

WANG

LABORATORIES, INC.

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DATA SHEET

The Wang "BASIC Processing System" (2200S/2220) is a BASIC language Processing System which combines simple keyboard operation with the BASIC language of much larger systems.

The nucleus of the "BASIC Processing System" is the System 2200S Central Processing Unit (CPU). The CPU contains a standard 4K memory, expandable in 4K increments to 16K. Because the BASIC language is hardwired into the CPU, all but 700 bytes, reserved for system tables, are available to the user. Also, hardwired into the CPU is an EDIT feature which allows easy correction of data and program lines being entered or already in memory.

The expandable memory, along with the hardwired BASIC language, furnishes ample storage area for most programming applications.

The basic System 2200S CPU has three I/O slots supporting the Model 2220 integrated control module (which occupies two I/O slots) and any one of a number of Wang's versatile peripheral devices. The compact, attractive Model 2220 control module contains a 16 line 64 character per line Cathode Ray Tube (CRT) for displaying instantly programs and calculations, a tape cassette drive for saving and loading data and programs and an upper/lowercase BASIC keyword keyboard for fast and efficient entry of programs and data. For users with a need for a number of peripheral devices Option 20, an additional three I/O slots, is available.



2200S/2220

BASIC PROCESSING SYSTEM

FEATURES	BENEFITS
Full BASIC language	BASIC is the easiest of programming languages to learn, permitting an inexperienced user to begin programming almost immediately.
Integrated CRT/tape cassette drive/keyboard module	Affords easy access to the display and control features of the Model 2220.
Compact size	Offers portability and permits efficient use of available office space.
Programming features	Before a program line is entered into memory the System 2200S checks the line for any syntax errors, thereby avoiding costly, time consuming errors.
EDIT feature	Permits simple and efficient editing of characters and words in programs and text being entered or already in memory.
Program Protection	Loaded, protected programs cannot be accidentally modified.
Special Function Keys	The 16 user defined Special Function Keys can be used to access up to 32 commonly used character strings for text entry or to provide program entry points directly from the keyboard.

Options

Option 20 Three I/O slots

Three additional I/O slots (OP-20) can be ordered with the System 2200S CPU or added to a previously purchased System to make a total of six I/O slots. With Option 20 a wide range of peripheral devices are made available to the user.

Option 21 Matrix ROM

The Matrix ROM (OP-21) offers the user additional mathematical functions; the Matrix statements include:

MAT addition	MAT PRINT
MAT CONstant	MAT READ
MAT equality	MAT REDIM
MAT IDN (identity)	MAT scalar multiplication
MAT INPUT	MAT subtract
MAT INVerse, D	MAT TRN (transpose)
MAT multiplication	MAT ZERO

Option 30 Upper/Lowercase Model 2220 Integrated CRT

The Upper/Lowercase Model 2220 Integrated CRT (OP-30) permits upper and lowercase characters to be displayed on the CRT screen. Additional characters are available with Option 30. These characters, with their respective HEX codes, are: left brace (7B), right brace (7D), equivalent sign (7E), broken vertical line (7C), solid rectangle (7F), and prime symbol (60).

Option 31 Audio Alarm

The Audio Alarm (OP-31) can be activated only under program control. There are variety of uses for this option, for example, to gain the operator's attention when an error occurs under program control, or to signal the end of a program or a segment of a program.

Peripherals

Model 2201	Output Writer
Model 2207A	I/O Interface Controller (RS-232-C)
Model 2214	Mark Sense Card Reader
Model 2215	BASIC Keyword Keyboard
Model 2216	CRT Executive Display
Model 2216A	Upper/Lowercase CRT Display
Model 2217	Single Tape Cassette Drive
Model 2216/2217	Combined CRT Executive Display/ Single Tape Cassette Drive
Model 2216A/2217	Combined Upper/Lowercase CRT Display/Single Tape Cassette Drive
Model 2218	Dual Tape Cassette Drive
Model 2220	Integrated CRT/Tape Cassette Drive/BASIC Keyword Key- board
Model 2221	Line Printer (132 column)
Model 2222	Alphanumeric Typewriter Keyboard
Model 2227	Telecommunication Controller
Model 2231	Line Printer (80 column)
Model 2234A	Hopper-Feed Punched Card Reader
Model 2244A	Hopper Feed Mark Sense/ Punched Card Reader
Model 2250	I/O Interface Controller (8- bit-parallel)
Model 2252A	Input Interface Controller (BCD 1 to 10-Digit-Parallel, scannable)
Model 2261	High Speed Printer (132 column)
Model 2262	Digitizer
Model 2290	CPU/Peripheral Stand
Model 2292	Auxiliary Display

"BASIC Processing System" Statements, Commands and Tape Cassette Operations Statements:

Statements:

COM	HEXPRINT	PRINTUSING
CONVERT	IF END THEN	READ
DATA	IF THEN	REM
DEFFN	%(IMAGE)	RESTORE
DEFFN'	INPUT	RETURN
DIM	KEYIN	RETURN CLEAR
END	LET	SELECT
FOR	NEXT	STOP
GOSUB	ON GOTO	TRACE
GOSUB'	ON GOSUB	
GOTO	PRINT	

Commands:

BACKSPACE	BACKSPACE
CLEAR	DATALOAD
CONTINUE	DATASAVE
HALT/STEP	LOAD (Statement and Command)
LINE ERASE	REWIND
LIST	SAVE (Command)
RENUMBER	SKIP
RUN	
RESET	
STATEMENT NUMBER	
EDIT	

Tape Cassette:

BACKSPACE
DATALOAD
DATASAVE
LOAD (Statement and Command)
REWIND
SAVE (Command)
SKIP

Mathematical functions, when used in BASIC Processing System statements, are calculated to 13 significant digits.

LOG – Natural Logarithm	*SIN – SINE
ABS – ABSOLUTE VALUE	*COS – COSINE
SQR – SQUARE ROOT	*TAN – TANGENT
RND – RANDOM NUMBER	*ARCSIN – ARCSINE
INT – INTEGER PART	*ARCCOS – ARCCOSINE
SGN – assigns 1 if positive, 0 if zero, or -1 if negative	*ARCTAN – ARCTANGENT
# PI – π (3.14159265359)	(*trig arguments: degrees, radians, gradians)
EXP – e^x	

Arithmetic Operators:

↑	exponentiation
*	multiplication
/	division
+	addition
-	subtraction

Relational Symbols:

=	equal
<	less than
<=	less than or equal to
>	greater than
>=	greater than or equal to
<>	not equal

String Functions:

STR	VAL
LEN	NUM
HEX	

User Defined Special Function Keys

All 32 Special Function Key operations can be defined by the user and instantly redefined to meet changing requirements. The keys can be used to write, store and then access, with a single keystroke, commonly used character strings for text entry; or the keys can provide program entry points directly from the keyboard.

Model 2220 Keyboard Operations

Most BASIC words are entered with a single stroke and require only one byte of memory. The keyboard has two modes of operation: Keyword/A and A/a. The Keyword/A mode provides most BASIC words and uppercase alpha characters. A/a mode functions as a standard typewriter providing upper and lowercase alpha characters.

Character EDIT Mode

The Character EDIT Mode is designed to facilitate editing of lines of program text recalled from memory or data being input and displayed on the CRT: ← (Multispace left); ← (Space left); → (Space right); → (multispace right); INSERT; DELETE; ERASE; RECALL.

The EDIT key is used to enter EDIT mode. The RECALL key is used to recall a program line previously entered into memory. The Multispace (left and right) keys are provided to move the cursor five spaces to the left or right. Two Space keys are provided to move the cursor a single space to the left or right. The INSERT key is used to expand a line to allow for additional text or data. When the DELETE key is depressed, the character at the current cursor position is deleted. A program or data line can be erased from the current cursor position to the end of the line by touching the ERASE key.



DATA SHEET

SPECIFICATIONS

*Average Execution Time (Milliseconds)

Add/Subtract	0.8
Multiply	3.8
Divide	7.4
Square Root	46.4
e^x	25.3
$\log_e x$	23.2
X^y	45.4
Integer Value	0.24
Absolute Value	0.02
Sign	0.25
SIN	38.3
COS	38.9
TAN	78.5
ARCTAN	72.5
Read/Write Cycle	1.6 μ sec

*Average execution times determined using Random Number Arguments with 13 digits of precision. Speeds are faster in calculations with arguments of less precision.

Memory Size:

4K - 16K (in increments of 4K)

Power Requirements

115 or 230 VAC \pm 10%, 50 or 60 Hz \pm 1/2 cycle

Operating Environment:

50°F to 90°F (10°C to 32°C)
20% to 90% relative humidity

Subroutine Stacking

50

Cassette Drive — Model 2220

Stop/Start Time

0.09/0.05 sec

Capacity

522 bytes/ft (1,712 bytes/m)

Recording Speed

7.5 IPS (19 cm/sec)

Search Speed

7.5 IPS (19 cm/sec)

Transfer Rate

326 characters/sec (approx)

Inter-record Gap

0.6 in. (1.52 cm)

(Capacity and transfer rate include gaps and redundant recording)

SPECIFICATIONS (Cont.)

Size of 2220

Height	13.5 in. (34.2 cm)
Depth	20.5 in. (52 cm)
Width	19.7 in. (50.2 cm)

Weight

48 lbs (21.7 kg)

Size of 2200S CPU

Height	9.8 in. (24.8 cm)
Depth	21 in. (53.3 cm)
Width	14.5 in. (36.8 cm)

Weight

40 lb (18 kg)

Size of 2220 Integrated CRT

9 in. diagonal

Capacity

16 lines, 64 characters/line

ORDERING SPECIFICATIONS

A Keyboard Programmable Central Processing Unit (CPU) with hardwired BASIC language. The CPU must have at least 4,096 bytes of memory, expandable in 4,096 byte increments to 16,384 bytes. An EDIT feature must be hardwired into the CPU. The unit must contain 3 I/O slots and be expandable to 6 I/O slots. The CPU must be capable of supporting any or all of a number of peripheral devices: Cathode Ray Tube display (16 lines by 64 characters per line), a Selectric Output Typewriter, an Input Keyboard of typewriter characters and single keystroke BASIC language verbs, an 80 or 132 column Line Printer, and a 132 column High Speed Printer. The CPU must support Option 21 Matrix ROM; Model 2207A I/O Interface-Controller; Models 2214, 2234A and 2244A Card Readers; Model 2227 Telecommunications Controller, Model 2250 I/O and Model 2252A Input Interface Controllers; and the Model 2262 Digitizer.

Wang Laboratories reserves the right to change specifications without prior notice.

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