

PRODUCT DATA SHEET

SYSTEM OVERVIEW

The Model 2200LVP Central Processing Unit (CPU) is a high-performance processor that can support as many as twelve users simultaneously and provide computing speed and power unavailable on other machines in its price range. Based upon the Wang 2200MVP processor, the 2200LVP also offers state-of-the-art disk storage, telecommunications capabilities, and an extremely low overhead operating system. Programmable in Wang's popular, high-level BASIC-2 language, the 2200LVP offers an economical answer to the need for a multiuser central processor.

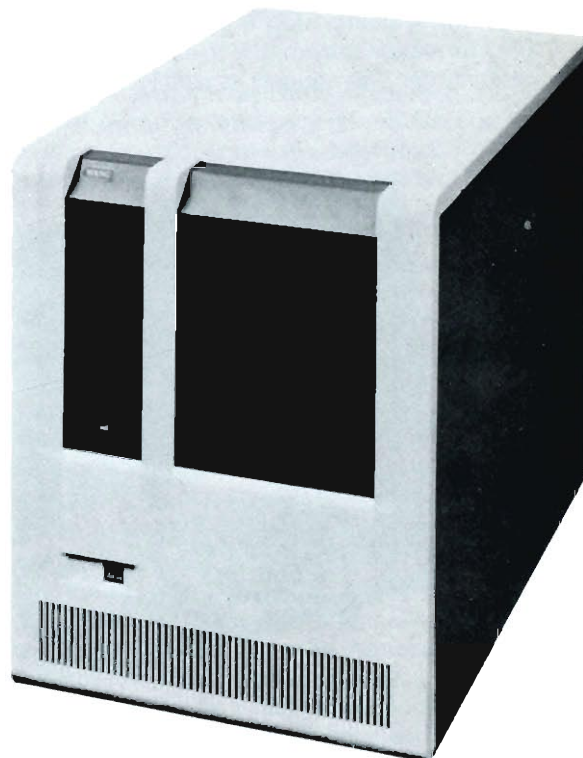
The 2200LVP utilizes a user-defined, fixed-partition memory configuration and an extremely fast and efficient central processor to extend multiprogramming capabilities to system users. This technique is simple in concept and design, yet sufficiently flexible to support most types of multiuser applications. In a fixed-partition memory scheme, user memory is divided into a number of distinct areas called *partitions*. Each partition can contain a separate program. The central processor allocates intervals of processing time to each partition in turn, permitting the program in an individual partition to execute for a brief time slice before servicing the next partition. Since programs performing input/output (I/O) operations are not serviced until the operation is complete, they relinquish their central processing time to another partition. By interleaving execution of different partitions and bypassing those that cannot use central processing time, the 2200LVP response time increases to create the illusion that each user has exclusive control of the system concurrently with all other users. Response time, an important consideration in a multiuser environment, is extremely fast for all users regardless of the number of partitions or type of program currently executing.

State-of-the-art disk technology enhances the speed and versatility of the 2200LVP. Two new types of disk drives are available with the 2200LVP — a dual-sided, double-density diskette drive and a fixed, Winchester-style drive. The expanded-capacity diskette can be used to obtain faster backup with fewer platters.

2200

LVP

- Office-Style Packaging
- Dual-Sided, Double-Density Diskette Drive
- Fixed Disk (Optional)
- Memory Expansion to 256K Bytes
- Multiuser/Multiprocessing Capabilities
- Available with Business Graphics Terminals
- Wang-Enhanced BASIC-2 Language



WANG

Wang Laboratories, Inc.

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The fixed disk provides fast data access in a compact space without the mechanical or environmental problems associated with removable drives. Both storage devices represent the latest developments in cost-effective, high-speed, mass storage peripherals. The 2200LVP enables a user to acquire the speed, reliability, and efficiency of disk devices that are frequently more expensive.

System users communicate directly with the 2200LVP by using either a Model 2236DE or Model 2236DW Terminal with business graphics capabilities. The 2236DW Multifunction Terminal supports an optional 2200/WP Word Processing Software Package, thus enabling users to perform both word processing as well as data processing applications at the same terminal. Each terminal consists of a large, easy-to-read 24 x 80 (24 lines, 80 characters per line) CRT screen display and a typewriter-style keyboard. Terminals can either be attached locally to the central processing unit at distances ranging up to 2,000 feet (609.6 meters) or remotely by using modems and telephone lines. Local terminal speeds, which range from 300 to 19,200 bits per second (bps), are supported by using asynchronous, full-duplex protocol. To accelerate communication and increase response time, the system performs automatic data compression on information transmitted to each terminal. Since each terminal can also support its own local Wang printer



Model 2236DE Terminal

through a connector on the back of the unit, screen dumps may be output and all standard printing operations may be performed. Both terminals also generate extensive bar and line graphics using standard program statements, providing the user with valuable displays for business applications.

At the customer's option, the 2200LVP may be equipped with telecommunications controllers to enable remote devices to be attached directly to the central processing unit and accessed by a user at the terminal. Both asynchronous and bisynchronous protocols are supported by the 2200LVP processor.

HIGH PERFORMANCE

The 2200LVP is operated by a high-performance, custom-designed MSI processor that combines highly reliable components with thoughtful design to produce a central processor with a memory cycle time of 600 nanoseconds. When combined with the extremely low overhead operating system and BASIC-2 interpreter, the 2200LVP provides exceptional response time for all system users. To illustrate the speed of the central processor, a representative selection of floating-point arithmetic operations is listed below along with the times required for completion. These times assume full 13-digit precision for each operation.

Operation	Central Processing Time
X+Y	0.11 msec
X-Y	0.11 msec
X*Y	0.38 msec
X/Y	0.76 msec
X↑Y	3.20 msec
10↑Y	6.20 msec
LOG	3.20 msec
LGT	2.80 msec
EXP	3.30 msec
SQR	1.70 msec
SIN	4.40 msec
COS	4.50 msec
TAN	7.70 msec
ARCSIN	12.50 msec
ARCCOS	12.60 msec
ARCTAN	9.90 msec
RND	0.27 msec
MOD	1.10 msec
ROUND	0.12 msec
Matrix Inversion (10 x 10)	0.57 sec
Matrix Inversion (20 x 20)	4.30 sec

The 2200LVP also provides high-speed alphanumeric-string processing capabilities. For example, the following times were measured when the specified operations were performed upon an alpha array consisting of 1000 eight-character elements.

Operation	Central Processing Time
Search for a specified value	0.02 sec(maximum)
Memory sort of random data	1.68 sec

VERSATILE, EASY TO USE

Unlike many multiuser computer systems, the 2200LVP does not have a complex, high-overhead operating system. There are no special job control languages, no elaborate operating procedures, and no complex programming considerations. The 2200LVP is simple to operate and easy to program. The system configuration can be easily modified by the user to accommodate changing requirements.

The number of partitions on the system and the size and characteristics of each are established initially in a process called partition generation. (Wang provides a special utility to facilitate the partition generation process.) When all partitions have been defined and other system characteristics have been specified, a system configuration is created. The user can create one or many system configurations, each tailored to a specific set of processing requirements. All configurations can be named and then saved in a system file on disk to be accessed when needed. Optionally, the user can designate a particular predefined configuration to be automatically loaded and executed whenever the system is powered on.

The system configuration selected determines factors such as how many partitions will be created, how much memory will be allotted to each, and how many partitions will be assigned to each terminal. Once the system configuration is executed, each terminal on the system functions much like a single-user system. In general, each user can enter and run programs, interrogate and modify variables, and access common disk files as if there were no other users on the system.

Since each user communicates with the system interactively, information needed by the program can be requested with clear, nontechnical prompts. For the

programmer, interactive operation greatly simplifies the tasks of program development and maintenance. Programs can be entered, edited, and run directly from the terminal keyboard. The system provides a range of diagnostic checks that identify many different types of errors. A powerful set of edit functions facilitate error correction. Since data can be visually verified upon entry, errors are detected and corrected easily.

STATE-OF-THE-ART DISK STORAGE

With the introduction of the 2200LVP, Wang Laboratories, Inc., also introduces two new disk drive units that feature the latest advances in hardware design. Both the dual-sided, double-density (DSDD) diskette drive and the Winchester-style fixed disk drive offer the user an exceptional cost/unit storage value, while surpassing many fixed/removable drives in performance. When combined with the 2200LVP processor, a total cost-effective, disk-based system is created for the small-scale user.

Dual-Sided, Double-Density Diskette Drive

Standard equipment on the 2200LVP is a dual-sided, double-density diskette drive that can store approximately 1 megabyte of data. A fixed disk drive (described in the following paragraphs) is also available as optional equipment.

By doubling the density at which data is recorded and utilizing both sides of the diskettes, the normal storage capacity of 1/4 megabyte for previous diskettes is increased fourfold. When used with the fixed drive, the DSDD provides an effective and easy backup since fewer diskettes are needed. In addition to its backup capabilities, the DSDD diskette also serves as the medium for archiving data and transferring system software and application packages obtained on DSDD diskettes. The DSDD diskette drive is compatible with the IBM 3741 format, and has an exceptionally quick data transfer rate for a flexible disk unit.

Fixed Disk Drive

A major innovation is the development of a fixed-only disk drive utilizing new head technology. The fixed-only approach eliminates the costly mechanical and electronic requirements of combining a removable platter with a fixed platter. Mechanical interlocks and loading devices are eliminated as well as the separation of the chambers housing each type of platter. Fixed-only-type heads provide a fast yet economical method of data access due to both a decrease in head

loading force and a minimizing of the air gap between the heads and the disk surface. The decrease in the size of the air gap permits a greater data density than was previously possible, enabling the user to access data faster and store more data in the same space.

Additionally, this fixed disk drive uses lubricated disk surfaces that permit the head to "take-off" and "land" on the platter surface during power-up and power-down procedures. This technology greatly reduces the possibility of a "head crash," ensures the integrity of the data, and lessens the expensive downtime that accompanies a crash. The combination of these features has created a compact disk drive that retains the performance and reliability of other models. Wang Laboratories, Inc., offers the fixed-disk drive as system options available in 2-, 4-, and 8-megabyte capacities.



Both the DSDD diskette drive and an optional fixed-disk drive are mounted directly within the compact office-style cabinet, which also contains the central processor, thus saving space that separate drives would customarily occupy. In summary, a 2200LVP can be configured with one of the following.

- One DSDD diskette drive (standard)
- One DSDD diskette drive and a fixed Winchester-style disk drive (optional 2, 4, or 8 megabytes)

SINGLE-USER OPERATION

While the 2200LVP supports multiple users, the customer who only needs a single-user system will find that the LVP fills that need also. By configuring the 2200LVP as a single-user system, the user may operate a stand-alone system with the same features and language as the multiuser arrangement. Unlike most single-user systems, the 2200LVP enables a single terminal to control several programs executing concurrently. In addition, the LVP operating system provides the fastest execution speeds in its class. Thus, the 2200LVP is an excellent choice for the first-time user because it combines high-performance computing with the capacity for extensive future expansion.

MULTIPROGRAMMING FEATURES

In a multiprogramming environment, the activities of different programs must frequently be coordinated and individual programs often need to communicate with each other. This coordination is necessary to use shared resources as efficiently as possible and to prevent potentially damaging conflicts between programs using common resources. The 2200LVP provides a variety of special features for these purposes, including global variables and a temporary seize/release capability for programs using shared devices. A "disabled programming" option provides security against unauthorized access to important files and unauthorized execution of critical programs.

Global variables are specially designated variables accessible to a number of different programs. Global variables can be interrogated and modified by programs running in other partitions, providing a convenient

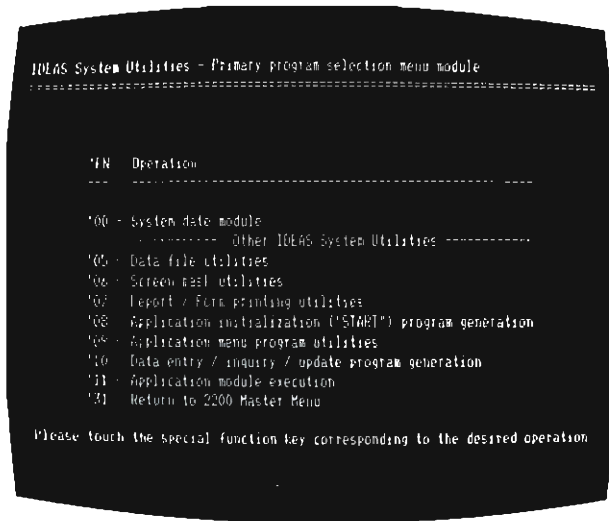
mechanism for interprogram communication. This communication may be particularly important if there is a danger of conflict between two or more programs, such as when a common disk file is updated by several different programs concurrently. In such cases, global variables can be used as flags that are tested and set by each program to indicate predefined conditions.

The 2200LVP operating system automatically handles all disk input/output operations from the various programs, granting each program access to the disk in turn. Except for the special case in which a common disk file is updated by several programs, each program can normally perform disk operations without concern for other programs sharing the same disk. When several partitions are simultaneously using the same common files, optional Wang-supplied software packages such as KFAM (Keyed File Access Method) and IDEAS™ (Inquiry Data Entry Access System) may be used to control file access and updating. For shared devices, such as printers, that do not lend themselves to interleaved use by several programs and for special cases in which one program must have exclusive

access to the disk temporarily, the 2200LVP provides special language features enabling a program to seize temporary control of a device and subsequently release it. In this way, a program can temporarily seize a shared printer, for example, complete all necessary printing, and then release the printer so that another program can use it.

A "broadcast message" facility enables the operator at Terminal 1 to define a message to be displayed automatically at every other terminal whenever the READY message is displayed. Information of interest to all users such as notification that a printer is down or that maintenance operations will be performed at a particular time can, therefore, be made available to all terminals.

Program and data file security are important considerations in a multiprogramming system. The 2200LVP provides a Disabled Programming mode that may be specified for each partition. In Disabled Programming mode, a terminal functions exclusively under program control. The operator cannot enter or modify program text from that terminal nor directly access any disk files. The operator's ability to interact with the system and obtain access to disk files is completely determined by the BASIC-2 program controlling the terminal. The BASIC-2 program can implement custom-designed security measures such as password protection and specific file access rights for users working at the terminal.

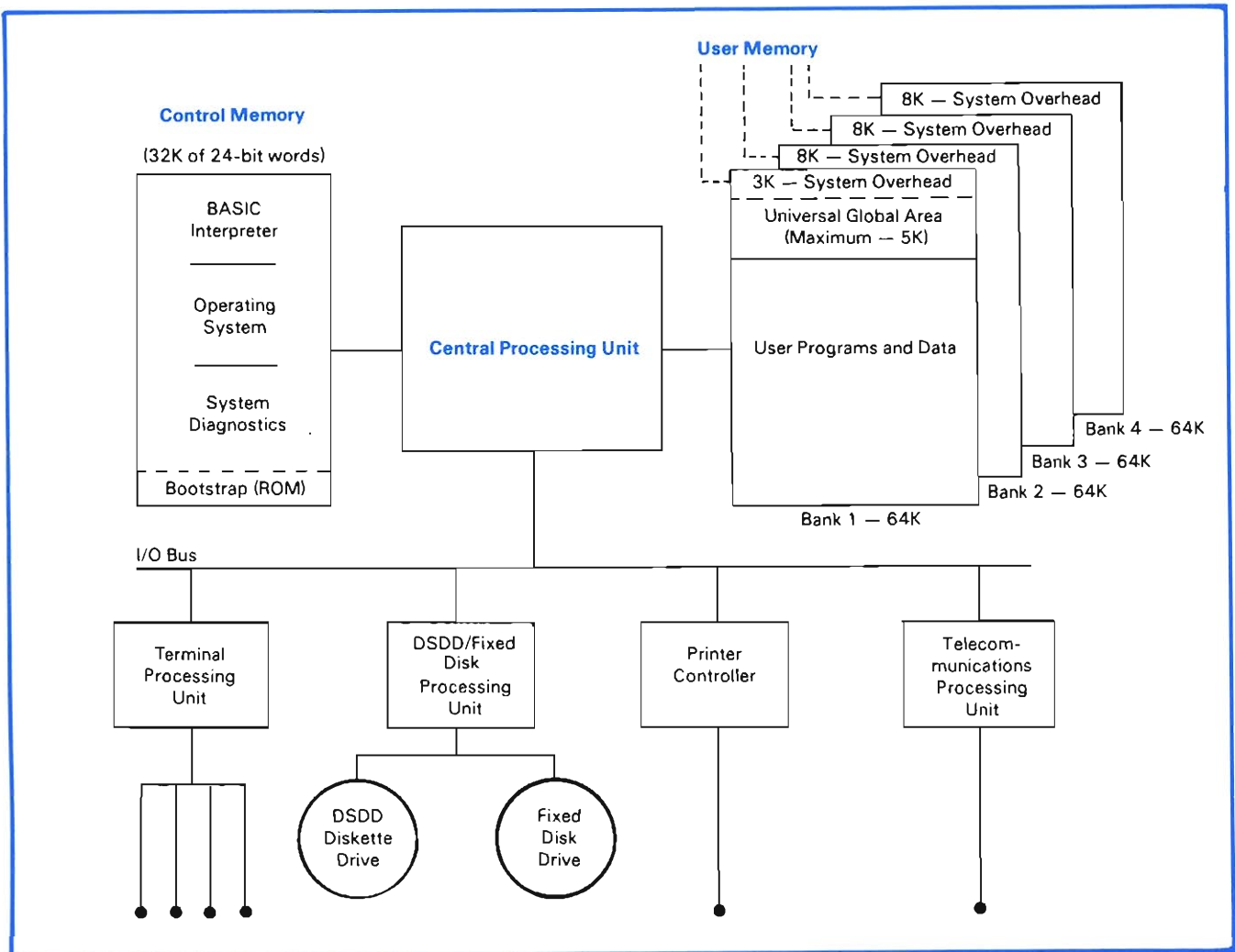


IDEAS Main Menu

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FUNCTIONAL ORGANIZATION

The 2200LVP consists of a microprogrammed MSI processor coupled with a number of special purpose LSI I/O processors and controllers. The operating system and language interpreter reside in a large control storage memory that is independent from user data memory; this microprogram directs the execution of the CPU and coordinates communication with the I/O processors. The independent I/O processors permit the overlap of CPU and I/O processing. The CPU is relieved of the responsibility for controlling peripherals that would otherwise require frequent or dedicated CPU attention.



Logical Organization of the 2200LVP

MEMORY ORGANIZATION

Among the most significant features of the 2200LVP are those that contribute to its highly efficient use of memory. These features include the use of a separate control memory to store the BASIC-2 interpreter and operating system, the "atomization" technique employed in storing BASIC-2 program text, and the availability of global partitions to contain shared program code.

Unlike most multiuser systems, the 2200LVP does not store its system programs (the BASIC-2 interpreter, operating system, and system diagnostics) in the same

memory area used to store the application software. System programs are stored in a separate memory area called "control memory." The 2200LVP contains approximately 32K 24-bit words of control memory. When the system is powered on, the system programs are loaded into control memory from the system platter and remain resident in memory until the system is powered off or reinitialized. Control memory is a separate, protected memory area that cannot be accessed by the user or the user's programs. The system programs are, therefore, always protected against accidental interference or destruction by a user program.

User memory is the area of memory available to the user's programs and data. User memory may be incrementally increased from a minimum of 32K bytes to a maximum of 256K bytes. Because the system programs are stored separately, all user memory except for a small portion used for system overhead is available for user programs and data.

User memory consists of one to four "banks", each containing a maximum of 64K bytes. The user may divide each bank into a number of partitions of fixed size, each of which can execute a separate program. The addressing scheme, however, does not permit partitions in one bank to extend into another bank. Within each bank, a fixed amount of memory is reserved for system overhead; in the first bank, 3K bytes are reserved for overhead and in each subsequent bank, 8K bytes are unavailable to the user. Thus, a total of 61K bytes in Bank 1 and 56K bytes in Banks 2 — 4 are available for user partitions. The amount of system overhead is fixed, regardless of the total memory purchased for each bank. In addition, each partition in each bank requires approximately 1K bytes of partition overhead. All remaining memory in a single partition is available for user programs and data.

To use the available memory as efficiently as possible, the 2200LVP automatically condenses each BASIC-2 program line into a format that not only conserves memory but also contributes to faster program execution. Sharing common resources also contributes to the efficient use of available memory. The LVP permits the user to define one or more global partitions within each memory bank. The programs and variables stored in a global partition are accessible to other partitions within that bank. Thus, when the same program is run by two or more users in the same memory bank, only one copy of the program need be kept in memory. Each user running the global program needs only a small partition with sufficient memory to define the required variables and issue a global subroutine call.

In general, a global partition in one bank cannot be accessed by partitions in the other bank. However, a 5K-byte area of the first bank can be reserved as a "universal" global partition area. A global partition located wholly within this area can be accessed by any partition on the system. A universal global partition can be used to store control variables used by any partition in the system.

In addition to promoting the efficient use of memory, global partitions also serve as a useful tool for controlling access to shared resources. For example, if several programs are using a shared disk file, all access to the file might be controlled by a single global routine. Within the global partition containing this routine, global variables could be used to store status and control information. Whenever a program attempts to access the file, it must branch to the global routine, which actually performs the file access. In this way, the use of a resource shared by several programs is controlled by a central routine that oversees the operations of these programs and resolves potential conflicts among them.

FOREGROUND/BACKGROUND OPERATION

Since each terminal on the system may be assigned more than one memory partition, each terminal may be running several different jobs concurrently. Although the terminal may be running several jobs in different partitions, it can communicate with only one job at a time. The job currently communicating with the terminal is running in the "foreground." The job or jobs associated with a terminal but not currently communicating with the terminal are running in the "background." A terminal may be switched from one partition to another, shifting the current foreground job into the background and shifting a particular background job into the foreground to permit operator communication with that program.

Foreground/background operation allows a user to run several jobs requiring varying degrees of operator attention from a single terminal. A typical example would involve running a batch-type job requiring minimal operator interaction (such as payroll processing) in the background, while a more interactive job (such as order entry) runs in the foreground.

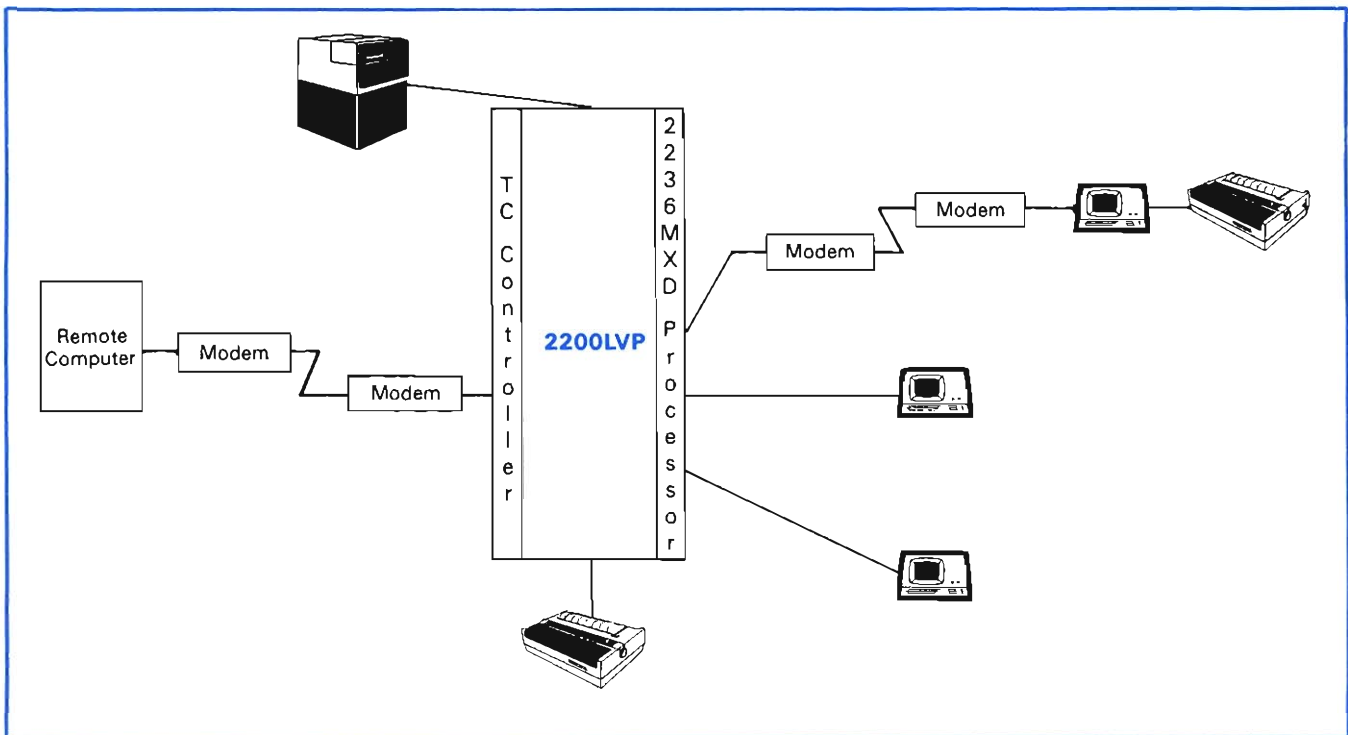
THE BASIC-2 LANGUAGE

Wang Laboratories, Inc., implements a greatly enriched version of the popular BASIC language, BASIC-2, for use on the 2200LVP. BASIC-2 is a high-level programming language designed for interactive programming. It is easily learned by beginning programmers. A variety of Wang extensions and enhancements have been added to BASIC-2 to facilitate writing, documenting, and debugging programs and to provide more powerful and flexible language capabilities for a wide range of applications.

The BASIC-2 instruction set is both comprehensive and extremely powerful. The math package includes numerous system-defined mathematical and trigonometric functions; the results obtained are accurate to 13 digits and may be either rounded or truncated. Alphanumeric data can be compared, analyzed, and modified with a truly impressive array of data manipulation statements. These statements permit the programmer to manipulate characters at the bit and byte levels and to perform various Boolean and binary arithmetic operations. A group of system commands enables each user to control system operations in each partition from the terminal keyboard and also serve as powerful debugging tools. The set of general-purpose BASIC-2 statements includes statements to facilitate common programming tasks such as formatting printed output, making decisions, branching, looping, passing data to subroutines, controlling the format of the CRT display, overlaying program modules, and accepting and processing operator-entered data. In addition to the general-purpose statements, several groups of special-purpose statements are provided, including

statements designed to perform such specialized operations as code conversion, sorting, matrix arithmetic, and customized input/output control.

Language enhancements within BASIC-2 also include statements used to control resources in a multiuser environment. Among these statements are functions that can be used by a program to determine which terminal is assigned to the current partition and the partition in which the program is running. A number of special statements is provided to perform operations such as seizing and releasing control of a shared peripheral device, defining and selecting global partitions, and temporarily suspending program execution in the current partition to provide more processing time to other programs. In addition, a special statement is provided to initially define a system configuration by specifying the number and attributes of all partitions. This statement may be used to create a customized partition generation routine if the utility supplied by Wang for this purpose does not meet the user's requirements.



Typical Telecommunications Configuration

COMMUNICATIONS CAPABILITIES

The 2200LVP supports a full range of communications capabilities between remote terminals and the 2200LVP and between the 2200LVP and other computer systems. Wang Laboratories, Inc., also offers a number of software packages to emulate common communications protocols.

Each terminal is connected to the 2200LVP by either a Model 22C32 Triple Controller for single-user systems or a Model 2236MXD Terminal Processor for multiuser systems. These devices control input/output operations between the central processing unit and the terminals. Line handling between the central processing unit and each terminal is asynchronous and full-duplex, with selectable line speeds ranging from 300 to 19,200 bps. For remote connection, two RS-232-C compatible modems are required to provide the communications link. Remote terminals located miles from the central processing unit can function exactly as local terminals, communicating directly with the system to perform operations within their assigned partitions. In addition, both remote and local terminals may have their own local printers to produce hard copy output at the terminal site.

For communicating with other computer systems, the 2200LVP can be equipped with either of the following single-board communications controllers. The Model 2227B Communications Controller supports asynchronous-only communications in half- or full-duplex at line speeds ranging from 300 to 9600 bps. The Model 2228B and Model 2228C Communications Controllers offer a choice of synchronous or asynchronous communications at speeds ranging from 300 to 4800 bps. Additionally, the Model 2228C supports IBM 3275 Emulation. The Model 2228D Communications Controller offers synchronous communications at speeds ranging from 300 to 19,200 bps and supports IBM 3270 protocol.

COMPATIBILITY WITH OTHER 2200 SYSTEMS

Software compatibility is an important consideration when contemplating the purchase of a new system. The 2200LVP has been designed to preserve maximum compatibility with Wang's older, single-user systems as well as the more recent single-user and multiuser systems. Since the 2200LVP is virtually compatible with the 2200MVP, multiuser software written for the

2200MVP will function correctly on the 2200LVP. However, differences in the number of peripherals that can be attached to the system may affect some packages.

The BASIC-2 language supported on the 2200LVP is identical to BASIC-2 on the 2200VP, MVP, and SVP. Additionally, the 2200LVP supports Wang BASIC syntax, providing a significant degree of compatibility with all earlier Wang 2200 systems. Since each 2200LVP terminal functions as a single-user 2200 system for program development purposes, this language compatibility means that programmers familiar with other 2200 systems will quickly become productive on the 2200LVP.

The 2200LVP offers several features, including global programs and global variables, that enable the programmer to use the memory available for multiuser programs as efficiently as possible. If a single-user program must be adapted for multiuser operations on a 2200LVP, the user should probably modify the program to capitalize upon these features. In general, such modification is not extensive. When memory space is not a problem, however, the program can be loaded and run in each partition with little or no modification.

The standard 2200LVP chassis contains three I/O slots. An expanded chassis containing seven I/O slots is available as a system option. The 2200LVP supports all current Wang 2200 Series peripherals, including a selection of diskette drives, fixed/removable disk drives, printers, and plotters.

2200LVP SPECIFICATIONS

Size

Height	27.0 in. (68.6 cm)
Width	20.4 in. (51.8 cm)
Depth	30.0 in. (76.2 cm)

Weight

166 lb (75.5 kg)

Memory Cycle Time

600 nsec

User Memory Size

32K bytes (standard)
Expandable to 64K, 128K, 192K, or 256K bytes

Control Memory Size

32K 24-bit words

Maximum Number of Partitions

16

Minimum Partition Size

1.25K (1,280) bytes

Maximum Number of Terminals

12

I/O Slots

3 (standard)
Expandable to 7

System Overhead

3K (3,072) bytes for 32K and 64K machines
11K (11,264) bytes for 128K machines
19K (19,456) bytes for 192K machines
27K (27,648) bytes for 256K machines
1K (1,024) bytes per partition

Power Requirements

115 VAC \pm 10%, 60 Hz \pm 1.0 Hz
230 VAC \pm 10%, 50 Hz \pm 1.0 Hz
317 W (maximum)

Fuses

5.0 amp (SB) for 115 V/60 Hz
2.5 amp (SB) for 230 V/50 Hz

Operating Environment

Temperature
50° to 90° F (10° to 32° C)

Relative Humidity
35% to 65% noncondensing (recommended)
20% to 80% noncondensing (allowable)

Heat Output

1,084 Btu/hr

Numeric Range

$-10^{100} < n \leq -10^{-99}$, $0, 10^{-99} \leq n < 10^{100}$,
floating point with 13 significant digits

DUAL-SIDED, DOUBLE-DENSITY DISKETTE DRIVE SPECIFICATIONS

1 Megabyte Diskette Drive	
Tracks	149
Sectors/Track	26
Total Sectors	3874
Bytes/Sector	256
Total Bytes	991,744
Average Access Time	91 msec
Average Latency Time	83.3 msec
Speed	360 rpm
Transfer Rate	500 kilobits/sec

FIXED DISK DRIVE SPECIFICATIONS

2 Megabyte Disk Drive - Option B	
Tracks	254
Sectors/Track	32
Total Sectors	8,128
Bytes/Sector	256
Total Bytes	2,080,768
Average Access Time	70 msec
Average Latency Time	9.6 msec
Speed	3,125 rpm
Transfer Rate	4 megabits/sec

FIXED DISK DRIVE SPECIFICATIONS (CONTINUED)

4 Megabyte Disk Drive - Option C

Tracks	510
Sectors/Track	32
Total Sectors	16,320
Bytes/Sector	256
Total Bytes	4,177,920
Average Access Time	70 msec
Average Latency Time	9.6 msec
Speed	3,125 rpm
Transfer Rate	4 megabits/sec

8 Megabyte Disk Drive - Option D

Tracks	1020
Sectors/Track	32
Total Sectors	32,640
Bytes/Sector	256
Total Bytes	8,335,840
Average Access Time	70 msec
Average Latency Time	9.6 msec
Speed	3,125 rpm
Transfer Rate	4 megabits/sec

ORDERING SPECIFICATIONS

The interactive, multiuser Central Processing Unit must contain a BASIC-2 interpreter, an operating system, and system diagnostics. The standard central processing unit must have 32K bytes of user memory and must be incrementally expandable to a maximum of 256K bytes. The operating system and BASIC-2 interpreter must reside in a separate control memory. The memory cycle time must be 600 nanoseconds. Full memory parity must be provided throughout both user and control memory. User memory must be divisible into 16 separate partitions. The system must be able to support up to twelve interactive terminals concurrently. An enhanced version of the BASIC language must be provided which supports extensive built-in editing and debugging features, a programmable error control capability, a programmable interrupt feature, extensive alphanumeric and binary data manipulation capabilities, and built-in internal data conversion, sort, math matrix, and general input/output features. The system must provide a complete set of input/output statements to control standard Wang peripherals, including both automatic cataloging and direct addressing statements for disk input/output operations. The math package must include a complete set of system-defined mathematical and trigonometric functions and must provide 13-digit accuracy for most operations. A round/truncate option and the option to calculate trigonometric functions in radians, degrees, or grads, must also be offered. The system must support a dual-sided, double-density diskette drive and an optional fixed-only disk drive. There must be available both synchronous and asynchronous communications hardware on a single board for installation directly within the processor.

Standard Warranty Applies

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