PRODUCT DATA SHEET

2200 SVP

SYSTEM OVERVIEW

The Model 2200SVP Central Processing Unit (CPU) is a compact, high-performance processor which offers a price/performance ratio never available before in 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 expansion capabilities unique to a single-user system. Execution speeds are extremely fast (600 nanoseconds), providing an overall throughput capability enabling the 2200SVP to be considered for a variety of data processing and heavy number-crunching jobs previously requiring 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 most processing problems. The entry level system is available with 32K bytes of user memory, expandable to a maximum of 64K bytes. This expansion capability, coupled with Wang's selection of peripherals, ensures many years of continued system growth.

The basic CPU contains 32K bytes of user memory and connections for an interactive terminal, a printer, and telecommunications. The CPU is also equipped with 16K of 20 bit words 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 memory (minus about 3K bytes 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 memory. Such storage efficiency, combined with the use of separate control memory for system software, extends the capacity of the available user memory for program storage.

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

Two types of disk drives are available with the 2200SVP — a dual-sided, double-density diskette drive and an optional 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. The terminal consists of a large, easy-to-read 24 x 80 Cathode Ray Tube (CRT) screen display with business graphics capabilities and a typewriter-style keyboard. The Model 2236DE terminal can also support its own printer, thus providing the overall system with two printers.

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 combining reliable components and 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 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

Operation	Central Processing Time
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 2200SVP also provides high-speed alphanumeric-string processing capabilities. For example, the following times were measured when the specified operations were performed on 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

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. 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 2200SVP 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 2200SVP is a dual-sided, double-density diskette drive which can store approximately 1 megabyte of data. 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.

Either a second DSDD diskette drive or a fixed disk drive (described in the following paragraphs) is also available as optional equipment. When used with the fixed drive, the DSDD provides an effective backup medium. In addition to its backup capabilities, the DSDD diskette also serves as the medium for 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 fast data transfer rate for a flexible disk unit.

Fixed Disk Drive

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 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 which 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 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 DSDD diskette drive and an optional fixed-disk drive or second DSDD diskette drive are mounted directly within 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 of the following.

- One DSDD diskette drive (standard)

- Two DSDD diskette drives (dual diskette system)

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

DISK CONTROL INSTRUCTIONS

The 2200SVP provides the following 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.

COMMUNICATIONS CAPABILITIES

The 2200SVP supports a full range of communications capabilities between the 2200SVP and other computer systems. Wang 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: the Model 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

The Model 2236DE Interactive Terminal contains a 12-inch (30.5 cm) diagonal measure Cathode Ray Tube (CRT) screen display. 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. In addition to controlling cursor movement and positioning from the keyboard, a number of control codes can be used to manipulate the cursor under program control for specially formatted displays.

TERMINAL KEYBOARD

The Model 2236DE 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 labeled A/A and A/a. In A/A mode, uppercase alphabetic characters are produced, whether the keyboard is shifted or unshifted. Shifted numeric keys produce symbols and special characters. In A/a mode, the keyboard function as a standard typewriter, producing uppercase and special characters when shifted, and producing lowercase and numeric characters in unshifted operation.

2236DE CHARACTER DISPLAY ATTRIBUTES

The Model 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, underlined, or reversed video (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 blinking portions on a 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 uses 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 character 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. When combined with display attributes, character graphics are useful for the construction of bar graphs, histograms, and other special displays.

COMPATIBILITY WITH OTHER 2200 SYSTEMS

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

The BASIC-2 language supported on the 2200SVP is identical to BASIC-2 on the 2200VP, MVP and LVP. Additionally, the 2200SVP 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, programmers familiar with other 2200 systems will quickly become productive on the 2200SVP.

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

2200SVP SPECIFICATIONS

Size
Height .... 12.0 in. (30.5 cm)
Width .... 21.5 in. (54.6 cm)
Depth .... 26.0 in. (66.0 cm)

Weight
75 lb (34.1 kg)

User Memory Size
32K bytes (standard)
Expandable to a maximum of 64K bytes

Power Requirements
115 VAC ± 10%, 60 Hz ± 1 Hz
230 VAC ± 10%, 50 Hz ± 1 Hz
230 Watts

Fuses
3.0 amps (SB) for 115 V/60 Hz
1.5 amp (SB) for 230 V/50 Hz

Operating Environment
Temperature
50°F to 90°F (10°C to 32°C)
Relative Humidity
35% to 65% noncondensing (recommended)
20% to 80% noncondensing (allowable)

Heat Output
1,050 Btu/hr

Numeric Range
$-10^{100} < n <= -10^{-99}, 0, 10^{-99} <= n < 10^{100}$

Accuracy
13 digits

Maximum Data Rate
100,000 bytes/sec

DUAL-SIDED, DOUBLE-DENSITY DISKETTE DRIVE SPECIFICATIONS

1 Megabyte Diskette Drive — Option A
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

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

ORDERING SPECIFICATIONS

The Central Processing Unit must contain a BASIC-2 interpreter, an operating system, and system diagnostics. The standard CPU must have 32K bytes of user memory and must be expandable to 64K 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 for both user and control memory. An enriched version of the BASIC language 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 must be provided. The system must provide a complete set of I/O instructions to control standard 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 dual-sided, double-density diskette drive. Both a fixed-only disk drive or a second dual-sided, double-density diskette drive must be available options. Both asynchronous and bisynchronous communications hardware must be available on a single board for installation directly within the processor.

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