synchronous	450	380	355	330	305	280
Asynchronous	220	190	175	165	150	140
Asynchronus (with BCC)	305	265	245	225	205	190
Bi-Synchronous	450	380	355	330	305	280
Tape	580	495	470	440	400	370
Multiprocessor	330	280	265	245	225	205
Disk (for Diablo 44)	450	380	355	330	305	280
Diskette	425	360	340	315	290	265
Printer	220	190	175	165	150	140
Byte String	320	275	255	235	220	200
Byte String (with word wrap-around)	515	440	410	380	350	320
Peripherals (4)						
Tape Cartridge Drives:						
Single Drive	1,595					
Dual Drive	2,895					
Printers:						
Centronics 101A	4,660					
Centronics 306	2,580					
Diablo HyType II	2,495					
Dual Diskette Drive	2,195					

(1) Includes a 12.5 μsec CPU, an I/O Microprocessor that supports 3 Device Controllers, a display, and a 68-key keyboard.

(2) Includes a 12.5 μsec CPU, Display Microprocessor, Asynchronous I/O Adapter, 256-byte bootstrap memory, display, a 93-key keyboard, and fixed data switches.

(3) Includes a 2.0 μsec CPU, 256-byte bootstrap memory, Display Microprocessor, Asynchronous I/O Adapter, I/O Microprocessor that supports 4 Device Controllers, a display, a 93-key keyboard, and fixed data switches.

(4) No discounts on options or peripherals quantity purchases. ■