



Vector Graphic

Vector 4, Vector 4-S & Vector 5

PROFILE

Operating Systems • CP/M, CP/M-86, and MS-DOS are supported on the Vector 4 Series, Vector's Extended CP/M is supported on the Vector 5

Data Management • Data Manager supports sequential and index sequential file; T.I.M. III

Communications/Networks • CONECT provides asynchronous communications (emulation for Lear-Siegler ADM3A or Hazeltine 1500; BIS-3780/3786 provides bisynchronous terminal emulation for IBM 2770, 2780, 3741, and 3780; LINC local area network support

Languages • Digital Research CBASIC-86, CB-86 Compiler, Pascal/MT86, Pascal-Z, Personal BASIC, and PL/I-86; Microsoft BASIC-80 Compiler and FORTRAN; and Microfocus CIS COBOL-86 and CIS COBOL-86 Level II

Models • Vector 4 models are 4/10, 4/20, 4/30, 4/40, and Vector 4-S models include 4S/10, 4S/20, 4S/30, 4S/40 and 4S/60; Vector 5 models are 5005E, 5010E, and 5032E

CPU • all models of the Vector 4 and Vector 4-S Series include both a Zilog Z80B microprocessor and an Intel 8088 microprocessor; all models of the Vector 5E Series include a Zilog Z80B microprocessor

Memory • all models of the Vector 4, 4-S, and 5E Series come with 128K bytes of RAM and can be expanded to 256K bytes

Chassis Slots • models of the Vector 4 and 4-S Series have 2 modified S-100 bus slots available; models of the 5-E Series have from 8-12 (depending on the number of terminals on the system) S-100 bus slots available

Ports • all models of the Vector 4 and 4-S series have: 1 parallel printer interface, 1 serial interface, and 1 RS-232 communications interface available; all models of the Vector 5E series have 2



parallel interfaces, 2 serial interfaces, and 2 RS-232 communications interfaces available, as well as

Mass Storage • all models of the Vector 4 Series include a 630K byte hard sectored floppy disk drive, while the Vector 4-S Series includes a 737K byte soft sectored floppy disk drive; additional storage capacity on the 4 and 4-S are the same: an additional 630K or 737K floppy drive on 4(S)/20, an additional 5M byte Winchester on 4(S)/30, an additional 10M byte Winchester on 4(S)/40, and an additional 36M byte Winchester on 4(S)/60 • all models of the Vector 5E Series include a 630K byte hard sectored floppy disk drive; additional storage capacities are: 5M byte Winchester on the 5005E, 10M byte Winchester on the 5010E and a 32M byte Winchester on the 5032E • 1/4 inch 6400 bpi cartridge tape available on all systems

Terminals/Workstations • all models of the Vector 4 and 4-S Series are single terminal systems; all models of the Vector 5E Series support up to 3 terminals

Printers • 340 cps matrix printer, and 2 letter quality thimble printers: 33 cps and 55 cps

First Delivery • 1982 for Vector 4/20 and 4/30; 1983 for Vector 4/10, 4/40, 4/60 and all of 4-S Series; 5/81 for Vector 5005E; 2/82 for Vector 5032E; and 1/83 for Vector 5010E

Systems Delivered • 4,400 for all models of Vector 4; 420 for all models of Vector 4-S; and 1,625 Vector 5E models

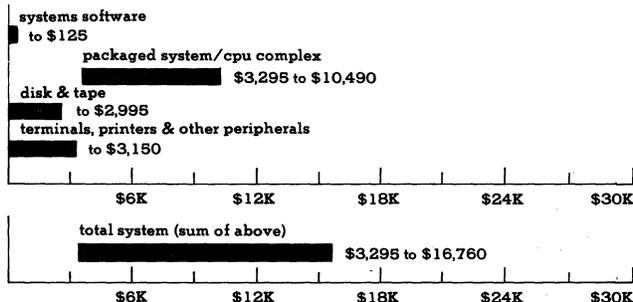
Comparable Systems • for Vector 4 and 4-S, any systems with dual processors, one of which is an 8-bit processor and one of which is a 16-bit processor in the \$3,300 to \$10,000 price range • for the Vector 5E, multi-user 8-bit Z80B systems in the \$6,300 to \$12,000 price range

Vendor • Vector Graphic Inc; 500 North Ventu Park Road, Thousand Oaks, CA 91320 • 805-499-5831

Canada • BSA Computer Analyst, Inc; P.O. Box 713, Moncton, NB

PURCHASE PRICE RANGE

hardware & software



VECTOR GRAPHIC VECTOR 4, 4-S, 5 PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing. • **SMALL SYSTEM** is based on Vector 4/10-s packaged system (includes 8-bit Z80B microprocessor, 16-bit 8088 microprocessor, with 128K bytes of memory, integrated 737K soft sectored diskette drive, detached keyboard, green phosphor display, CP/M and CP/M-86 operating systems, and GSX-86 Graphics software) • **LARGE SYSTEM** is based on Vector 4/60-S packaged system (includes 8-bit Z80B microprocessor, 16-bit 8088 microprocessor, with 256K bytes of memory, integrated 737K soft-sectored diskette drive, 36M byte hard disk drive, detached keyboard, green phosphor display, CP/M and CP/M-86 operating system and GSX-86 Graphics software) and the following options: Vector 4 MS-DOS, SofStor TD-15 Tape Cartridge, and Vector 7700 Letter Quality printer.



Vector Graphic Vector 4, Vector 4-S & Vector 5

ElC 8M9 • 506-854-1283

Distribution • worldwide distribution through approximately 450 independent dealers and OEMs

■ ANALYSIS

Vector Graphic, which was founded in 1976, designs, develops, manufactures and markets a family of word and data processing systems. Their latest computer offerings are the single user, dual processor Vector 4 and Vector 4-S Series, and the multi-user single processor Vector 5E Series. The Vector 4 and 4-S Series consist of both an 8-bit Intel Z80B microprocessor and a 16-bit Intel 8088 microprocessor. As a result they will execute either 8-bit or 16-bit software. The Vector 5E Series, which supports up to 3 users, is built around an 8-bit Z80B microprocessor. All of Vector's series run under CP/M-based operating systems, with the Vector 4 and 4-S also supporting MS-DOS.

The Vector 4 Series and the recently announced Vector 4-S Series are mirror images of each other except in the integrated diskette drive. The Vector 4 Series comes with a 630K byte hard sector diskette, where as the Vector 4-S is sold with a 737K byte soft sectored diskette. Both Vector 4 families consist of 5 models the 4/10(S), 4/20(S), 4/30(S), 4/40(S) and 4/60(S). The only distinguishing feature of the models is the amount of mass storage provided with each system. Besides the integrated diskette previously mentioned the 4/20(S) include an additional diskette drive, while the 4/30(S), 4/40(S), and 4/60(S) include 5M-byte, 10M-byte and 36M-byte integrated Winchester disk drives, respectively. All models come with 128K bytes of main memory which is expandable to 256K bytes. Main memory is timeshared between the CPU and the video display controller, allowing fast access to screen memory which supports high resolution graphics.

The Vector 5E family consists of 3 models the 5005E, 5010E, and 5032E. All models can support up to 3 users. Again, as in the Vector 4, the only distinguishing feature of each of the models is the amount of mass storage that comes with each model. Each model includes a 630K byte integrated diskette drive. The 5005E provides 5M, the 5010E provides 10M, and the 5032E provides 32M byte Winchester Disk Drives. All models come with 128K bytes of main memory expandable to 256K bytes.

□ Strengths

An obvious feature of the Vector 4 and 4-S families are their ability to process both 8-bit and 16-bit software. This is accomplished using a swapping feature, which allows the system to select the appropriate processor for each job. Since word processing applications are handled more easily in 8-bit mode, and number/data processing is handled more efficiently by 16-bit processors, the Vector 4 provides the best of both worlds.

Another area reflecting a positive note has nothing to do with the system at all, but concerns the manufacturer, Vector Graphic. Since Vector Graphic's products are aimed at first time, small business users or department managers, dealer support and software availability are two major concerns. Vector is very conscious of this fact and has initiated a major dealer support and recruiting program with emphasis on value-added dealers and vertical market-

oriented system houses. In addition, a plan has been started to identify, evaluate, and market third-party software compatible with all Vector microcomputers. This information is available through Vector Quest which provides data on hundreds of software packages that Vector has reviewed and evaluated.

Also since both the Vector 4 and 5E families operate under a CP/M-based operating system, both will readily run many of the already available CP/M programs.

Vector has added a nice touch with its recently announced Vector 4-S Series. The soft-sectored diskette drive that is integrated on the 4-S line is IBM PC compatible. But in addition to that, according to the vendor, it will automatically identify the type of diskette being used and whether it was created in the MS-DOS or CP/M-86 operating system environment. This will make it very easy to exchange data and programs with computer systems from other manufacturers.

□ Limitations

Users of the Vector 4, 4-S and 5E systems are probably first time/small users, and will probably take some time to outgrow the maximums (disk storage) available on each of the systems. But once that happens there seems to be no ability to grow beyond the maximum capacities for each of the models. Granted 36M (Vector 4 and 4-S) or 32M (Vector 5E) bytes are not small capacities for micro systems but once a system is up and running users put more and more applications on the system, which obviously uses more storage. Since the disk drives are Winchester and not removable, a few good size applications could use up most of the storage very quickly. The diskettes could be used to load and unload data back and forth but this could get quite cumbersome.

With the release of the soft sectored IBM compatible diskette, any compatibility limitation is eliminated on the Vector 4-S. It would probably be a good idea if this diskette could be an optional peripheral on the 5E. Maybe the vendor will come out with a mirror image to the 5E series with the new diskette as they have done with the 4.

■ SOFTWARE

□ Terms, Support & Documentation

Terms • standard Vector 4 and 4-S Systems include CP/M-86 operating system, GSX-86 Graphics, SCOPE 8-bit Text Editor, MBASIC 8-bit Interpreter, RAID Debugger, ZSM-80 Assembler, and ASM 8086/8088 Assembler; Vector 4 Systems include the CP/M operating system while the Vector 4-S includes a CP/M Simulator • standard Vector 5E Systems include an Extended CP/M operating system • optional software products are available on a one-time license fee basis.

Support • corrective updates are available for one year at no additional charge.

Documentation • easy-to-use documentation is provided including training manuals.

□ Software Overview

All Vector Graphic's systems have bundled into the standard system price a CP/M-based operating system. In addition, the Vector 4 and 4-S include a BASIC Interpreter, as well as other software development tools including GSX-86 Graphics, SCOPE 8-bit Text Editor, RAID Debugger, ZSM-80 Assembler, and ASM 8086/8088 Assembler.



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Various languages and programming software are available for program/systems development including: Microsoft BASIC-80 Compiler and FORTRAN, Microfocus COBOL, and Digital Research Pascal-Z (all systems); also included are Digital Research; CBASIC-86, CB-86 Compiler, Pascal/MT+86, Personal BASIC, and PL/I-86, a C compiler is available for use with CP/M-86 only.

Datamanager and T.I.M. (Total Information Management) III provide file and record management, MEMORITE III provides Word Processing, ACCUCHAR supports printed graphics, ExecuPlan II and Forecasting Execu Modeler support electronics spreadsheets, and Milestone provide project management capabilities.

Asynchronous communications is handled through the CONECT package. The Vector 4 and 4-S also support 2780/3270/3780 emulation, and the Vector 4 accommodates (Local Interactive Network Communications) a local area network that operates without a dedicated master station or file servers. Mail Inc, an electronic mail system, is available to operate under LINC.

Vector Graphic has initiated Vector Quest Business Software Information Service, which provides data on hundreds of software packages, that Vector has identified, reviewed and evaluated. These are third party packages that are compatible with Vector Graphic's microcomputers. In addition, there are a vast number of CP/M-based programs available which can run on Vector Graphic equipment with little or no modification.

Operating Systems

Each of the Vector systems comes bundled with a CP/M-based operating system. The Vector 4 includes both CP/M and CP/M-86, Vector 4-S systems include CP/M-86 and an 8-bit CP/M Simulator, and the Vector 5E models include an Extended CP/M operating system. MS-DOS is an extra cost optional operating system for both the Vector 4 and 4-S.

CP/M (2.2) • single-user, single-tasking general purpose operating system designed to support the Intel and Zilog families of 8-bit processors; features and facilities of this basic system are all upward compatible and are present in all other versions of CP/M; consist of 4 elemental structures: Basic I/O System (BIOS), Basic Disk Operating System (BDOS) Console Command Processor (CCP), and a Transient Program Area (TPA) • BIOS is the modifiable portion of the operating system enabling users to tailor CPM systems to meet specified configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system • BDOS provides all the disk management control; supports up to 16 logical devices containing up to 65,536 records, with up to an 8M byte capacity • CCP provides the interface between the user's console and the rest of the CP/M system; it reads, interprets, and executes commands entered from the console; commands are both built-in commands and transient commands, transient commands are loaded into TPA and executed • TPA is the area designated to hold programs that are loaded from disk and then executed • standard utilities provided include: DDT interactive debugger, PIP file transfer utility; DUMP utility; SUBMIT/XSUB batch control utilities; ED command-oriented text editor; ASM assembler, and STAT system status utility • memory requirements depend on number and types of options implemented; basic system requires 20K bytes of memory and an ASCII terminal.

CP/M-86 • a 16-bit enhanced version of the 8-bit CP/M operating system designed to support Vector Graphics dual 8-bit Z80B and 8088 microprocessors; incorporates all the basic elements of the CP/M system but adapts these functions to the larger and faster operating environment • consists of 4 elemental structures: Basic Input/Output System (BIOS), Basic Disk Operating System (BDOS), Command Console Processor (CCP), and a Transient Program Area (TPA) BIOS is the modifiable portion of the operating system enabling users to tailor CPM systems to meet specific configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system • BDOS provides all the disk management control; supports up to 16 logical drives, containing up to 8M bytes each, for a maximum of 128M bytes of on-line storage; any one file can reach the full drive size • CCP provides the interface between the user's console and the rest of

the CP/M system it reads, interprets, and executes commands entered from the console; commands are both built-in commands and transient commands; transient commands are loaded into the TPA and executed • TPA is the area designated to hold programs that are loaded from disk and then executed • standard utilities provided include: DDT-86 interactive debugger; PIP file transfer utility; SUBMIT batch control utility; ED command-oriented text editor; ASM-86 assembler; STAT system static utility, and GENCMD processes Intel "H86" format files • memory requirements depend on number and types of options implemented • supports up to 1M bytes of memory; requires 56K bytes of memory and an ASCII terminal.

Vector 4 MS-DOS 2.0 • a Vector modified version of MS-DOS designed to support the Vector 4 and 4-S systems' 8088 micro-processor • as of this writing no specifications were available entailing any of the changes that were necessary to allow MS-DOS to operate on the dual processor Vector 4 or 4-S systems:

\$125 lcns

Data Management

Data Manager • a menu driven generalized data management system that provides capabilities for data entry, data manipulation, computations, and reporting • supports record sizes up to 1,020 characters, with up to 99 fields per record, and up to 70 characters per field; allows up to 9 data entry screens to be used to generate a record • includes sorting and merging capabilities • uses simple fill in the blanks type of screens for file definition, data entry formatting and report formatting • data entry features are as follows: they allow specific default values for data fields; they pick up values from previous records; they provide 4 options to update and edit a file or specific fields; they allow adding, deleting, or displaying specific records, they select records based on AND/OR conditions; and they allow search or scan of a file in sorted order with select conditions • reporting features include: capability to prevent multiple lines from a single record; provisions for sub-totalling of numeric columns; and capability to print one record per page in entry screen format • computation capabilities include: add, subtract, multiply, divide, minimum and maximum; ability to create new numeric fields from old fields and constants; and the capability to update existing fields • can be purchased as part of the Vector Professional Series (VPS) to create, maintain and sort files for use by MEMORITE III, ExecuPlan II, ACCUCHAR, and CONECT software • available on all Vector 4, 4-S and 5 systems:

\$495 lcns

T.I.M. Total Information Management III • data management system for Innovative Software:

495

Communications/Networks

Both the Vector 4 and 4-S Systems support bisynchronous communications emulation. The Vector 4, 4-S and 5E Systems all support asynchronous communications via the CONECT software. The Vector 4 Systems support LINC (Local Interactive Network Communications) a token-passing bus/ring local area network for up to 32 Vector 4's.

BIS-3780 • provides bisynchronous data communications emulation • supports emulation for IBM 2770, 2780, 3741, and 3780 protocols • requires a Vector 4 running under 8-bit CP/M based operating system:

\$695 lcns

BIS-3786 • provides bisynchronous data communications emulation • supports emulation for IBM 2770, 2780, 3741, and 3780 protocols • requires a Vector 4 running under 16-bit CP/M based operating system:

695

CONECT • asynchronous communications package that provides 4 modes of transmission • send/receive mode supports

LCNS: one-time license fee. Corrective updates are available for no additional charge for one year. NA: not available. Prices effective as of October 1983.



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transmission of data files between any 2 Vector systems both with CONECT software • interactive mode supports interaction with a user on another computer; all information appearing on the screen can be captured and saved; emulates an ADM3A or Hazeltine 1500 series terminal • link mode allows user's CP/M disk to be accessed remotely and allows user to access a remote CP/M disk from the users terminal • terminal mode emulates either a Lear Siegler ADM3A or Hazeltine 1500 terminal, converting it into an interactive communications terminal that can send or receive data at up to 1200 baud • other features include: support for automatic phone dialing and answering; selectable originate/answer mode; full or half duplex operation; auto-repeat dialing and answering; and voice communications interrupt • includes a HELP facility • available on all Vector systems:

150

LINC (Local Interactive Network Communications) • supports a local area network without the need of a dedicated master station or file servers • supports up to 32 Vector 4 systems with each supporting a printer • a SABER-Net token-passing system that utilizes a modified Synchronous Data Link Control (SDLC) protocol; stations can be up to 2,000 feet apart with a 10,000 feet maximum cable length • supports a data transfer rate of 750K bits per second; supports a variable-length block transmission with 16-bit CRC protection and immediate acknowledgement; provides automatic retransmission on error detection • requires Vector 4:

695

□ Program Development/Languages

The Vector Graphic's 4, 4-S and 5-E support various program development languages produced by 3rd party vendors. Following is the current list.

BASIC-80 Compiler • developed by Microsoft • runs on Vector 4, 4-S and 5E:

\$350 lcms

FORTRAN • developed by Microsoft • runs on Vector 4, 4-S, and 5E:

400

CBASIC-86 • developed by Digital Research • runs on Vector 4, and 4-S:

325

CB-86 Compiler • developed by Digital Research • runs on Vector 4, and 4-S:

600

Pascal/MT+86 • developed by Digital Research • runs on Vector 4, and 4-S:

600

Pascal-Z • developed by Digital Research • runs on Vector 4, 4-S and 5:

395

Personal BASIC • developed by Digital Research: runs on Vector 4, and 4-S:

150

PL/I-86 • developed by Digital Research • runs on Vector 4, and 4-S:

750

CIS COBOL-86 • developed by Microfocus • runs on Vector 4, and 4-S:

850

CIS COBOL-86 Level II • developed by Microfocus • runs on Vector 4 and 4-S:

1,600

"C" Language • runs on Vector 4 and 4-S:

600

SPP-86 Speed Programming Package • runs on Vector 4 and 4-S:

250

Programmer's Utilities • runs on Vector 4 and 4-S:

250

□ Application Packages

MEMORITE III • menu driven word processing system that also provides mailing list management, a spelling dictionary, and a phrase library • word processing features include: proportional spacing and right justification with spacing adjusted between letters; boldface typing; variable pitch; superscript; subscript; centering, underlining; abbreviated commands for text editing; copy, move or delete individual words, sentences, or entire sections; a variety of cut and paste functions; and search and replace • mailing list management supports: up to 3500 members per list; 15 data items per member; and provides labels, lists, or specific item printing • dictionary starts with 30,000 words and allows business specific words to be added • includes a HELP facility • can be acquired as part of Vector Professional Series (VPS) software cluster • runs on any Vector 4, 4-S, or 5E system:

\$450 lcms

Execu Plan II • planning and forecasting tool used to create electronic spreadsheets • provides commands in the areas of mathematics, conditions/comparisons, formatting, printing, and disk manipulation • supports sorting of files by: ascending, descending, row, column, range, and elements; provides various HELP screens • mathematical commands include: standard arithmetic functions as well as absolute value, average, count, maximum, mean, minimum, square root, and standard deviation; trigonometric functions include arctangent, cosine, sine and tangent; and provides decimal logarithm, natural logarithm (base "e") and exponent (base "e" antilog) commands • some of the conditional/comparison capabilities are: AND, OR, IF/THEN, ELSE, EQUAL, NOT EQUAL, LESS THAN, and GREATER THAN • formatting provides capabilities to specify: array size, column width, open column, open row, move column/row, exchange column/row, \$ sign, % sign, and floating point • printing commands provide the ability: to assign 4 Main Titles, Row and Column Titles, Column Print Boundaries; to select paper width and length, and to exclude selected rows and titles • disk commands provide capabilities to: load, save, delete, update, and create word processing files • can be acquired as part of Vector Professional Series (VPS) software cluster • runs on any Vector 4, 4-S, or 5E system:

195

Forecasting Execu Modeler • a menu driven, front end process to Execu Plan II electronic spreadsheet program • using menu-prompted commands users can create more than 40 sophisticated templates; basic information is entered and the program then generates models inserting all titles, format commands, and formulas; makes use of all the functions and features of Execu Plan II • requires Execu Plan II; runs on any Vector 4, 4-S, or 5E system:

295

Milestone • project management tool • provides facilities for planning, scheduling, and maintaining control over projects; uses critical path analysis techniques • projects are broken down into a series of distinct activities; data stored for each activity includes name, duration, capital cost, mix of manpower requirements, and a prerequisite list; detailed cost estimates based on the sums of each activity's individual equipment and manpower requirements are produced; aids in investigating tradeoffs between manpower, dollars and time are available; any changes or additions of activities will cause the schedule to be recomputed with a new critical path reflected; displays manpower and cost summaries at the bottom of the screen which constantly shows how schedule changes affect budget and resources; handles projects with over 100 activities • runs on any Vector 4, 4-S, or 5E system:

295

Accuchart • menu drive graphics package • supports 6 types of charts: pie charts, comparative bar charts, X-Y charts, stacked bar charts, joined bar charts, and separate bar charts • features provided include: automatic centering of titles and labels; main titles up to 80 characters; vertical/horizontal titles up to 40 characters; pie chart sector titles up to 20 characters; and stacked and comparative chart variable names up to 20 characters • X-Y charts support up to 60 data points and first quadrant plotting; pie



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charts can have up to 25 sectors; stacked bar charts and comparative bar charts can have up to 20 bars with 5 variables per bar; joined bar charts can have up to 40 bars; and separate bar charts support up to 20 bars • charts can be produced on standard 11 inch by 15 inch continuous form paper either an 11 inch by 14 inch or an 8.5 inch x 11 inch format • can be acquired as part of Vector Professional Series (VPS) software cluster • runs on any Vector 4, 4-S, or 5E system:

295

GSX-86 • a library of graphics routines • provides the ability to do complex graphic functions in only a few commands • provides a device-independent interface for application software • requires a Vector 4 running under CP/M-86; 256K bytes of memory are recommended:

90

MAILINC • electronic mail system designed to work in conjunction with the LINC local area network • provides capabilities for composing, sending, and retrieving messages and files to and from individual or group mailboxes • requires Vector 4 system and LINC software:

995

Peachtree IV • a general accounting package designed for non-technical first-time users • consists of 5 separately available modules: general ledger, accounts payable, accounts receivable, inventory management, and payroll • General Ledger supports up to 600 accounts, and a user defined chart of accounts; provides complete audit trails, and departmental accounting; reports include a Transaction Register and Trial Balance • Accounts Receivable supports a 600 customer masterfile; handles open item or balance forward accounting; reports include: Invoices and Statements, Aging Report, and Credit & Adjustment Register • Accounts Payable supports up to 600 vendors; payables can be selected by due date, discount date, and cash requirements; reports include: checks, check register, Open Voucher Report, Aging Report, and Cash Requirements Report • Payroll supports up to 200 employees; FICA and federal withholding deductions are table driven; supports multiple states and municipalities; and prints checks and payroll register • Inventory Management supports up to 1600 items; maintains period and year-to-date information; reports include: Detail Inventory Report, Price List, Status Report, Reorder Report, Physical Inventory Worksheet, and Departmental Summary • runs on any Vector 4, 4-S or 5E system.

Each Individual Package:

650

All 5 Packages:

3,000

■ HARDWARE

□ Terms & Support

Terms • available on purchase basis from 450 independent dealers and OEMS.

Support • mail/carry-in corrective maintenance provided at no additional charge during initial 90-day warranty period • national service is available from TRW/Customer Service Division throughout the U.S. in selected major metropolitan areas • TRW works on a time-and-material basis or will write service contracts covering on-site maintenance and repair or walk-in service.

□ Physical Specifications (H x W x D); Weight

Series 4

CPU • 14 x 19 x 25.5 inches; weight not available.

Display • integral to CPU unit.

Keyboard • information not available.

Series 5

CPU • 12.8 x 18 x 20.7 inches; 22.7 pounds.

Display • integral to CPU unit.

Keyboard • integral to CPU unit.

□ Systems Overview & Configurability

The Vector 4 and 4-S Series of systems 4(S)/10, 4(S)/20, 4(S)/30, 4(S)/40, and 4(S)/60 are single user, dual processor systems, while the Vector 5E Multishare Series 5005E, 5010E, and 5032E are multiuser, single processor systems. The only difference between the Vector 4 and 4-S, is that Vector 4 models include an integrated 630K byte hard-sectored floppy disk drive, while the 4-S models include an integrated 737K byte soft-sectored floppy disk drive. All of the models within each of the individual lines (4, 4-S and 5E) contain the same processor and provide the same features and capabilities except in the amount of integrated mass storage that each model supports.

The Vector 4 and 4-S Series models include both an 8-bit Zilog Z80B microprocessor, and a 16-bit Intel 8088 microprocessor. They support up to 256K bytes of memory, provide single parallel, serial, and RS-232 interfaces, and provide 2 modified S-100 slots. All Vector 4 models include a 630K byte integrated diskette drive, while the Vector 4-S models include a 737K byte integrated diskette drive. The 4(S)/20 include an additional diskette drive, and the 4(S)/30, 4(S)/40, and 4(S)/60 include single 5.25 inch Winchester disk drives with 5M byte, 10M byte and 36M byte capacities respectively.

All models of the Vector 5E Multishare Series include an 8-bit Z80B microprocessor. They all support 256K bytes of memory, and up to 3 users per system. An 18-slot S-100 bus is incorporated into each model providing 12 expansion slots. In addition, 2 serial and 2 parallel interface ports are standard on all models. All models support a 630K byte diskette drive, and a single 5.25 inch Winchester disk drive with 5M byte, 10M byte, and 32M byte capacities on the 5005E, 5010E, and 5032E respectively.

On the Vector 4, 4-S, and 5 two systems printers, and a cartridge tape drive are available for each of the models. Expansion beyond the aforementioned peripherals and the standard packaged system is not currently possible.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

Vector 4 Maximums • all models • 256K bytes of memory; single terminal; single serial interface; single parallel interface; single RS-232C interface; and 2 modified S-100 slots.

Vector 4/10 Maximums • 630K byte hard sectored diskette.

Vector 4/20 Maximums • 2 630K byte hard sectored diskettes.

Vector 4/30 Maximums • 2630K byte hard sectored diskette and a 5M byte Winchester disk drive.

Vector 4/40 Maximums • 630K byte hard sectored diskette and a 10M byte Winchester disk drive.

Vector 4/60 Maximums • 630K byte hard sectored diskette and a 36M byte Winchester disk drive.

Vector 4-S Maximums • all models • 256K bytes of memory; single terminal; single serial interface; single parallel interface; single RS-232C interface; and 2 modified S-100 slots.

Vector 4/10-S Maximums • 737K byte soft sectored diskette.

Vector 4/20-S Maximums • 2 737 byte soft sectored diskettes.

Vector 4/30-S Maximums • 737K byte soft sectored diskette and a 5M byte Winchester disk drive.

Vector 4/40-S Maximums • 737 byte soft sectored diskette and a 10M byte Winchester disk drive.

Vector 4/60-S Maximums • 737 byte soft sectored diskette and a 36M byte Winchester disk drive.

Vector 5E Maximums • all models • 256K bytes of memory; 3 terminals; 2 serial interfaces; 2 parallel interfaces; and 12 S-100 expansion slots.

Vector 5005E Maximums • 630K byte hard sectored diskette, and 5M byte Winchester disk drive.

Vector 5010E Maximums • 630K byte hard sectored diskette, and 10M byte Winchester disk drive.

Vector 5032E Maximums • 630K byte hard sectored diskette,



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and 32M byte Winchester disk drive.

☐ Packaged Systems

Vector 4 Basic System • 8-bit Zilog Z80B processor and 16-bit Intel 8088 processor; 128K bytes of RAM; CRT with graphics capabilities and controller; integrated 630K byte diskette drive and dual mode disk controller; serial interface; parallel interface; RS-232C interface; 2 modified S-100 expansion slots; and a switching power supply.

Vector 4/10 • includes all components of the basic system:
\$3,295 prch

Vector 4/20 • includes all components of the basic system plus a second integrated 630K byte diskette drive:
3,995

Vector 4/30 • includes all components of the basic system plus a 5M byte integrated Winchester disk drive:
4,995

Vector 4/40 • includes all components of the basic system plus a 10M byte integrated Winchester disk drive:
5,995

Vector 4/60 • includes all components of the basic system plus a 32M byte integrated Winchester disk drive:
9,995

Additional 128K bytes of RAM • available for any model:
495

Vector 4-S Basic System • 8-bit Zilog Z80B microprocessor and 16-bit Intel 8088 microprocessor; 128K bytes of RAM; CRT and controller; integrated 737K byte diskette drive and dual mode disk controller; serial interface; parallel interface; RS-232C interface; 2 modified S-100 expansion slots; and a switching power supply

Vector 4/10-S • includes all components of the basic system:
3,295

Vector 4/20-S • includes all components of the basic system plus a second integrated 737K byte diskette drive:
3,995

Vector 4/30-S • includes all components of the basic system plus a 5M byte integrated Winchester disk drive:
4,995

Vector 4/40-S • includes all components of the basic system plus a 10M byte integrated Winchester disk drive:
5,995

Vector 4/60-S • includes all components of the basic system plus a 36M byte integrated Winchester disk drive:
9,995

Additional 128K bytes of RAM • available for any model:
495

Vector 5 Basic System • 8-bit Zilog Z80 processor; 128K bytes of RAM; CRT and controller; integrated 630K byte diskette drive and dual mode disk controller; 2 serial interfaces; 2 parallel interfaces; 18 slot S-100 bus with 12 slots available; and a switching power supply.

Vector 5005E • includes all components of the basic system plus a 5M byte integrated Winchester disk drive:
6,250

Vector 5010E • includes all components of the basic system plus a 10M byte integrated Winchester disk drive:
6,750

Vector 5032E • includes all components of the basic system plus a 32M byte integrated Winchester disk drive:
11,995

Additional Multishare Terminal • with 64K bytes of RAM • available for any Vector 5E model up to a total of 3:
1,685

☐ CPU

Z80B Microprocessor • 8-bit processor • supports 158 instruction set, and 16 address lines • operates at 5.1MHz clock speed.

8088 Microprocessor • 16-bit processor • supports 235 instruction set, and 20 address lines • operates at 6 MHz clock speed.

☐ Memory

8K Static RAM • 250-nanosecond or 450-nanosecond versions available • S100 bus compatible:
\$282 prch

16K Static RAM • 300 nanoseconds • S100 bus compatible:
558

48K Dynamic RAM • compatible with Z80 at 4MHz without wait states:
799

64K Dynamic RAM • compatible with Z80 at 4MHz without wait states:
975

☐ I/O & Communications

The Vector 4 Series provides 2 modified S100 bus slots for expansion as well as a serial interface, a parallel interface, and an RS-232C communication port. The Vector 4 Series supports 3270, 2780/3780 emulation and asynchronous, bisynchronous and HASP communications at a maximum transfer rate of 9600 bps. Local Area Network communications is supported through Vector's proprietary LAN (Vector Linc) at transmission speeds of 750K bps. The Vector 5E Multishare series provides 12 S100 expansion slots, 2 serial interfaces, and 2 parallel interfaces. The 5E Series supports all of the same communications as the 4 Series with the exception of the LAN support.

☐ Mass Storage

The Vector 4 and 5 both include an integrated 5.25-inch hard-sectored floppy disk drive with a 630K byte capacity. The Vector 4-S includes an integrated 5.25-inch soft-sectored floppy disk drive with a 737K byte capacity. In addition, certain models of each of the series include either an integrated 5 1/4 inch Winchester disk drive with 5M, 10M, or 36M byte capacities or an 8-inch Winchester disk drive with 32M byte capacity.

5M Winchester • 5M byte capacity • 5.25 inch, 2 surface hard disk, using 9074 BPI recording density • 85 millisecond average access time; 5M bit/sec transfer rate • bundled into system prices on Vector 4/30, Vector 4/30-S, and Vector 5005E systems.

10M Winchester • 10M byte capacity • 5.25 inch, 4 surface hard disk, using 7690 BPI recording density • 85 millisecond average access time; 5M bit/sec transfer rate • bundled into system prices on Vector 4/40, Vector 4/40-S, and Vector 5010E systems.

36M Winchester • 36M byte capacity • 5.25 inch, 8 surface hard disk • 33 millisecond average access time; 5M bits/sec transfer rate • bundled into system prices on Vector 4/60 and 4/60-S systems.

32M Winchester • 32M byte capacity • 8-inch, 8 surface hard disk, using 6600 BPI recording density • 85 millisecond average access time; 5M bit/sec transfer rate • bundled into system price on Vector 5032E.

Diskette Unit • 630K byte capacity; hard-sectored; 5.25 inch, 2 sided diskette • 16 sectors per cylinder; 77 cylinders per diskette • 118 millisecond average access time; 250K bit/sec transfer rate • bundled into each of the system's prices on Vector 4 or Vector 5E systems.

Diskette Unit • 737K byte capacity; soft sectored; 5.25 inch, 2

PRCH: purchase price. Service contracts are available from TRW's Customer Service Division throughout the U.S. in selected major metropolitan areas. NA: not available. Prices effective as of October 1983.



Vector Graphic

Vector 4, Vector 4-S & Vector 5

sided diskette • 250K bit/sec transfer rate • bundled into each of the systems prices on Vector 4-S systems.

TD-15 Sof Stor Cartridge Tape Drive • 6400 bpi • 30 ips forward and reverse; 90 ips search and rewind; 24K-byte-per-second transfer rate • ANSI X3.55 (1977) specification compatible • supports 300 to 450 foot cartridge tapes: tapes hold up to 13M bytes: can be used on all Vector hard disk systems:

\$2,995 prch

Terminal/Workstation

Vector 4 and 4-S systems include an integral CRT display, and detached keyboard with an 8035 auxiliary microprocessor. The CRT supports graphics functions. The Vector 5E supports up to 3 CRT displays which use 2 slots each of the available S-100 bus slots. The CRT has a detached keyboard and an auxiliary microprocessor, but does not support graphics.

Vector 4 Display • 12-inch diagonal, P-31 green on black phosphor display; 1920-characters (24 lines x 80 characters) • 96 ASCII characters; 16 x 13 high resolution matrix; 640 horizontal x 312 vertical pixels in high resolution graphics mode; 160/320 horizontal x 312 vertical pixels in 4 level/16 level gray scale graphics; supports reverse video • bundled with packaged system.

Vector 4 Keyboard • detachable keyboard • capacitance key-switch with 91 sculptured/contoured keys, including 15 programmable function keys, cursor control keys, and 10-key numeric pad • includes auxiliary microprocessor with 64K buffer • bundled with packaged systems.

Vector 5 Display • 12-inch diagonal, P31 green on black phosphor display; 1920-characters (24 lines x 80 characters) • 96

ASCII characters; 8 x 13 dot matrix • supports reverse video.

Vector 5 Keyboard • same as Vector 4 keyboard.

Vector 5 additional terminals (Display & Keyboard):

\$1,685 prch

Printers

M-200 Matrix Printer • 340 cps bidirectional, logic seeking; 200 lpm average throughput • 7 x 7 half dot matrix font; 10 cpi and 16.7 cpi standard; 6 or 8 lpi; 132 columns; handles 6 part forms, 3- to 16-inch wide paper; 128 character set made up of 96 ASCII character and 32 commonly used international characters; 11 position forms length select switch • uses RS-23C serial printer interface:

NA prch

3500 Letter Quality Thimble Printer • 33 cps bidirectional • fully formed characters; 10-, 12-, 15-pitch and proportional spacing; superscripting and subscripting capabilities; 163 columns; handles 3- to 16-inch wide paper; 128 character set • uses parallel interface:

2,300

7700 Letter Quality Thimble Printer • 55 cps bidirectional • fully framed characters; 10- and 12-pitch and proportional spacing; superscripting and subscripting capabilities; 163 columns; handles 3- to 17.5-inch wide paper; 128 character set • uses parallel interface:

3,150

• END



Wang Professional Computer Microcomputer Systems

■ PROFILE

Operating System • Wang menu-enhanced version of Microsoft MS-DOS is bundled with all system packages; Digital Research CP/M-80 emulation and UCSD-p Runtime System Support package optional.

Data Management • PC Database system, using both random access and sequential access methods.

Communications/Networks • asynchronous communications; DEC VT-100 asynchronous emulation; IBM 2780/3780 RJE emulation; IBM 3276 and 3275 bisynchronous emulation; IBM 3276 SNA/SDLC emulation; local communication option supports operation as a workstation on a Wang VS system; Wang RPS protocol allows linkage and document interchange with Wang local area network; Local Interconnect Option supports clustering of PCs and provides high-speed baseband local area communications; Wang Systems Network Transport Products provide multipoint, point-to-point, LAN (local area network), and X.25 packet-switched network communications.

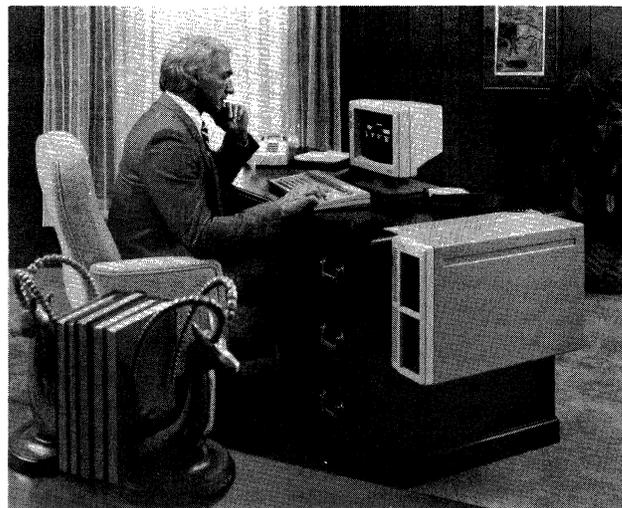
Languages • interpretive BASIC standard; optional Pascal, FORTRAN, COBOL, and BASIC compilers.

Models • single model in 8 system packages; 1 suitable for attachment to home TV; the others with integrated monitors.

CPU • Intel 16-bit 8086 microprocessor operating at 8 MHz.

Memory • 128K bytes to 640K bytes.

Chassis Slots • standard chassis has 5 slots and expanded chassis has 8 slots • number available depends on system package since some are implemented in the individual packaged system.



Mass Storage • 360K-byte 5.25-inch diskette standard; either second 360K-byte 5.25-inch diskette or 10M-byte 5.25-inch hard disk can be added.

Terminals/Workstations • single-user systems with no add-on terminals; the Wang PC can itself operate as a Wang LAN- or Wangnet-compatible RPS terminal.

Printers • dot-matrix character/graphics printer or letter-quality daisywheel printer.

First Delivery • 1982.

Systems Delivered • data not available.

Comparable Systems • over 100 CP/M-80 single-user systems and over 40 with generic MS-DOS operating or derivative systems, including the IBM personal computer.

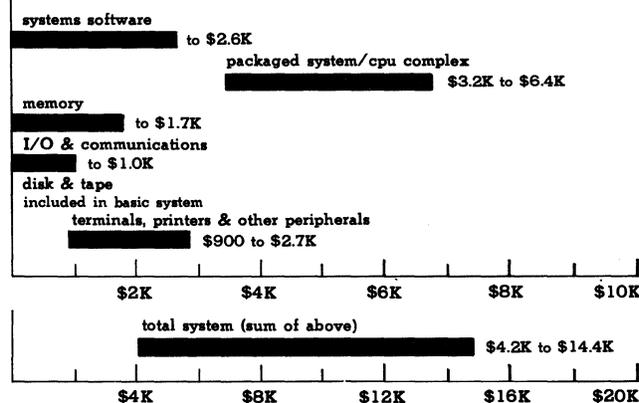
Vendor • Wang Laboratories, Inc; One Industrial Avenue, Lowell, MA 01851 • 617-459-5000.

Canada • Wang Laboratories (Canada) Ltd, 240 Duncan Mills Drive, Don Mills ONT M3B 1Z4 • 416-449-2175.

Distribution • through Wang's worldwide network of sales/distribution/maintenance offices.

PURCHASE PRICE RANGE

hardware & software



WANG PROFESSIONAL COMPUTER PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing, and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on PC-002 packaged system (includes CPU, 128K-byte memory, MS-DOS and BASIC software, 5 internal I/O slots, 2 external ports, 360K-byte diskette, and character display monitor) and the following option: dot-matrix printer • **LARGE SYSTEM** is based on PC-005A packaged system (includes CPU, 128K-byte memory, MS-DOS and BASIC, 5 internal and 2 external ports, 1 diskette, 1 hard disk, character/graphics display monitor) and the following options: additional system software, 512K-byte additional memory, communications module, and daisywheel printer.

■ ANALYSIS

The Wang Professional Computer (PC) is a single-user, single-tasking MS-DOS-based professional desktop workstation based on the 16-bit Intel 8086 microprocessor, with a clock speed of 8 MHz. An optional CP/M-80 emulation board also allows CP/M-80 programs to be adapted to the Wang system. This combination of operating environments gives the Wang system access to both the enormous existing body of 8-bit-oriented CP/M software and the growing body of 16-bit-oriented MS-DOS software. CP/M-80 has been implemented on more than 100 microcomputer systems. Many analysts feel that the growing body of MS-DOS-type



Wang Professional Computer Microcomputer Systems

software will be the de facto standard for 16-bit systems, since IBM uses it on its Personal Computers (PC).

The Wang version of MS-DOS runs on the Intel 8086, a more powerful version of the Intel 8088 used on IBM's PC. Both have the same type of instruction sets, registers, operands, and so on, but the 8086 has 16-bit data paths to memory and I/O (as opposed to 8 bits on the 8088) which allows data to be transferred more quickly. The CPU, memory, I/O ports, and internal disk drives are housed in an electronics unit that can clamp to the side of a desk or rest on its top. A movable, typewriter-style keyboard with numeric pad, graphics keys, programmable function keys, and help keys is standard, but the user can choose to attach Wang's monitor, another industry-standard monitor, or a home TV for the display. Wang's display stands on a tiltable pedestal, or can optionally be set on a movable arm also clamped to the desk.

Wang supports adapted versions of Microsoft and Peachtree software that allow business graphics, business accounting, and word processing applications. Of particular interest is the communications software which currently allows Wang personal computers to act as IBM 2780/3780/3270 terminals as well as Wang VS and TTY terminals. Software has been released that allows the Wang PC to act as a local area network for Alliance, OIS, 2200, and VS systems.

Wang's sales and service approach is more like the mainframe market approach than most microcomputer vendors. Wang's systems can be rented with up to 3-year leases whereas most microcomputer vendors do not lease. On-site maintenance as well as mail-in contracts are available. The extensive rental options and on-site maintenance suggest that Wang is particularly aiming its system at Wang users with multiple Wang products—as well as multiple Wang PCs—since business users are more likely to be interested in these types of contractual arrangements.

Strengths

Since the Wang PC runs the same type of MS-DOS operating and support software as the IBM PC, but on a more powerful Intel 8086 processor and at a lower price, low-end Wang PC systems provide better price/performance ratios than low-end IBM systems, although memory and disk subsystem expandability is not as great. The greater processor power can yield better response to complex spreadsheet instructions. Furthermore, the more extensive help facilities and menu-driven mode will probably make the system easier for most novice users to learn. Wang user documentation is excellent.

The strengths of the Wang PC also depend partly on whether or not the potential buyer is already a Wang customer, or is a potential office automation customer looking for an integrated office/data processing approach. Wang's reputation for excellent office automation products, and particularly their integrated LAN and Mailway systems, provide a more coherent approach to office automation than IBM has. Since the Professional Computer can act as a local workstation for OIS, Alliance, 2200, and VS systems, as well as a remote

Wang VS terminal, and an IBM 2780/3780/3270 terminal, it can be an integral part of a Wang automated office, as well as accessing the facilities of Wang and IBM mainframes.

Limitations

The similarity of operating environment and basic system capabilities make it inevitable to compare the Wang PC against IBM's PC. In comparing the 2 model sets, we find that the Wang system processor is faster, has more powerful 16-bit I/O data paths, but supports only half of IBM's maximum diskette storage capacity, a quarter of IBM's maximum hard disk capacity, and slightly more than half of IBM's memory and I/O attachability. It can certainly be argued that IBM's lower processor power will not support a fully loaded system without significantly impairing response times, but the Wang processor power seems underutilized in comparison. Of course this may simply indicate future development.

Although Wang uses the same basic operating software and similar support packages as IBM, it is not plug compatible. It cannot run IBM software or attach IBM peripherals and options without conversion. The similarity in environment does mean that conversions should be relatively easy, however.

SOFTWARE

Terms & Support

Terms • purchase only for software packages.

Support • telephone hot-line during business hours; extensive documentation.

Software Overview

The Wang Professional Computer can operate in 3 environments. The systems are bundled with Wang's menu-driven version of Microsoft MS-DOS operating software; optionally, an 8-bit-oriented CP/M-80 emulation card can be added to the system. Also available is the UCSD-p runtime support system, which allows industry-standard applications running in this mode to be utilized. In all cases, the operating logic is in the form of ROM rather than being stored in main memory.

Packaged Software

PC-SS001 Wang Menu-Enhanced MS-DOS Operating System With Interpretive BASIC • see Operating System for a description of Wang's version of Microsoft DOS; see Program Development/Languages for BASIC language description • this operating system and language are bundled into the price of every Wang PC configuration at no extra cost.

PC-CS001 Software Productivity Package # 1 • a combination of PC-AS001 PC Multiplan (see Other Software), Asynchronous Communications (see Communications Software) and PC-AS002 PC Word Processing (see Application Packages):

\$650 lcn\$

PC-CS003 • Package of MicroFocus Level II COBOL, Animator, and Forms-2 programming tools available as a package:

1,750

Operating System

Wang Menu-Enhanced MS-DOS Operating System • single-user, single-task operating system adapted from Microsoft MS-DOS • user interface enhanced by Wang to allow both

LCNS: one-time license fee. NA: information not yet available. Prices effective as of November 1983.



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menu-driven mode and MS-DOS command mode; user prompts; automatic startup • easy-to-use system and maintenance functions, screen formatting utilities, file to document conversion utilities • program development tools include interactive menu-driven editor, online debugger, linker supporting all PC languages; other program development tools • operating system bundled into all other system packages at no extra charge.

UCSD-p Runtime System Support Package • enables use of the many application programs written for the UCSD-p Operating System:

\$100 lcns

CP/M-80 Emulation Software • provides the ability to access CP/M, and the programming languages and application programs that execute under it without having to commit expansion slot required by CP/M Emulator Card:

240

MS-Windows • an extension of the MS-DOS operating system that creates an operating environment where users can run multiple applications at the same time • scheduled to be available second quarter 1984:

NA

□ Data Management

PC-AS004 PC Database • provides for dynamic space allocation, file management, random and sequential file access:

\$650 lcns

□ Communications/Networks

PC-SS060 IBM 2780/3780/WPS Emulation Option for PC • supports the Wang PC as an IBM 2780/3780 RJE terminal or as a Wang terminal using the WPS protocol • WPS allows document interchange with other Wang systems; when used in conjunction with the Remote Communications card, the PC can access remote VS hosts:

\$200 lcns

PC-SS020 PC Asynchronous Communications Option • includes 2236 DW emulation; allows the Wang PC to communicate with host systems by means of the TTY protocol • requires local or remote communications hardware card:

55

PC-SS062 3276 & 3275 Bisynchronous Emulation Package • as a 3275 bisynchronous control terminal, supports emulation at line speeds up to 4800 bps for an IBM Model 2 Display Station; as a 3276 bisynchronous terminal emulation, line speeds up to 9600 bps are supported for an IBM Model 2 Display Station; supports features such as leased or private line connections, multipoint operation, and line speeds up to 9600 bps • requires multipoint communications card, RS-232C modem cable, and a synchronous modem:

400

PC-SS063 3276 SNA/SDLC • within IBM's Systems Network Architecture (SNA) environment, functions as a synchronous data link control terminal (SDLC); emulates a 3276 control unit with a Model 2 Display Unit • requires multipoint communications card, RS-232C modem cable, and a synchronous modem:

400

VT-100 Emulation • enables a PC to act as an asynchronous terminal in a DEC host environment, using leased or dial-up lines; supports remote interactive online processing; supports access to DEC host databases and to the use of DEC host application programs, utilities, and editors; provides capabilities to receive and respond to most DEC host commands and receive and display system messages • also provides capabilities to serve as a workstation on a Wang VS, 2200, OIS, or Alliance system, as well as access IBM systems:

200

Wang Systems Network Transport Products

PC-WSNT-MS WSN Multipoint Transport • supports Wang Systems Networking services and applications between a Wang VS system acting as a primary controller and the Wang PC acting

as a secondary controller • any combination of PCs can access the resources of and exchange information with a VS computer using polled, full-duplex, link-level protocol (HDLC) • supports line speeds from 2400 bps through 19.2K bps:

\$250 lcns

PC-WSNT-PP WSN Point-Point Transport • supports Wang Systems Networking services and applications between any combination of Wang systems using a contention-link protocol (HDLC):

250

Wang Band Transport • provides Local Area Network communications among Wang computers over a broadband dual-cable network using CSMA/CD access and Wang-enhanced protocols:

NA

PC-WSNT-X25 X.25 Transport • provides capabilities for establishing and running communications to other Wang systems over the X.25 packet-switched network:

250

PC Multistation • provides support for users who are operating the PC as a workstation, via the Wang Local Communications Options to a Wang VS computer, to use the VS multiple-window display facilities • provides capabilities such as simultaneous task support, data transfer between tasks, simultaneous view of multiple applications, virtual disk storage for PCs, and centralized backup • scheduled to be available March 1984:

250

PC-SS080 Local Interconnect Software • provides capabilities for clustering PC's using high-speed baseband local area communications • provides the ability to access devices on other Wang PCs, share resources such as program and data files, and transmit messages • provides 3 tiered levels of security • supports connections at up to 4 miles distance • requires Interconnect Option Card, Local Interconnect Repeater, and Local Interconnect Repeater Card:

500

PC-SS035 File Sharer • operates in conjunction with local communications hardware option (which when purchased includes software) • provides capabilities to transfer files, produced on the PC under MS-DOS, to the larger disk capacity of a Wang OIS or IIS/VS • requires PC-PM041 Local Communications Option:

500

PC-SS070 Voice Attachment Programmer Utilities • works in conjunction with PC-VA300 Computer-Voice Attachment hardware • provides facilities to be used with Voice Attachment such as providing the ability to determine whether an incoming call is voice or data as well as monitoring all incoming calls:

200

PC-AS005 PC Notebook • an end-user-oriented application for the storage and retrieval of unstructured text • provides query and selection capabilities through which users can access any note in the notebook by entering a word or string of words that appear in the text • includes a HELP facility • can be integrated with the PC Voice Attachment so that users can create an automated Rolodex-type application:

200

Workstation Emulation • allows the Wang PC to operate like a workstation for Wang VS, OIS, Alliance, or 2200 systems; requires local communications card.

□ Program Development/Languages

Basic Interpreter • ANSI subset of Dartmouth BASIC; includes trace facilities, error trapping, support for programmable function keys, full-screen editor, direct I/O device access; supports matrices up to 255 dimensions, automatic line numbering, and renumbering; integer, string, single- and double-precision constants • included with operating system and all system packages at no extra charge.

PC-SS010 MS-Compiled BASIC • optimized compiler,



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compatible with the interpreter BASIC; includes double-precision transcendental functions:

\$295 lens

PC-SS011 MS-Pascal • ISO standard Pascal with global optimization:

295

PC-SS012 MS FORTRAN • ANSI 77 subset:

345

PC-SS013 MS COBOL • ANSI 74 standard with Interactive ACCEPT/DISPLAY facility:

695

Level II COBOL Programming Environment • compiler and program development utility that supports ANSI 74 Level II programs • features interactive screen handling, sequential file handling, and runtime specifications of external file and program names • developed by MicroFocus:

1,500

Animator • works in conjunction with Level II COBOL • provides the ability for users to monitor the logical path of program execution at the source code level • allows the suspension of operations to debug programs • requires Level II COBOL:

500

Forms-2 • works in conjunction with Level II COBOL • a visual programming tool that aids in the creation of interactive screen handling programs • provides the ability for users to create interactive forms on the screen and then automatically generates appropriate COBOL code • requires Level II COBOL:

150

PC BASIC-2 • a compatible version of Wang's 2200 BASIC-2 • designed for interactive programming and ease-of-use; facilitates task of writing, documenting, and debugging programs • scheduled to be available in second quarter 1984:

395

Advanced PC BASIC Compiler • complements the BASIC interpreter included as standard with the PC • provides a development environment that optimizes speed and execution of programs generated by BASIC interpreter while increasing security of program code • scheduled to be available second quarter 1984:

295

□ Application Packages

PC-AS002 PC Word Processing • assisted with highlighted prompts, HELP key, and word processing function keys on the standard keyboard • facilities include automatic word wraparound, glossary, automatic centering, decimal alignment, global search and replace, horizontal scrolling, document filing and indexing, text movement, and text copying:

\$400 lens

PC-AS002-2 Advanced Word Processing • includes all features of PS-AS002 plus provides complete document compatibility with the rest of Wang's product line • includes a 30,000 word master dictionary for spelling verification • provides capabilities for merge, page, sort, prepare new disks, and copy and delete documents:

500

PC-AS001 PC Multiplan • financial planning and modeling facility with spreadsheet of 63 columns x 255 rows • section on cell naming; referencing by name, spreadsheet linking, formula defining • formatting of spreadsheet and windowing in up to 8 windows:

245

PC-AS003 PC Business Graphics • decision support graphics; creates bar, line, and pie charts from input guided by menus and commands • from Business and Professional Software, Inc:

300

PeachPak 8 Accounting Series • a series of integrated accounting packages from Peachtree.

Inventory Control:

595

Job Costing:

1,000

Project Management:

500

Calendar Management:

375

PeachPay Payroll:

375

General Ledger:

595

Accounts Receivable:

595

Sales Invoicing:

595

Accounts Receivable:

595

Visi On Applications Manager • an integrated software applications manager that provides users with the ability to display and execute independent application programs simultaneously through a multiple-window operating environment • all resident applications are displayed and controlled within user-definable "windows" or workspaces that appear on the screen, allowing users to move from one task to another quickly and easily • requires 256K bytes of memory, 10M-byte disk drive, a Wang mouse, and a graphics card; 512K bytes of memory suggested for optimum performance:

495

Visi On Calc • enhanced version of VisiCalc electronic spreadsheet package:

395

Visi On Word • word processing application:

375

Visi On Graph • provides graphic capabilities:

250

1-2-3 • integrated spreadsheet, graphics, and information management program • spreadsheet component provides workspace of 2048 rows x 256 columns with 500K bytes of model capacity; formulas describing the relationships between different types of entry data can be entered in English; features include advanced cell and page formatting options, numerous statistical, financial, and calendar functions, and up to 110 control commands • graphics component provides a full range of high resolution chart types in color or black and white, with extensive formatting options; hard copy can be produced on a variety of dot-matrix printers and pen plotters • information management component supports up to 2047 records in user-defined formats with more than 32 columns of criteria in search-and-retrieval commands; database information is available for statistical analysis and reports, and can be extracted for use as variables in spreadsheet models and graphs • developed by Lotus Development Corporation:

495

TK! Solver • a tool kit especially designed for professionals who perform number crunching • users enter equations or formulas that describe a given relationship between several variables, and the program produces values for the unknown variables; handles strings of equations and multiple variables • developed by Software Arts Inc:

299

TK! Solver Packs • modules to be used in conjunction with TK! Solver for performing the most commonly used equations, talks, and formulas for financial management, mechanical engineering, and several other fields • price reflects cost for each pack:

100



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■ HARDWARE

□ Terms, Support & Documentation

Terms • purchase or leases for 1, 2, or 3 years; lease prices include on-site maintenance.

Support • 90-day warranty for full parts and labor • on-site or mail-in maintenance contracts only.

Documentation • full range of documentation, including training and reference manuals.

□ Physical Specifications (H x W x D); Weight

CPU • 23.1 x 6.5 x 14.9 inches; 27.8 pounds.

Display • 11.8 x 13.0 x 10.8 inches; 14 pounds.

Keyboard • 1.7 x 18.3 x 7.8 inches; 4.5 pounds.

□ Systems Overview & Configurability

The Wang PC is a single-user desktop unit with 8 packaged system configurations. Five configurations are based on the 5-slot chassis and 3 are based on the newer 8-slot chassis. The detached keyboard is standard to all systems, and the monitor is standard on 4 out of 5 of the 5-slot chassis based systems. The monitor card and monitor must be ordered separately for all other systems. The physically separate electronics unit that provides space for all disks, and all options on the system except those attached to external serial and I/O ports, are standard to all configurations. Configurations differ by whether the user obtains the Wang monitor or another CRT, and on which disk and display control options are bundled into the system.

The electronics unit includes the CPU, an 8-MHz system clock, MS-DOS and BASIC, 8K-byte bootstrap internal EPROM, diagnostics, power, memory, 4-channel DMA logic, 5 or 8 internal option slots, and 2 external option slots.

Storage and I/O options include diskette and hard disk storage, printers, communications lines, graphics enhancements to the CRT monitor, and interconnections with Wang's local area network facilities.

All Wang PC models have the same system maximums since they are all basically the same systems. Five of the models have a 5-slot chassis, while 3 have the expanded 8-slot chassis, but the individual maximums listed below can apply to any of the models.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

PC Base Unit System Maximums • single-user, up to 640K bytes of RAM, 10M bytes of hard disk storage, 720K bytes of diskette storage, and up to 2-system printers.

□ Packaged Systems

PC-001 Base Unit • includes CPU, 128K-byte memory, 360K-byte diskette drive, keyboard, MS-DOS Operating System and Interpretive BASIC:

\$169/\$143/\$125 mo \$2,595 prch \$15/\$9 maint

PC-002 System Unit • includes PC-001 Base Unit plus PC-PM001 monochrome monitor character interface card, and PC-PM004 Monochrome Monitor:

213/180/157 3,265 21/12

PC-003B Dual Diskette System Unit • includes PC-002 System Unit plus PC-PM020 diskette drive for a total of 720K bytes of storage:

247/209/182 3,790 29/17

PC-004A Graphics System Unit • includes PC-003B Dual Disk System Unit plus the PC-PM002 Graphics Card Interface for the monitor:

262/222/194 4,030 32/19

PC-005A Hard Disk Graphics System Unit • includes all the features of the PC-004A diskette-based Graphics System Unit except the second diskette • also includes the PC-PM030 128K-byte memory expansion card for a total of 256K bytes of main memory, and the PC-PM021 10M-byte Winchester disk

with controller for a total of 10.35M bytes of disk/diskette storage:

416/352/308 6,400 53/31

PC-XC1 Expanded Chassis Base Unit • includes CPU, 128K-byte memory, 360K-byte diskette drive, keyboard, MS-DOS operating system, and Interpretive BASIC:

192/162/142 2,945 18/NA

PC-XC2 Dual Diskette Unit • includes PC-XC1 plus additional 360K-byte diskette drive:

226/191/167 3,470 26/NA

PC-XC3 Hard Disk System • includes PC-XC2 plus 10M-byte Winchester Drive and controller:

347/294/256 5,330 42/NA

PC-XC Expansion Chassis • required to upgrade from standard chassis to expanded chassis:

NA/NA/NA 1,380 NA/NA

□ CPU

The CPU, based on a 16-bit Intel 8086 with a 8-MHz clock speed, is included in the system unit together with a supporting electronics unit, I/O motherboard, and automatic power-on and diskette diagnostic logic. The system unit containing the CPU can either lie on a desk or be clamped to its side with a desk clamp. See Packaged Systems for all system unit pricing since the system unit is not sold separately.

Numeric Coprocessor • Intel 8087 16-bit 8-MHz coprocessor for high-speed mathematical and floating-point operations:

NA/NA/NA mo NA prch NA/NA maint

PC-PM050 PC CP/M-80 Emulator Card • includes emulation hardware board and supporting CP/M logic to allow CP/M-80 applications software to run on the system under the MS-DOS umbrella:

39/33/29 600 10/7

PC-AC002 System Unit Desk Clamp • requires at least a 0.75-inch lip on the desk:

7/6/5 100 NA/NA

□ Memory

Each CPU is associated with at least 128K bytes of memory as a standard part of the electronics unit. An additional memory board must be added to increase capacity beyond 128K bytes; each board requires a single slot. The maximum of 640K bytes can be achieved through the addition of a single board, since the single board options range from 128K to 512K bytes. All memory uses 64K-bit chips; access time is 200 nanoseconds.

PC-PM030 128K-Byte Memory Expansion Card • with parity • requires 1 slot:

\$34/\$29/\$25 mo \$510 prch \$5/\$3 maint

PC-PM031 256K-Byte Memory Expansion Card • with parity • requires 1 slot:

55/47/41 840 10/6

PC-PM032 512K-Byte Memory Expansion Card • with parity • requires 1 slot:

110/93/81 1,685 15/9

□ I/O & Communications

I/O and communications devices, as well as memory, are interfaced to the system in 3 ways: through internal slots, an external serial interface, or an external parallel interface. Up to 5 or 8 internal slots, depending on chassis ordered, support CPU and memory option cards or certain device interfaces. A single RS-232C-/V.24-compatible asynchronous serial port with a baud

MO: first figure is monthly charge for 1-year lease; second figure is monthly charge for 2-year lease; third figure is monthly charge for 3-year lease. PRCH: purchase price. MAINT: first figure is for on-site, prime-shift maintenance; second figure is for mail-in maintenance. NA: not available. Prices effective as of November 1983.



Wang Professional Computer Microcomputer Systems

rate generator allowing 16 programmable rates ranging from 50 to 19,200 bps is standard; supporting device-interfacing software must be tailored to the device type, and hence is included with the device if it is obtained from Wang. A Centronics-standard parallel port is also standard; here again device interfacing software comes with the device if it is obtained from Wang.

Internal option cards include memory expansion cards (see Memory); 3 types of monochrome monitor cards and graphics monitor cards (see Terminals); a CP/M-80 emulation card (see CPU and Operating Systems), a Winchester disk controller card (see Disks), a remote communications card, a multipoint communications card, local interconnect option card, and a workstation emulation card. Note that the number of option slots available to the user depends on the system package, since some of the above cards are already implemented in certain packaged systems.

PC-PM040 PC Remote Communications Option • includes supporting remote Wangnet software interface • includes logic for asynchronous or synchronous communications at 16 rates selected from 50 to 19,200 bps • half- or full-duplex • supports IBM 3270, 2780/3780, or Wangnet remote protocols if the remote communications card and supporting software is implemented and/or local Wangnet communications if the local card and supporting software is implemented • requires 1 slot:
 \$59/\$50/\$44 mo \$900 prch \$8/\$6 maint

PC-PM041 PC Local Communications Option • includes LAN software interface • requires 1 slot:
 130/110/96 2,000 8/6

PC-PM042 Multipoint Communications Option • required for WSN Multipoint Transport • requires 1 slot:
 33/28/24 500 8/NA

PC-PM070 Local Interconnect Option • requires 1 slot:
 26/22/20 400 6/NA

PC-PM071 Local Interconnect Repeater • includes 1 repeater card:
 39/33/29 600 4/NA

PC-PM072 Repeater Card:
 26/22/20 400 4/NA

PC-VA300 Professional Computer Voice Attachment:
 33/28/24 500 5/NA

WA-3451 Synchronous/Asynchronous Modem • 300 to 1200 bps:
 NA/NA/NA 1,050 12/NA

Mass Storage

Every system unit, including the basic unit, includes a diskette drive with integrated control electronics and space allowing addition of a second diskette drive. Alternatively a single 10M-byte Winchester drive can be added.

Integrated System Diskette • 5.25-inch 360K-byte, double-sided, double-density diskette storage drive with capability to automatically read single-sided, single-density removable diskettes; 250K-byte-per-second transfer rate; 48-track-per-inch recording density; 300-rpm rotational speed.

PC-PM020 Diskette Drive • 360K-byte storage capacity on 5.25-inch add-on drive with same drive characteristics as standard drive • can be added to PC-001 Base Unit or PC-002 single drive system unit; space is provided in the basic system electronics unit:
 \$35/\$29/\$26 mo \$525 prch \$8/\$5 maint

PC-PM021 Winchester Disk • includes adapter • 10M-byte

storage capacity; internal 5.25-inch drive with adapter that can fit into the system electronics unit in place of a second diskette drive:
 156/132/115 2,385 24/14

Terminals/Workstations

PC-PM004 Monochrome Monitor Display • 12-inch, 1920-character, tiltable CRT displaying 24 rows x 80 columns of data and a 25th row of status information; green or black, mounted on pedestal base with 5-degree forward, 15-degree backward tilt, or on optional monitor arm • contrast and brightness control, scroll, blink, reverse video, subscript and superscript, underscore and overscore are standard • 8x10 dot matrix for characters, 800x300 pixels for optional bit-mapped graphics • 224-character ASCII set • optional on PC-001 configuration; standard on all other system packages • requires PC-PM001 Wang monochrome (character) monitor card; prices below are for PC-001 option:
 \$23/\$19/\$17 mo \$340 prch \$4/\$2 maint

PC-PM001 Wang Monochrome Monitor Card • supplies interface and control logic for operating the PC-PM004 monitor in character mode • optional on PC-001 configuration; standard on all other system packages • requires PC-PM004 Wang monochrome monitor:
 22/19/16 330 2/1

PC-PM002 Wang Graphics Card • supplies control for operating the PC-PM004 monitor in graphics mode, allowing bit-mapped graphics with 800x300 pixels • optional on PC-001, PC-002, and PC-003B configurations, standard on PC-004A and PC-005A • prices below are for optional configurations • requires PC-PM001 character monitor card and Wang Monitor:
 16/14/12 240 3/2

PC-PM003 Industry-Standard Monitor/Graphics Card • allows attachment of a non-Wang, industry-standard RGB color or black and white monitor, or an RF modulator with color or black and white home TV in place of the Wang monitor:
 26/22/20 400 5/3

PC-AC001 Monitor Clamp & Arm • allows monitor to be suspended above the desk, and moved out of the way:
 10/9/8 150 NA/NA

Standard Keyboard • included with all system units • detached low-profile 101-key typewriter-style keyboard with numeric/calculator keypad, cursor control keys, special operations keys, HELP key, and function keys • 5 programmable LED indicators, diagnostics • includes complex sound generator with 2-inch speaker producing up to 3 simultaneous tones.

Printers

Wang supports both a dot-matrix character/graphics dot-addressable printer and a letter-quality daisywheel printer.

PC-PM012 DW-20 Daisy Wheel Printer • 20-cps, bidirectional daisywheel letter-quality printer; accepts discrete sheets of paper or continuous forms:
 \$85/\$72/\$63 mo \$1,295 prch \$25/\$15 maint

PC-PM010 Dot-Matrix Printer • 80-cps dot-matrix character and graphics printer; accepts discrete sheets of paper or continuous forms:
 59/50/44 900 7/4

Tape

Wang does not provide tape drive for its personal computer.

• END



WICAT Systems

System 140, System 150, System 155, System 160, System 200, System 220

PROFILE

Operating Systems • WICAT's MCS (Multiuser Control System) single-/multiuser, real-time, multitasking operating system, or Uni Plus (Unix-based) multiprogramming, multiprocessing operating system.

Data Management • KSAM (keyed sequential access method) integrated into MCS; Pacific Software Manufacturing Company's Sequitar, relational database system; and various other OEM-developed data management software for Motorola 68000-based microcomputers.

Communications/Networks • emulation for 3275, and 2780/3780.

Languages • RM/COBOL, CIS COBOL, SMC BASIC, Coherent BASIC, Pascal, C, FORTRAN 77, APL 68000, and assembler.

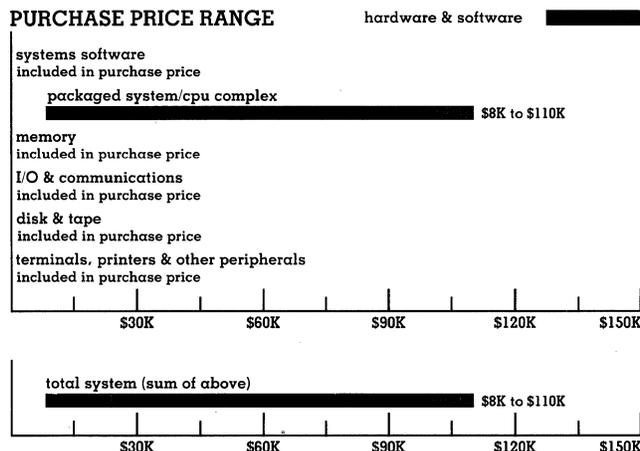
Models • single-user System 140, and System 150; multiuser Systems 150-3WS, 150-6, 155, 160, 200, and 220.

CPU • all WICAT systems based on the Motorola 68000 L8 processor (32-bit processor with 16-bit data paths).

Memory • 16K bytes to 32K bytes of ROM which contains System Boot Strap program; 512K bytes of main memory on System 140; 256K bytes to 1.5M bytes of main memory on System 150—all models; 512K bytes to 4.5M bytes of main memory on Systems 155 and 160; 512K bytes to 5M bytes of main memory on System 200; and 1M bytes to 16M bytes of main memory on System 220.

Chassis Slots • standard chassis slots per system are: System 140, 6 slots; System 150, 6 slots; System 155, 12 slots; System 160, 12 slots; System 200, 8 slots; System 220, 20 slots.

Ports • System 140 provides 1 RS-232C serial and 1 parallel port; System 150 accommodates 5 serial and 1 parallel port; Systems 155/160 provide 2 RS-232C serial, 12/10 async-only RS-232C serial ports, and 2 parallel ports; Systems 200 and 220 support 32 asynchronous ports, 8 synchronous ports, and 1 Master Control Port.



WICAT SYSTEMS PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing • **SMALL SYSTEM** is based on **SYSTEM 140 packaged system** based on a minimum operational system includes both hardware & software • **LARGE SYSTEM** is based on **System 220 packaged system** (includes a maximum operational system including all hardware & software).

Mass Storage • 630K bytes of diskette storage and 15M bytes of disk storage on System 140; 630K bytes of diskette storage and 60.6M bytes of disk storage on System 150; 60M bytes of disk storage on System 155; and 1.684G bytes of disk storage on System 160, System 200, and System 220.

Terminals • System 140 and System 150-1WS, one terminal; System 150-3WS, 3 terminals; System 150-6WS, 6 terminals; Systems 155 and 160, 12 terminals; System 200, 32 terminals; and System 220, 64 terminals.

Printers • 2 types of printers available: a Prism dot-matrix printer and an impact thimble letter-quality printer.

First Delivery • January 1984 for System 140; October 1981 for System 150; May 1983 for System 155; October 1982 for System 160; October 1982 for System 200; May 1983 for System 220.

Systems Delivered • information is not available.

Comparable Systems • any Motorola 68000-based single-/multi-user systems ranging from entry-level systems priced at \$8,000 to \$25,000 to the high-end systems priced at \$32,000 to \$110,000 for example, the high-end Alpha Micro models, and the Altos 8086-based systems.

Vendor • WICAT Systems; PO Box 539, 1875 South State, Orem, UT 84057 • 801-224-6400.



WICAT Systems

System 140, System 150, System 155, System 160, System 200, System 220

Canada • OEM Distributors: Cohesive Computer Systems; 1250 Leeds Avenue, Ottawa, ONT K1B 3W3; 613-748-1100 • Becterm; 12 Trans Canada Quest, Levis, QUE G6V 4Z2; 418-837-5894 • WI Systems; 1020 Principal Plaza, 10303 Jasper Avenue, Edmonton, ALTA T5J 3N6 • 403-428-0235.

Distribution • United States and Canada through company sales/service offices.

■ ANALYSIS

WICAT Systems have developed in their Systems 140 through 220, microprocessor-based systems a series that provides speed and capabilities available only in mainframes until a few years ago. All Systems in the series are based on the Motorola MC68000L8 microprocessor, which is a 32-bit processor with 16-bit data paths. The Systems range from the single-user entry-level System 140 which supports up to 512K bytes of dynamic parity and ECC RAM, to the System 220 which supports up to 64 users and 14M bytes of dynamic parity ECC RAM. The other models in the series the System 150, 155, 160, and 200 support most of the logical increments of users and memory between the low and high end systems. Disk capacities supported range from the 15.6M bytes on System 140 to 1.89G bytes on the System 220. With the wide range of support provided by the models within the WICAT series, prospective customers should have no trouble finding a model to meet their specific needs.

Two operating systems are supported, the MCS (Multiuser Control System) and an optional UNI Plus (UNIX Version 7-based) operating system. Various program/system development languages are available, as is a database management system, a word processing package, spreadsheet package, and an interactive system for education. This is the limit of application programs available although packages developed by OEM's for the Motorola 68000 might be available.

WICAT was an outgrowth of a research institute which designed and developed interactive videodisc instruction programs. WICAT Systems was founded to assist in distributing these programs, to create a delivery system, and to combine the needed hardware capability with the software. Because of this there is a definite limitation on the amount of application software that is available.

□ Strengths

One of the most obvious pluses that the WICAT Systems provide is their wide range of memory, terminals, and disk storage that are supported within the models offered. The ability to support from 1 to 64 users, handle 512K bytes to 14M bytes of memory, and support disk storage from 15M to almost 2G's gives users quite a nice range to choose from.

The WICAT-developed MCS (Multiuser Control System) operating system, which provides multitasking/multiuser capabilities, appears to combine many of the features and capabilities of such popular minicomputer operating systems as Bell Laboratories UNIX and DEC's VAX/VMS operating systems. MCS appears easy to learn and use due to the tutorial documentation that is part of MCS.

The 3 separate maintenance options offered by WICAT, as well as the option to create a customized maintenance plan appear to be somewhat above those offered by the normal microprocessor vendor. In addition, the toll-free hotline that is available for technical assistance, should prove a boon to most first-time users, in the event of any unexpected problems.

WICAT's Systems support a large number of language compilers which makes them very versatile as far as program/system development is concerned. Any user ready to develop their own systems will probably find a familiar language that is supported, thus saving on training. In addition, the hierarchical file management system supported by MCS appears easy to use and flexible. If that is not enough the Sequitor relational database management system that is available should handle any other file management problems which arise.

□ Limitations

Since WICAT grew out of a research institute that developed interactive videodisc instruction programs their tutorials are excellent, but the documentation available for parts of the system not covered by tutorials is not quite as good. In fact, some of the documentation is a little confusing. There is no ready explanation about what is needed to attach additional memory, peripherals and terminals. The number of chassis slots available are indicated, but attachment requirements of various items are not indicated. Documentation on available software is also rather sketchy, as well as whether packages operate under both operating systems or either one of the two.

What is considered a plus in one area, can in return be a limitation in another. On the one hand, there are many different languages supported for program/system development, but on the other hand there are very few application packages available. This might prove to be a drawback in that the systems might not be a viable system for the first-time user that doesn't have a little expertise somewhere within the office since it will be difficult to get full utilization of the system without applications running. The very low end can probably use the office automation and spreadsheets applications, but the higher-end users might require some experienced personnel to develop applications to fully utilize the machines.

There doesn't appear to be any upgrade capability within the series. With the wide range of systems support provided with the Series, it would seem logical that a user could grow from one system to the next without much problem, but nothing is indicated in the documentation that this is a possibility. Communications capabilities are somewhat limited also.

■ SOFTWARE

□ Terms & Support

Terms • each standard WICAT system includes MCS (Multiuser Control System) and a language (customer's choice) at no additional charge • all other optional software products are available on a one-time license fee basis.



WICAT Systems

System 140, System 150, System 155, System 160, System 200, System 220

Support • corrective updates and enhancements are provided during 30-day warranty period • optional Master Support Plan, which covers both software and hardware, provides all software and documentation updates and enhancements for the life of the plan.

Software Overview

All WICAT systems have bundled into the standard system price MCS (Multiuser Control System) and the customer's choice of any of the available languages.

WICAT also offers the UniPlus operating system for an additional fee. UniPlus is based on UNIX Version 7, and includes UNIX System III enhancements, the 4.1 Berkeley Standard Distribution enhancements, and enhancements made by WICAT Systems.

Various languages are available for program/system development including: RM/COBOL, CIS COBOL, SMC BASIC, Coherent BASIC, Pascal, FORTRAN 77, APL 68000, assembler, and a "C" compiler.

All standard data management, including sequential, random, and keyed sequential access methods, are supported through the operating systems. Relational database management is provided through the Sequitar package; Office Information System (OIS) provides word processing, editing and formatting capabilities, and the UltraCalc package provides electronic spreadsheet capabilities.

Communications support comes in the form of emulation for IBM 3275 and 2780 terminals.

Computer-aided instruction is provided through WISE (WICAT Interactive System for Education) package.

Operating Systems

MCS (Multiuser Control Program) is included as part of each standard WICAT system. Other optional operating systems that are available are WICAT's UniPlus, and Bell Lab's UNIX.

MCS • multiuser, multitasking real-time operating system • memory-resident portion consists of 3 parts: kernel, class handlers, and system buffers requiring from 20K bytes to 85K bytes of memory depending on configurations; disk-resident portion includes system utilities, command interpreter, online help files, and device drivers • kernel includes: dynamic memory management facilities; a scheduler which controls all user tasks based on their priority and time slice; and twenty common routines, known as system services, which are available for use by the operator or can be accessed through all languages • class handlers for disks, terminals, and tapes can be configured in or out of the system depending on the needs of the application • KSAM, which is considered a class handler, provides services for keyed file access, in addition to the standard sequential and random access methods • system buffers area grows dynamically to support the necessary I/O buffers, disk cache and nine drivers; the kernel also manages its control tables in this area • provides 75 standard system utilities including • sort program, text editor, incremental system backup, archive file management, and system-to-system file transfer • command interpreter program is user interface to the operating system; provides user access to system utilities as well as help facilities, wild carding, background execution, and I/O redirection • requires 256K bytes of memory and 10M bytes of disk storage.

UniPlus • based on Bell Laboratories UNIX Version 7 • kernel and utilities are essentially those of Version 7, with enhancements from UNIX System III, and the 4.1 Berkeley Standard Distribution, as well as WICAT System's enhancements • includes a sort utility • requires 512K bytes of memory on any WICAT system with a minimum of 15M bytes of disk storage.

Data Management

Standard data manipulation for sequential, random, and keyed sequential access method are handled through the operating system.

Sequitur • a relational database management and word processing system • provides facilities for database management,

word processing, report generation, forms generation, and word processing which manages documents • uses step-by-step visual prompting to guide novice users; uses a fill-in-the-blanks style of prompt to guide users in setting up tables, combining data, generating and printing lists and performing calculations • an integrated editing technique allows any part of a table or section to be changed throughout the database wherever that information is stored.

Prices for System 140, 150, 155 & 160:

\$1,260 lcns

Prices for System 200 & 220:

1,920

Communications/Networks

Communications supported by the WICAT Systems are provided from within the operating system itself (MCS). Bisynchronous communications consist of IBM 3275 and 2780/3780 emulation. Since this is built into the operating system there is no additional charge for this facility.

Program Development/Languages

RM/COBOL • high-level implementation of the ANSI 74 COBOL standard • provides for development and execution of COBOL business applications • provides most of the features commonly required on minicomputer and mainframe applications.

CIS COBOL • a GSA-approved version of COBOL • compiler exceeds the ANSI Level I COBOL requirements; provides special screen handling features and extensions for interactive debugging; handles sequential, relative, and indexed sequential files.

SMC BASIC • a Business BASIC implementation of the original Dartmouth BASIC • includes ease-of-use enhancements which make the language particularly simple and easy to use in business applications.

Coherent BASIC • an extended version of BASIC that can be used interactively as an interpreter • produces code like a compiler and then executes the code.

Pascal • an enhanced version of the ISO standard Pascal • produces optimized native 68000 code; extensions include: random file access, UCSD-compatible strings, and liberal-set capabilities.

FORTRAN 77 • a GSA-validated, full implementation of the ISO standard FORTRAN 77 • provides enhanced I/O and program structure; provides full support for FORTRAN 66 standard.

APL 68000 • an APL interpreter • provides a powerful file system, formatter, and IEEE floating-point arithmetic.

Assembler • standard 68000 Assembler • supports the standard mnemonics and pseudo-instructions contained in Motorola's portable cross-assembler; allows easy transport of applications; operates at approximately 2000 lines per minute.

C • compiler derived from standard UNIX C compiler • includes full standard I/O and math libraries; a low-level language supporting easy access to the operating system and hardware, as well as to FORTRAN and Assembler.

Application Packages

In addition to the following application packages provided by WICAT, various OEM software applications are available for the WICAT MC68000-based microcomputers. These packages must be purchased from the OEM and also supported by them.

Office Automation • a screen-oriented, interactive package providing facilities for: word processing, a spelling dictionary, data manipulation, and office management functions such as time, calendar, and activity scheduling • word processing features include: centering, underscoring, margin control, scrolling, automatic realignment/page numbering, superscript/subscript, global search and replace, and various others • spelling dictionary fea-

LCNS: one-time fee for license purchase. NA: not available. Prices effective as of January 1983.



WICAT Systems

System 140, System 150, System 155, System 160, System 200, System 220

tures are: identifies misspelled words; and provides the ability to add job specific related special words • data manipulation facilities include: ability to merge/file documents, sorting in ascending/descending sequences, label generation, and report generation • office management capabilities are: calendaring; meeting scheduling; activities autoscheduler; telephone message tracking; electronic mail; and reminder list maintenance.

UltraCalc • an electronic spreadsheet • provides the ability to manipulate and analyze tabular data using graphs, automatic recalculations, 15-digit arithmetic, and advanced math features; supports economic forecasting, trend analysis, as well as other computations • major features are: full, online HELP facilities; automatic swapping of pages to disk for expanded workspace; support of multiuser simultaneously; attribute highlighting including columns, rows or items with bold, blinking, reverse video, or underlined character fields; display of non-adjacent rows or columns together on the screen which can be scrolled in sequence; automatic recalculation of all figures effected by a change in any number or formula; provision for full set of arithmetic, exponential, and trigonometric functions; and allows entry of data from external programs or files on an UltraCalc worksheet, as well as allowing transfer of data from the worksheet to external programs • provides over 20 commands to manipulate data, and 8 commands to set global worksheet options.

WISE (WICAT Interactive System for Education) • a computer-aided instruction (CAI) interactive system, that enables non-programmers to compose text, design graphics displays, outline progress through courseware, and define criteria for evaluation; commands are written in ordinary language and simple two-letter commands • text and graphics features are: multiple character fonts and type sizes; variable intercharacter spacing and rotation; color graphics; production of any combination of circles, squares, rectangles, ellipses, spline, curves, and arcs; and creation of graphics objects patterned, filled, moved, copied, rotated, scaled, and animated along X- or Y-axis • instructional design is generated through a series of menu options which allow the author to choose standard formats or specify details for each frame; features provided allow authors: to define menu frames, presentation frames, and routines for complex branching or simulations: to define linear/branched progress through courseware; to set stringent or flexible time limits for uniform or individual pacing, to set variable answer formats such as: screen locations (cursor or touch panel), multiple choice, or free response; specify routines for judging free responses such as: synonym dictionaries, ignorable words, key words, spelling tolerance algorithms, and numeric ranges; and to allow prescriptive criteria for weighting and scoring students' responses • software capabilities which aid in support of the WISE application are: high-resolution graphics, digitized audio, and videodisc interface.

■ HARDWARE

Terms & Support

Terms • hardware products are available on purchase-only basis • discounts available from 5% to 15% based on the number of systems purchased.

Support • 30-day warranty provided with purchase • after 30-day warranty, users can choose from 3 maintenance plans: Master Support Plan, Depot Support Plan, or Time-and-Material Support. Master Support Plan provides on-site service for emergency repairs, regularly scheduled preventive maintenance, and software assistance; in addition the user automatically receives any hardware engineering changes • Depot Support Plan is an off-site alternative to full-support service costing half as much; it provides a guaranteed 10-day turnaround once the system is received, free return shipping, and a 30-day warranty on repaired or replaced parts • Time-and-Material Support provides for service to be charged at an hourly rate plus parts and material; service can be performed at user's site or WICAT maintenance depot; when equipment is sent to WICAT depot, a normal turnaround is 15 days from the time the system arrives at the depot • telephone hot-line is available for all plans • customized plans to fit any users' needs are also available.

Physical Specifications (H × W × D); Weight

System 140

CPU • 16 × 19 × 16.5 inches; 50 pounds.

Display • integrated with CPU unit.

Keyboard • information not available.

System 150

CPU • 16 × 19 × 16.5 inches; 50 pounds.

Display • integrated with CPU unit.

Keyboard • 1.56 × 20.5 × 9.44 inches; weight not available.

System 155

CPU • 25.5 × 10.3 × 23.5 inches; information not available.

Display • 12 × 14.5 × 15.8 inches; 30 pounds.

Keyboard • information not available.

System 160

Rack Mount • 43 × 21 × 33 inches; 170 pounds.

CPU • 10 × 19 × 26 inches; 40 pounds.

Display • 12 × 14.5 × 15.8 inches; 30 pounds.

Keyboard • information not available.

System 200

Rack Mount • 43 × 21 × 33 inches; 170 pounds.

CPU • 10 × 19 × 26 inches; 50 pounds.

Display • 12 × 14.5 × 15.8 inches; 30 pounds.

Keyboard • information not available.

System 220

Rack Mount Quarter Bay • 31 × 21 × 33 inches; 120 pounds.

Rack Mount Half Bay • 43 × 21 × 33 inches; 170 pounds.

CPU • 10 × 19 × 26 inches; 50 pounds.

Display • 12 × 14.5 × 15.8 inches; 30 pounds.

Keyboard • information not available.

Systems Overview & Configurability

All WICAT Systems are built around the Motorola 32-bit MC68000 processor. The Systems 140, 150, 155, and 160 use IEEE 796 extended Multibus architecture, while the 200 and 220 use a proprietary bus. The entry-level systems include the single-user System 140 and the System 150 which comes in 3 models that support 1, 3, and 6 terminals. The System 155 and 160 both support up to 12 terminals, while the top-of-the-line 200 and 220 support 32 and 64 terminals respectively. The 140, 150 and 155 support 15M-byte Winchester disk subsystems, while the 160, 200 and 220 support 80/160/474M-byte disk subsystems. Backup is handled through diskettes on the 140 and 150, through cartridge tape subsystems on the 155, and with cartridge tape subsystems or 9-track 1600-/3200-bpi tape drives on the 160, 200, and 220. Memory supported ranges from 512K bytes on the low-end System 140, to the 14M bytes supported on the high-end System 220. In between, the System 150 supports 1.5M bytes, the System 155 and 160 support 4.5M bytes, and the System 200 supports 5M bytes. All processors provide 7 vectored interrupt levels. On the System 220 a Zilog Z80 co-processor is dedicated to every group of 16 RS-232 ports.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

System 140 Maximums • single user; 512K bytes of memory; 15.6M bytes of disk storage on a 15M-byte 5.25-inch Winchester disk drive and a 630K-byte 5.25-inch diskette drive; an RS-232C serial interface; and a 16-bit parallel printer port.

System 150 Maximums • 6 users; 1.5M bytes of memory; 60.6M bytes of disk storage on 4 15M-byte 5.25-inch Winchester disk



WICAT Systems

System 140, System 150, System 155, System 160, System 200, System 220

drives and one 616K-byte 5.25-inch diskette drive; single 12M-byte 0.25-inch cartridge tape; 5 RS-232C serial ports; 1 parallel interface printer; and 2 programmable interval timers.

System 155 Maximums • 12 users; 4.5M bytes of memory; 60M bytes of disk storage on 4 15M-byte 5.25-inch Winchester disk drives; single 12M-byte 0.25-inch cartridge tape; 2 RS-232C serial ports (async or sync), 12 RS-232C serial ports (async only), and 2 general-purpose parallel ports; and 12-slot chassis (IEEE 796, extended Multibus).

System 160 Maximums • 12 users; 4.5M bytes of memory; 1.684G bytes of disk storage on 4 474M-byte 10.5-inch SMD Winchester disk drives; single 37M-byte 0.5-inch 9-track tape drive; 2 RS-232C serial interfaces (async or sync), 10 RS-232C serial interfaces (async only), and 2 general-purpose parallel interfaces; and 12-slot chassis (IEEE 796 multibus architecture).

System 200 Maximums • 32 users; 5M bytes of memory; 1.684G bytes of disk storage on 4 474M-byte 10.5-inch SMD Winchester disk drives; single 37M-byte 0.5-inch 9-track tape drive; 32 async intelligent ports, 8 sync intelligent ports, and a Master Control Port; and an 8-slot chassis.

System 220 Maximums • 64 users; 16M bytes of memory; 1.684G bytes of disk storage on 4 474M-byte 10.5-inch SMD Winchester disk drives; single 37M-byte 0.5-inch 9-track tape drive; 32 async intelligent ports, 8 sync intelligent ports, and a Master Control Port; and a 20-slot chassis.

Packaged Systems

The vendor was reluctant to give individual pricing breakdowns for all components for the WICAT Systems. Instead they gave us ranges for each of the systems based on complexity of the individual configurations.

System 140 • typical system ranges:

\$8,000/\$9,000 prch

System 150 • typical system ranges:

9,500/20,000

System 155: • typical system ranges:

15,000/25,000

System 160 • typical system ranges:

25,000/43,000

System 200 • typical system ranges:

27,000/80,000

System 220 • typical system ranges:

32,000/110,000

CPU

Motorola 68000 Processor • 32-bit internal (ALU) architecture, 16-bit data bus interface • 24-bit addressing to 16M bytes; CPU has eight 32-bit data registers and eight 32-bit address registers; two 32-bit stack pointers, a 16-bit status register and a 23-bit program counter • powerful 56 mnemonic instruction set includes 16- and 32-bit data manipulation, signed and unsigned multiply and divide, five basic addressing modes with pre- and post-incrementing, offsetting and indexing, seven levels of priority interrupt with 256 possible interrupt vectors, a trace mode and sophisticated trap operations for debugging; Motorola "HMOS" technology large-computer geometric architecture.

I/O & Communications

The Systems 140, 150, 155, and 160 all use the Intel IEEE 796 (Extended Multibus), while the System 200 and 220 use a proprietary bus. Serial ports (RS-232) on all systems provide 50- to 19.2-baud rate, while the parallel ports support up to 1M-byte-per-second transfer rate.

The System 140 includes a single RS-232C serial interface and a 16-bit parallel port; System 150 supports 5 RS-232C serial interface and a 16-bit parallel port; System 155 and System 160 provide 2 RS-232C serial ports that can be asynchronous or synchronous as well as 12/10 (155/160) asynchronous-only RS-232C serial ports and

2 general-purpose parallel ports; System 200 and System 220 handle 32 asynchronous intelligent ports, 8 synchronous intelligent ports, and a Master Control Port.

Mass Storage

Disk

The 616K-byte diskette system is standard on all models of the 150 Systems. A 15M-byte Winchester disk is standard on all models of the System 150 expandable to 4 drives. The basic System 155 comes with two 15M-byte Winchester drives, expandable to 4 drives. All other models can accommodate up to 4 474M-byte SMD disk drives.

Floppy Diskette • 5.25-inch double-sided, double-density diskette drive; 616K bytes per formatted diskette • 31K-bps transfer rate; 267-millisecond average seek time • one drive per system available where applicable:

NA prch

Winchester Disk Subsystem (5.25-Inch) • 13M-/19M-byte and 10M-/15M-byte formatted/unformatted capacities • 625K-bps transfer rate; 85-millisecond average seek time • up to 4 drives per system where applicable:

NA

84MB SMD Disk Subsystem • 8-inch Winchester disk drive; 84M-byte (unformatted), 76M-byte (formatted) capacities • 1.2M-bps transfer rate; 20-millisecond average seek time • up to 4 drives per system where applicable:

NA

168MB SMD Disk Subsystem • 14-inch Winchester disk drive; 168M-byte (unformatted), 152M-byte (formatted) capacities • 1.2M-bps transfer rate; 30-millisecond average seek time • up to 4 drives per system where applicable:

NA

474MB SMD Disk Subsystem • 10.5-inch Winchester disk drive; 474M-byte (unformatted), 421M-byte (formatted) capacities • 1.8M-bps transfer rate; 18-millisecond average seek time • up to 4 drives per system where applicable:

NA

Tape

The System 150 or 155 can include a DEI Cartridge Tape for backup, while all the others are capable of handling the DEI Cartridge Tape or a 9-track Cipher Tape.

Cartridge Tape • 0.25-inch cartridge tape; 450-foot tape capacity • 6400 bpi; 30/90 ips; 24K-bps transfer rate; 17M-byte (unformatted), 12M-byte (formatted) capacities:

NA prch

9-Track Tape Drive • 0.5-inch, 9-track, 2400-foot magnetic tape • 1600/3200 bpi; 25 ips; 160K-bps transfer rate; 46M-byte (unformatted), 37M-byte (formatted capacities):

NA

Printers/Graphics

There are currently 2 printers available: a 1055 Letter-Quality Printer and an 1100 Dot-Matrix Graphics Printer. 1055 is a micro-processor (8080-based) controlled impact printer; ideally suited for applications requiring letter quality, it also provides plotting and graphics capabilities; supports 5,760 addressable points per square inch for graphics and plotting. 1100 is a microprocessor (8048-based) controlled dot-matrix impact printer; provides 1K of PROM per formatting routines; 4896 dots per inch with dots on a X/Y matrix; program accessible.

1055 Letter-Quality Printer • 55-cps bidirectional impact thimble printer • 128-character ASCII character set; 34 standard print

PRCH: first figure is low-end one-time purchase price, second figure is high-end one-time purchase price. NA: not available. Prices effective as of January 1984.



WICAT Systems

System 140, System 150, System 155, System 160, System 200, System 220

timbles including various international character sets; 163 columns; 10 cpi; handles 4- to 16-inch wide fanfold paper or 5.5- to 12-inch single-sheet paper; graphics capabilities support 48 positions per inch vertical and 120 positions per inch horizontal • full range of control codes and forms handling options • attachment via ASCII or Diablo serial interfaces or Centronics-type parallel interface:

NA prch

1100 Dot-Matrix Graphics Printer • 1000-cps or 3300-dot-per-second, dot-matrix impact printer • 7 × N dot addressable raster scan; 128-character ASCII character set with additional fonts user or factory installed; 80, 96, or 132 programmable columns; 8 pre-programmed forms length; 5, 6, 8, 10, 12, or 16 cpi; 6 or 12 lpi; handles 3-part paper, 4- to 16-inch wide fanfold paper or 1.5- to 9-inch single-sheet paper; graphics capabilities support 3600- or 4896-dot-per-inch resolution • full range of control codes and forms-handling options • attachment via RS-232C serial or parallel interface or 20-mA current loop:

NA

Terminals/Workstations

There are currently 2 general-purpose monochrome video terminals available; the T7000 which is designed to handle word processing and office management needs, and the MG8000 which provides graphics capabilities. The T7000 includes a Z80 microprocessor allowing users to program function keys and ports, define I/O modes and video attributes, and protect screen fields from all but specifically designated input. Terminal functions can be defined for text editing and word processing programs. The

MG8000 includes a Z-800Z microprocessor allowing users to program the same functions as the T7000, as well as graphics functions. Designs can be stored in the terminal's memory and effect animation by displaying one graphics plane while modifying another. An asynchronous attachment via RS-232C serial interface is provided. Selectable transmission speeds range up to 19.2K bps; other features include a 12-inch diagonal screen, detached keyboard, and optional touch panels, with 768 discrete touch points.

T7000 Video Terminal • 2000-character display (25 lines × 80 characters); 7 × 9 dot-matrix characters in a 10 × 12 cell • 128 ASCII characters with an additional user-definable character set, available from an on-board EPROM, for special symbols and non-Latin alphabets; terminal functions can be defined for text editing and word processing programs; cursor controls, video attributes, and editing commands conform to ANSI X3.64 standards; features include: half intensity, reverse video, blank, blinking, underscore, and blinking underline:

NA prch

MG8000 Video Terminal • includes all attributes and features of T7000 plus includes graphic capabilities • 400 × 300 pixel resolution; two independent graphics planes; and graphics commands for lines, curves, arcs, circles, graphic text characters, and pattern fill; supports object definition and relocation; and is compatible with SIGGRAPH CORG standard:

NA

• END



Xerox 16/8 Professional Computer

■ PROFILE

Operating Systems • Digital Research's CP/M-80 and CP/M-86, and Microsoft's MS-DOS 2.0 single user diskette operating systems

Data Management • dBase, Analyst, QSORT

Communications/Networks • TTY communications, 3270-emulation, bisync 3270/3780 communications

Languages • CBASIC from Compiler Systems, Inc, BASIC-80 from Microsoft

Models • single model • choice of diskette/disk storage systems available

CPU • dual processor configuration with 8-bit Zilog Z80A and 16-bit Intel 8086 microprocessors

Memory • 64K bytes for Zilog Z80A; 128K to 256K bytes for Intel 8086

Chassis Slots • optional 5- or 10-slot expansion modules available with 4 or 9 available slots

Ports • 1 RS-232C serial communications port; 1 serial printer port; 2 parallel ports are internal to the system

Mass Storage • 168/338K-byte 5.25-inch dual diskettes; 497/997K-byte 8-inch dual diskettes; 8.35M hard disk; all capacities listed are formatted

Terminals/Workstations • single-user system with detached 12-inch monochrome monitor

Printers • 20- and 40-cps letter-quality printers

First Delivery • announced May 1983; delivered November



1983

Systems Delivered • information not currently available

Comparable Systems • systems with Z80 and 8088/8086 processors: Digital Equipment Rainbow 100, NCR Decision Mate V, North Star Advantage 8/16, Vector Graphic 4; other systems are available with dual processor configurations but featuring other processor combinations

Vendor • Xerox Corporation; 1341 West Mockingbird Lane, Dallas TX 75247 • 214-689-6000

Canada • Xerox Corp; 703 Don Mills Road, Toronto, ONT M3C 1S2 • 416-429-6750

Distribution • all sales are handled through the Xerox internal sales force; nearly 85 percent of all Xerox microcomputer systems sold to date have been placed within large corporate environments; contact the nearest local Xerox sales center for further details

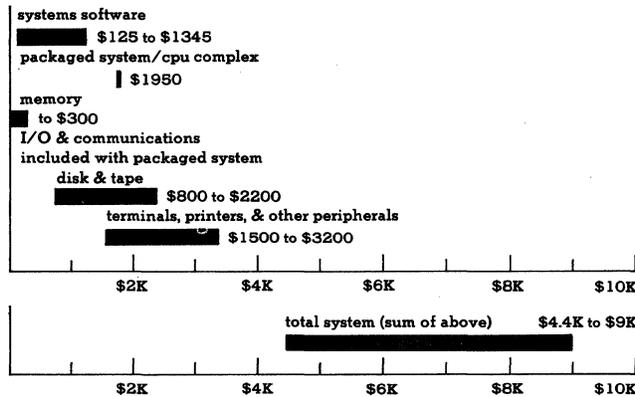
■ ANALYSIS

Xerox Corporation has been recognized as a leader in the office automation market for many years. Their first entry into the professional and personal microcomputer market was relatively early for a major vendor when compared to the likes of Wang and Digital Equipment who announced products nearly a year later. Xerox even beat IBM to the punch by a few months. The original Xerox PC, the 820, was announced in June 1981. The IBM PC came to market in August of the same year.

The Xerox 820 was a basic CP/M-based system with a Z80 processor and 64K bytes of memory. Market reaction was somewhat disappointing as more was expected from a company with as good a reputation as Xerox. Hoping to gain some marketing momentum, Xerox announced the 820-II in July 1982. The 820-II boasted a faster processor, an improved version of CP/M, a 10M-byte hard disk, and IBM communications. The situation improved a bit at Xerox

PURCHASE PRICE RANGE

hardware & software



XEROX 16/8 PROFESSIONAL COMPUTER PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing, • **SMALL SYSTEM** is based on 16/8 Display/Processor packaged system (includes dual CPUs, 192K-byte RAM memory, 12-inch monochrome monitor, keyboard, 4 ports, CP/M-80, CP/M-86, and MS-DOS) and the following options: CBASIC-II, dual 250K-byte 5.25-inch single-sided diskettes & 20 cps letter quality printer. • **LARGE SYSTEM** is based on 16/8 Display/Processor packaged system (includes dual CPUs, 192K-byte RAM memory, 12-inch monochrome monitor, keyboard, 4 ports, CP/M-80, CP/M-86, and MS-DOS) and the following options: CBASIC-II, BASIC-80, WordStar, SuperCalc, TTY mode comm, 5-slot expansion module, 128K-byte memory expansion, dual 800-byte, 8-inch single sided diskettes & 40 cps letter quality printer.



Xerox 16/8 Professional Computer

but it's hard to take the world by storm with a 64K-byte CP/M-only system. Hence the Xerox 16/8 Professional Computer.

The 16/8 Professional computer is a single-user system with dual processors and 3 operating systems—CP/M 80, CP/M 86, and MS-DOS. The use of dual processors recognizes a user's valid concern about having an investment in 8-bit software left in the dust of the newer 16-bit product announcements. The dual 8- and 16-bit microcomputers offer a way to have the best of both worlds. The system will run the tried and true 8-bit market favorites as well as whatever new 16-bit wonders are announced.

One very nice thing to note about Xerox and their various product announcements is that they did not forget their early customers. All the products are upward compatible. The 820 and 820-II systems may be upgraded to a complete 16/8 system. While the upgrade is an extra cost for the user, all software and peripherals are compatible with the new system. The fact that Xerox planned a migration path for the product is worthy of a few extra points. Not all vendors are that concerned with their customer base.

Strengths

The Xerox 16/8 has a number of strong points to recommend it. Offering the user a choice of diskette formats seems like a simple idea, but one that is not available from a number of major vendors. Users now have the option of single- or double-sided 5.25- or 8-inch diskettes. Some people like the mini-diskettes, while others feel restricted by their smaller capacities. At the moment, Xerox offers only an 8-inch rigid disk with an 8-inch diskette as backup but that situation may change very soon.

The Xerox product line offers a number of communications packages to allow the minicomputers to act as IBM 3270 or 3780 devices. Software is available to provide asynchronous 3270 emulation using the Xerox Interactive Communications Emulator as a plug-compatible controller. Bisynchronous 3270 emulation is also available, as is 3780, 2770, and 2780 batch bisynchronous operation. A Shared Interface Unit is available to provide an Ethernet link to 2 Xerox microcomputers, be they 16/8 or 820-II systems.

The fact that Xerox with 82 national service locations stands behind their products is also an asset. Xerox is currently making quite a name for itself with its AmeriCare service plan for other manufacturer's microcomputers. If they can do that well with someone else's product, things should go pretty smoothly for their own. A number of service plans ranging from on-site service to depot repairs are available from Xerox.

Limitations

One major limitation with the 16/8 is that if you don't like a black-on-white monitor, you're out of luck. The processor and electronics are housed in the monitor, so choices of screen color are out of the question. If you can't live without a green, amber, or color monitor, the Xerox desktops are not for you.

Any expansion on the 16/8 requires the addition of 1 or 2 5-slot expansion modules. That may or may not be a problem, depending on your individual situation. When compared to systems that have multiple expansion slots that are immediately taken up by extra cost controllers required to have a usable system, the 16/8 may not be too bad. It's not so much a major cause for concern as it is something to note when comparing system configurations.

SOFTWARE

Terms & Support

Terms • prepaid license fee arrangement only; quantity discounts available; prices shown are for single item purchases.

Support • hot line to Customer Support Center provides first line of support for all Xerox-developed and third-party software sold in conjunction with their microcomputer products.

Software Overview

The Xerox 16/8 Professional Computer includes 2 operating systems as part of its packaged system. The combination of CP/M 80/86 from Digital Research and MS-DOS from Microsoft allow the Xerox 16/8 to run a wide variety of commercially available packages. The Xerox PC Products Directory includes nearly 150 pages listing software packages by vendor and application type which operate on Zilog Z80- and Intel 8086-based microcomputers. Even this list is by no means exhaustive but it is a good resource for Xerox users looking for additional application software.

A number of software packages are directly available from Xerox for use on the 16/8 system. These include a number of communications packages to allow teletype compatibility, asynchronous or bisynchronous 3270 emulation, and batch 3780 emulation.

Available data management software includes the dBase II data management system as well as the analyst and QSORT records management system. CBASIC and BASIC-80 are the programming languages supported by Xerox. Menu is available for new users who want to avoid dealing with the CP/M system prompts.

In addition a number of applications packages are available from Xerox for use on the 16/8 system. These include a number of choices in each individual application area. Both WordStar and Select are available for word processing. SuperCalc and Multiplan provide the electronic spreadsheet capability. Business graphics, an integrated accounting system, and CP/M tutorial are also available through Xerox.

Packaged Software

Not currently provided by vendor.

Operating Systems

The Xerox 16/8 Professional Computer includes CP/M 80/86 and MS-DOS as part of the basic system. CP/M 80/86 loads CP/M-80 and CP/M-86 and then brings the system up in 16-bit mode. If the user has only 8-bit software to run on the system, only CP/M-80 needs to be loaded.

CP/M 80 • single-user, single-tasking, general-purpose operating system designed to support the Intel and Zilog families of 8-bit processors; features and facilities of this basic system are all upward compatible and are present in all other versions of CP/M; consists of 4 elemental structures: Basic I/O system (BIOS), Basic Disk operating system (BDOS), Console Command Processor (CCP), and a Transient Program Area (TPA) • BIOS is the modifiable portion of the operating system enabling users to tailor CP/M systems to meet specific configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system • supports up to 16 logical devices, containing up to 65,536 records, with up to an 8M-byte capacity • CCP provides the interface between the user's console and the rest of the CP/M system; it reads, interprets, and executes commands entered from the



Xerox 16/8 Professional Computer

console; commands are both built-in commands and transient commands; transient commands are loaded into the TPA and executed • TPA is the area designated to hold programs that are loaded from disk and then executed • standard utilities provided include: DDT interactive debugger; PIP file transfer facility; DUMP utility; SUBMIT/XSUB batch control utilities; ED command-oriented text editor; ASM assembler; and STAT system status utility • memory requirements depend on number and types of options implemented; basic system requires 20K bytes of memory and an ASCII terminal; bundled in basic system price:

_____ **NC lcms**

CP/M 86 • a 16-bit enhanced version of the 8-bit CP/M operating system designed to support the Intel 8086 or 8088 microprocessors; incorporates all the basic elements of the CP/M system but adapts these functions to the larger and faster operating environment • consists of 4 elemental structures: Basic Input/Output System (BIOS), Basic Disk Operating System (BDOS), Command Console Processor (CCP), and a Transient Program Area (TPA) • BIOS is the modifiable portion of the operating system enabling users to tailor CP/M systems to meet specific configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system • supports up to 16 logical devices, containing up to 8M bytes each, for a maximum of 128M bytes of online storage; any one file can reach the full drive size • CCP provides the interface between the user's console and the rest of the CP/M system; it reads, interprets, and executes commands entered from the console; commands are both built-in commands and transient commands; transient commands are loaded into the TPA and executed • TPA is the area designated to hold programs that are loaded from disk and then executed • standard utilities provided include: DDT-86 interactive debugger; PIP file transfer facility; SUBMIT batch control utilities; ED command-oriented test editor; ASM-86 assembler; STAT system status utility; and GENCMD that processes Intel "H86" format files • memory requirements depend on number and types of options implemented • supports up to 1M bytes of memory; requires 56K bytes of memory and an ASCII terminal bundled; in basic system price.

MS-DOS 2.0 • single user, interactive and batch processing operating system with Unix-like hierarchical directories, piping functions, filters and hard disk support; equivalent to IBM-PC DOS 2.0 • supports up to 186K bytes in up to 64 different files in single-sided format, up to 360K bytes in up to 112 files in double-sided format, and up to 5M or 10M bytes with thousands of filenames on hard disk; handles records from 1 to 65,535 bytes long in file transfer, executes external (disk based) commands giving the user ability to expand the DOS vocabulary to limits of disk space • batch processing capabilities with automatic execution on power-up, user commands include: DATE, TIME, COPY, ECHO, PATH, MKDIR, RMDIR, CHDIR, TREE, RECOVER, GRAPHICS, BREAK, and CTTY • additions over DOS 1.25 in performance include hierarchical directories to facilitate hard disk use, numerous performance enhancements, redirection of I/O, piping of functions (sequentially rather than concurrently as in UNIX), higher sector density per track (9 sectors per track versus 8 in DOS 1.25), and installable device drivers • MS-DOS is divided into 4 parts: a device independent I/O handler, an I/O processor, reference and jump vectors in low memory, and a command processor; the device independent I/O handler on hidden file MSDOS.SYS is the core of MS-DOS through which I/O must be directed, I/O is physically moved by hidden file IO.SYS as commanded by MSDOS.SYS, COMMAND.COM is responsible for interface between user and MS-DOS, error trapping, batch file processing, interpreting user commands and executing file names • MS-DOS 2.0 will read earlier MS-DOS diskettes, there are several unique system interrupt calls and file descriptors that make programs utilizing these features non-transportable between MS-DOS 2.0 and earlier versions • an editor, debugger, and other utilities are provided; bundled in basic system price.

Utilities

Menu CP/M • screen-oriented utility to allow users to perform CP/M system function through use of menus, rather than system level A prompts; available in 8-inch diskette format:

_____ **\$95 lcms**

Data Management

dBase II • data base management system by Ashton Tate; uses English-like commands to ADD, DELETE, EDIT, DISPLAY, and PRINT; handles 64K records per file with 1K bytes per second and 32 fields per record; supports 7 key fields per file; available in 8-inch diskette format; operates under CP/M or MS-DOS:

_____ **\$700 lcms**

Analyst • records management system by Structured Systems Group; companion product to QSORT; consists of 4 modules: Interactive Data Entry, Analyst Program, Extract Program, and Enquiry Program; available in 5.25-inch and 8-inch diskette format; operates under CP/M:

_____ **250**

QSORT • sort program by Structured Systems Group; companion product to Analyst; consists of 2 modules: Q-SORT and Q-PARM; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

_____ **100**

Communications/Networks

TTY Mode • general asynchronous communications software to link system to terminals, mainframes, mini and micro computers, word processors, information networks, and optical character readers; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

_____ **\$200 lcms**

820/871 3270 Communications • provides asynchronous 3270 emulation; requires Xerox 871 Interactive Communications Emulator (ICE) plug-compatible control unit to provide dial-up access; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

_____ **400**

Bisync 3270 Standalone Comm • provides bisync 3270 terminal emulation, supports direct link to mainframe to bypass cluster controller; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

_____ **850**

Bisync 3780 Standalone Comm • provides bisync 3780, 2770, and 2780 batch emulation; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

_____ **850**

Program Development/Languages

BASIC-80 • version 5.2, developed by Microsoft, interactive BASIC, meets ANSI subset standard for BASIC, provides single- and double-precision floating point operations, includes trace facility for debugging; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

_____ **\$325 lcms**

CBASIC • compiler from Compiler Systems; includes 14-digit arithmetic, accepts source code from another file using INCLUDE statement, provides multiple line functions with multiple parameters to permit modular program development; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

_____ **125**

Applications Packages

WordStar • word processing package by MicroPro International; menu-driven to allow users to perform a wide variety of text-oriented functions such as: enter, edit, copy, format, save, and print documents and file; available in 5.25-inch and 8-inch diskette formats; operates under CP/M or MS-DOS:

_____ **\$500 lcms**

Select • word processing package by Select Information Systems; consists of 4 modules: Teach, Edit, Super-Spell, and Merge Print;

_____ **LCMS: license fee.**



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uses single-key commands; compatible with SuperCalc and Multiplan; available in 5.25-inch and 8-inch diskette formats; operates under CP/M or MS-DOS:

595

SuperCalc • electronic spreadsheet from Sorcim; provides basic grid of 63 columns by 254 rows; allows variable width columns; 16-digit precision provided in calculations; available in 5.25-inch or 8-inch diskette formats; operates under CP/M:

195

Multiplan • electronic spreadsheet from Microsoft; provides basic grid of 63 columns by 255 rows; allows data manipulation and analysis; links several worksheets together; compatible with VisiCalc files; available in 5.25-inch and 8-inch diskette formats; operates under CP/M and MS-DOS.

275

Business Graphics • graphics package to produce pie, bar, line, organizational, and hilo charts; cluster bar charts can be produced to combine data from several files; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

195

BOSS Financial Accounting System • integrated accounting system from Balcones Computer Corp; includes accounts payable, accounts receivable, general ledger, and financial reporting; can handle up to 9000 customers, 9000 transactions per accounting period, 900 active accounts, 900 department codes, and 900 category codes; available in 8-inch diskette formats; operates under CP/M:

995

Other Facilities

ATI-Power • interactive training package from American Training International; simulates CP/M operation to instruct user in fundamental system commands; available in 5.25-inch and 8-inch diskette formats; operates under CP/M:

\$75 lens

■ HARDWARE

Terms, Support & Documentation

Terms • purchase only, quantity discounts available; prices shown are for single item purchases.

Support • 90-day warranty standard; full-service maintenance or an extended warranty is available at standard rates for users located within 26 miles of a Xerox service center; 3 additional service options are available: equipment pick-up and delivery with a loaner, equipment pick-up and delivery without a loaner; and customer carry-in or mail-in service; contact your local Xerox service branch for specific details.

Documentation • system documentation includes Xerox 16/8 User Manual as well as reference manuals and handbooks for the 3 bundled operating systems, the reference manuals are more technical while the handbooks are oriented towards the first time computer user; additional manuals and handbooks are supplied with each software applications package.

Physical Specifications (H x W x D); Weight

CPU • integrated with monitor.

Display • 13.2 x 15 x 14.75 inches; 30 pounds.

Keyboard • 1.6 x 19.9 x 8.25 inches; 5 pounds.

Systems Overview & Configurability

The Xerox 16/8 Professional Computer is a single-user desktop system capable of supporting both 8- and 16-bit operation. A combination of operating systems further expands the system's capabilities. The processor and electronics are housed in the 12-inch monochrome monitor. This approach allows the user to select from a number of diskette and hard disk storage options to suit their particular application needs. A low profile keyboard connects to the processor-monitor module by a coiled cable.

Four dual diskette units and 1 hard disk with diskette backup are

the basic choices available to a new Xerox 16/8 user. The diskettes are available in 5.25-inch and 8.0-inch formats with a choice of single- or double-sided, double-density, capacities. This provides the users a choice of unformatted capacities of 250K, 500K, 800K, and 1.6M bytes per diskette. The hard disk option provides an unformatted storage capacity of 10M bytes combined with a 1.6M-byte, 8-inch diskette for backup and program loading.

The Xerox 16/8 includes 4 connectors on the rear panel of the basic system. These are assigned as follows: 1 for serial communications, 1 for a serial printer, 1 for the disk, and 1 for the keyboard. The communications port may be used with a user-supplied modem to provide access to the wide variety of information resource services. The Xerox 16/8 also provides compatibility with IBM asynchronous or bisynchronous 3270 and 3780 terminals to further expand the systems use. Alternatively, the 16/8 can connect to an Ethernet local area network through a Shared Interface Unit (SIU). Each SIU can attach 2 Xerox 16/8 or 820-II systems to an Ethernet link.

The serial printer port provides compatibility for any number of industry standard printers. Xerox provides a choice of 2 letter-quality printers for use with the 16/8. These are a low-speed (20 cps) impact printer designed for light to moderate use and a higher-speed (40 cps) more rugged printer intended for a more intensive printing environment. Two parallel ports are available. They are internal to the system and need an additional cable to be accessible to the user.

A number of kits are available from Xerox to allow users to upgrade earlier 820 and 820-II systems to the 16/8 level of operation. The prices for these kits may vary with the starting configuration of the 820 or 820-II and the desired end configuration for the 16/8. Please contact Xerox directly for information on the suitable upgrade path for each system.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

System Maximums • 320K-byte memory; 8.35M-byte hard disk with 1.6M-byte diskette; two serial ports; two internal parallel ports, two system connectors; nine expansion slots.

Packaged Systems

16/8 Display & Processor • includes 16-bit Intel 8086 processor with 128K bytes of memory, 8-bit Zilog Z80A processor with 64K bytes of memory, 12-inch monochrome monitor with 80 column by 24 line display, low profile keyboard, 4 connectors (2 serial ports, 2 system hookups), 2 internal parallel ports, CP/M 80/86, and MS-DOS.

\$1,950 prch

CPUs

Intel 8086 Processor • 16-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, approximately 70 basic instructions with up to 30 addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands, extensive string and block move facilities • powerful segmentation facilities allow memory partitioning for multi-tasking, concurrent or multi-user capabilities • a pseudo-superset of the Intel 8080 instruction set where translation to 8086 is straight forward • instruction set compatible with 8088.

Zilog Z80 Processor • 8-bit internal architecture, 8-bit data bus interface; direct addressing to 64K bytes of memory; 14 registers include 16-bit program and stack pointers, 2 index registers, and a duplicate set of an 8-bit accumulator and a 7-bit flag register; upwardly compatible with Intel 8080 it provides binary coded decimal (BCD) arithmetic, double precision operations, coded indexing with address registers, multiple interrupt, increment, decrement and move capabilities • in addition to being able to execute all 78 Intel 8080 instructions, 50 enhancements to the instruction set include advanced block move and search macros, relative jump and 3 types of selectable response interrupts for a total of 128 operations.

PRCH: purchase price.



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Memory

Each processor in the Xerox 16/8 system has its own associated RAM memory; the basic configuration includes the Intel 8086 16-bit processor with 128K bytes of expandable memory and the Zilog Z80A 8-bit processor with 64K bytes of non-expandable memory; the Intel 8086 memory may be expanded to 256K bytes through the addition of a 128K-byte memory board in the optional 5- or 10-slot expansion chassis.

Memory Expansion Kit • 128K-byte memory module; requires 5- or 10-slot expansion chassis:

\$300 prch

Expansion Module • 5-slot expansion chassis; 16/8 PC supports 2 expansion modules but requires 1 slot for connection to main system to provide 4 or 9 usable slots.

I/O & Communications

Four rear panel connectors are included in the basic 16/8 system; these are a serial communications port, a serial printer port, diskette/disk connector, and the keyboard connector; the communications port is RS-232C interface supporting asynchronous operation at speeds to 19.2K bps. Two additional parallel ports are internal to the system. They may be used to support a parallel printer or other device. A special cable is required to access these ports.

Shared Interface Unit • provides access to Ethernet local area network; includes 2 serial RS-232C ports for simultaneous use by 2 Xerox 16/8 or 820-II systems; supports direct and modem connections; diagnostic routine instituted automatically on power-up:

\$995 prch

Interactive Communications Emulator • 8 full-/half-duplex lines, IBM plug-compatible control unit to provide dial-up access with speeds to 9600 bps; used in conjunction with bisync 3780/3270 communications software.

14,990

Mass Storage

Dual Single-Sided 5.25-inch Diskettes • single-sided, double-density diskettes with 250K-byte unformatted, 168K-byte formatted, and 155K-byte usable capacity per drive; 40 tracks, 17 sectors per track, 256 bytes per sector:

\$800 prch

Dual Double-Sided 5.25-inch Diskettes • double-sided, double-density diskettes with 500K-byte unformatted, 338K-byte formatted, and 322K-byte usable capacity per drive; 80 tracks, 17 sectors per track, 256 bytes per sector:

1,200

Dual Single-Sided 8-inch Diskettes • single-sided, double-density diskettes with 800K-byte unformatted, 497K-byte format-

ted, and 482K-byte usable capacity per drive; 77 tracks, 26 sectors per track, 256 bytes per sector:

1,500

Dual Double-Sided 8-inch Diskettes • double-sided, double-density diskettes with 1.6M-byte unformatted, 997K-byte formatted, and 980K-byte usable capacity per drive; 154 tracks, 25 sectors per track, 256 bytes per sector:

2,200

Hard Disk with 8-inch Diskette Backup • double-sided, double-density, 8-inch rigid disk with 10.67M-byte unformatted, 8.35M-byte formatted, and 8.192M-byte usable capacity per drive; 1024 tracks, 32 sectors per track, 256 bytes per sector; includes 8-inch double-sided, double-density diskette drive as backup and program loading device:

3,050

Terminals/Workstations

12-inch Monochrome Monitor • white characters on dark background with blink, dual intensity, inverse video, and graphics; 6 x 9 dot character format; optional anti-glare screen filter; monitor houses processor electronic and is included in base system price.

Low-Profile Keyboard • includes 12 user-defined function keys, 6 system function keys, 1 10-key numeric pad, cursor-key cluster, HELP key; attaches to processor unit by coiled cable; included in basic system price.

Printer/Graphics

The printer port included in the basic Xerox 16/8 system provides compatibility for a wide variety of industry standard printers to suit the user's specific application needs.

20-cps Letter Quality Printer • serial, impact printer with bidirectional operation for low- to moderate-volume printing needs; 98-character plastic printwheel and ribbon system; automatically changes pitch and hammer intensity when printwheel is changed; 10-pitch wheel prints 132 columns, 12-pitch prints 158 columns; handles 1- to 5-part forms with no adjustment; prints subscripts and superscripts:

\$1,595 prch

40-cps Letter Quality Printer • serial, impact printer with bidirectional operation for larger-volume printing needs; choice of over 100 different 88-, 92-, and 96-character metal or 96-character plastic printwheels in 10- and 12-pitch; 10-pitch wheel prints 132 columns, 12-pitch prints 158 columns; handles 1- to 6-part forms with 2-position carriage lever adjustment; friction platens and bidirectional forms tractors available:

2,900

• END



Zenith Data Systems Z-100 Series

Dual 8-bit & 16-bit Microprocessor Desktop Systems

■ PROFILE

Operating Systems • Z-DOS single-user, interactive or batch operating system for 16-bit processor; CP/M-85 single-user, single-tasking operating system for 8-bit processor; CP/M-86 single-user, single tasking operating system for 16-bit processor; MP/M-II multiuser, multitasking operating system for 16-bit processor is scheduled to be available 2nd quarter 1984; Concurrent CP/M-86 single-user, multitasking operating system for 16-bit processor scheduled to be available 2nd quarter 1984 • Z-DOS is bundled with packaged systems, others are optionally available.

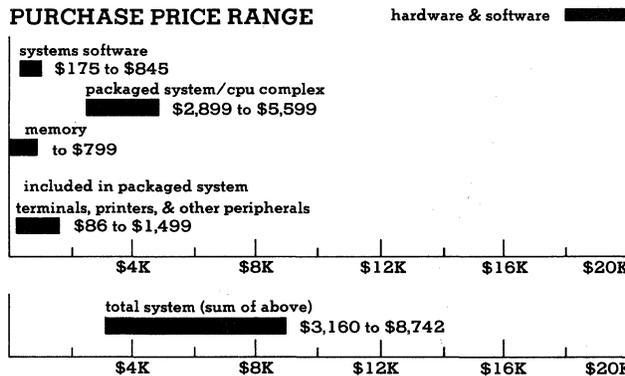
Data Management • all basic data file manipulation provided in operating systems • Condor rDBMS relational database management system and Condor File Manager are optionally available.

Communications/Networks • 3270 bisynchronous emulation and 2780/3780 RJE emulation available.

Languages • BASIC-80 available for 8-bit processor; Z-BASIC (interpreter), BASCOM-86 (BASIC compiler), Microsoft FORTRAN 86, Microsoft COBOL 86, and Microsoft Pascal available for 16-bit processor.

Models • Z-100 Series currently consists of 5 models with differences in packaging, the amount of memory, and disk storage • ZF-101-21, ZF-111-22, and ZW-111-32 are in low-profile cabinets; the ZF-121-22 and ZWG-121-32 are packaged in All-in-one cabinet.

CPU • all models include both a 16-bit Intel 8088 microproces-



ZENITH DATA SYSTEMS Z-100 SYSTEM PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing • **SMALL SYSTEM** is based on ZF-101-21 packaged system (includes low-profile cabinet, Intel 8-bit 8085 microprocessor and Intel 16-bit 8088 microprocessor, 128K bytes of memory, keyboard, a built-in 5.25-inch 320K-byte floppy disk drive, 2 RS-232C serial ports, a Centronics-compatible parallel port, 5-slot S-100 chassis, and Z-DOS operating system) and the following options: Z-BASIC programming language and 12-inch monochrome monitor • **LARGE SYSTEM** is based on ZWG-121-32 packaged system (includes All-in-one cabinet, Intel 8-bit 8085 microprocessor, Intel 8088 microprocessor, 192K bytes of memory, green monochrome display, integrated 11.3M-byte Winchester, integrated 320K-byte floppy drive, 2 RS-232C serial ports, a Centronics-compatible port, 5-slot chassis, and Z-DOS operating system) and the following options: CP/M-85 operating system for 8-bit processor (includes BASIC-85) Package (includes Z-BASIC, Condor File Manager, Multiplan, Z-Chart), FORTRAN 86, 256K-bytes of memory, 16-cps dot matrix printer.

sor operating at 5 MHz and an 8-bit Intel 8085 microprocessor operating at 5 MHz.

Memory • all models support up to 768K bytes of memory; 3 banks of 64K bytes (192K) are mounted internally, while the rest (576K bytes) are mounted externally • 2 models ZF-101-21 and ZF-111-22 are packaged with 128K bytes of memory and the other 3 models ZF-121-22, ZW-111-32, and ZWG-121-32 are packaged with 192K bytes of memory.

Chassis Slots • all models include an industry-standard IEEE 696 S100 bus with 5 slots • the floppy disk controller (which is standard on all packaged systems) uses 1 slot; the Winchester disk controller also uses a slot on those models which include the Winchester drive • 3 or 4 slots are then available depending on which packaged system is purchased.

Mass Storage • all models that do not include a Winchester drive can support 2.64M bytes of diskette storage on 2 built-in 5.25-inch, 320K-byte floppy disks and 2 8-inch 1M-byte floppy disks • those models with the built-in Winchester drive can support 11.3M bytes of hard disk storage and 2.32M bytes of diskette storage.

Terminals/Workstations • currently a single-user system • number of terminals to be supported after MP/M-II operating system is released is not yet available.

Printers • only 160-cps dot-matrix printer available from vendor, but the system is compatible with: Zenith/Heath Z-25 and Z-125; Diablo Models 630, 1610, 1620, 1640, and 1650; Epson MX80; DEC LA34 and LA36; Texas Instruments TI810; and Heath H14.

First Delivery • August 1982.

Systems Delivered • information is not available.

Comparable Systems • any single-user systems consisting of both



Zenith Data Systems Z-100 Series Dual 8-bit & 16-bit Microprocessor Desktop Systems

an 8-bit microprocessor operating under CP/M and 16-bit microprocessor under an MS-DOS-compatible operating system whose processors operate at approximately 5 MHz with prices between \$3,000 and \$6,000 for the base systems with a top price about \$9,000 such as Compupro System 8/16 A, B and C, and Pertec Model 3205 and 3215.

Vendor • Zenith Data Systems Corporation; 1000 Milwaukee Avenue, Glenview, IL 60025 • 312-391-8744.

Canadian • Zenith Data Systems Corporation; 1020 Islington, Toronto, ON M8Z 5Z5 • 416-231-4171.

Distribution • through Zenith Data Systems network of 27 regional distributors and more than 950 dealers, as well as direct sales to national accounts, colleges and universities, and the federal government.

■ ANALYSIS

Zenith Radio Corporation acquired the assets of the Heath Company, a leading electronic kit manufacturer, in 1979. They then created Zenith Data Systems Corporation to manufacture and market a full line of Zenith branded, standardized computer products. The first products produced were the 8-bit Z-89, and Z-90 desktop computers. The Z-100 is the latest offering in Zenith's desktop computer line. With Zenith's fine reputation in the radio and television industry, one can only assume they will put the same quality control and quality assurance in their computer systems as they do in all of their other products.

A lower-priced, build-it-yourself kit of the Z-100 is also available from the Heath Company, for those do-it-yourselfers who might want a Z-100.

Zenith first introduced the single-user Z-100 Series of desktop computers in June 1982. The Z-100s are built around dual Intel 8- and 16-bit microprocessors (8085 and 8088 respectively), making it possible for users to run programs written for either 8- or 16-bit systems. The processors operate independently of each other on an either/or basis, with each being selected for use by software through the CPU selection logic. Both the 8-bit Intel 8085 and 16-bit Intel 8088 operate at 5 MHz. The operating systems that are supported on the Z-100 are Z-DOS (Microsoft's MS-DOS based), which is bundled with the packaged systems and CP/M. This allows for a huge quantity of software which is available for a user to choose from.

The Z-100s are packaged in two distinct models: a low-profile cabinet which does not include a monitor and an All-in-one cabinet that has a built in 12-inch diagonal monochrome display. An attached keyboard is standard on all models. Both models are available with single or dual 320K-byte integrated diskette drives or an integrated 11.3M-byte Winchester disk drive and a 320K-byte diskette drive. Memory is 128K or 192K bytes with every model being expandable to 768K bytes. However, only 3 banks of 64K bytes are attached to the motherboard, and expansion beyond that requires the use of one of the available chassis slots. All models include a 5-slot S-100 chassis with one slot automatically used by the diskette controller, which is standard on all models. The Winchester disk controller also uses one of the 5 available slots on those packaged systems with a Winchester drive, thus leaving only 3 slots available.

Also provided with all models are 2 RS-232C serial ports, and a Centronics-compatible parallel port. One of the serial ports is for printer attachment and the other for modem hookup.

Black and white graphics capabilities are standard on all models. Two of the packaged systems also provide color graphics, and the other 3 can be upgraded to support color graphics with the addition of optional video memory expansion chips. A color monitor is optional on all models.

□ Strengths

Standardization is one of the key features of the Z-100. The Z-100 is built around many industry standards—from the MS-DOS and CP/M operating systems, S-100 bus, Seagate- and Shugart-compatible disk drives, RS-232C serial ports and Centronics-compatible parallel port. Any user wanting to purchase software or peripherals from sources outside of the Zenith should have no trouble finding what they need.

Another feature of the Z-100 is the dual 8-bit and 16-bit processors that are standard on the system. This feature allows users to execute all of the older 8-bit programs which run under CP/M as well as many of the newer 16-bit programs written to run under MS-DOS. One of the best features of the Z-100 is the support that is provided. Ninety days of on-site, free service is almost unheard of when dealing with microcomputer vendors. In addition, after the 90 days are up, service can be contracted for on- or off-site. Because of the multitude of Zenith centers across the United States, it should be a fairly easy job to get anything fixed if the need arises. Zenith is also retraining some of their television repair people to work with the Z-100 systems.

□ Limitations

A minor limitation is the attached keyboard which is not the norm on most current microcomputer systems. Because of this, the operator is somewhat restricted as far as movement is concerned. Zenith Data Systems has indicated that there will be a detached keyboard on the next release of the Z-100, but as of this writing, it has not occurred.

The documentation supplied by the vendor which deals with the operating system is probably good enough for someone who knows what they want to do. However, a first-time user (or novice) might run into a little difficulty. If the documentation was written in more of a tutorial nature it would probably be satisfactory.

Communications capabilities are somewhat lacking and networking capabilities are non-existent.

■ SOFTWARE

□ Terms & Support

Terms • Z-DOS operating system is bundled with packaged system price; optional software products are available for a one-time charge for license purchase.

Support • corrective updates and enhancements from the manufacturer • support through distributors and dealers.



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□ Software Overview

All Zenith Z-100 systems have bundled into the packaged system price the Z-DOS operating system. The Z-DOS operating system operates on the 16-bit microprocessor and is based on Microsoft's MS-DOS operating system. CP/M-85 is optionally available to support the 8-bit processor portion of the Z-100s. Also optionally available is CP/M-86; and Concurrent CP/M-86 and MP/M II are scheduled for release in 2nd quarter 1984. These latter 3 operating systems support the 16-bit processor portion of the Z-100s.

All basic data management facilities are provided through the available operating systems. Condor DBMS relational database management system and their File Manager are also available for added capabilities.

Currently, the only communications facilities available from the vendor are a 3270 emulator and a 2780/3780 RJE emulator. A computerized phone system, which allows interfacing with Compu Serve's MicroNet and SOURCE time sharing services, is also available. Various languages are provided to handle program/system development. Microsoft's BASIC is available under the CP/M-85 operating system, while Z-BASIC, BASCOM-86 (BASIC compiler), and Microsoft's FORTRAN, COBOL-86 and PASCAL are available under the Z-DOS operating system.

There are a number of word processing (with dictionary and file merging add-ons), electronic spreadsheet, statistical, and accounting packages that are also available. These packages are in addition to the large number of CP/M- and MS-DOS-compatible packages that are available from third-party vendors.

□ Packaged Software

ZSS-100-17 Office Productivity System • includes WordStar Version 3.3, MailMerge, Multiplan (see application packages for more detailed explanation), Condor File Manager (see data management), Z-BASIC and Z-CHART (see program/development languages):

\$850 lcms

ZSS-100-11 Office Productivity System II • includes Z-BASIC and Z-CHART (see program/development languages), Condor File Manager (see data management), and PeachText 5000:

625

ZSS-100-4 • 8-bit package • includes CP/M-85 (see operating systems) and BASIC-85 (see program/development languages):

150

ZSS-100-6 Accounting System • includes Peachtree General Ledger, and Inventory Management (see application packages section):

200

ZSS-100-9 • 16-bit package • includes Z-BASIC (see program/development languages), Condor File Manager (see data management), MailMerge, Multiplan, and Z-chart (see application programs):

500

□ Operating Systems

05-63-4 Z-DOS • 16-bit operating system based on Microsoft's MS-DOS; consists of a disk file manager and an I/O device handler • disk file manager provides commands which allow users to perform all basic file tasks including create, delete, read, and write; no practical limit on file or disk size; handles files of different logical record lengths on any one diskette; blocks and deblocks its own physical sectors • I/O device handler manages the keyboard CRT, disk drives, and the printer; simplifies input/output to different devices with a single set of I/O calls that treat all devices alike, transparent to the user • system utilities included are: COMMAND, CONFIGUR, LINK, MASM and DEBUG; COMMAND provides the interface between the file manager and the user, converts user input to system calls and allows the user to perform file management function and to load and execute programs; CONFIGUR provides the ability to configure the I/O

system to use the correct protocol for any printer, modem, or other I/O devices; LINK combines object files (as well as object modules from a library) into a relocatable RUN file; MASM provides capabilities for users to assemble macrocode source documents into a file that may be relocated and loaded by LINK in order to create an executable file • DEBUG is a program debugging tool used to provide a controlled testing environment for executable object files included in price of packaged systems:

\$150 lcms

05-53-2 CP/M-85 (2.2) • single-user, single-tasking, general-purpose operating system designed to support the Intel and Zilog families of 8-bit processors; features and facilities of this basic system are all upward compatible and are present in all other versions of CP/M; consists of 4 elemental structures: Basic I/O System (BIOS), Basic Disk Operating System (BDOS), Console Command Processor (CCP), and a Transient Program Area (TPA) • BIOS is the modifiable portion of the operating system enabling users to tailor CP/M systems to meet specific configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system • BDOS provides all the disk management control; supports up to 16 logical devices, containing up to 65,536 records, with up to an 8M-byte capacity • CCP provides the interface between the user's console and the rest of the CP/M system; it reads, interprets, and executes commands entered from the console; commands are both built-in commands and transient commands; transient commands are loaded into TPA and executed • TPA is the area designated to hold programs that are loaded from disk and then executed • standard utilities provided include: DDT interactive debugger; PIP file transfer utility; DUMP utility; SUBMIT/XSUB batch control utilities; ED command-oriented text editor; ASM assembler; and STAT system status utility • memory requirements depend on number and types of options implemented; basic system requires 20K bytes of memory and as ASCII terminal:

150

05-63-2 Concurrent CP/M-86 • a single-user, multitasking operating system that is compatible with CP/M-86 and MP/M-86 operating systems; provides a virtual console environment where each virtual console can be performing its own task; one virtual console is always mapped to the physical console and is the foreground console, with all other virtual consoles being background consoles; switching a virtual console to the physical console is accomplished through the use of function keys (typical installations use from 4 to 10 function keys for this process) • supports up to 1M bytes of memory, multiple list devices, and up to 16 logical disk drives, each containing up to 512M bytes of storage for a maximum of 8G bytes of online storage • features include: Real-Time Monitor providing process control and dispatching, as well as queue, flag, and clock management; allows processes to share reentrant code; file management with date and time stamping; and protection of user files and directories through the use of optionally assigned passwords • requires an Intel 8086/8088 microprocessor, 256K bytes of memory (recommended), a console device, disk storage, and a real-time clock • developed by Digital Research, Inc • scheduled to be available in 2nd quarter 1984:

250

05-63-5 MP/M II • multiuser, multitasking, multiprogramming operating system designed to support the Intel and Zilog families of 8-bit processors; an enhanced upward-compatible version of CP/M supporting up to 400K bytes of user memory; up to 7 users can be supported using 48K-byte banks of memory • consists of Basic Disk Operating System (BDOS), Extended Disk Operating System (XDOS), Extended Input/Output System (XIOS), Terminal Message Processor (TMP), and Command Line Interpreter (CLI) • BDOS provides the capabilities for managing files and directories, consoles, and printers; supports up to 16 logical drives, each containing up to 512M bytes, for a maximum of 8G bytes of online storage; supports files up to 32M bytes;

LCNS: one-time fee for license purchase. NA: not available. Prices effective as of December 1983.



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and supports up to 16 list devices (typically printers and teletypes) • XDOS is the real-time nucleus of MP/M II which monitors the execution of processes and arbitrates conflicts for system resources; it provides facilities for dispatching, queue, flag, and time base management • XIOS is the portion of the operating system that contains all physical hardware-dependent code, such as Input/Output device handlers; maintains disk definition tables which translate logical drive, directory, and file structure to physical characteristics of a disk • TMP provides the interface between users and the system; reads user's commands and repeats them to the CLI • CLI interprets user commands and loads programs based on user command line • includes all commands (utilities) which are common to CP/M, as well as additional commands unique to MP/M II; some of the additional commands include: MPMSTAT, which displays runtime system status; RDT, a relocatable version of the Dynamic Debugging Tool; SCHED, which allows a specified program to be executed on a specified date and time; ATTACH, which attaches a program to a console; and over 15 others • requires 48K bytes of memory, an ASCII console, and a real-time clock • developed by Digital Research, Inc. • scheduled to be available 2nd quarter 1984:

649

Data Management

A disk file manager is included as part of the operating system which allows users to perform all basic file tasks.

CD-463-1 CondorDBMS • relational data management system • provides capabilities for creation, maintenance, inputting, and updating of data; report writing and analysis; and operator aids • supports up to 32,767 records per file, from 2- to 1024-byte records, 1 to 127 fields per record, 1 to 127 bytes per field, numeric fields up to 10 digits stored as 1- to 4- byte integers and sort sizes up to 128K bytes • features provided are: self-contained query language; data entry and updating using CRT screens; ability to handle 5 data types: alphabetic, alphanumeric, date, dollar, and numeric; audit trails capabilities; and batch operations support • includes a HELP facility; sorts can be applied on up to 32 fields • requires Z-DOS operating system:

\$650 lcms

CD-463-2 Condor File Manager • provides all functions of file management including data entry, updating, sorting, merging, analyzing, and printing of data • supports up to 32,767 records per file, 1023 characters per record, 127 bytes per field, and 127 fields per record • includes a HELP facility • available as part of packaged Office Productivity System • requires Z-DOS operating system:

290

Communications/Networks

PO-463-1 3270 Emulator • provides 3270 emulation for Z-100 systems running under Z-DOS operating system:

\$650 lcms

WI-463-1 2780/3780 Emulator • provides 2780/3780 emulation for Z-100 systems running under Z-DOS operating system:

899

Computerized Phone System • data communications interfacing utility that supports the transfer of data files between the user and Compu Serve's MicroNet or The Source timesharing computers • provides the capability to access data files and programs in the MicroNet library • supports user-defined keys for auto log-in and mail check; and provides full error checking and an on-screen elapsed time clock • CB-253-7 for CP/M-85 operating system, CB-463-7 for Z-DOS operating system:

40

Program Development/Languages

MS-463-1 Z-BASIC • an enhanced BASIC compiler with full color graphics capabilities • supports manipulation of complex scenes, data, and animation type operations • graphic functions include: circle statement that draws an ellipse with a center and

radius indicated by the user; PUT and GET statements that transfer graphic images to and from the screen; draw statement which supports drawing an arbitrary shape using any desired configuration on horizontal, vertical, or diagonal lines; and paint statement which fills an arbitrary graphics figure of a specified border attribute with another specified or tonal graduation • requires a minimum of 128K bytes of RAM and Z-DOS operating system:

\$175 lcms

MS-253-1 Microsoft BASIC • interpreter BASIC that meets the requirements for ANSI subset standard • supports the following: 4 variable types—integer, string, single- and double-precision floating point; error trapping using the ON ERROR GO TO statement; read or write any memory location using PEEK/POKE; calling up to 10 assembly language subroutines; and support for random and sequential disk files with a complete set of file manipulation statements • math functions include: algebraic and trigonometric capabilities as well as double-precision floating point number and double-precision mathematics • requires CP/M-85 operating system:

175

MS-463-4 BASCOM 86 • single-pass compiler used to produce optimized 8080 machine code that is Microsoft standard, relocatable binary format • support double-precision algebraic functions such as SIN, COS, TAN, ATN, LGO, EXP, and SQRT; supports constant multiplications distributed to allow more complete constant folding; and reorders expressions to minimize temporary storage and whenever possible transforms floating-point division into multiplication • includes utility programs: Macro-86 assembler, Link-80 Editor, and LIB-86 Library Manager • requires Z-DOS operating system:

250

MS-463-2 Microsoft FORTRAN Version 3.1 • a FORTRAN compiler that implements the ANSI-66 standard except for complex numbers; includes extensions to increase system utility and efficiency and performs some object code optimization • provides a floating decimal for extended arithmetic; produces an error summary and tables showing addresses assigned to labels, variables and constants; has an option to list generated object code in 8088 assembly language; includes instructions that support Intel 8087 Arithmetic Co-processor • includes: Macro-86 Relocatable Assembler; CREF Cross Reference Generator for sorted cross reference listings; and Link-80 Linkage Editor to generate executable load modules • requires Z-DOS operating systems, and 192K bytes of memory:

195

MS-463-3 Microsoft COBOL-86 1.07 • exceeds ANSI requirements with a combination of the most useful Level 1 and Level 2 features • features include: all Level 1, plus CONDITION, VERB, and IDENTIFIER features of Level 2 for Nucleus; all Level 1, plus RESERVE clause, multiple operands in OPEN and CLOSE, with individual options per file features of Level 2 for I/O; library supports Level 1; and Debugging section has special extensions to ANSI-74 standard providing convenient trace-style debugging • provides special syntax for cursor positioning for protected and unprotected fields for highlighting for full and partial screen erase, and for defining connections between fields defined on the screen and data source/destination fields in Working/Storage • requires Z-DOS operating system:

395

MS-463-5 Microsoft Pascal Version 3.1 • includes commands for Intel 8087 arithmetic co-processor • requires Z-DOS operating system and 192K bytes of memory:

295

Application Packages

MP-463-10 WordStar Version 3.3 • integrated word processing system featuring multilevel HELP messages • features include: flexible find and replace commands; automatic word wrap; dynamic page break display; subscripting and superscripting; ragged or justified right margins or mixed; flexible pagination;



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hyphenation-help; automatic decimal alignment when columns are entered; horizontal scroll for documents over 80 characters; and horizontal and vertical movement of blocks of text • supports color • requires Z-DOS operating system • developed by MicroPro International Corporation:

\$399 lens

MP-463-6 SpellStar Version 3.3 • proofreading tool that operates in conjunction with WordStar documents • uses a 20,000 word-plus dictionary of standard and commonly used business words; users job-specific terms can also be added to the dictionary; provides a report after scanning documents including: number of words in the document, number of different words, number of misspelled words, and number of words in the dictionary • requires WordStar • developed by MicroPro International Corporation:

249

MP-463-11 MailMerge • a file merging tool that operates in conjunction with WordStar documents • provides capabilities for merging a file containing names and addresses with a file containing letter text and automatically inserts data where variables are specified • features include: supports multiple copy printing; allows file names to be specified within a text line where the file will automatically be printed later; and allows the same data file to be used for both form letters and mailing labels • requires WordStar • developed by MicroPro International Corporation:

139

RS-463-9 Magic Wand • word processing package that provides a comprehensive range of text-handling functions • features provided include: single-stroke cursor movement commands; word, line, and block deletion; support of 128 variables of up to 55 characters for boilerplate letters or individualized form letters; mailing list file merge capabilities; and ability to edit any file stored in ASCII format • requires Z-DOS operating system • developed by Retail Sciences Inc:

295

IS-463-1 Magic Spell • proofreading tool • uses a 20,000 word standard usage dictionary; users job-specific terms/words can also be added to the dictionary; dictionary can be expanded up to the limit of disk storage capacity; handles difficult word situations such as hyphenated words, hyphens at the end of lines, ghost hyphens and apostrophes; and includes extensive help facilities • requires Z-DOS operating system • developed by Retail Sciences Inc:

295

MP-463-1 Supersort • provides capabilities for sorting, merging, and selecting information from data files • supports fixed or variable-length records up to 512 characters; data can be justified or include floating decimals, exponential notation, or upper- and lowercase letters; selection criteria include: between, not between, equal to, and less or greater than; supports up to 32 sort keys • requires Z-DOS operating system • developed by MicroPro International:

199

LS-463-1 Lotus 1-2-3 • an integrated electronic spreadsheet, database, and graphics package which supports full 8-color presentation • designed to perform spreadsheet analysis (including "what if Analysis"), create graphs or charts, and manipulate information files • a HELP key provides over 200 possible screens of information • requires 192K bytes of memory and 2 diskette drives and Z-DOS operating system:

495

MS-463-7 Multiplan • electronic spreadsheet that provides capabilities to manipulate data for planning, forecasting, and "what if" calculations • supports up to 63 columns in width and 255 rows in length; provides 40 built-in functions including True, False, STDEV (Standard Deviation), SINE, COSINE and LN, LOG (Logarithmic functions) • includes a sort command which allows sorting on columns in ascending or descending order and a HELP facility • requires Z-DOS operating system:

250

SC-463-1 Supercalc • electronic spreadsheet that provides capabilities to manipulate data for producing in-depth analysis and modeling • supports up to 63 columns in width and 254 rows of data in length; up to 127 characters for report headings and supporting footnotes; provides conditional calculation statements IF, AND, OR, and NOT; supports up to 512K bytes of usable workspace • includes a HELP facility • requires Z-DOS operating system • developed by Sorcim Corporation:

195

ES-463-1 Microstat • interactive statistics package for data manipulation and statistical testing • provides data management facilities to create a file, add or delete data to or from an existing file, list data, merge, duplicate, and sort files • features include: frequency distribution either grouped or listed by individual value, their corresponding percentages and cumulative percentages; hypothesis tests for both mean and proportion; analysis of variance for both one- and two-way analysis; scatterplot drawn with either automatic or user-defined scaling; and various others • requires Z-DOS operating system:

250

Peachtree Series 5 Accounting Software • independent standalone series of accounting programs that can be linked together to provide a total accounting system • provides two-level password security and the ability to make control reports optional or mandatory • requires Z-DOS operating system • developed by Peachtree Software Inc.

RS-463-1 General Ledger • consists of 16 application programs which perform file creating, maintaining, updating, and report generating functions • the programs support: system start-up; enter, query, delete or change accounts in the master file; enter, delete transactions; query account status; and develop a trial balance • reports include: Balance Sheet, Income Statement, Departmental Income Statement, Subsidiary Schedules, Depreciation/Amortization Schedules, and Trial Balance • supports approximately 500 accounts and 2,000 transactions per month:

399

RS-463-2 Accounts Receivable • an open item or balance forward accounts receivable system • features are: printing statements and invoices, with sales or dun messages; credit limit checking; automatic service charge calculations; sales tax calculations; and automatic month-end file backup • reports include: statements; Summary and Detail Aging Reports; and Transaction Report • supports approximately 200 accounts and 800 transactions per month:

399

RS-463-3 Accounts Payable • maintains complete records for each vendor, helps determine which vouchers to pay by due date or discount date or within certain cash requirements, and automatically prints checks and a check register; provides cash requirements forecasting • reports include: Transaction Register Report; Open Invoice Report; and an Aging Report • supports approximately 400 accounts and 900 transactions per month:

399

RS-463-5 Inventory Management • maintains detailed information on each inventory item including part number, description, unit of measure, vendor and reorder data, item activity and information on current item costs, pricing and sales • reports include: Detail Inventory Report; Departmental Summary Report; Inventory Status Report; Reorder Report; and Period-To-Date and Year-To-Date Reports • supports up to approximately 1,800 items:

499

RS-463-6 Sales Invoicing System • provides for accessing and updating Customer and Inventory data files during the invoicing operation • provides facilities to recognize stock items, non-stocked items (factory direct shipments) and miscellaneous charges such as labor, taxable and non-taxable items may be mixed on an invoice; and automatically verifies credit limits and stock levels • reports include: Invoice Register; Inventory Activity Report; Inventory Backorder Report; Sales Tax Report; and dollar profit and percent of profits totals • supports up to approximately 288 different accounts:

299



Zenith Data Systems Z-100 Series Dual 8-bit & 16-bit Microprocessor Desktop Systems

RS-463-7 Property Management • designed as a multiproperty accounting system with 3 general program modules: File Maintenance, Transaction Processing, and Report Generation • File Maintenance is used to establish and define relationships between properties, rental units within a property, tenants, and individual leases • Transaction Processing provides support for entering all daily transactions with automatic updating of individual tenant records • Report Generation provides: Property Report with company totals; Rental Units Report with a vacancy list; Rent Roll; Tenant Reports; Rent Worksheet; Tenant A/R Activity Report; A/R Aging Report; Statement Generation; and Mailing Labels • supports approximately 300 different names and properties per 5.25-inch diskette • requires Z-DOS operating system • developed by Peachtree Software Inc:

999

Other Facilities

Zenith Data Systems Corporation has compiled a directory listing more than 230 16-bit software programs for the Z-100 desktop computer. The programs all run under Z-DOS operating system. The directory is available from Zenith Data Systems Corporation computer dealers and Heathkit Electronics Centers:

\$25 lcms

HARDWARE

Terms, Support & Documentation

Terms • available on a purchase-only basis from manufacturer • also available through distributors, retail outlets, system integrators, and direct sales force.

Support • 90-day warranty, on-site service for both parts and service • after initial 90-day period contracts for on-site or off-site service available through any of the Zenith centers across the U.S.

Documentation • clear documentation provided for system installation; hard disk installation guidelines are also provided.

Physical Specifications (H x W x D); Weight

All-in-One Cabinet

System Unit • 13.5 x 19.5 x 19.5 inches; approximately 50 pounds.

Display • integrated in system unit.

Keyboard • integrated with system unit.

Low Profile Cabinet

System Unit • 7.25 x 19 x 19.25 inches; approximately 40 pounds.

Display • information not available.

Keyboard • integrated with system unit.

Systems Overview & Configurability

The Z-100 Series is designed with a dual 8-bit Intel 8085 microprocessor and 16-bit Intel 8088 microprocessor. Both of these microprocessors operate at 5 MHz. All models support up to 768K bytes of memory, 192K bytes of the maximum are on the motherboard with the remainder on S-100 bus expansion slots. Two RS-232 serial interfaces, and a Centronics-compatible parallel interface are standard on all models. The S-100 5-slot chassis is standard on all models; the diskette controller uses 1 of these slots. For those packaged systems that include an 11.3M-byte Winchester drive another S-100 slot is used. The packaged systems include a single or dual 5.25-inch 320K-byte integrated floppy disk or a single 5.25-inch 320K-byte floppy diskette and an 11.3M-byte Winchester drive. All models include an attached keyboard. The All-in-one models also include an integrated display, while the low-profile models accommodate an optional vendor-supplied or third-party display. Color graphics capabilities are standard on 2 of the packaged systems and optionally available on the other models with the addition of 2 video memory expansion chips and a color monitor.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

Z-100 System Maximums • all models in the Z-100 series are single-user systems, with dual 8-bit and 16-bit microprocessors that support up to 768K bytes of memory, 2.64M bytes of diskette storage using 2 built-in floppy drives and 28-inch 1M-byte separately attached floppy drives; up to 11.3M bytes of hard disk storage, a single system printer; 5 S-100 bus slots are provided of which 1 is used for diskette controller and 1 for the hard disk controller.

Packaged Systems

ZF-101-21 • includes Low Profile cabinet, dual Intel 8088 and 8085 microprocessors, 128K bytes of dynamic RAM, attached keyboard, a built-in 5.25 inch 320K-byte floppy disk, 2 serial ports, a parallel port, 4 available IEEE 696 S-100 bus expansion slots, DEC VT-52 emulation, and Z-DOS operating system:

\$2,899 prch

ZF-111-22 • includes same as ZF-101-21 plus additional 5.25-inch 320K-byte floppy disk for 640K bytes of diskette storage and support for 8 color graphics:

3,499

ZF-121-22 • includes All-in-one cabinet, dual Intel 8088 and 8085 microprocessor, 192K bytes of dynamic RAM, green monochrome display, attached keyboard, 2 5.25-inch 320K-byte floppy disks, 2 serial ports, a parallel port, 4 available IEEE 696 S-100 bus expansion slots, and Z-DOS operating system:

3,599

ZW-111-32 • includes Low Profile cabinet, dual Intel 8088 and 8085 microprocessors, 192K-bytes of dynamic RAM, attached keyboard, 5.25-inch 11.3M-byte Winchester Disk drive, 5.25-inch 320K-byte floppy disk drive, 2 serial ports, a parallel port, 4 available IEEE 696 S-100 bus expansion slots, color graphics capability, and Z-DOS operating system:

5,499

ZWG-121-32 • includes same as ZW-111-32 except has All-in-one cabinet and green monochrome display:

5,599

CPU

The Z-100 system includes both an Intel 8088 and an Intel 8085 microprocessor. An Intel 8087 Arithmetic Co-processor is also optionally available.

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, approximately 70 basic instructions with up to 30 addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands, extensive string and block move facilities • powerful segmentation facilities allows memory partitioning for multitasking, concurrent or multiuser capabilities • a pseudo-superset of the Intel 8080 instruction set where translation to 8088 straightforward • instruction set compatible with 8086.

Intel 8085 Processor • 8-bit processor that generates 16-bit wide memory addresses that are extended to 24 bits using address latching, 12 8-bit registers where 4 function as 2 16-bit register pairs only, and the others can be utilized as 8-bit registers or 16-bit register pairs, 84 instructions in the set, 4 addressing modes, and 4 vectored interrupts.

Z-216 Intel 8087 Math Co-Processor • provides extension of Intel 8086/8088 for approximately 100 times faster hardware execution of number-crunching mathematics • 84-bit wide data paths; 80-bit wide working registers perform with 18-decimal digit accuracy; 8 data formats and close interfacing to mother CPU

PRCH: purchase price. NA: not available. Prices effective as of December 1983.



Zenith Data Systems Z-100 Series

Dual 8-bit & 16-bit Microprocessor Desktop Systems

result in a powerful numeric data processor (NDP) • to utilize the Intel 8087 processor capabilities it must be supported by the language processor or have specific 8087 assembly subroutines • scheduled to be available in 2nd quarter 1984:

NA prch

Memory

Packaged systems include 128K or 192K bytes of dynamic RAM with internal parity checking. Internal RAM maximum is 192K bytes. Total maximum RAM is 768K bytes. Memory access time is 200 nanoseconds.

Z-205-1 • 64K-byte memory expansion chips to expand 128K byte systems to 192K bytes • used to expand motherboard:

\$165 prch

Z-205 • 256K-byte dynamic RAM card • IEEE 696 compatible:

799

Z-219-1 • 64K-byte video RAM chips • two sets are required for color capability in models with monochrome video boards:

145

I/O Communications

A Standard IEEE 696 S-100 bus 5-slot chassis is provided on the Z-100 system. One of the slots is utilized by the floppy disk controller. Another of the slots is used for the Winchester disk controller on those packaged systems that have the Winchester drive. Two RS-232C serial ports and a Centronics-compatible parallel printer port are also standard on all Z-100s. One of the RS-232C serial ports is used for printer attachment while the other is used for communications. Communications is supported at speeds ranging from 110 to 38.4K bps.

Mass Storage

All Z-100 packaged systems include a 5.25-inch 320K-byte floppy disk drive. Two of the packaged systems include 2 floppy drives and two include a 5.25-inch 11.3M-byte Winchester disk drive.

Diskette Storage

5.25-Inch Floppy Drive • half-height floppy disk drive • 320K-byte capacity; 48 tracks per inch; double sided double density • price included in packaged systems • controller requires 1 chassis slot and supports up to 2 drives.

Z-207-41 8-Inch Floppy Drive • 1.2M-byte capacity • 77 tracks per side, 48 tracks per inch; double sided double density; IBM 3740 format • 3-millisecond track to track; 90-millisecond average access time; 83-millisecond average latency • controller requires 1 chassis slot and controls 2 drives:

\$1,599 prch

Z-207-42 • same as Z-207-41 except includes 2 8-inch floppy drives:

2,299

Z-207-6 • upgrade for Z-207-41 to make it dual drives:

699

Hard Disk Storage

5.25-Inch Winchester Drive • 11.3M-byte capacity • 4 heads, 306 cylinders, 18 sectors per track, 512 bytes per sector; 5M-bps data transfer rate • 3-millisecond track to track; 85-millisecond average access time; 8.33-millisecond rotational latency • price included in packaged system • controller requires 1 chassis slot.

ZS-217 Upgrade • Winchester upgrade kit • includes 11.3M-byte Winchester disk drive, controller, mounting hardware, Z-100 ROM version 2.0, and new front panel • requires 1 chassis slot:

\$1,999 prch

Tape

Currently the Z-100 series does not support any tape.

Terminals/Workstations

The Z-100 All-in-one cabinet models include a 12-inch monochrome video display. All Z-100 models include an attached keyboard.

Monitors

All-In-One CRT • 12-inch diagonal non-glare green phosphor display with 100-degree deflection; 2000-character display of 25 lines by 80 characters with the 25th being a user status line; displays 128 upper-/lowercase ASCII characters in an 8x9 dot matrix; 225 lines of 640 dots providing 144K individually controlled dots for graphics execution • can be upgraded to color graphics with the addition of 2 sets of optional video memory expansion chips and separate color monitor • included in price of All-in-one cabinet systems.

ZVM-131 Video Monitor • 13-inch diagonal color, medium-resolution monitor; 2000-character display of 25 lines by 40 characters with the 25th being a user status line; supports composite and analog RGB inputs • includes amplifier and speaker • used on low-profile models:

\$379 prch

ZVM-135 Video Monitor • 13-inch diagonal, color, high-resolution monitor; 2000-character display of 25 lines by 80 characters with the 25th being a user status line; supports composite and analog RGB inputs • includes RGB cable, audio amplifier, and speaker • used on low-profile models:

599

ZVM-122A Video Monitor • 12-inch diagonal non-glare amber monochrome monitor; displays 2000 characters of 25 lines by 80 characters with the 25th line being user status line • supports composite video input • used on low-profile models:

85

ZVM-123A Video Monitor • 12-inch diagonal non-glare green monochrome monitor; displays 2000 characters of 25 lines by 80 characters with the 25th line being a user status line • supports composite video input • used on low-profile models:

70

Keyboard

The keyboard is the same for all Z-100 models.

Keyboard • attached 77-alphanumeric keys; sculptured keyboard • includes 13 function keys plus an 18-key numeric keypad which includes cursor control keys, insert/delete character, insert/delete line, and HELP key.

ZVM-135-1 Cables • cable to connect Z-100 models to ZVM-131 or ZVM-135 color terminals in RGB mode:

\$25 prch

Printers/Graphics

Printers compatible with the Z-100 and supported by both hardware and software include: Zenith/Heath Z-25 and Z-125; Diablo Models 630, 1610, 1620, 1640, and 1650; Epson MX80; DEC LA34, and LA36; Texas Instruments TI810; and Heath H14.

Z-125-AA • 160-cps bidirectional dot-matrix printer; 9x9 dot matrix • 95-character ASCII set and 33 block graphic characters • 10, 12, 13.2 or 16.5 cpi; 132 columns; 6 or 8 lpi; handles up to 6-part forms from 3.5 to 17.8 inches wide • RS-232C serial interface:

\$1,499 prch

• END



Zenith Data Systems Z-150 & Z-160 PC Series

Z-150 Desktop & Z-160 Portable PC Series

■ PROFILE

Operating Systems • MS-DOS 1.25 and MS-DOS 2.0 are the standard operating systems; CP/M-86 and Concurrent CP/M-86 are also available.

Data Management • Condor rDBMS (relational database management system).

Communications/Networks • CPS • 3-Comm ETHERNET networking software scheduled to be available in late May 1984.

Languages • Microsoft GW BASIC Interpreter, MS FORTRAN, and MS Pascal are available.

Models • Z-150 desktop systems consist of 3 models; the Z-160 portables are available in 2 models; the difference is in packaging the kind and amount of disk storage • ZF-151-21, ZF-151-22, ZW-151-22 desktop models; and ZFA-161-21 and ZFA-161-22 portables.

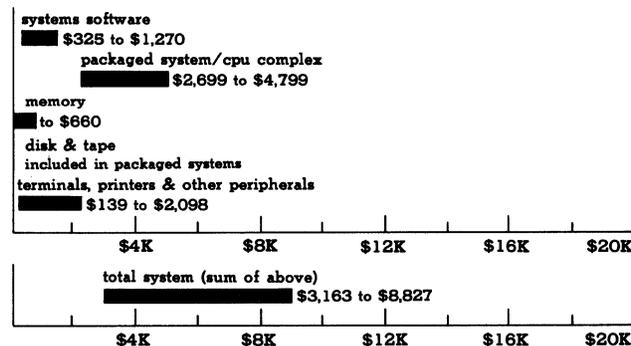
CPU • all models include a 16-bit Intel 8088 microprocessor operating at 4.77 MHz; an Intel 8087 Arithmetic Co-Processor is optionally available.

Memory • all models are packaged with 128K bytes expandable to 640K bytes; basic memory card supports up to 320K bytes and expansion board supports an additional 320K bytes.

Chassis Slots • all models include an IBM-compatible expansion bus with 4 available chassis slots except on the model that is packaged with a hard disk whose controller uses one of the available slots.



PURCHASE PRICE RANGE hardware & software



ZENITH Z-150 & Z-160 PC SERIES PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing • **SMALL SYSTEM** is based on ZF-151-21 desktop PC packaged system (includes 16-bit Intel 8088 microprocessor, 128K bytes of memory, detached keyboard, a built-in 5.25-inch 360K-byte floppy disk drive, 2 RS-232C serial ports, a Centronics-compatible parallel port, 4 available IBM-compatible expansion slots, and automatic power-on diagnostics) and the following options: MS-DOS 2.0 operating system, GW BASIC programming language, and 12-inch monochrome monitor • **LARGE SYSTEM** is based on ZW-151-22 desktop PC packaged system (includes 16-bit Intel 8088 microprocessor, 128 bytes of memory, detached keyboard, built-in 5.25-inch 10.6M-byte Winchester hard disk and 5.25-inch 360K-byte floppy disk drive, 2 RS-232C serial ports, a Centronics-compatible parallel port, 3 available IBM-compatible expansion slots, and automatic power-on diagnostics) and the following options: MS-DOS 2.0 operating system, GW BASIC and MS Pascal programming languages, Condor rDBMS data management package, 256K bytes of memory, 13-inch high-resolution monitor and 160-cps bidirectional dot-matrix printer.

Ports • all models include 2 RS-232C asynchronous serial ports and a Centronics-compatible synchronous port.

Mass Storage • all models except the single system with a hard disk can support up to 720K bytes of diskette storage on 2 built-in, 5.25-inch, 360K-byte floppy disks • the model with the built-in hard disk supports 10.6M bytes of hard disk storage on a 5.25-inch drive and 360K bytes of diskette storage.

Terminals/Workstations • all models are single-user systems.

Printers • only 160-cps dot-matrix printer available from vendor but the system is compatible with Zenith/Heath Z-25 and Z-125; Diablo Models 620, 630, 1610, 1640, 1650; Epson MX80; DEC LA34, LA36; Texas Instruments T1810; and Heath H14.

First Delivery • February 1984.

Systems Delivered • information not available.

Comparable Systems • over 30 vendors are selling MS-DOS and IBM-compatible desktop and portable microcomputers including Columbia, Compaq, Corona, Sperry, and Seequa.

Vendor • Zenith Data Systems Corporation; 1000 Milwaukee Avenue, Glenview, IL 60025 • 312-391-8744.

Canada • Zenith Data Systems Corporation; 1020 Islington, Toronto, ON M8Z 5X5 • 416-231-4171.

Distribution • through Zenith Data Systems network of 27 regional distributors and more than 950 dealers, as well as direct sales to national accounts, colleges and universities, and the Federal government.

■ ANALYSIS

Zenith has jumped onto the IBM-compatible bandwagon with the February 1984 introduction of the Z-150 desktop



Zenith Data Systems Z-150 & Z-160 PC Series

Z-150 Desktop & Z-160 Portable PC Series

and Z-160 portable PC-compatible systems. Both systems are built around a 16-bit Intel 8088 microprocessor, and use MS-DOS 1.25 and MS-DOS 2.0 as their standard operating systems. Both provide software and expansion-board compatibility with the IBM PC, thus allowing users to have access to the broad base of software and hardware expansion being developed for the IBM PC. The Z-150 and Z-160 systems are the mid-range series of micros produced by Zenith, above the 8-bit Z-89 and Z-90 desktop computers, and below the top-of-the-line dual 8-bit and 16-bit microprocessor Z-100 systems.

There are five models available in the Z-150 and Z-160 Series, all of which are essentially the same internally, except for the type and number of drives. The desktop systems are available in three configurations: single or dual 5.25-inch soft-sectored floppy disk drive, and a dual drive system in which one of the drives is a Winchester hard disk drive. The portables come in single or dual floppy disk drive configurations. All drives are entirely contained within the system cabinet. Other differences in the desktop and portables are that the portables have a built-in 9-inch amber monitor, and their detached keyboards double as covers when the system is being transported. The desktops include a detached keyboard but a monitor is not included with the packaged systems.

Memory on all models is 128K bytes expandable on the existing board to 320K, and with one expansion board, expandable to 640K. All models provide as standard equipment 2 RS-232 serial ports, and a Centronics-compatible parallel port allowing 3 peripheral devices to be supported without tying up slots on the IBM-compatible expansion board. There are 4 available slots on the expansion board on all models except the model that includes the Winchester disk drive, whose controller uses one of the available slots.

Zenith has indicated that they have tested over 175 software packages to assure compatibility with the IBM PC. These packages were off-the-shelf, without any modifications. This compatibility is built into read-only memory where all I/O statements are converted to Zenith code.

A Winchester version of the Z-160 portable model is scheduled for the near future. The Z-150 and Z-160 Series are scheduled to be available in Europe in the 3rd quarter of 1984, and a kit from Heath Company, another Zenith subsidiary, for the Z-150 desktop model is scheduled to be available during the 2nd quarter of 1984. The Z-150s and Z-160s might cut into IBM's sales of their PCs because of the slow delivery time. But once IBM cuts their delivery schedule (from their current 4 month estimate on large-volume deliveries) Zenith might have a tougher time selling their PCs since they do not offer a marketing gimmick or technological advantages for their systems, such as greater speed, more memory, or greater disk capacity. They have included the asynchronous ports and Centronics-compatible port as standard equipment, an easier to use keyboard, and greater graphics capabilities into their systems, but these particular advantages might not be able to offset the IBM name or status for prospective customers.

□ Strengths

One of the best features of the Zenith Z-150 and Z-160s is the complete compatibility with the IBM PC, coupled with the extended delivery dates of the IBM PC. This means that anyone who might not be able to obtain an IBM PC immediately, yet still wants to be able to operate the software and hardware expansion board capabilities of the IBM PC, can purchase a Z-150 or Z-160.

An interesting feature on the Z-160 is its pop-up disk drive housing, which provides for the half-height drives to be raised for convenient use. When the unit is being transported the drives lock down inside the case.

A feature built into the Zenith PCs provides 3 scrolling modes: basic, smooth, and jump. This is much more comprehensive than their IBM PC counterparts. The video display system provides smooth scrolling and high-speed display while being virtually 100 percent flicker free.

Basic diagnostics provided in ROM with the Z-150s and Z-160s, execute in less than 5 seconds. Diagnostics come in 3 levels: basic diagnostics, a menu-driven set of ROM-based diagnostics, and a comprehensive disk-based set of diagnostics. These should allow the identification of just about any machine malfunction; and with modular design of the system components can be changed in a minimum of time. In addition, Zenith's on-site support capabilities are something almost unheard of in the microcomputer environment.

The keyboard, which is standard on all Z-150 and Z-160 models is an IBM-compatible keyboard which Zenith has redesigned slightly to make certain improvements without changing the basic layout. The keyboard has an enlarged L-shaped return key, and a double-width shift key located where it seems more logical. In addition, the backslash key has been moved, and LEDs (light emitting diodes) have been added to signal when the keyboard or numeric keypad is shifted.

□ Limitations

Zenith has opted to build its compatibility into ROM, which uses proprietary I/O statements to provide its IBM PC compatibility. This chip-level compatibility saved Zenith from modifying software, but if IBM ever changes its architecture Zenith would be vulnerable to this change and would have to copy the changes into its ROM statements. Currently it does not appear that IBM plans to change its architecture, but the company has been known to make changes (in larger machines) to maintain competition with the plug-compatible vendors.

To entice buyers, Zenith has built into their system greater expansion capabilities than the IBM PC, including 2 RS-232 serial ports and a Centronics-compatible port as standard equipment; however, once IBM becomes current with their delivery dates the question remains—why would anyone buy a clone of the real thing? Zenith might have been better off offering features such as more speed capabilities (compare Sperry's PC with 4.77-MHz or 7.14-MHz internal speeds), or more disk capacities (compare Eagle's 72M-byte hard disk capabilities) rather than intangibles such as ease of use (more logically



Zenith Data Systems Z-150 & Z-160 PC Series

Z-150 Desktop & Z-160 Portable PC Series

designed keyboard), larger power supply, and enhanced video characteristics.

Also, Zenith's current support for only 10M bytes of hard disk storage is less than the IBM PC's supported 20M bytes.

■ SOFTWARE

□ Terms & Support

Terms • software products are available for a one-time fee for license purchase.

Support • corrective updates, enhancements, and custom configurations from the manufacturer; telephone support lines from manufacturer • support through distributors and dealers.

□ Software Overview

Zenith's Z-150 and Z-160 PCs are IBM PC-compatible products that take advantage of all the available software products written for the IBM PC and compatibles. When the Zenith PC was announced in February 1984, Zenith had already tested over 175 off-the-shelf software packages to assure compatibility. Zenith indicates that this testing program will continue, and lists of tested software will be published periodically. In addition, a family of tested and approved software is offered under the Zenith name. This is value-added software which exceeds the performance of the off-the-shelf versions.

Both MS-DOS 2.0 and MS-DOS 1.25 are the standard operating systems on the Zenith PCs. CP/M-86 and Concurrent CP/M-86 are also available. An MS-DOS tool kit package is available which allows a system programmer to modify MS-DOS's BIOS.

For program/system development GW BASIC interpreter, MS FORTRAN, and MS Pascal compilers are available. The compilers support Zenith PC's optionally available Intel 8087 co-processor.

Electronic spreadsheet packages available from Zenith include Lotus 1-2-3, Microsoft Multiplan 1.1, and Sorcim Corporation SuperCalc. Word processing is handled by Microsoft's Word 1.1.

Currently, the BPI Accounting Series is available from Zenith, with Peachtree's accounting products scheduled for release in the 2nd half of 1984.

There are six graphic dump utilities available supporting IDS Prism, Okidata, MPI, MX-80, Printek 920, and Transtar printers.

□ Operating Systems

MS-DOS 1.25 • single-user, interactive and batch processing disk operating system developed by Microsoft; has its equivalent in IBM PC-DOS 1.2 • supports maximum diskette storage of 160K bytes in up to 64 different files in double-sided format; handles records from 1 to 65,546 bytes long in file transfers; executes external (disk based) commands, giving the user ability to expand the DOS vocabulary to the limits of disk space • includes batch processing capabilities with automatic execution on power up; user commands include DATA, TIME, DISKCOPY, FORMAT, RENAME, ERASE, COMP (compare), CHKDSK (check disk) • innovations include a double File Allocation Table (disk map) with third memory resident copy for efficient disk access, a disk mapping technique which conceptualizes conventional tracks and sectors as a single dimensioned array of logical sectors, and allocation units which subdivide data section into 1, 2, 4, 8, 16, 32, 64, or 128 logical sector groups, eliminating disk external fragmentation typical of conventional track-sector mapping • MS-DOS is divided into four parts; a device independent I/O handler, an I/O command processor, reference and jump vectors in low memory, and a command processor; the device independent I/O handler on hidden file MSDOS.SYS is the core of MS-DOS through which I/O must be directed; the I/O processor physically moves data and instructions by means of hidden file IO.SYS as commanded by MSDOS.SYS; the command processor, using the COMMAND.COM program is responsible for interface between user and MS-DOS, error trapping, batch file processing, interpreting user commands and executing file names • MS-DOS 1.25 is a predecessor of MS-DOS 2.00:

\$150 lcms

MS-DOS 2.00 • single-user, interactive and batch processing operating system with Unix-like hierarchical directories, piping functions, filters and hard disk support; equivalent to IBM PC-OS 2.0 • supports up to 180K bytes in up to 64 different files in single-sided format and up to 360K bytes in up to 112 files double sided, and 5M or 10M bytes with thousands of filenames on hard disk; handles records from 1 to 65,535 bytes long in file transfer, executes external (disk based) commands giving the user ability to expand the DOS vocabulary to limits of disk space • batch processing capabilities with automatic execution on power-up, user commands include: DATE, TIME, COPY, ECHO, PATH, MKDIR, RMDIR, CHDIR, TREE, RECOVER, GRAPHICS, BREAK, and CTTY • additions over DOS 1.25 in performance include hierarchical directories to facilitate hard disk use, numerous performance enhancements, redirection of input/output (I/O), piping of functions (sequentially rather than concurrently as in Unix), higher sector density per track (9 sectors per track vs 8 in DOS 1.25), and installable device drivers • MS-DOS is divided into four parts: a device independent I/O handler, an I/O processor, reference and jump vectors in low memory, and a command processor; the device independent I/O handler on hidden file MSDOS.SYS is the core of MS-DOS through which I/O must be directed; the I/O processor physically moves data and instructions by means of hidden file IO.SYS as commanded by MSDOS.SYS; the command processor, using the COMMAND.COM program, is responsible for interface between user and MS-DOS, error trapping, batch file processing, interpreting user commands and executing file names • MS-DOS 2.00 will read earlier MS-DOS diskettes; there are several unique system interrupt calls and file descriptors that make programs utilizing these features non-transportable between MS-DOS 2.00 and earlier versions • an editor, debugger, and other utilities are provided:

150

CP/M-86 • a 16-bit enhanced version of the 8-bit CP/M operating system designed to support the Intel 8086 or 8088 microprocessors; incorporates all the basic elements of the CP/M system but adapts these functions to the larger and faster operating environment • consists of 4 elemental structures: Basic Input/Output System (BIOS), Basic Disk Operating System (BDOS), command Console Processor (CCP), and a Transient Program Area (TPA) • BIOS is the modifiable portion of the operating system enabling users to tailor CP/M systems to meet specific configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system • BDOS provides all the disk management control; supports up to 16 logical drives containing up to 8M bytes each, for a maximum of 128M bytes of online storage; any one file can reach the full drive size • CCP provides the interface between the user's console and the rest of the CP/M system; it reads, interprets, and executes commands entered from the console; commands are both built-in commands and transient commands; transient commands are loaded into the TPA and executed • TPA is the area designated to hold programs that are loaded from disk and then executed • standard utilities provided include: DDT-86 interactive debugger; PIP file transfer utility; SUBMIT batch control utility; ED command-oriented text editor; ASM-86 assembler; STAT system status utility; and GENCMD that processes Intel "H86" format files • memory requirements depend on number and types of options implemented • supports up to 1M bytes of memory; requires 56K bytes of memory and an ASCII terminal:

250

Concurrent CP/M-86 • a single-user, multitasking operating system that is compatible with CP/M-86 and MP/M-86 operating systems; provides a virtual console environment where each virtual console can be performing its own task; one virtual console is always mapped to the physical console and is the foreground console, with all other virtual consoles being background consoles; switching a virtual console to the physical console is accomplished through the use of function keys (typical installations use from 4 to 10 function keys for this process) • supports up to 1M bytes of memory, multiple list devices, and up to 16 logical disk drives, each containing up to 512M bytes of storage

LCNS: one-time fee for license purchase. NA: not available. Prices effective as of February 1984.



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for a maximum of 8G bytes of online storage • features include: Real-Time Monitor providing process control and dispatching, as well as queue, flag, and clock management; allows processes to share reentrant code; file management with date and time stamping; and protection of user files and directories through the use of optionally assigned passwords • requires an Intel 8086/8088 microprocessor, 256K bytes of memory (recommended), a console device, disk storage, and a real-time clock • developed by Digital Research, Inc:

NA

MS-DOS Tool Kit Package • provides tools necessary for a system programmer to modify MS-DOS operating systems BIOS • includes BIOS source listings and notes, Macro 86 assembler, 2 full-screen editors, CREF, and other miscellaneous utilities:

NA

□ Data Management

A disk file manager is included as part of each of the operating systems which allows users to perform all basic file tasks.

Condor rDBMS • relational data management system • provides capabilities for creation, maintenance, inputting, and updating of data; report writing and analysis; and operator aids • supports up to 32,767 records per file, from 2- to 1024-byte records, 1 to 127 fields per record, 1 to 127 bytes per field, numeric fields up to 10 digits stored as 1- to 4-byte integers and sort sizes up to 128K bytes • features provided are: self-contained query language; data entry and updating using a CRT screen; ability to handle 5 data types: alphabetic, alphanumeric, date, dollar, and numeric; audit trail capabilities and hatch operations • support includes a Help facility; sorts can be applied on up to 32 fields:

\$650 lcms

Condor File Manager • provides all functions of file management including data entry, updating, sorting, merging, analyzing and printing of data • supports up to 32,767 records per file, 1023 characters per record, 127 bytes per field, and 127 fields per record • includes a Help facility:

290

□ Communications/Networks

Currently Zenith Z-150 and Z-160 systems support CPS asynchronous communication which is available from a third-party vendor. An ETHERNET board with accompanying software is scheduled to be released in late May 1984.

□ Program Development/Languages

GW BASIC Interpreter • implementation of Microsoft BASIC-86 • provides dual-mode graphics capability in medium and high resolution; drawing statements are available for creating lines and circles or painting the screen; screen editor implements special function keys and multistatement lines • allows calling of machine language subroutines, merging of multiple programs, and transferring control to specific program lines during certain events • IF/THEN/ELSE constructs are supported as well as trace/no trace for easy debugging:

\$175 lcms

MS FORTRAN • implements FORTRAN-77 • includes double-precision arithmetic; long and short integers with selectable default integer length; CLOSE statement; full-form OPEN statement; Hollerith data; formatted direct access files; unformatted sequential access files; ERR = specifier; compiler directions added to provide programmer with source text INCLUDE facility; and back-slash edit for control for use in interactive I/O • supports Intel 8087 co-processor • requires 192K bytes of memory:

195

MS Pascal • compiler • features include: expanded string support with variable size LSTRING type; UNITS and USES interface for clean separate compilation; machine-oriented WORD type and operators; dynamic and conformant arrays using SUPER array types; attributes for variables and procedures, and machine address type and operators • includes low-level escapes such as direct access to memory locations, call to assembly language subroutines, and retype function • supports Intel 8087

co-processor • requires 192K bytes of memory:

295

□ Application Packages

Lotus 1-2-3 • an integrated electronic spreadsheet, database and graphic package which supports full 8-color presentation • designed to perform spreadsheet analysis including "what if" analysis, create graphs or charts, and manipulate information files • a Help key provides over 200 possible screens of information • developed by Lotus Development Corporation:

NA lcms

Multiplan • electronic spreadsheet that provides capabilities to manipulate data for planning, forecasting, and "what if" calculations • supports up to 63 columns in width and 255 rows in length; provides 40 built-in functions including TRUE, FALSE, STDEV (standard deviation), SINE, COSINE and LN, LOG (logarithmic functions) • includes a sort command which allows sorting on columns in ascending or descending order and a Help facility • developed by Microsoft:

250

SuperCalc • electronic spreadsheet that provides capabilities to manipulate data for producing in-depth analysis and modeling • supports up to 63 columns in width and 254 rows of data in length; up to 127 characters for report headings and supporting footnotes; provides conditional calculation statements IF, AND, OR, and NOT; supports up to 51.2K bytes of usable workspace • includes a Help facility • developed by Sorcim Corporation:

295

Microsoft Word • word processing package • features include multiple windows; a set of preformatted options called style sheets; capabilities for footnotes, subscripts and superscripts; glossary buffers; multiple fonts and formats; and a horizontal scroll for text that is wider than the screen • direct formatting allows the user to designate characters, words, paragraphs or series of paragraphs to be boldfaced, italicized, underlined, or struck through:

375

BPI Accounting • modular package consisting of general ledger, accounts receivable, accounts payable, inventory control, payroll, and job cost • modules can be installed on standalone basis.

BPI Accounts Payable • supports accrual or cash method of accounting • provides for multiple bank accounts with optional bank reconciliation for each account, each vendor, or selected vendors; allows invoices previously entered to be edited to revise the due date, discount or pay status or can be deleted; provides flexible aging and cash requirements reports which lists unpaid invoices for each vendor; check disbursements can be selected by due date, vendor(s), or voucher(s); account distribution report lists invoices by general ledger account number for an audit trail:

595

BPI Accounts Receivable • supports both balance forward and open item accounting • provides capabilities to: detail each item on the ledger with amounts and dates; print an alphabetical listing of all accounts cross-indexed to account numbers; analyze activity for one account or more at a time; and produce an aged trial balance for early collection and business planning • allows customized statement with company name and address, one line for customized payment terms and two for message or advertising:

595

BPI General Ledger • uses a fixed set of chart of accounts codes; supports up to 10 departments each having their own income statement • uses subledgers to capture detail backup information to general ledger control accounts; provides specialized journals of purchases, cash disbursements, invoice register, and cash receipts; provides detailed schedules of accounts receivable and accounts payable • all essential reports are available including journals, general ledger, trial balance, and financial reports:

595

BPI Inventory Control • purchase order module allows entry of order quantities to vendors and passes this data to the inventory file; maintains customer backordered items online; prints purchase orders complete with quantities, pricing, and shipping instructions • provides for printing of packing list word to accompany customer



Zenith Data Systems Z-150 & Z-160 PC Series

Z-150 Desktop & Z-160 Portable PC Series

shipments; prints price labels for each item; provides an inventory report by item, location, backordered item required reorder items, and cost layers • maintains 3 cost layers with 3 costs associated with quantities received; allows for use of inventory overage or shrinkage accounts to adjust book inventory against actuals:

795

BPI Job Costing • provides a breakdown of data by job and work code • maintains up to 6 expense categories including: administration, equipment, labor, material, subcontractors, and other • maintains journals for cash receipts, job purchases, inventory transfers, labor costs, and general journal • reports available include: job estimate, monthly job cost summary, retainage profit and loss report, and income report • provides both completed-contract and percentage of completion methods for reporting income:

795

■ HARDWARE

□ Terms, Support & Documentation

Terms • available on a purchase only basis from manufacturer • also available through ZDS network of 23 U.S. and Canadian wholesaler distributors and more than 950 retail outlets including Control Data Business Centers, and through direct sales to national accounts, educational institutions and government agencies; also available through the 73 North American Heathkit Electronics Centers and Heath mail order catalog; distributed overseas through wholly owned subsidiaries in major European countries and more than 40 independent distributors throughout the world.

Support • 90-day warranty, on-site service for both parts and service • after initial 90-day period, contracts for on-site or off-site service available through any of the Zenith centers across the U.S.

Documentation • an SMZ service manual provides complete hardware support, including schematics and circuit diagrams • a TM-150 manual provides programming information, including BIOS listing.

□ Physical Specifications

PC-150

System Unit • 16x6.25x16.5 inches • approximately 42 pounds with keyboard and 2 drives.

Display • 4 different displays available.

Keyboard • information not available.

PC-160

System Unit • 19.5x8.38x19.3 inches • approximately 33 pounds with keyboard and 2 drives.

Display • integrated with system unit.

Keyboard • information not available.

□ Systems Overview & Configurability

The Zenith 150 Series and 160 Series (Zenith Z-100 PCs) are IBM compatibles designed around Intel 8088 microprocessors. This line of Zenith PCs includes 3 desktop systems and 2 portable systems. All of the packaged systems have 128K bytes of RAM expandable to 640K bytes, 2 RS-232C serial ports, a Centronics-compatible parallel port, RGB color output (desktop models also provide gray-scale monochrome output), an IBM expansion bus and a detached keyboard.

Desktop systems (Z-150 Series) are available in 3 configurations which include: a single 5.25-inch floppy drive system, a dual 5.25-inch drive system, and a single 5.25-inch floppy disk drive and a single 10.6M-byte Winchester hard disk drive system. These desktop systems do not include a monitor as standard equipment.

The 2 portable (Z-160 Series) systems both include a built-in 9-inch amber monitor, and also include a single 5.25-inch floppy disk drive or dual 5.25-inch floppy drives.

With the inclusion of a socket for Intel 8087 co-processor, 2

RS-232 serial ports and a Centronics-compatible parallel port on the motherboard as standard equipment, the co-processor and 3 peripherals can be supported, while still leaving 4 available chassis slots. The exception to this is the system with the hard disk whose controller uses 1 of the available slots. If memory is expanded beyond 320K bytes, an expansion board, which supports 320K-byte additional memory (for 640K bytes total), is required, and also uses one of the expansion slots.

All systems also include 32K bytes of ROM which provide function for I/O to and from screens, keyboard, disk, and serial and parallel ports. Also included in ROM is a full Microsoft Debug-compatible debugger with extensions to set the video modes and to boot from disk. It is in the ROM where Zenith controls the IBM compatibility by using proprietary I/O statements so that individual software wouldn't have to be changed.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

System Maximums • all Zenith 150 desktop systems and 160 portable systems support the same maximums except currently the portables will not support hard disk • Zenith has indicated a hard disk version of its portables are in the planning stages.

All models are single-user systems, with an Intel 8088 microprocessor, 32K bytes of ROM, and support for up to 640K bytes of RAM; the 160 Series accommodates dual 360K-byte diskette drives for 720K bytes of total diskette storage, and for the 150 Series a 10.6M-byte hard disk and a single 360K-byte diskette drive are available; 2 RS-232C serial ports, a Centronics-compatible parallel printer port, and 4 available expansion slots are maximum on both series.

□ Packaged Systems

The Z-100 PC is available in 2 basic configurations: a desktop and a portable, with 5 models available. The only difference in the 3 desktop models and the 2 portable models is the amount of diskette/disk storage packaged with each model. In addition, the portable models include a built-in 9-inch amber monitor, while the desktops do not include a monitor as standard equipment.

ZF-151-21 • includes desktop cabinet, 16-bit Intel 8088 microprocessor, 128K bytes of dynamic RAM with internal parity check, single built-in 5.25-inch 360K-byte floppy disk drive, detached keyboard, 2 RS-232 serial ports, a Centronics-compatible parallel printer port, 4 available IBM-compatible expansion slots, and automatic power-on diagnostics:

\$2,699 prch

ZF-151-22 • includes same as ZF-151-21 except includes 2 built-in 5.25-inch 360K-byte floppy disk drives:

3,099

ZW-151-22 • includes same as ZF-151-21 plus a single built-in 5.25-inch 360K-byte floppy disk drive and a single built-in 5.25-inch 10.6M-byte Winchester hard disk drive:

4,799

ZFA-161-21 • includes portable cabinet, 16-bit Intel 8088 microprocessor, 128K bytes of dynamic RAM with internal parity check, single built-in 5.25-inch 360K-byte floppy disk drive, built-in 9-inch amber phosphor display monitor, detached keyboard, 2 RS-232C serial ports, a Centronics-compatible parallel printer port, 4 available IBM-compatible expansion slots, and automatic power-on diagnostics:

2,799

ZFA-161-22 • includes same as ZFA-161-21 plus 2 built-in 5.25-inch 360K-byte floppy disk drives:

3,199

□ CPU

All models include a 16-bit Intel 8088 microprocessor operating at 4.77 MHz. An Intel 8087 Math Co-processor is optionally available.

PRCH: purchase price. **NA:** not available. **Prices effective as of February 1984.**



Zenith Data Systems Z-150 & Z-160 PC Series

Z-150 Desktop & Z-160 Portable PC Series

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, approximately 70 basic instructions with up to 30 addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands, extensive string and block move facilities • powerful segmentation facilities allows memory partitioning for multitasking, concurrent or multiuser capabilities • a pseudo-superset of the Intel 8080 instruction set where translation to 8088 is straightforward • instruction set compatible with 8086.

Intel 8087 Math Co-Processor • provides extension of Intel 8086/8088 for approximately 100 times faster hardware execution of number-crunching mathematics • 84-bit wide data paths; 80-bit wide working registers perform with 18-decimal digit accuracy; 8 data formats and close interfacing to mother CPU result in a powerful numeric data processor (NDP) • to utilize the Intel 8087 processor capabilities it must be supported by the language processor or have specific 8087 assembly subroutines • uses available slot on motherboard on all models:

NA prch

□ Memory

All Zenith 150 and 160 systems are packaged with 128K bytes of RAM which can be expanded to 320K bytes, in 64K-byte increments, on the motherboard. To expand beyond 320K bytes an expansion board is required that uses one of the available chassis slots. With this expansion board, up to 640K bytes are supported on the systems.

Z-205-1 • 64K-byte memory expansion kit • used to expand beyond the 128K-byte basic memory:

\$165 prch

Z-205 • 256K-byte dynamic RAM card:

799

□ I/O & Communications

Zenith's 150 and 160 Series PCs are designed with an IBM-compatible expansion bus, with 4 available expansion slots, to accompany the 2 RS-232C serial asynchronous ports and a Centronics-compatible parallel printer port. The asynchronous ports operate in full- or half-duplex modes at a rate of 110 to 19.2K bps. The 2 connections are accessible from the rear of the units. The Centronics-compatible parallel printer port uses a 25-pin D-connector which is also accessible from the rear of the unit.

□ Mass Storage

All Z-100 PC packaged systems include at least one 5.25-inch 320K-byte floppy disk drive. Two of the packaged systems include dual floppy disk drives and one includes a 5.25-inch 10.6M-byte Winchester disk drive.

5.25-Inch Floppy Drive • 320K-byte capacity; 48 tracks per inch; double-sided, double-density • price included in packaged systems; controller is connected to motherboard and supports up to 2 drives.

5.25-Inch Winchester Drive • 10.6M-byte capacity, 12.76M bytes unformatted • 4 heads, 306 cylinders; 5M-bps data transfer rate • 3-millisecond track-to-track access time; 85-millisecond average access time; 8.33-millisecond rotational latency • price included in packaged system • controller requires one of the available chassis slots • not available on 160 Series.

Tape • the Z-100 PCs currently do not support any tape.

□ Terminals/Workstations

All the Z-100 PC models (Z-150s and Z-160s) include a detached keyboard. The Z-160 portable models also include a built-in 9-inch monochromatic video display, while the Z-150s support either a 12-inch amber or green phosphor chromatic monitor or a 13-inch color composite display. The Z-160 can also optionally attach a color video display.

Z-160 9-Inch Display • built-in 9-inch diagonal non-glare amber monochrome monitor; 2000-character display of 25 lines by 80 characters with the 25th line a user status line • supports composite video input • standard display which is included on all Z-160 portable packaged systems.

ZVM-131 Video Monitor • 13-inch diagonal color, medium-resolution monitor; 2000-character display of 25 lines by 40 characters with the 25th line a user status line • graphics resolution 320x200 pixels (color), 640x200 (black and white); supports composite and analog RGB inputs • optionally available on all models:

\$379 prch

ZVM-135 Video Monitor • 13-inch diagonal color, high-resolution monitor; 2000-character display of 25 lines by 80 characters with the 25th a user status line; supports composite and analog RGB inputs • includes RGB cable, audio amplifier and speaker • optionally available on all models:

599

ZVM-122 Video Monitor • 12-inch diagonal non-glare monochrome monitor; 2000-character display of 25 lines by 80 characters with the 25th line being used as status line • supports composite video input • used on Z-150 desktop models:

169

ZVM-123 Video Monitor • 12-inch diagonal non-glare monochrome monitor; 2000-character display of 25 lines by 80 characters with the 25th line being used as status line • supports composite video input • used on Z-150 desktop models:

139

Keyboard • detached low-profile IBM-compatible but redesigned 85-key sculptured keyboard • keyboard has enlarged L-shaped return key, double-width shift key located where it should be, the backslash key has been moved, and LEDs (light emitting diodes) signal when the keyboard or numeric keypad is shifted • includes 10 function keys, 17 keypad keys, and 57 alphanumeric; caps lock and numeric lock have LED indicators; cursor control keys include: page-up, page-down, home, end, insert, and delete • bundled with the basic system prices on both the 150 and 160 Series.

□ Printer/Graphics

Printers compatible with the Z-100 PCs (Z-150s and Z-160s) and supported by both hardware and software include: Zenith/Heath Z-25 and Z-125; Diablo Models 620, 630, 1610, 1640, and 1650; Epson MX 80; DEC LA34 and LA36; Texas Instruments T1810; and Heath H14.

Z-125-AA • 160 cps bidirectional dot-matrix printer; 9x9 dot matrix • 95-character ASCII set and 33 block graphic characters • 10, 12, 13.2, or 16.5 cpi; 132 columns; 6 or 8 lpi; handles up to 6-part forms from 3.5 to 17.8 inches wide • RS-232C serial interface:

\$1,499 prch

• END