

# Xerox Diablo 3000 and 3200 Small Business Systems

## MANAGEMENT SUMMARY

Through the advantage of their leadership in technology and innovative design and the proven peripherals of Xerox Companies such as Shugart and Diablo, Xerox Office Products Division produced their small business systems, the Diablo 3000 and Diablo 3200. The systems are well-packaged combinations of proven mass storage devices, terminals, system software, and printers with a central processor. The hardware and system software are complemented by an ever-growing base of distributor-provided application programs. In the United States, the distributor is Shasta General Systems.

When the Diablo 3200 was announced in 1976, the group responsible for the development, manufacture, and marketing of the Xerox small business systems was part of the Systems Division of Diablo Systems Inc., a company wholly owned by Xerox. This same group, now known as the Small Business Systems Operations, was split off from Diablo Systems Inc. and has become a strategic business unit within the Office Products Division of Xerox. Electing to continue the Diablo name as model identification, the Small Business Systems Operations of Xerox introduced the Diablo 3000, an entry-level, desktop system in late 1979.

Part of the success of the Diablo line of Xerox small business systems in the marketplace can be attributed to the application software and service and support provided by their carefully selected distributors around the world....in the U.S., Shasta General Systems.

Shasta General and its dealer network have developed application packages for the Diablo 3000 and 3200 systems ➤

Xerox Corporation, Office Products Division, has added another model to the Diablo Small Business System product line. The Diablo 3000 is an entry level system which is software compatible with the Diablo 3200. These systems are sold in conjunction with an extensive applications program library through a world-wide distributor network.

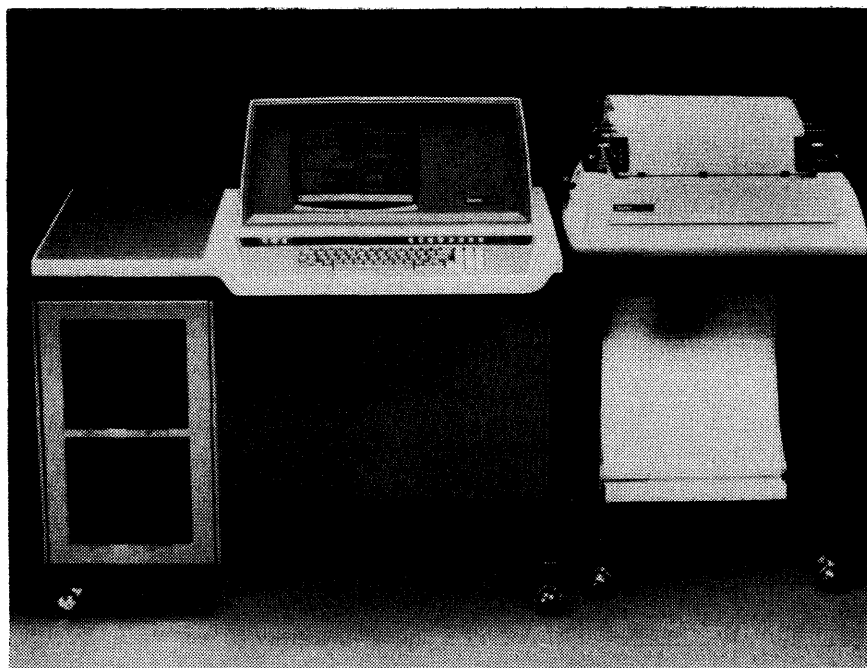
**Main memory:** to 64K bytes.  
**Disk capacity:** 3000, to 2.4 megabytes; 3200 to 25 megabytes.  
**Workstations:** 3000, 4 plus console; 3200, 8 plus console.  
**Printers:** 3000, to 200 cps; 3200, to 300 lpm.

## CHARACTERISTICS

**MANUFACTURER:** Xerox Corporation Office Products Division, Small Business Systems Operations, 440 Oakmead Parkway, Sunnyvale, California 94086. Telephone (408) 733-2300.

Diablo Systems Incorporated, a subsidiary of Xerox Corporation, manufactures moving-head disk drives, daisy-wheel and matrix printers, terminals, and the Diablo 3000 and 3200 small business systems.

The Small Business Systems Operations is responsible for both the development and manufacture of the Diablo line of small business systems. Engineering, System Software Development, and Marketing are housed in Sunnyvale, while manufacturing is in a Xerox facility in the Dallas, Texas area. ➤



The Diablo 3200 system pictured here includes 32K bytes of RAM memory, four double density diskette units for 2.4 megabytes of storage and a Diablo matrix printer. The printer includes the print stand, forms tractor, and paper stand. The CRT console and diskette drives are housed in a workstation configuration.

## Xerox Diablo 3000 and 3200 Small Business Systems

▷ to meet the specific needs of distributors, manufacturers, service companies and professionals. Currently available application software for business markets includes order entry, billing, accounts receivable, inventory control, manufacturing systems, accounts payable, general ledger, and financial statement preparation. In the professional markets Shasta provides time reporting and billing systems for attorneys and accountants, client financial statement preparation systems for accountants, and medical billing and practice management systems for doctors and dentists.

Comprehensive word processing software is also available for all business and professional users of the Diablo 3000 and 3200. The Shasta Word Processor is a software based system—all operating programs and menu dialog prompts are resident on the disk(ette). The business computer user is provided with features usually found only on dedicated word processing equipment. The Word Processor is document oriented and provides the ability to scroll (or search) horizontally, vertically, or by page through the entire document.

The basic configuration for the Diablo family of computers consists of a CPU with 32K bytes of main memory (expandable to 64K bytes), a 1920 character CRT, keyboard (removable on the 3000 model), two double density diskette drives, and a Diablo HyType II plastic daisy wheel printer with stand. The Diablo HyType II metal wheel printers are also supported, as well as the Diablo 200 CPS bi-directional printer. In addition, Shasta has developed a 125 cps matrix printer and a line printer (300 lpm) which are compatible with the system.

The double density diskette drives may be equipped for one-sided (600 MB/disk) or two-sided (1.2 MB/disk) types of diskette media. Two diskette drives are integrated in the Diablo 3000 while the 3200 may have up to 4 diskette drives. In addition to diskette drives, the 3200 model will also support 1 or 2 Century Data Systems 44-B cartridge-type disk units (10 MB/each) or a 14 inch Winchester type sealed disk (10 or 20 MB), provided as an option from Shasta.

The Diablo 3000 and 3200 computers are available with a single console station or in multiple workstation and/or printer configurations to support multi-tasking capabilities.

The additional workstations and printers are interfaced to the host CPU via a multi-com controller board. The Diablo 3000 utilizes a 4-port controller, while the Diablo 3200 supports an 8-port controller; any combination (not to exceed number of ports) of Diablo workstations and printers can be interfaced through these ports. Shasta also offers other workstation/controller combinations under the Shasta name which can be interfaced to the Diablo system. Included is the Shasta 3360 Intelligent workstation which makes concurrent multi-station word processing and data processing possible. ▷

▶ **DISTRIBUTOR:** The Diablo 3000 and 3200 are marketed in the United States by Shasta General Systems through 10 Shasta offices and an extensive dealer network which combined service more than 125 metropolitan marketing areas. Shasta also adds certain disk subsystems, printers, and other devices which are important in particular vertical markets.

Shasta is located at 1329 Moffett Park Drive, Sunnyvale, California 94086. Telephone (408) 734-9360.

**MODELS:** Diablo 3000, Diablo 3200.

**DATE ANNOUNCED:** Diablo 3000, October, 1979; Diablo 3200, October, 1976.

**DATE OF FIRST DELIVERY:** Diablo 3000, December, 1979; Diablo 3200, December, 1976.

**NUMBER INSTALLED TO DATE:** Diablo 3000, 250; Diablo 3200, 1500. These numbers reflect those systems installed by Shasta. Xerox policy does not permit the release of this information.

### DATA FORMATS

**BASIC UNIT:** The basic data unit used by both the Diablo 3000 and 3200 is the 8-bit word.

**FIXED-POINT OPERANDS:** May have 8 or 16 bits; decimal mode up to 30 digits in DACL and ABL.

**FLOATING-POINT OPERANDS:** None.

**INSTRUCTIONS:** An instruction consists of a one-byte operation code followed by an optional 1 or 2 byte operand. Character strings may be up to 127 alphanumeric characters in DACL; up to 254 characters in ABL.

**INTERNAL CODE:** ASCII and Binary.

### MAIN STORAGE

**TYPE:** MOS RAM.

**CYCLE TIME:** 3000, 1 microsecond; 3200, 488 nanoseconds.

**CAPACITY:** Minimum memory is 32K bytes. Memory can be expanded to 64K bytes in increments of 16K bytes.

**PARITY CHECKING:** Standard; one check bit per 8-bit word.

**STORAGE PROTECTION:** None.

### CENTRAL PROCESSOR

The Diablo 3000 uses the Intel 8085A 8-bit microprocessor; the Diablo 3200 uses the Intel 8080A 8-bit microprocessor. The processor in both the 3000 and 3200 responds to interrupt requests from each of the controllers, participates in the DMA facility, and influences the direct memory access operation of the CRT and diskette controllers. The processor comprises seven accessible working registers, a program counter, a stack pointer, and a processor status register (PSR) containing five status flags which reflect the current condition of the processor.

Four buses link the device controllers to the processor and memory: the device address bus, the memory address bus, the data bus, and the control bus.

The device address bus is an 8-bit unidirectional bus originating at the processor and connecting to all device controllers. Eight lines permit a maximum of 256 unique ▶

## Xerox Diablo 3000 and 3200 Small Business Systems

### PERIPHERALS/TERMINALS

MODEL	DESCRIPTION & SPEED	MANUFACTURER
<b>CRT TERMINALS</b>		
3355	12" CRT/keyboard, 1920 characters, 96 character ASCII, 24 lines by 80 characters, 7 x 9 dot matrix, typewriter style keyboard, 10 key numeric pad	Shasta
3360	Same as 3355 except includes 32K RAM for downloading certain application programs	Shasta
3280	12" CRT/keyboard, 1920 characters, 96 character ASCII, 24 lines by 80 characters, 7 x 9 dot matrix, typewriter style keyboard, 10 key numeric pad	Hazeltine
<b>PRINTERS</b>		
3311	Diablo HyType II 1345, 132 Column, 45 CPS	Diablo
3312	Diablo Matrix Printer, 132 Column, 200 CPS	Diablo
3313	Diablo HyType II 1355 WP, 132 Column, 40 CPS	Diablo
3319	Shasta Line Printer, 132 Column 300 LPM	Shasta
3357	Diablo Hyterm 1640, 132 Column, 45 CPS	Diablo
3358	Diablo Hyterm 1650, 132 Column, 40 CPS	Diablo

➤ In addition to the Shasta application software for business and professions, there is a comprehensive system software library for the Diablo 3000 and 3200 provided by Xerox. Included are a single or multiple terminal operating system, applications development software and an extensive library of system utilities.

The Diablo applications development software includes a job control language (JCL) executor, an assembly language, the Diablo Application Compiler Language (DACL), the Advanced Business Language (ABL), a File Access Method (FAM) and a source code editor (UPDATER). Utility software provides the user with file handling, sort/merge, diagnostic and communications capability at no additional charge.

Shasta also offers a user-oriented report generator (WH12) which can also be used to extract data from data processing files for use in word processing (WHIZ WP) and Chameleon, a file maintenance program generator. Both the Diablo models offered by Xerox provide communication capability through a synchronous/asynchronous programmable communications controller. Specific support is available for Teletype compatible asynchronous communications and for the BIM 2780 and 3780 protocols.

Diablo hardware configurations distributed by Shasta range in price from \$13,995 up to \$60,000. Shasta application package prices vary, depending upon the application involved and the amount of customization requested by the end user. Individual application charges cover a broad spectrum from \$500 to more than \$5,000.

#### USER REACTION

During August 1980, Datapro interviewed 8 Diablo 3200 users selected at random from a list of over 50 users supplied by Shasta General Systems. Each of the users had one system. The group included one new user at 2½ months to two veterans with 2 years of service. The remaining five respondents were in two categories: 3 at less than 1 year of service and 2 between 12 and 20 months. ➤

➤ addresses to be generated. The bus contains an address when there is a programmed transfer of data between processor and controller.

The *memory address bus* is a 16-bit unidirectional bus which terminates at memory and connects to all DMA device controllers as well as memory and the processor. Sixteen lines permit a maximum of 65,536 memory locations to be addressed. The bus contains an address when there is a memory access by any DMA device.

The *data bus* is an 8-bit bi-directional bus connecting the processor and all device controllers in the system. Each time data is transferred in the system as a result of a direct memory access, a programmed input/output, or an interrupt operation, the data bus carries the data being moved in the direction required.

In addition, three sets of control lines also connect the device controllers and the processor; the DMA priority chain, the interrupt request/acknowledge lines, and the input/output command lines. Complete descriptions of the control lines and their functions are included in the Interrupts and Input/Output Control entries below.

**CONTROL MEMORY:** Consists of 2K bytes of read-only memory (ROM) in the 3000 and 1K bytes in the 3200. Control memory contains the initial program load (IPL) routine and diagnostics that check the operational readiness of the system prior to IPL.

**REGISTERS:** Both the 3000 and 3200 CPU's contain two 16-bit registers and eight 8-bit registers which can be accessed by the programmer using assembly-language commands. The two 16-bit registers are the stack pointer (SP) and the program counter (PC). One of the 8-bit registers is used as the accumulator, while the remaining registers are used for temporary storage of data and addresses.

**ADDRESSING:** 3000 and 3200 memory can be accessed in three ways: direct, indirect, and immediate. Registers can be addressed only directly; that is, a register being accessed is specified as part of the instruction. In direct addressing, the memory location to be accessed is specified as part of the instruction. In indirect addressing, the assembly-language statement specifies a computer register which, in turn, contains the address of the memory location to be accessed. Immediate addressing means that the memory location to be accessed is located immediately following the memory location containing the instruction.

**INSTRUCTION REPERTOIRE:** There are 6 groups of instructions utilized by the 3000 and the 3200. The groups ➤

## Xerox Diablo 3000 and 3200 Small Business Systems

➤ All of the users were using their system for basic accounting functions. The companies represented included 1 CPA firm, 1 public accountant, 2 distributors, 2 construction-related firms, 1 manufacturer's representative, and 1 religious organization. Seven of the respondents purchased their system while one preferred to lease his equipment.

Tabulated below are the results of the Diablo user survey.

	Excellent	Good	Fair	Poor	WA*
Ease of operation	7	1	0	0	3.9
Reliability of mainframe	4	3	0	1	3.3
Reliability of peripherals	2	5	0	1	3.0
Maintenance service:					
Responsiveness	8	0	0	0	4.0
Effectiveness	6	2	0	0	3.8
Technical support:					
Trouble-shooting	5	2	1	0	3.5
Education	2	3	1	2	2.6
Documentation	2	4	1	1	2.9
Manufacturer's software:					
Operating system	1	3	0	0	3.3
Compilers and assemblers	1	0	0	0	4.0
Applications programs	3	5	0	0	3.4
Ease of programming	1	1	0	0	3.5
Ease of conversion	4	3	1	0	3.4
Overall satisfaction	5	3	0	0	3.6

\*Weighted Average on a scale of 4.0 for Excellent.

The ratings for the Diablo 3200 systems were generally high. The comments were all encouraging for a new system user. System performance and dealer support received universal accolades. Comments included: "Good, simple, basic system. It does not make pretentious claims. It works!" "A best buy, not the least expensive but certainly the most for my money." "My choice was based on my confidence in the Shasta salespeople. They sold me my system."

The ratings do support a number of comments expressed by the users. The lack of responses concerning the operating system, compilers/assemblers, and ease of programming reinforces the strength of Shasta's application programs as most of these users do not feel the need to do their own application programming.

The few maintenance problems involved a heat build-up in the central processor and sticking contacts on a workstation keyboard. These negatives were immediately counted by glowing descriptions of the maintenance support provided. One company was located 100 miles away from a service center and always received a service visit within 4 hours of a trouble call. No one reported having any extensive downtime.

The weakest link of the Diablo System seems to be in the education and documentation area. The comments indicated that some improvement had already been made and some of the fault may be with individual branches or dealers in the Shasta network. The only advice here was: "Someone has to take charge and show interest in the system. You can't drop the job on anyone without a lot of support."

➤ contain 78 instructions and 8 pseudo instructions. They are: data transfer (10), arithmetic (14), logic (15), branch (29), microprocessor control (10), and pseudo (8). The data transfer category includes those instructions which move data between registers and between registers and memory. The arithmetic category comprises all arithmetic operations, while the logic group contains the instructions which perform logical operations such as AND, OR, complement, etc. The branch category groups together all those instructions which conditionally or unconditionally change the sequence of instruction execution. Microprocessor control includes those instructions that direct the computer to perform some function such as manipulate stack pointer, halt, etc. The pseudo group comprises those instructions that command the assembler rather than the computer.

**INSTRUCTION TIMINGS:** Instruction execution timings are shown in microseconds for full-word fixed-point operands.

	3000	3200
Load/Store:	1.3 - 4.3	2 - 6.5
Add/Subtract:	1.3 - 2.3	2 - 3.5
Compare and Branch:	3.3 - 8	5 - 12

**INTERRUPTS:** The interrupt request/acknowledge lines connect to all system device controllers and tie directly to the processor. Each device controller is assigned a unique interrupt priority identification determined by its need to access the processor in comparison with other system devices. The controllers generate interrupts to the processor, which permits interrupts to be enabled or disabled by program control. Eight levels of priority interrupt are possible. An executing program can enable or disable all interrupts, enable interrupts above a specific priority level (all those below the level are disabled), and selectively enable or disable interrupts from individual controllers. Interrupt nesting occurs when a program processing an interrupt is itself interrupted by a higher-priority interrupt.

**PHYSICAL SPECIFICATIONS:** The Diablo 3000 system is a desk-top device which is 14¼ inches high, 23¾ inches wide, 23¾ inches deep and weighs 104 pounds. The Diablo 3200 system includes a desk-type console which is 29 inches high, 39 inches wide, 26 inches deep and weighs about 290 pounds. Both the 3000 and 3200 require either 115 VAC, 60-Hz or 220 VAC, 50 Hz grounded AC power. Both systems can operate in temperatures from 15.5 to 35 Degrees C., and relative humidity tolerance is 20 to 80 percent, noncondensing. No special air conditioning is required.

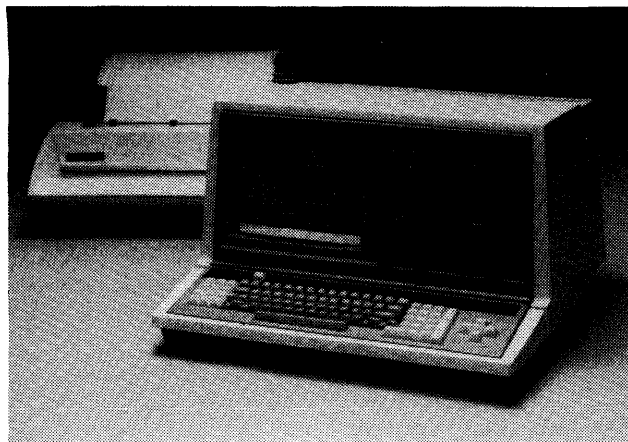
### INPUT/OUTPUT CONTROL

Diablo 3000 and 3200 peripheral devices connect to the system via their associated controllers. The input/output command lines connect to each controller and the processor to inform all controllers which type of data transfer is about to occur. Data is transferred in the system in two ways: under processor control via input and output instructions, or as the result of a direct memory access operation. All controllers generate an interrupt to the processor, and status information is transferred between the controller generating the interrupt and the processor. However, only the disk, diskette, CRT controllers, and the processor can directly access memory. The DMA devices have an additional line, the DMA priority chain, connecting their controllers to the processor. The chain establishes which DMA device or controller is in control of memory so that each accesses memory in the order prescribed by the DMA priority scheme established for the system.

### CONFIGURATION RULES

➤ Maximum configuration parameters for a Diablo 3000 and 3200 system are as follows: ➤

## Xerox Diablo 3000 and 3200 Small Business Systems



The Diablo 3000 system shown here with its associated Diablo matrix printer includes 32K bytes of RAM memory and two integral double density diskettes with a storage capacity of 1.2 megabytes in a compact tabletop configuration.

▷ The overall response and rating were very impressive. These people varied in their level of data processing experience but they all paid careful attention to their selection of their first computer system. They are all very glad that they did. □

- ▶ • Up to 64K bytes of main memory.
- Up to 2.5 megabytes of diskette storage for the Diablo 3000; up to 25.0 megabytes of on-line disk storage for the Diablo 3200.
- Up to 5 workstations for the Diablo 3000; up to 9 workstations for the Diablo 3200. These workstations include the system console.

### Workstations

Any combination of up to 4 additional printers, video displays, and hard copy workstations can be connected to the Diablo 3000 via a 5-port Multi-Peripheral Interface. The fifth port is a modem port to provide data communications capabilities.

The Diablo 3200 incorporates a Multiport option which provides eight Current Loop or RS-232 ports for printers, video displays, or hardcopy terminals.

### Disk Storage

A maximum of two diskette units can be supported by the Diablo 3000. Either single or double sided diskettes can provide for a 1.2 megabyte or 2.4 megabyte capacity. The Diablo 3200 will support up to four of these diskette units in addition to up to 2 Century Data 443 cartridge disk units. Additionally, the system will support the Shasta 14 inch Winchester type sealed disk.

### MASS STORAGE

**FLEXIBLE DISKETTE UNIT:** Each single-sided diskette stores approximately .6 megabytes of data; each double-sided unit handles 1.2 megabytes of storage. Each drive is formatted into 77 tracks (single-sided) or 154 tracks (double-sided) with a recording density of 6500 bits/inch. Each track is divided into 32 sectors of 256 bytes.

Average rotational delay is 83.3 milliseconds at 360 rpm. Average access time is 300 milliseconds for the single-sided drive and 90 milliseconds for the double-sided unit. The data transfer rate is 250K bits/second.

**CARTRIDGE DISK DRIVE:** Each disk drive has 1 fixed disk and 1 removable disk of 5 megabytes each, for a total storage capacity of 10 megabytes per drive. Rotational speed is 2400 rpm, and average rotational delay is 12.5 milliseconds. Recording density is 2200 bits/inch. There are 4 tracks per cylinder, 408 tracks per cartridge surface, 200 tracks per inch, and 2 surfaces per cartridge. Each track has 24 sectors of 256 bytes each. The data transfer rate is 312K bytes/second, and the average access time is 50 milliseconds. The unit is installable in a separate top-loading cabinet and occupies one slot in the Diablo 3200 CPU.

**WINCHESTER DISK DRIVE:** Shasta makes available two Winchester disk subsystems for the Diablo 3200: 10 megabytes, or 20 megabytes unformatted. Rotational speed is 2400 rpm and average rotational delay is 12.5 milliseconds. Recording density is 7545 bits/inch. Depending on the disk capacity, there are 2 or 4 tracks per inch and 420 or 840 tracks per drive. Each track has 76 sectors of 256 bytes each. Data transfer rate is 960 kilobytes/second and average access time is 72.5 milliseconds. The Winchester unit is installed in the 3200 desk console.

### INPUT/OUTPUT UNITS

See Peripherals/Terminals Table.

### COMMUNICATIONS CONTROL

An optional communications controller interfaces the Diablo 3000 or 3200 with other computer systems or terminals for batch processing. The controller is configured for an EIA Standard RS-232-C interface which can connect to Bell System type 103, 113, 201A/8, 203, 208A/B, and 209A or other equivalent modems. The controller provides asynchronous and synchronous communications using various protocols, including the Binary Synchronous Communications (BCS) control method, in full- and half-duplex mode. In asynchronous mode, data rates range from 60 to 9600 bits/second. In synchronous mode, data rates from 300 to 9600 bits/second. The controller also provides a programmable cyclic redundancy check.

### SOFTWARE

Three groups of software are provided with the Diablo business computers: disk operating systems; applications development software including languages, editors, and sort/merge; and utility software. An extensive library of application packages are available from Shasta General Systems.

**OPERATING SYSTEMS:** The Diablo operating system is a memory resident operating system which is loaded into CPU main memory at IPL (Initial Program Load) time. It supports up to 4 terminals and the system console on the Diablo 3000, or up to 8 terminals and the system console on the Diablo 3200. Terminals can consist of additional workstations and/or printers. Each workstation is allocated a separate partition in memory, the size of which can vary for each station and can be changed at IPL time. Additionally, partitions can be allocated for background processing. These partitions (without workstations) may be activated by any resident program.

The Diablo operating system software consists of four major programs: Command Processor, Interrupt Processor, Device Drivers, and File Manager. Support for multi-station users is provided by the appropriate language processor interpreter or executor rather than the Operating System per se. The ▶

## Xerox Diablo 3000 and 3200 Small Business Systems

► amount of dedicated memory is a function of what interpreter is in use (DACL INT or ABL EXEC). It also varies slightly between the 3000 and 3200.

The *Command Processor*, responding to keyboard commands, acquires programs from disk(ette) and loads them into memory for processing. It also provides debugging functions and maintains the system clock.

The *Interrupt Processor* permits interrupts from the system hardware elements to be processed concurrently with, and transparent to, normal system processing.

The *Device Drivers* control the physical hardware devices and data communication lines. In conjunction with the Interrupt Processor they permit executing programs to access the system peripheral devices. The Device Drivers are aided by 18 common subroutines which perform such tasks as converting binary code and interfacing assembly language applications to the Device Drivers and to the Command Processor.

The *File Manager* provides programs executing in the system with the capability to create, access, and delete files from disk(ette) storage. File Manager routines allocate files, open and close files, write, read and verify data, and acquire file status.

**LANGUAGES:** Diablo offers an Assembly Language, the Diablo Applications Compiler Language (DACL), the Advanced Business Language (ABL), and BASIC for use on the Diablo 3000 and 3200. A SORT, EDITOR/UPDATER, File Management System, and JCL EXECUTER are also provided for program development.

The *Assembly Language* provides the basic repertoire of instructions including data transfer, arithmetic, logical, branch, processor control, and pseudo. In addition, the language accommodates labels which are defined in one segment of assembly-language statements and referenced in other segments (global labels), and can perform multiple-segment assembly by assembling a collection of segments. Multiple-segment assembly permits the programmer to write subroutines that can be referenced by other programs. A cross-reference listing of statements can be produced on request with each assembly.

*DACL* is a high-level business applications language which provides a repertoire of English-like instructions in six groups: directive; control; string; arithmetic; keyboard, CRT, and printer input/output; and disk input/output. Their functions are as follows:

- Directive instructions define alphabetic, integer, and real numeric variables and define their initial values and sizes.
- Control instructions permit conditional branches within a program and allow a DACL program to call another DACL or assembly-language program into execution.
- String instructions perform string-handling operations.
- Arithmetic instructions add, subtract, multiply, divide, move, and compare real or integer numeric variables. Arithmetic operations are performed on the actual string variables rather than on their binary equivalents. Decimal arithmetic is accommodated.
- Keyboard, CRT, and printer I/O instructions control the I/O functions of these devices.
- Disk I/O instructions perform the basic disk handling functions for reading, writing, and manipulating diskette files. DACL can accommodate fixed-length as well as space-compressed record files, can record

numeric data as decimal, and can directly access a record within a file or create index files and access records via the index files.

The DACL Program Interpreter processes the compiled program code and causes the specific functions to be executed at the basic machine level. The DACL Interpreter has the unique feature of making all DACL programs completely compatible between the Diablo 3000 and 3200 models.

The *Advanced Business Language* (ABL) is a general-purpose, business-oriented applications programming language. ABL programs are written using English language words, numbers, arithmetic symbols, punctuation marks, and programmer-created words.

ABL bears some similarity to DACL but has many additional features. ABL includes an automatic translator program (TRANS) which may be used to convert existing DACL programs to the new higher-level ABL.

Some examples of these enhancements are: hierarchical data definitions; IF, THEN, ELSE, FOR, and WHILE loop control instructions, compound statements; and buffer control over I/O record formats.

The *Xerox Business BASIC* is available as an interpreter and/or compiler. It is a variation of the Microsoft BASIC-80 licensed to Xerox by Microsoft. It has been enhanced to take advantage of the Xerox small business system features.

**UTILITIES:** Utility software provides the operator with file handling, diskette/disk handling, diagnostic, and communications capabilities as well as access to the system real-time clock.

The *File Access Method* (FAM) is a record-oriented file management system designed for use with small-business data processing programs such as those written with Xerox's Advanced Business Language (ABL). FAM software is available on floppy diskette along with the ABL compiler and its interpreter, EXEC.

Data base systems such as FAM allow easy, efficient access to and manipulation of large accumulations of data stored in disk files. The data records in the files must previously exist through use of another applications program written in a programming language such as ABL. These disk files of data can then be indexed so that the randomly filed records can be accessed indirectly in subsequent applications programs; the location of any record wanted can be obtained by referencing that record's identifying key, which is listed sequentially in a separate index file, rather than having to search through voluminous records. This results in considerable time-savings and ease of access. Files accessed in this way are referred to as keyed data files.

The system editor, *UPDATER*, permits assembly language and DACL programs, source data, and text files to be created and edited interactively from the keyboard or in batch mode, where all commands are read from an update file. Commands exist to insert, delete, search, modify, sequence, skip and display data. In the edit process, the UPDATER can locate and modify a string of data within the file and then proceed to find and modify all identical strings in the file. Additional commands perform file handling operations and control and operation of the CRT and printer.

The *SORT* package operates under the control of the SORT verb in the DACL language or from the console or from the console as an operator command. Up to ten sort keys may be processed in one pass. The output options include a sorted output file, a sorted key-only file, and a pointer file containing the disk address of the records in sort-key sequence. The beginning and ending records, inclusive, to be sorted may also be specified. ►

## Xerox Diablo 3000 and 3200 Small Business Systems

► The *JCL EXECUTER* allows a series of programs to be initiated and left to run in unattended mode. The JCL Executer will read the appropriate instructions from a file and deliver them to the Command Processor. Parameters can be passed to this JCL file and execution can be controlled by conditional branching within the file.

The FILES utility provides 12 individual file handling functions, some of which are allocating, deleting, and truncating individual files; protecting and unprotected files; renaming and dating files; and displaying or printing the files directory.

Seven other utilities provide diskette/disk handling capabilities and include formatting disk; initializing the disk file directory; displaying on CRT or printer the contents of a file in either binary code (DUMP) or ASCII code (PRINT); copying the contents of a file from a source location to a destination location either by overlaying or appending to the destination data (COPY); moving selected files from one disk to another disk (SAVE); and saving the entire contents of a disk to another disk (DISK COPY).

Eight diagnostic utilities perform tests on various system components to help isolate hardware errors. These include a disk memory test, a disk compatibility test, a CRT memory test, a disk sequential scan test, two disk exerciser tests, and two memory tests. Additionally, a programming language called SERVANT is provided to write other special diagnostic routines.

Another utility, FIXD, permits access to an individual sector on disk, the correction of data in that sector, and returning the corrected sector to disk.

The communications function is provided by two utilities, ASR and BSC, which permit asynchronous and synchronous communications in batch mode. The IBM 2780 and 3780 protocols are also supported.

Access to the system real-time clock is provided by the utilities TIME and TIME SET.

Shasta's WHIZ Report Generator gives the user the ability to print special management reports from their existing data files. Simply answering questions asked by WHIZ on the video screen will generate these special reports. This report generator allows the user to select up to eleven criteria and six sort keys for each report and will also perform mathematical calculations on existing data and print the results.

Shasta's WHIZ WP generator system gives the user the ability to selectively retrieve data from their data processing files to be used by their Shasta Word Processing System. Data can be retrieved based on up to eleven criteria and the data can be pre-sorted into a desired sequence using up to six sort keys. Math calculations can also be performed on data processing files with the results transferred to word processing files.

Shasta's Chameleon File Maintenance Program Generator is a program development tool. Chameleon will generate the programs necessary to add, delete, change and sort records in a data file. The contents of the data file are defined by responding to Chameleon's Video Screen prompts to describe the size and description of each field within a file record. Both source and object programs are generated by Chameleon, so that the user can modify the resulting programs if desired.

**APPLICATIONS:** The Diablo family of Xerox systems are marketed primarily as a small business system with application software developed by Xerox distributors. In the United States, Shasta General Systems and its dealers have developed a library of application packages for end users. Shasta also has created word processing software which permits the combination of data processing and word processing capabilities when addressing application requirements.

**SHASTA WORD PROCESSOR:** The Shasta Word Processor is a software based system with all operating programs and menu dialog prompts resident on disk(ette), thus providing the business computer user with standard word processor features that have usually been found only on dedicated word processing equipment. It is a document oriented word processor which provides the ability to scroll (or search) horizontally, vertically, and page by page through the entire document.

Representative samples of Shasta application software are described below:

The *General Accounting System* consists of a General Ledger (G/L) module, an Accounts Payable (A/P) module, an Accounts Receivable (A/R) module, a Payroll (PY) module, and a Financial Reporting (F/R) module. G/L includes the detail of all journal entries and provides the necessary trial balance reports (summary trial balance, detail trial balance, working trial balance, budget trial balance) for balancing and validation of all G/L accounts. A/P includes the functions necessary to accrue liabilities to vendors by open items, distribute expenses to G/L, create vendor checks, and analyze vendor liability by aging period, vendor cash flow, and year-to-date purchases by vendor. The A/R module includes the functions necessary to enter invoices as open items and cash receipts into the A/R files and to prepare customer statements, customer aged trial balance in detail and summary, customer sales analysis, and sales tax analysis. The PY module offers the options of wage accrual and labor distribution to cost centers. It provides for entry of time card data, creation of checks with automatic calculation of all taxes and deductions, and preparation of weekly and monthly reports of earnings, deductions, labor distribution, monthly union reports, quarterly payroll summary report, and 941A and W2 forms. The Financial Reporting module includes the Balance Sheet, Income Statements with options for ratio to sales and dollar or percentage comparison to last year, schedules with options for ratios and dollar or percentage comparison to last year, Budget Reports with options for dollar and percentage variance, Budget Schedules with options for dollar and percentage variance, and Statement of Changes in Financial Position. All of the above modules include master file lists.

The *Wholesale Sales Accounting System* includes all of the functions of the Accounts Receivable module, and in addition provides for the preparation of invoices and the control of inventory and inventory back orders, including inventory status, analysis of critical items, and reorder analysis. This system is also compatible with all modules of the General Accounting system.

The *Medical Management System* consists of a Medical Group Practices module and a Medical Laboratory module. Each module provides for entry of charges, payments, and adjustments and for the preparation of special documents and reports, including: patient insurance forms; patient statements (or "Superbills") which can be used in lieu of insurance forms for many private insurance companies; account receivable aged trial balance by guarantor, insurer, governmental agency; and monthly reports of revenue by insurance company, by treating doctor, by referring doctor, by RVS code, by payment type and by facility/department.

The *Dental Management System* incorporates substantially the same features as the Medical Management System. Additional features unique to dental practice such as contract billing and a group dental care plan are being implemented.

The *Accountant's Client Reporting System* is designed to give accountants the ability to provide complete accounting service and financial reporting for their clients, including multiple-level reporting at corporate, division, and cost center/department levels. It provides for transaction entry ►

## Xerox Diablo 3000 and 3200 Small Business Systems

► from various sources such as sales, cash disbursements and payroll, and a full array of G/L trial balances and financial reports; trial balance in summary or detail, working trial balance, budget trial balance, balance sheet, income statements with options for ratio to sales and dollar and percentage comparison to last year, schedules with options for ratios and dollar and percentage comparison to last year, budget reports with options for dollar and percentage variance, statement of changes in financial position, payroll summary report, and 941A and W2 forms.

The Shasta *Professional Time Accounting System* accommodates all the accounting and reporting requirements of the professional firm (Attorney, CPA, etc.) by accumulating the time spent by all staff members for each client, insuring proper and timely billing of clients for each matter, and providing analysis of client activity and the time-effectiveness of various staff members.

Program modules for this system include posting time spent on each client/account, automatic drafting of billing memorandums for staff review, automatic or discretionary preparation of clients' actual bills, posting of retainers and payments on account, preparation of client statements automatically summarizing all activity, and the many management report modules.

These management reports include: accounts receivable aged trial balance, client activity analysis, billing and billing variance reports, work-in-progress report, time utilization analysis, service/category analysis report, client directory and account list, and management's employee performance/utilization report.

The system is also useful for architects, engineers and others who account for time, bill clients and measure staff efficiency.

### PRICING

**POLICY:** The Diablo 3000 and 3200 are sold internationally by distributors. The U.S. distributor is Shasta General Systems, 1329 Moffett Park Drive, Sunnyvale, California 94086; telephone (408) 734-9360.

Shasta markets the equipment through its own direct offices and a dealer network in more than 125 metropolitan marketing areas. Sales, application installation, and hardware maintenance are all provided by the local Shasta branch or dealer.

The Diablo 3000 and 3200 are marketed worldwide through distributors located in Australia, England, Greece, Holland, Italy, Japan, Mexico, and South America. Contact your Xerox sales office for further details.

**SOFTWARE AND SUPPORT:** Operating system software, applications development software, and utility software are included in the price of the packaged Diablo configurations. Application packages for the Diablo 3000 and 3200 are developed, sold, and maintained by Shasta General Systems. Prices vary based on the application involved and the amount of change requested by the end user.

**EQUIPMENT:** The components and prices of numerous packaged configuration of the Diablo 3000 and 3200 systems in the United States are listed in the Equipment Prices section that follows.■

## EQUIPMENT PRICES

(These prices are for United States based systems distributed through Shasta General Systems.)

### DIABLO 3000-DISKETTE DRIVE SYSTEMS

Central processor with 32K bytes of RAM memory, one 1920 character CRT (12") with keyboard, two double density diskette drives (1.2 MB) in CRT housing, printer stand, forms tractor, stacker and following printers:

		Purchase Price	Annual Maint.
3006-40	Standard Diablo 55 CPS HyType Printer	15,950	1,300
3016-40	Diablo 200 CPS Matrix Printer	16,300	1,330
3026-40	Metal Wheel Diablo 45 CPS HyType Printer	16,300	1,330
3066-40	Shasta 125 CPS Matrix Printer	13,995	1,300

### INCREMENTAL COST FOR SUBSTITUTIONS IN BASE PACKAGED SYSTEMS (Diablo 3000)

30X2-XX	Substitute 2 Double-sided/Double Density Diskette Drives (2.5 MB) in Base System	2,000	400
30XX-6X	Increase Memory from 32K to 48K	1,000	85
30XX-86	Increase Memory from 32K to 64K	2,000	170

### DIABLO 3000—TERMINALS/CONTROLLERS

3150	4 Port Multi-Terminal Control Unit/Synch-Async Communications Option	1,290	130
3155	1920 Character Desk Top CRT (Shasa)	1,895	180

### DIABLO 3200—WINCHESTER DISK SYSTEMS

Central processor with 32K bytes of RAM memory, one 1920 character CRT (12") with keyboard, desk housing, one double density diskette drive, 10 Megabyte Winchester Disk Drive, printer stand, forms tractor, and following printers:

3205-43	Base System w/Hytype Printer	27,750	2,850
3215-43	Base System w/Matrix Printer	28,400	2,980
3245-43	Base System w/Line Printer (300LPM)	30,590	3,690
3255-43	Base System w/Line Printer (300LPM) and one Model 3357 Diablo HyType Auxiliary Printer w/Controller	36,970	4,275

### DIABLO 3200-CARTRIDGE DISK SYSTEMS

Central processor 32K bytes of RAM memory, one 1920 character CRT (12") with keyboard, 10 Megabyte Cartridge Disk Drive, desk housing, printer stand and forms tractor.

3200-41	Base System w/55 CPS HyType Printer	31,120	2,750
3210-41	Base System w/200 CPS Matrix Printer	32,095	2,835



**Xerox Diablo 3000 and 3200  
Small Business Systems**

<u>Purchase Price</u>	<u>Annual Maint.</u>
---------------------------	--------------------------

**INCREMENTAL COST FOR SUBSTITUTIONS IN BASE PACKAGED SYSTEMS (Diablo 3200)**

32XX-45	Substitute 20 Megabyte for 10 Megabyte Winchester	2,140	200
32XX-6X	Increase Memory from 32K to 48K	1,550	130
32XX-8X	Increase Memory from 32K to 64K	3,100	260

**DIABLO 3200 TERMINALS/CONTROLLERS**

3350	8 Port Multi-Terminal Control Unit	1,750	150
3351	Synchronous/Asynchronous Communications Option	960	90
3352	4 Port Multi-Terminal Control Unit	1,045	90
3355	1920 Character Desk Top CRT (Shasta)	1,895	180
3357	Diablo Hyterm Model 1640 Plastic Daisy Wheel Printer (Same as used on Diablo 3000)	6,395	500
3358	Diablo Hyterm Model 1650 Metal Daisy Wheel Printer (Same as used on Diablo 3000)	6,770	550
3360	Shasta Intelligent Workstation	4,270	400
3319	300 Line Per Minute Printer in Cabinet	9,990	1,295