# DATA SHEET

The System 2200T BASIC Interpreter Central Processor Unit (CPU) is designed to meet the computing demands of research, engineering, business, and industrial environments by providing a powerful and responsive processor in combination with an extremely easy to program built-in higher level interactive language and extensive memory capacity.

The standard System 2200T CPU contains 8,192 bytes (8K) of Random Access Memory (RAM) and three input/output (I/O) slots. A powerful 42.5K byte Extended BASIC Interpreter is separately "hardwired" into a Read Only Memory (ROM) area of the CPU leaving nearly the entire RAM available for user data and programs — only 700 bytes are reserved for system use. By "hardwiring" the interpreter, the System 2200T CPU is instantly ready to use with user memory directly accessible and fully available for your particular processing needs.

With the Extended BASIC Instruction Set, the System 2200T CPU is capable of supporting all peripherals presently offered by Wang Laboratories, Inc. These peripherals include a Model 2226 Console-12" Cathode Ray Tube and Alphanumeric/BASIC Keyword Keyboard for overall system control and operation, including program data entry and display; a Model 2270-1, -2, -3 Removable Diskette Drive and the Models 2230 and 2260B Fixed/Removable Disk Drives for mass storage; and a Model 2221W Character Printer for report quality printed output.

In addition to a comprehensive standard version of the BASIC language provided with the System 2200T, the CPU also is equipped with four special BASIC instruction sets, hardwired into the ROM, which significantly expand the power and capability of the processor. The SORT ROM set provides a group of advanced programming statements containing six matrix operations for byte and array-element manipulation, sorting, statistical searching, etcetera. The Matrix ROM set offers fourteen mathematical matrix procedures which operate on numeric arrays according to the rules of linear algebra, invert matrices, simplify and expedite input/output (I/O), and print alphanumeric material. The General I/O ROM set consists of five statements which provide customized data input/output and I/O control operations, and permit high-speed data conversion, packing and unpacking. The EDIT ROM set is designed to simplify editing of program text recalled from memory or data being entered and displayed on the Cathode Ray Tube (CRT).
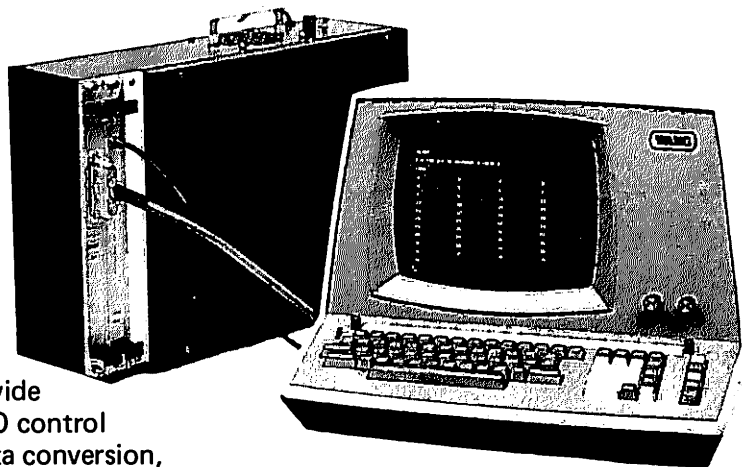
SYSTEM 2200T
CENTRAL PROCESSOR UNIT

For nonstandard instrument interfacing we have the Model 2207A I/O Interface Controller (RS-232-C) Selectable BPS, the Model 2252A Scanning Input Interface Controller (BCD 1-10 digit parallel), and the Model 2250 I/O Interface Controller (8-bit parallel) to cover a wide variety of requirements.

As your programming, data development, and peripheral demands grow, the System 2200T CPU can expand with you. The CPU's memory can be expanded in 8K modules to 32K, providing ample storage area for most data processing 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.

Numerous other options, peripherals and controllers also are available to custom configure a system to meet your particular needs.

2200T INSTRUCTION SET
GENERAL BASIC STATEMENTS, COMMANDS, AND FUNCTIONS

Many BASIC statements and commands are single keystrokes, input into the System 2200T via an alphanumeric/BASIC keyword keyboard, and require only one byte of memory.

BASIC Commands

A BASIC command provides the user with a means of communicating with the system. A BASIC command facilitates the running or modifying of a program, but is not part of the program.

CLEAR	HALT/STEP	RENUMBER	RUN
CONTINUE	LIST	RESET	LOAD

Standard BASIC Statements

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

Although this instruction set represents, for the most part, statements most commonly found in BASIC languages, it also has a number of additions which extend the power and versatility of your programming and data processing capabilities. For example, the PRINTUSING and % (Image) statements permit easy and concise formatting of printed reports that include leading dollar signs ($), commas, and decimal point insertion of numbers. The COM and COM CLEAR statements allow the efficient use of memory for passing variable data between overlayed

program steps. A number of statements permit extensive customization of the keyboard and display for program data entry. These statements include KEYIN (receives one keyboard character); DEFFN, DEFFN' HEX( ), and RETURN CLEAR (use the 16 keyboard special function keys to execute program subroutines, continue program execution at various points, and enter predetermined text strings of alphanumeric or hexadecimal characters). GOSUB' permits the passing of arguments to subroutines, PLOT provides flexible and efficient plotting capabilities, and ON ERROR allows error recovery processing under program control.

Standard Data Manipulation Statements and Functions

This instruction set contains many unique and powerful statements to perform bit and byte manipulation, binary and logical arithmetic, and data searching and conversion. With these statements, the System 2200T provides a powerful system for the conversion, editing and efficient use of data.

ADD	LEN
AND, OR, XOR	NUM
BIN	PACK
BOOL	POS
CONVERT	ROTATE
HEX	STR
HEXPRINT	UNPACK
INIT	VAL

The AND, OR, XOR and BOOL instructions perform all logical Boolean operations on two specified arguments. The BIN statement converts the decimal system value of an expression into a binary value and stores the results in a named alphanumeric value; the operation is the inverse of the VAL statement. To set every byte in one or more specified arguments equal to an indicated value, the INIT statement can be used. The ROTATE statement rotates the bits within each byte of a specified alphanumeric variable a designated number of positions. The POS statement allows efficient searching of alphanumeric data. The great power of the bit/byte manipulation statements and functions reduces programming requirements for many data processing and reduction applications.

Advanced BASIC Statements

In addition to the powerful standard BASIC language provided in the System 2200T CPU, a number of special instruction groups, "hardwired" into the ROM of the CPU, significantly expand the power and versatility of the system.

Math Matrix Statements

These instructions perform matrix input/output and arithmetic operations including addition, subtraction, multiplication, inversion and transposition. Array default dimensions are 10 by 10 with an alphanumeric element default size of 16 bytes. Redimensioning of arrays is automatic for many arithmetic matrix operations.

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

SORT Statements

The SORT instruction set contains six advanced matrix operations designed to facilitate text editing, and the sorting, searching and moving of data. MAT CONVERT, MAT SORT, MAT MERGE and MAT MOVE are primarily used for data sorting operations. MAT SEARCH along with MAT MOVE provide a powerful capability to do statistical searching of data and text edit searching. Segments of data can be moved with the MAT COPY statement.

MAT CONVERT	MAT MOVE
MAT COPY	MAT SEARCH
MAT MERGE	MAT SORT

General I/O Statements

The five statements included in this instruction set are identified by the following names:

$GIO	$PACK
$IF ON	$UNPACK
$TRAN	

In particular, the $GIO statement is unlike any other BASIC language I/O statement since a technique similar to machine language programming is used to custom-tailor I/O operations sequences which are executable within the framework of the high-level BASIC language. The $GIO statement is required when a Model 2209 Nine Track Tape Drive, a Model 2228 Communications Controller or a Model 2227B Buffered Asynchronous Communications Controller is used with the System 2200T. Furthermore, the statement can be used to support the operation of non-Wang devices interfaced to a System 2200T via the Model 2207A, 2227B, 2250, and 2252A interface controllers. The $IF ON statement is designed to test the device-ready condition of a specified output device or test the data-ready condition of a specified input device and initiate a branch to a specified line number if a ready or busy condition is sensed. The $TRAN statement provides a high-speed character conversion capability implemented by a table look-up procedure or the replacement of specified characters. The $PACK and $UNPACK statements are designed to facilitate data packing and unpacking, by fields or delimiters, between a specified alphanumeric array buffer and specified BASIC numeric and/or alphanumeric variables in an argument list.

Tape Cassette and Disk Statements and Commands

The tape cassette instruction set consists of statements and commands for the reading and writing of blocked records. With the 23 statements and commands in the disk instruction set, the System 2200T can control any of the units in Wang's complete line of disk drives including the Model 2230-1, -2, or -3, and 2260B, B½, or B¼ Fixed/Removable Disk Drives, the Model 2270-1 Single Removable Diskette Drive, the Model 2270-2 Dual Removable Diskette Drive, and the Model 2270-3 Triple Removable Diskette Drive.

Tape Cassette:

BACKSPACE	LOAD
DATALOAD	REWIND
DATALOAD BT	SAVE
DATASAVE	SKIP
DATASAVE BT	

Instructions in a form similar to the tape cassette instructions are also provided to support such peripherals as the Model 2203 Punched Tape Reader, the Models 2234A and 2244A Card Readers, the Model 2207A Teletype Controller, and the Model 2262 Digitizer.

Disk:

Automatic File Cataloging Mode Statements

DATALOAD DC	LOAD DC
DATALOAD DC OPEN	MOVE
DATASAVE DC	MOVE END
DATASAVE DC CLOSE	SAVE DC
DATASAVE DC OPEN	SCRATCH
DBACKSPACE	SCRATCH DISK
DSKIP	VERIFY
LIST DC	LIMITS

Absolute Sector Addressing Statements

DATALOAD BA	COPY
DATASAVE BA	LOAD DA
DATALOAD DA	SAVE DA
DATASAVE DA	

Automatic File Cataloging Mode provides rapid access to cataloged files on the disk. Catalog mode permits the user to save and load program and data files by name, without concern for where or how the files are actually stored on the disk. The system itself automatically keeps track of the size and location of each file.

Absolute Sector Addressing Mode consists of statements which permit the programmer to address specific sectors on the disk directly, thus enabling him to design his own disk operating system. Two of the eight Absolute Sector Addressing mode instructions are special statements which can be used to read or write one sector (256 bytes) of unformatted data. These special statements enable the programmer to write his own control information in individual sectors.

Program and Data Storage and Retrieval

The DATALOAD BT and DATASAVE BT cassette statements, and the DATALOAD BA and DATASAVE BA disk statements enable the programmer to save and load records which do not contain standard System 2200T control information.

Since records saved and loaded in this manner are not automatically formatted by the system, the programmer is free to write his own control information, and format his records in a manner appropriate for his application.

The DATALOAD and DATASAVE cassette commands and the DATALOAD DC or DA and DATASAVE DC or DA disk commands easily read and write lists of variables and arrays from or onto a disk or cassette without preformatting.

Loaded, protected programs cannot be accidentally modified; any attempt to modify a loaded, protected program results in an error message being displayed.

Programs, or specified sections of programs, can be recorded on cassette, disk or other selectable storage device for future use. When needed, the programs are loaded into the System 2200T's memory to replace or append an existing program. Loading can be effected from the keyboard, or under program control, to ease chained program operation.

When chaining programs, using the COM statement allows program variables and arrays to be defined permitting their passage to subsequent program steps; the COM CLEAR statement removes these variables and arrays when they are no longer needed for subsequent steps.

Stored programs can be identified by an alphanumeric name and then retrieved by searching for the specified program with the LOAD or LOAD DC command.

Arithmetic Operators Relational Symbols and Mathematical Functions

Arithmetic operations are performed with an accuracy of 13 digits. Most trigonometric and exponential functions are calculated to 12 digits of accuracy. Calculations are performed over a range of 10^{-99} to 10^{+99}

Arithmetic Operators		Relational Symbols	
↑	exponentiation	<	less than
*	multiplication	<=	less than or equal to
/	division	>	greater than
+	addition	>=	greater than or equal to
−	subtraction	<>	not equal
=	equal		

Mathematical Functions

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)	— 3.14159265350
EXP	— e^x
SIN	— sine*
COS	— cosine*
TAN	— tangent*

ARCSIN	— arcsine*
ARCCOS	— arccosine*
ARCTAN	— arctangent*

(*trig arguments: degrees, radians, gradians)

Variables

Up to 286 variable names can be assigned to each of the following: simple numeric variables, numeric array variables, string variables and string array variables. Either one-or two-dimensional numeric or alphanumeric string arrays can be used, dimensioned to a maximum of 255.

The lengths of alphanumeric variables and array elements are defined from 1 to 64 bytes, with a 16 byte default size.

SYSTEM 2200T FEATURES

Immediate Mode
● In the Immediate Mode, the user may enter unnumbered BASIC statements as one-line calculations. Multi-statement lines can be entered and executed without altering programs resident in memory, thus allowing the system to be used as a calculator and to make selective program dumps during debugging.

Programming Mode
● The System also processes "multi-statement lines", which save keystrokes and memory.
● A total of 16 User-Defined Special Function Keys can be used for single-keystroke access of up to 32 subroutines, program entry points, program functions, or entry of character strings.
● The amount of unused memory is indicated on the CRT when the END statement is included at the completion of a program, or at any time during immediate mode operation.

Editing, Debugging, and Error Diagnostics
● When errors occur during program entry or execution, the program line is displayed and a Diagnostic Error Pointer/Error Code indicates the approximate location in the program line where an error is made and identifies the cause of the error with an error code.
● The programmable TRACE mode traces the program, producing a printout or display whenever a program variable receives a new value or a program transfer is made.
● The HALT/STEP key executes and displays one program statement each time it is depressed, allowing a line-by-line analysis of the program. If TRACE mode is activated, each executed statement as well as received calculated values are displayed.
● The ON ERROR GOTO statement permits a program to execute error recognition and/or recovery procedures under program control.
● The Character EDIT Mode is designed to facilitate editing of lines of program text recalled from memory or data and program lines currently being input and displayed on the CRT:

←---(Multispace cursor left), ← (Space cursor left), → (Space cursor right), ---→ (Multispace cursor right), INSERT, DELETE, ERASE, and 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 by inserting a space character 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.

- The RENUMBER command assigns an entire program, or a specified segment of a program, with user-selectable, equally incremented statement numbers.
- Errors can be corrected in a program statement by using the edit functions, by backspacing (which erases characters) in an unexecuted line to the point where the error was made and properly reentering the remainder of the line; deleting the entire line by reentering the line number, followed by a CR/LF command; or replacing the line completely by reentering the line number, followed by the correct program statement.
- Additional statements can be inserted into a program by entering a line number between two existing line numbers. The new line automatically is inserted between the two original line numbers.

Telecommunications

- The Model 2228 Communications Controller with its microprocessor, memory, buffers, and transmitter/receiver circuits can emulate the binary synchronous communications protocol of particular terminals, such as the IBM 2780, at transmission rates up to 4800 baud. The controller comes with a Wang-supplied terminal emulator program which automatically loads the controller microprocessor with appropriate microcode to support each communications protocol. With the controller, the program, and a suitable modem (not supplied by Wang Laboratories), the System 2200T can operate as a remote batch terminal over dial-up telephone lines to any host computer (e.g., an IBM 360 or 370) which utilizes the same communications protocol. Since the System 2200T with its stand-alone computer capability can preprocess or post-process communicated data off-line for a wide range of data processing applications, the Model 2228 Communications Controller can add a cost-effective remote batch terminal capability to the CPU.
- The Model 2227B Buffered Asynchronous Communications Controller allows local or remote asynchronous communication with other System 2200T's, remote asynchronous telecommunications with "foreign" CPU's (IBM, Univac, Honeywell, et cetera), or directly connected communication with RS-232-C compatible equipment. The controller supports transmission rates from 110 to 9600 bits per second. Compatible modems include the Bell 103 or 202, or equivalent. A null modem available through Wang permits a direct communications link.

Instrumentation Interfacing

- The Model 2252A Scanning Input Interface Controller (BCD 1-to-10 Digit Parallel) is an input-only interface directly compatible with many digital meters for on-line applications using the System 2200T CPU. The interface accepts, in parallel, a readout consisting of a sign-bit and up to ten BCD digits in 8-4-2-1 notation, or up to 41 bits of discrete data. Four "number of digits" switches are provided to indicate the exact number of BCD digits (or the number of 4-bit groups of discrete binary data) to be processed per readout. The number-of-digits selectivity feature offers two advantages for applications involving readouts of fewer than 10 BCD digits. Less time is required to transfer each readout to the CPU, and less memory is required when storing multireadouts in alphanumeric arrays.

  The scanning mode capability is useful when instruments or devices with relatively slow settling times are interfaced to a System 2200T via one or more Model 2252A interface controllers.
- The Model 2250 I/O Interface Controller (8-Bit-Parallel) transmits data at up to 10,000 (8-bit) characters per second asynchronously between System 2200T's linked directly by a maximum 100-foot cable. The controller facilitates mass data transfer between System 2200T's and 8-Bit-Parallel I/O devices, and instrumentation.
- The Model 2207A I/O Interface Controller (RS-232-C) allows direct asynchronous input and output of data between a Teletype or other RS-232-C serial compatible devices and the System 2200T. The controller is excellent for linking the System 2200T to a local unit or for monitoring instruments. Laboratory or medical instrumentation which is RS-232-C and 8-level ASCII-compatible can be supported, as well as Teletype 33 and 35's equipped with EIA, RS-232-C adapters.

  Operation is selectable at 110, 150, 300, 600 or 1,200 baud. The controller can be used with the System 2200T CPU alone; the CRT is not required.

Device Selection

- The SELECT statement is used both in the Immediate Mode and under program control to select a device for particular I/O operations (PRINT, INPUT, TAPE, DISK).
- Device selections are maintained independently for input and output operations, allowing programs to be modified easily to work with any I/O device.

- Sector address parameters for up to 7 disk independent data files can be maintained in memory concurrently.

Disk Operation

- The System 2200T can address numerous disk drive units with varying capacities from 0.25 to 20 megabytes.
- Each disk operates in two modes: automatic file cataloging and absolute sector addressing. With catalog operations, programs and data files can be saved and accessed automatically by name, without keeping track of sector addresses on the disk. The absolute disk operations permit the user to specify disk sector addresses when saving and loading programs and data. An extensive set of support operations is provided, including the ability to copy backup disk platters and list the catalog index in a single statement.

Plotting Operation

- A powerful BASIC statement (PLOT) controls any of the plotting devices offered with the System 2200T.
- The plotters can perform any number up to 999 X and Y increments and can print entire words by using a single PLOT statement.
- The PLOT statement allows recursive plot arguments and multi-plot arguments to optimize plotting efficiency.

OPTIONS, PERIPHERALS, AND INTERFACES

Central Processor Unit Memory/I/O

- The standard System 2200T CPU contains 8,192 (8K) bytes of memory and 3 I/O slots. Memory can be expanded in 8K increments to 32K.
- Option 20 provides up to 6 I/O slots.
- Option 20A offers up to 9 I/O slots.

Keyboard/Display Peripherals and Options

- Model 2216 CRT Executive Display provides 16 lines of 64 characters each, instantly displayed.
- Model 2216A Upper and Lowercase CRT offers 16 lines of 64 characters each in either upper or lowercase alphanumeric characters.
- Option 4 Audio Alarm is a programmable signal for the Models 2216 and 2216A CRT.
- Model 2216/2217 Combined CRT Executive Display/Single Tape Cassette Drive is what its name implies — a CRT and cassette drive housed in the same chassis. The cassette drive and controls are located to the right of the CRT.
- Model 2216A/2217 Combined Upper and Lowercase CRT/Single Tape Cassette Drive houses the upper/lowercase CRT and cassette drive in one space-saving chassis.
- Model 2220 Integrated Console provides a 9 in. (22.9 cm) diagonal CRT, a Single Tape Cassette Drive, and an Alphanumeric/BASIC Keyword Keyboard in one unit.
- Model 2226 CRT/Keyboard Console consists of a 12 in. (30.5 cm) diagonal CRT and an Alphanumeric/BASIC Keyword Keyboard in a single unit. The keyboard provides two switch selectable typing modes.

- Option 30 provides an upper/lowercase capability for the 2220 and 2226 CRT.
- Option 31 Audio Signal provides a programmable signal for the Models 2220 and 2226 console units.
- Model 2223 Alphanumeric/BASIC Keyword Keyboard offers two switch selectable typing modes: BASIC keyword and uppercase character entry, and uppercase/lowercase text entry.
- Option 32 Keyboard Clicker provides an audible indication that a key has been sufficiently depressed to enter a character.
- Model 2290 CPU/Peripheral stand stores the System 2200T CPU and provides a sturdy table for a number of peripherals. Four electrical outlets and a master ON/OFF switch also are provided.
- Model 2292 Auxiliary Display (w/25' cable) is a 12" (30.5 cm) diagonal "slave" CRT that can be attached to any Wang CRT controller. The Model 2292 echoes the primary system display. Up to 10 Auxiliary Displays may be daisy-chained to a single controller, up to a maximum of 500 feet.

Output Peripherals

- Model 2201 Output Writer types numeric, and upper and lowercase alphabetic output from the System 2200T with full format control and typewriter quality print.
- Model 2202 Plotting Output Writer combines complete digital plotting with the alphanumeric capabilities of the Model 2201. Thus, plots are easily titled and labeled. (Both the Model 2201 and the Model 2202 can be used as standard electric typewriters when not interacting with the System 2200T.)
- Model 2212 Analog Flatbed Plotter (10" x 15") provides continuous line or point plotting of curves and data as well as full alphanumeric labeling of problems solved with the System 2200T.
- Model 2232A Digital Flatbed Plotter (31" x 48") offers continuous line or point plotting of curves or data. The plotter uses any type paper including vellum, linen, and Mylar. Fiber tip, ballpoint, or drafting pens can be used.
- Model 2232B and 2232BM Digital Flatbed Plotter (31" x 48") offers exceptional plotting resolution. The 2232BM provides plotting in metric increments.
- Model 2272-1, -2 Digital Drum Plotter offers point and continuous line plotting over a plotter area of 16 inches and unlimited length. Its 64 ASCII character set in 15 co-optive sizes may be positioned and easily repositioned with the four selectable coordinate axis settings. One pen (2272-1), two pen (2272-2) and metric versions are available.

- Model 2291 Digital Flatbed Plotter stand provides a sturdy support for the Model 2232A Flatbed Plotter.
- Model 2221W Wang Line Printer (132 columns) is a 9 by 9 dot matrix impact printer which produces output at approximately 200 char/sec (60 to 300 lines/minute). Its set of 96 characters include upper and lowercase characters, numerics, and special characters. The 2221W also can produce highlighted print of double-width characters under program control.
- Model 2231W-1, -2 Line Printer (112 and 132 columns, respectively) is a 7 by 9 dot matrix, 120 characters per second printer. Its ASCII set of 96 characters can be generated under program control in uppercase, lowercase and highlighted double-width.
- Model 2251 Line Printer (40 columns) is a 7 by 8 dot matrix printer. It prints a full ASCII set of 96 characters in both uppercase and lowercase from a program selectable red/blue ribbon.
- Model 2261 High Speed Printer (132 columns) utilizes two bidirectional printing heads to print up to 330 characters/second, or 125 lines/minute with a maximum of 132 characters per line.

Input Peripherals

- Model 2203 Punched Tape Reader automatically reads raw paper tape data, in any format, into the System 2200T providing an efficient "data reduction" operation. The reader supports 5, 6, 7 or 8 track paper tape.
- Model 2234A Hopper-Feed Punched Card Reader reads up to 300 cards/minute and can stack 500 cards in the input and output hoppers. An 80-column card can be punched with Hollerith or binary code. The card reader supports both data and program loading.
- Model 2244A Hopper-Feed Mark Sense/Punched Card Reader reads up to 300 cards/minute and can stack 500 cards in the input and output hoppers. The Model 2244A reads standard 80-column punch cards (the same cards used with the Model 2234A), 80-column optical mark sense cards without clock marks (either punched or marked in pencil), and optical mark sense cards with timing marks and 80 columns or less of data (punched or marked). Data can be in Hollerith or binary code, and programs can be in Hollerith code.
- Model 2262-1, -2, -3 XY Digitizer provides the capability to digitize single points or curves at a resolution of ± .005 of an inch over the entire digitizing surface. Three tablet sizes are available: 20" by 20", 30" by 40", and 36" by 48".

Mass Storage Peripherals

- Model 2209 Nine-Track Tape Drive offers IBM compatible nine-track capability to the System 2200T. Tapes written conform to ANSI standards and are written and read at 800 bpi, NRZI. Read-after-write and single track error correction capabilities are provided. The unit accommodates tape reels up to 10.5 in. (26.7 cm) in diameter.
- Model 2217 Single Tape Cassette Drive is fast and easy to operate. The magnetic tape cassette provides a low cost bulk storage system for both programs and data. A 150-foot tape has a capacity of 78,000 (8-bit) bytes, with a transfer rate of 326 bytes/second.
- Model 2218 Dual Tape Cassette Drive consists of two cassette drives housed in a single unit. The cassette drives are identical in operation and performance to the Model 2217. One controller board operates both cassette drives, but each drive functions independently, with separate device addresses.
- Model 2230 Fixed/Removable Disk Drive is available in three versions which provide storage for 1.25, 2.5, and 5 megabytes of information. Storage is divided equally between one fixed and one removable platter.
- Model 2260B, B½, B¼ Fixed/Removable Disk Drive offers 10, 5, and 2.5 megabytes, respectively, of on-line storage.
- Model 2260-2 Dual Ten Megabyte Disk Drive System is a pair of specially modified 2260B Ten Megabyte Disk Drives connected together to be accessed as a single unit. Each drive in the dual drive system provides ten megabytes of storage, for a total on-line storage capacity of 20 megabytes.
- Model 2270 Diskette Drive is available in one, two, and three drive configurations, each supporting a capacity of approximately .25 megabytes.
- Model 2230MX Disk Multiplexer provides multiplexing capabilities which enable a single disk unit to be shared by a maximum of four separate System 2200T's. Multiple CPU's can share a common data base for efficient file interrogation and updating. Systems multiplexed to a disk via the 2230MX are connected in a daisy-chain; the maximum length of the chain is 500 feet.

Interface Controllers

- Model 2207A Interface Controller (RS-232-C) Selectable BPS allows attachment of a Model 33 Teletype as a terminal for the System 2200T, generating hardcopy and inputting programs and data stored on a Teletype punched paper tape. It also supports the interface of other Teletype compatible instrumentation or terminals at 110, 150, 300, 600 or 1,200 baud.
- Model 2227B Buffered Asynchronous Communications Controller allows local or remote asynchronous communication with other System 2200T's, remote telecommunication with "foreign" CPU's (IBM, Univac, Honeywell, etcetera) or directly connected communication with

RS-232-C compatible equipment. With the Model 2227B, the System 2200T becomes an "intelligent terminal."

● Model 2228 Communications Controller with its microprocessor, memory buffers, and transmitting/receiver circuits can emulate the binary synchronous communication protocol of particular terminals, such as the IBM 2780, at transmission rates up to 4800 bits per second. A Wang-supplied terminal emulator program automatically loads the microprocessor with appropriate microcode to support the desired terminal protocol. When equipped with this controller, the System 2200T can operate as a remote batch terminal over dial-up telephone lines to any host computer, e.g., an IBM 360 or 370, which utilizes the same communications protocol.

● Model 2250 I/O Interface Controller (8-bit parallel) allows interfacing of external instrumentation and equipment enabling parallel 8-bit data to be transmitted from or received by the System 2200T.

● Model 2252A Scanning Input Interface Controller (BCD 1-10 digit parallel) permits external devices, such as digital voltmeters, to be directly connected to a System 2200T and allows the user to select the number of BCD digits to be transmitted. The controller accepts data consisting of a sign and up to 10 BCD digits or up to 40 bits of binary information in parallel.

Software

Wang Laboratories, Inc. provides an extensive software library which continually is being updated and expanded to meet the changing needs of the user. Our software library is divided into six application areas: Business; Education; Medicine; Public Service; Science, Engineering, and Mathematics; and Utilities. Each application area consists of a number of systems to fit varying needs.

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	0.25
Sign	0.25
Sine	38.3
Cosine	38.9
Tangent	78.5
Arctangent	72.5
Read/Write Cycle	1.5 μ sec

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

Memory Size
8K - 32K (in 8K increments)

Power Requirements
115 or 230 VAC ± 10%, 50 or 60 Hz ± ½ Hz

Wattage
220W

Fuse Size
3ASB @ 115V
1.5ASB @ 230V

Operating Environment
50°F to 90°F (10°C to 32°C)
20% to 80% relative humidity, non-condensing, allowable
35% to 65% relative humidity, recommended

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 8,192 bytes of memory, expandable in 8,192 byte modules 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 ancillary 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.

Standard Warranty Applies

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