

PRODUCT DATA SHEET

SYSTEM OVERVIEW

The Model 2200SVP Central Processing Unit (CPU) is a compact, high-performance processor which offers a price/performance ratio never before available with a small business computer. Programmable in Wang's popular high-level BASIC-2 language, the 2200SVP is designed to meet the processing requirements of both the first time user and large corporations.

The 2200SVP CPU offers a combination of speed, easy programming, flexibility, and expandability unique for a single-user system. Its execution speeds are extremely fast (600 nanoseconds), providing an overall throughput capability which enables the 2200SVP to be considered for a variety of data processing and heavy number-crunching jobs which previously required much larger systems. The system's interactive programming and debugging capabilities can substantially reduce training and program development time. The 2200SVP can be configured with up to two disk storage devices and any Wang printer peripheral. These configurations, in conjunction with the powerful BASIC-2 language, provide the programmer with a system versatile enough to solve any processing problems. The entry level system is available with 32K of user memory, expandable up to a maximum of 64K. Such expandability, coupled with Wang's selection of peripherals, ensures the user that the system will continue to grow for many years.

The basic CPU contains 32K of user memory and connections for an interactive terminal, printer, and telecommunications. The CPU is also equipped with 16K of control memory for storing system software (the BASIC-2 interpreter, operating system, and system diagnostics). The operating system and BASIC-2 interpreter are loaded into control memory from a system diskette at the start of the working day, an arrangement which leaves the user memory (minus about 3K used for "housekeeping" purposes by the system) available exclusively for the user's programs and data. The 2200SVP employs an efficient "atomization" technique for program storage, resulting in the use of less user memory. Such storage

2200

SVP

- Single-User System
- Single-Sided, Double-Density Diskette Drive
- Fixed-Only Disk Technology (Optional)
- Interactive Terminal with Business Graphics
- Wang-Enhanced BASIC-2 Language



WANG

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efficiency, combined with the use of separate control memory for system software, extends the capacity of the available user memory for program storage.

Two types of disk drives are available with the 2200SVP — a single-sided, double-density diskette drive and, optionally, a fixed, Winchester-style drive. The expanded capacity diskette greatly increases program storage capability for a single-user system. The fixed disk provides fast data access in a compact space without the mechanical or environmental problems associated with removable media-type drives. Both storage devices represent the latest developments in cost-effective, high-speed, mass storage peripherals. The 2200SVP enables a user to acquire the speed, reliability, and efficiency of disk devices that are usually found on more expensive systems.

System users communicate directly with the 2200SVP by using a Model 2236DE Interactive Terminal with business graphics capabilities. The terminal consists of a large, easy-to-read 24 x 80 CRT screen display and a typewriter-style keyboard. The Model 2236DE terminal can also support its own printer, thus providing two printers to the overall system.

At the customer's option, the 2200SVP may be equipped with telecommunications controllers, enabling data transfer between the SVP and another system. Both asynchronous and bisynchronous protocols are supported by the 2200SVP processor.

HIGH PERFORMANCE

The 2200SVP is operated by a high-performance processor which combines highly reliable components with thoughtful design to produce a CPU with a memory cycle time of 600 nanoseconds. When combined with the extremely low overhead operating system and BASIC-2 interpreter, the 2200SVP provides exceptional response time for all system users. To illustrate the speed of the CPU, 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 milliseconds (ms) |
| X-Y | 0.11 ms |
| X*Y | 0.38 ms |
| X/Y | 0.76 ms |

Operation

Central Processing Time

| | |
|----------------------------|----------|
| XIY | 3.20 ms |
| 10IY | 6.20 ms |
| LOG | 3.20 ms |
| LGT | 2.80 ms |
| EXP | 3.30 ms |
| SQR | 1.70 ms |
| SIN | 4.40 ms |
| COS | 4.50 ms |
| TAN | 7.70 ms |
| ARCSIN | 12.50 ms |
| ARCCOS | 12.60 ms |
| ARCTAN | 9.90 ms |
| RND | 0.27 ms |
| MOD | 1.10 ms |
| ROUND | 0.12 ms |
| Matrix Inversion (10 x 10) | 0.57 sec |
| Matrix Inversion (20 x 20) | 4.30 sec |

The 2200SVP 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.

| | |
|-------------------------------|------------------------|
| Search for a specified value: | 0.02 seconds (maximum) |
| Memory sort of random data: | 1.68 seconds |

DISK STORAGE

With the introduction of the 2200SVP, Wang Laboratories, Inc., also introduces two new disk drive units which feature the latest advances in hardware design. The new rigid disk drives offer the user an exceptional cost/unit storage value, while surpassing many fixed/removable drives in performance. When combined with the 2200SVP processor, a total cost-effective, disk-based system is created for the small-scale user.

Standard equipment on the 2200SVP is a single-sided, double-density (SSDD) diskette drive which can store over 500 kilobytes of data. By doubling the density at which data is recorded on new diskettes, the normal storage capacity of 250 kilobytes for previous diskettes is more than doubled. Either a second SSDD diskette drive or a fixed disk drive (described below) is also available as optional equipment. When used with the fixed drive the SSDD provides an effective backup medium. In addition to its backup capabilities, the SSDD diskette also serves as the medium for transferring system software and application packages

2200SVP SPECIFICATIONS

Dynamic Range

$-10^{100} < n \leq -10^{-99}, 0, 10^{-99} \leq n < 10^{100}$

Accuracy

13 digits (typical)

Maximum Data Rate

100,000 bytes/sec

Memory Size

32K bytes (standard). Expandable to a maximum of 64K bytes.

Power Requirements

Voltage 115 VAC \pm 10%, 60Hz \pm 1 cps
230 VAC \pm 10%, 50Hz \pm 1 cps

Power 230 Watts

Fuses 3ASB @ 115V

1.5ASB @ 230V

Operating Environment

50° F to 90° F (10° C to 32° C)

20% to 80% relative humidity, non-condensing
(maximum range)

35% to 65% relative humidity (recommended range)

CPU Dimensions

Height 12 in. (30.4 cm)

Width 21 in. (53.5 cm)

Depth 26 in. (66.0 cm)

Heat Output

1,050 Btu/hr

SINGLE-SIDED DOUBLE-DENSITY DISKETTE DRIVE SPECIFICATIONS

Rotational Speed

360 rpm

Seek Time

Minimum 20 ms

Average 264 ms
(includes track settle time of 10 ms)

Maximum 280 ms

Latency Time

Average 84 ms at 360 rpm

Data Rate

250 KHz at 360 rpm

User Storage Capacity

Approximately 500 Kilobytes

FIXED DISK DRIVE SPECIFICATIONS

Rotational Speed

3,125 rpm

Seek Time

Minimum 19 ms

Average 100 ms
(includes track settle time of 19 ms)

Maximum 150 ms

Latency Time

Average 9.63 ms

Data Rate

4.3 MHz at 3,125 rpm

Track Density

172 tracks per inch (tpi)

User Storage Capacity

Option 1: Approximately 2 Megabytes

Option 2: Approximately 4 Megabytes

ORDERING SPECIFICATIONS

A Central Processing Unit with a BASIC-2 interpreter, operating system, and system diagnostics. The standard CPU must have 32K bytes of user memory and must be expandable to 64K. 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. An enriched 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 I/O features. The system must provide a complete set of I/O instructions to control standard Wang peripherals, including both automatic cataloging and direct addressing instructions for disk I/O 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 be supported by a single-sided double-density diskette drive, and, optionally, by either a fixed-only disk drive or another single-sided, double-density diskette. There must be available both asynchronous and bisynchronous communications hardware on a single board for installation directly within the processor.

Standard Warranty Applies

underlined, or reversed (dark characters on a light field). More than one attribute may be assigned to a particular screen location to allow, for example, both reversed video and the blinking of portions of the screen intended for close examination. Error messages, input fields, and other special messages can have particular attention drawn to them by using the appropriate character attributes, which do not take up any display space so a programmer need not worry about alignment problems caused by attributes using display space.

GRAPHIC CAPABILITIES

The Model 2236DE terminal makes use of both an alternate character set and normally unused portions of each character position to create remarkable graphics capabilities for a terminal in its price range. Box graphics allow line segments to be drawn at any CRT position. Character graphics are an alternate character set which displays geometric designs rather than the normal characters.

Box Graphics

Box graphics are used for drawing horizontal or vertical lines on the screen, enabling forms to be depicted or fields to be separated by lines or boxes. Horizontal lines are drawn between character lines on the CRT screen, while vertical lines are drawn through the center of character positions. Since the horizontal lines are not drawn through portions of the existing characters, characters contained within the confines of a box will not interfere with the line segments. For example, within a box area used to highlight a prompt, the prompt may be rewritten a number of times without altering or erasing the box itself. Consequently, box graphics may be used to increase the readability of a dense display without greatly reducing the capacity of that display. A special BASIC-2 statement, the PRINT BOX statement, can be used to draw any size box beginning at the current cursor location on the screen.

Character Graphics

Character set graphics comprise an alternate set of display characters on the Model 2236DE terminal. They are similar to standard characters in that each character graphic occupies one position on the CRT display. Character graphics are created by dividing the normal character position into six equal areas (three vertically by two horizontally). Certain character codes then cause one or more of these areas to be displayed on the screen at the current cursor position. Adjacent areas of two graphic characters will touch, as will areas in two character positions next to each other on the

CRT, creating continuous light or dark areas on the screen. The characteristic permits the construction of bar graphs and special displays. When combined with display attributes, character graphics are useful for histograms and other similar displays.

COMPATIBILITY WITH OTHER 2200 SYSTEMS

Software compatibility is an important consideration when a user contemplates purchasing a new system. The 2200SVP has been designed to preserve maximum compatibility with Wang's other, single-user systems as well as the more recent single and multiuser systems.

Because the BASIC-2 language supported on the 2200SVP is identical to BASIC-2 on the 2200VP, there is nearly 100% software compatibility between these systems for single-user programs. The 2200SVP, like the 2200VP, 2200MVP and 2200LVP, also supports earlier Wang BASIC syntax, providing a significant degree of compatibility with non-VP, -MVP, and -LVP systems. Since each 2200SVP system 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 2200SVP.

Since the 2200SVP supports any standard Wang printer, a wide variety ranging from high quality daisy printers to high speed chain printers is available.

DISK CONTROL INSTRUCTIONS

The 2200SVP provides a sophisticated disk control capability. Two separate types of disk I/O instructions are available: Automatic File Cataloging instructions, and Absolute Sector Addressing instructions. Automatic File Cataloging instructions permit the programmer to establish a catalog on the disk which will contain both program and data files. Instructions are provided to save and load program files by name, and to open and access data files by name. (The system itself automatically keeps track of where each file is stored on disk.) A maximum of 16 data files can be open simultaneously for multiple-file processing operations. Additional features of the Automatic File Cataloging mode include the capability to move an entire catalog, or only selected files, from one disk to another; to save programs on disk in a protected format; and to automatically load and run multiple program modules in sequence.

Absolute Sector Addressing statements permit the programmer to directly access specified sectors on the disk, and to read or write information in a user-specified format.

obtained on SSDD diskettes. The SSDD diskette drive is compatible with the IBM 3741 format, and has an exceptionally quick data transfer rate for a flexible disk unit.

A major innovation is the development of a fixed-only, rigid 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 are 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 a decrease in head loading force and a consequent 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 and a special track which permits 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," ensuring the integrity of the data and lessening the chances of expensive downtime that accompany a crash. The combination of these features have created a compact disk drive that retains the high performance and reliability of other models. The fixed-disk drives are available as system options in 2 or 4 megabyte capacities.

Both the SSDD diskette drive and an optional fixed-disk drive or second SSDD diskette drive are mounted directly in the compact office style cabinet, which also contains the central processor, thus saving space which separate drives would customarily occupy. In summary, a 2200SVP can be configured with:

- One SSDD diskette drive.
- A second SSDD diskette drive (dual diskette system).
- A SSDD diskette drive and fixed-disk drive (2 or 4 Megabytes).

COMMUNICATIONS CAPABILITIES

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

For communicating with other computer systems,

the 2200SVP can be equipped with any of the following communications controllers: Option 27B, Option 28B, or Option 28C. The Option 27B Communications Controller supports asynchronous-only communications in half- or full-duplex at line speeds ranging from 300 to 9600 bps. Both the Option 28B and Option 28C Communications Controllers offer a choice of synchronous or asynchronous communications at speeds ranging from 300 to 4800 bps.

CRT DISPLAY

Wang's Model 2236DE Interactive Terminal contains a 12-inch (30.4) diagonal measure, Cathode Ray Tube (CRT) screen display for operator prompting and verification. The CRT displays a full 128-character set, including uppercase and lowercase keyboard characters, some foreign language characters, special symbols, and underlining. The CRT also displays an alternate character set of graphic characters and "box" graphics. All characters may be displayed using one or more of several character display attributes.

The CRT has a 24-line, 80 character-per-line capacity (1920 character positions) for full-screen operator prompting and verification of keyed characters. Brightness and contrast controls provide a sharp, clear image on the screen. Display speed is approximately 2,000 characters per second at 19,200 baud. A cursor (resembling an underscore) is used to indicate the location on the display where the next character will appear. The cursor can be programmably turned off and on for special applications.

TERMINAL KEYBOARD

The keyboard supports both uppercase and lowercase alphabetic characters. Control functions are handled by several types of function keys. The alphabetic keyboard has two modes of operation, selected by a toggle switch labelled "A/A" and "A/a." In A/A mode, alphabetic characters are produced as uppercase whether shifted or unshifted. Shifted numerics produce symbols and special characters. In A/a mode, the keyboard function is a standard typewriter producing uppercase and special characters when shifted and providing lowercase and numerics in unshifted operation.

2236DE CHARACTER DISPLAY ATTRIBUTES

The 2236DE terminal defines a character display attribute for each position on the CRT display. By using special codes before displaying a character or string of characters, the programmer can cause the output to be bright or normal intensity, blinking or non-blinking,

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