The System 2200T CPU (Central Processor Unit) is a powerful, sophisticated, multi-faceted system base.

The standard System 2200T contains 4,096 (4K) bytes of Random Access Memory (RAM), expandable in 4K or 8K modules to a maximum of 32K bytes, and three I/O slots. A powerful 42.5K Extended BASIC Interpreter is resident in a separate Read Only Memory (ROM) area of the CPU; nearly the entire RAM is available to the user for programming (only 700 bytes are reserved for system use). By "hardwiring" the interpreter, the time and necessity of 'paging' the system in and out of user memory is eliminated. In this way, the 2200T CPU favorably compares to a large computer with a much greater memory.

The CPU, with its Extended BASIC Instruction Set, is capable of supporting all peripherals presently offered by Wang Laboratories, Inc. These peripherals include a Model 2226 Console-12" CRT and keyboard, for overall system control and operation including program data entry and display; a Model 2270 Removable Diskette Drive and a Model 2260 Fixed/Removable Disk Drive, for mass storage; and a 2221W Character Printer for report quality printed output. Numerous other peripherals also are available to custom configure a system to meet your particular needs.

For users with a need for a number of peripheral devices, Option 20 (6 I/O slots) and Option 20A (9 I/O slots) are available.

SOFTWARE

Wang Laboratories, Inc. provides an extensive software library which continually is being updated and expanded to meet the changing needs of the user. Some of the software contained in our library include: structural packages, statistical packages, and accounting packages.
2200T INSTRUCTION SET

General Basic Statements
ADD GOTO PLOT
AND HEXPRINT PRINT
BIN % (IMAGE) PRINTUSING
BOOL IF END THEN READ
COM IF-THEN REM
COM CLEAR INIT RESTORE
CONVERT INPUT RETURN
DATA KEYIN RETURN CLEAR
DEFFN LET ROTATE
DEFFN' NEXT SELECT
DIM ON GOTO STOP
END ON GOSUB TRACE
FOR ON ERROR UNPACK
GOSUB OR XOR
GOSUB' PACK

Disk Statements (all models)
Automatic File Cataloging Mode Statements
DATLOAD DC LOAD DC
DATLOAD DC OPEN MOVE
DATSAVE DC MOVE END
DATSAVE DC CLOSE SAVE DC
DATSAVE DC OPEN SCRATCH
DBACKSPACE SCRATCH DISK
DSKI P VERIFY
LIST DC

Basic Commands
CLEAR HALT/STEP RENUMBER
CONTINUE LIST RUN
RESET

Absolute Sector Addressing Mode Statements
LIMITS DATLOAD BA
LOAD DA DATSAVE BA
SAVE DA DATLOAD DA
COPY DATSAVE DA

Tape Cassette Commands and Statements
BACKSPACE LOAD
DATAD O RE WIND
DATALOAD BT SAVE
DATASAVE SKIP
DATASAVE BT

The SORT Instruction Set
MAT CONVERT
MAT COPY
MAT MERGE
MAT MOVE
MAT SEARCH
MAT SORT

The General I/O Instruction Set
SGIO $PACK
$IF ON $UNPACK
$TRAN

Matrix Instruction Set
OPERATION
MAT addition
MAT CON
MAT equality
MAT IDN
MAT INPUT
MAT INV,d
MAT multiplication
MAT PRINT
MAT READ
MAT REDIM
MAT scalar multiplication
MAT subtraction
MAT TRN
MAT ZER

MATHEMATICAL FUNCTIONS
Mathematical functions are calculated to 13 significant digits.
LOG — natural logarithm
ABS — absolute value
SQR — square root
RND — random number
INT — greatest integer function
SGN — assigns 1 if positive, 0 if zero, or -1 if negative.
# PI (π) — (3.14159265359)
EXP — e^x
*SIN — sine
*COS — cosine
*TAN — tangent
*ARCSIN — arcsine
*ARCCOS — arccosine
*ARCTAN — arctangent
(*trig arguments: degrees, radians, or gradians)
ALPHANUMERIC FUNCTIONS

<table>
<thead>
<tr>
<th>STR</th>
<th>POS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEN</td>
<td>HEX</td>
</tr>
<tr>
<td>VAL</td>
<td>NUM</td>
</tr>
</tbody>
</table>

Arithmetic Operators:
- † exponentiation
- * multiplication
- / division
- + addition
- - subtraction
- = equal

Relational Symbols:
- < less than
- <= less than or equal to
- > greater than
- >= greater than or equal to
- <> not equal

User Defined Special Function Keys

The 2200T CPU provides 32 Special Function Keys, operations which may be defined by the user through the keyboard 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.

OPTIONS AND PERIPHERALS

Memory

Additional 4,096 and 8,192 byte blocks. (Memory is available in 4K increments up to 16K, and in 8K increments from 16K to 32K.)

CPU/Keyboard/Display Options

Option 4 Audio Signal for 2216 & 2216A CRT
Option 20 Up to 8 I/O slots
Option 20A Up to 9 I/O slots
Option 30 Upper/Lowercase for 2220 & 2226 CRT
Option 31 Audio Signal for 2220 & 2226 CRT
Option 32 Keyboard Clicker
Model 2290 CPU/Peripheral Stand

Keyboard/Display Peripherals

Model 2215 BASIC Keyword Keyboard
Model 2216 CRT Executive Display
Model 2216A Upper/Lowercase CRT Display
Model 2216/2217 Combined CRT Executive Display/Single Tape Cassette Drive
Model 2216A/2217 Combined Upper/Lowercase CRT Display/Single Tape Cassette Drive
Model 2220 Console-CRT/Keyboard/Single Tape Cassette Drive

Model 2222 Alpha-Numeric Typewriter Keyboard
Model 2223 Alpha-Numeric/BASIC Keyboard
Model 2226 Console-12" CRT/Keyboard
Model 2292 Auxiliary Display w/25' cable

Output Peripherals

Model 2201 Output Writer
Model 2202 Plotting Output Writer
Model 2212 Analog Flatbed Plotter (10" x 15")
Model 2221 Line Printer (132 columns)
Model 2221W Line Printer (132 columns)
Model 2231 Line Printer (80 columns)
Model 2232A Digital Flatbed Plotter (31" x 48")
Model 2261 High Speed Printer (132 columns)
Model 2291 Digital Flatbed Plotter stand

Interface Controllers

Model 2207A I/O Interface Controller (RS-232-C) Selectable BPS
Model 2227 Asynchronous Telecommunications Controller
Model 2227N Null Modem for 2227
Model 2250 I/O Interface Controller (8 bit parallel)
Model 2252A Scanning Input Interface Controller (BCD 1-10 digit parallel)

Input Peripherals

Model 2203 Punched Tape Reader
Model 2214 Mark Sense Card Reader
Model 2234A Hopper-Feed Punched Card Reader
Model 2244A Hopper-Feed Mark Sense/Punch Card Reader
Model 2262-1,2,3 Digitizer (Tablet sizes: 20" by 20", 30" by 40", 36" by 42")

Mass Storage Peripherals

Model 2209 Nine-Track Tape Drive
Model 2217 Single Tape Cassette Drive
Model 2218 Dual Tape Cassette Drive
Model 2244-2,3,4 Disk Multiplexer (for 2, 3, or 4 CPU's)
Model 2230-1,2,3 Fixed/Removable Disk Drive (1,228,600 to 5,013,504 bytes)
Model 2230MXA/B Daisy-Chain-Type Disk Multiplexer (for 1, 2, 3 or 4 CPU's)
Model 2244-2 Dual Removable Flexible Disk Drive (524,288 bytes)
Model 2242 Single Removable Flexible Disk Drive (262,144 bytes)
Model 2243 Triple Removable Flexible Disk Drive (786,432 bytes)
Model 2260 Fixed/Removable Disk Drive (10,027,008 bytes)
Model 2270-1,2,3 Single, Double, or Triple Removable Diskette Drive (262,144 to 786,432 bytes)
# DATA SHEET

## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Operation</th>
<th>Time (Milliseconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add/Subtract</td>
<td>0.8</td>
</tr>
<tr>
<td>Multiply</td>
<td>3.8</td>
</tr>
<tr>
<td>Divide</td>
<td>7.4</td>
</tr>
<tr>
<td>Square Root</td>
<td>46.4</td>
</tr>
<tr>
<td>$e^x$</td>
<td>25.3</td>
</tr>
<tr>
<td>$\log_x$</td>
<td>23.2</td>
</tr>
<tr>
<td>$x^y$</td>
<td>45.4</td>
</tr>
<tr>
<td>Integer Value</td>
<td>0.24</td>
</tr>
<tr>
<td>Absolute Value</td>
<td>0.02</td>
</tr>
<tr>
<td>Sign</td>
<td>0.25</td>
</tr>
<tr>
<td>Sine</td>
<td>38.3</td>
</tr>
<tr>
<td>Cosine</td>
<td>38.9</td>
</tr>
<tr>
<td>Tangent</td>
<td>78.5</td>
</tr>
<tr>
<td>Arctangent</td>
<td>72.5</td>
</tr>
<tr>
<td>Read/Write Cycle</td>
<td>1.6 $\mu$ sec</td>
</tr>
</tbody>
</table>

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

## Operating Environment
- 50°F to 90°F (10°C to 32°C)
- 20% to 80% relative humidity, Non-condensing

## Subroutine Stacking
- 50

## Size of 2200T 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)

## ORDERING SPECIFICATIONS

A keyboard programmable Central Processing Unit (CPU) with hardwired Extended BASIC language. The CPU must have at least 4,096 bytes of memory, expandable in 4,096 and 8,192 increments to 32,588 bytes. The character EDIT mode, Disk Instruction Set, General I/O Instruction Set, SORT Instruction Set, and MATRIX Instruction Set must be standard features. The CPU must be capable of supporting all Wang Laboratories, Inc. peripherals and auxiliary equipment presently available, and the following options: Option 4, Audio Signal for 2216 & 2216A CRT; Option 20, 6 I/O slots; Option 20A, 9 I/O slots; Option 30, Upper/Lowercase for 2220 & 2226 CRT; Option 31, Audio Signal for 2220 & 2226 CRT; and Option 32, Keyboard Clicker.

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

WANG LABORATORIES, INC.
836 NORTH STREET, TEMPEST, MASSACHUSETTS 01876, TEL (617) 851-4111, TWX 710 343-6769, TELEX 94 7421

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