WANG 3300 BASIC TIME-SHARING SYSTEM

SYSTEM DESCRIPTION

Wang 3300 BASIC is a compact computer system designed for use as an in-house multi-terminal time-sharing system, utilizing the BASIC language. The system fills the initial gap between the most sophisticated programmable calculators and the least expensive large computer terminals.

The combination of standard teletypes, input/output typewriters and high-speed magnetic tape cassettes provide a flexible system that equals the performance of large time-sharing systems.

Wang Laboratories provides software and field support that enables engineers, scientists, students and researchers to operate the system the day it is delivered. The goal of the company was to provide this type of turn key system at a reasonable cost.

EXPANDABILITY

The system can handle up to 16 users with a mixture of teletypes and I/O writers. Remote access to the central processor is limited to the Model 3315 Teletype. Model 3310 I/O Writers should be located within 75 feet of the central processor.

Minimum system configuration for the BASIC compiler and two terminals is 12K of core. This gives each user a 1000-byte partition. Partition size is variable and additional core storage (up to 65K) can be added to increase user partition size.

HARDWARE

Wang 3300 BASIC consists of a central processor with multiple terminals. Terminals may be standard 33-ASR Teletypes or I/O Writers* with magnetic tape cassettes. The Wang 3300 Computer is used as the central processor in the system.

The 3300 is a byte-oriented computer technically termed a mini-computer. Its internal organization, instruction set and input/output logic were specifically designed for multiple-terminal system applications.

Word Length: 8 bits

Memory: 1.6 microsecond full cycle memory in 4K units up to 65K, with 256-byte pages.

Registers: A. 8-bit accumulator register, 8-bit accumulator extension.

B. Addressable 8-bit status register used for saved carry, last result zero, valid decimal, binary-decimal mode indicator, absolute page designator and programmable user status bits.

INSTRUCTION REPERTOIRE:

- 72 instructions
- 21 memory reference instructions with both single and double byte operands.
- 6 single and double arithmetic instructions that operate in either binary or decimal mode.

*IBM Selectric Typewriters

- 6 logical instructions.
- 7 shift and rotate instructions including single and double, binary and decimal.
- Compare instructions with corresponding conditional jumps (equal, not equal, less than, greater than).
- A class of non-memory reference micro-instructions with optional in-page jump facility.
- A class of powerful register instructions such as parity bit generation, load and transfer indirectly via registers, binary or decimal complement.

ADDRESSING

Four available modes of addressing:
1. In page
2. Absolute (page 0 on 1)
3. Immediate
4. Indirect (with the option of auto-increment, auto-decrement, indirect addressing throughout core for both single and double byte addressing). Decrementing occurs before fetch and incrementing after. The overall effect is a push/pop addressing capability to facilitate efficient list handling and stack operations.

INPUT/OUTPUT

- An extensive and compatable set of I/O bus and channel input/output, interrupt and skip instructions.
- Identical input/output and register skip formats.
- Automatic device address fetch upon interrupt acknowledgement to minimize interrupt processing time.
- Direct memory access cycle stealing between instruction execution sub cycles.
- Buffered I/O controller logic.
- 3301 – 4K Memory Modules – Additional ferrite magnetic core memory modules available in 4K (4096 bytes) units up to a maximum of 64K. Up to 16K can be inserted in the 3300 central processor. Additional 4K memory modules require a 3302 memory extension chassis.
- 3302 – Memory Extension Chassis – Required to handle additional 4K core memory modules above 16K of core. Up to the initial 16K of core is located within the 3300 central processor chassis.

3300 CENTRAL PROCESSOR SOFTWARE

. 3300 Assembler
. Source Tape Edit Package
. Debug Package
. Loader and IOCS Modules
. Diagnostics

BASIC SOFTWARE

The Wang 3300 BASIC system is designed to accommodate up to 16 simultaneous users in either in-house or remote configuration. The interpretive basic compiler is modularly designed to be expandable to all terminal and memory configurations. A minimum two user configuration can operate in 12K bytes of core with 1000 byte user partitions.

BASIC STATEMENTS

The following BASIC verbs are available in the standard Wang 3300 BASIC system:

COM	FOR	INPUT	REM
DATA	TRACE	LET	RESTORE
DEF	GOSUB	NEXT	RETURN
DIM	GOTO	PRINT	STOP
END	IF	READ	FILE READ/ WRITE

IMMEDIATE EXECUTION MODE

The Immediate Execution Mode of the Wang 3300 BASIC allows the system to function as a powerful calculator. By entering an unnumbered BASIC statement, the user causes the 3300 to execute immediately. Since the system allows for multiple statements on a line, the 3300 can execute powerful one-line calculator programs.

FLOATING DECIMAL POINT

The Wang 3300 utilizes a floating point format for all variables with 8 digits of rounded decimal accuracy. Data exponents may range from 10^{-65} to 10^{63}. Arithmetic calculations are also performed in decimal mode.

FUNCTIONS

Wang 3300 BASIC computes most functions using the highly accurate digit by digit computation method, providing a full 8 digits of accuracy. The following functions are provided in the standard Wang 3300 BASIC system:

SIN	EXP	INT	OR
COS	LOG	RND	BOOL
TAN	ABS	SGN	
ATN	SQR	AND	

SAVE AND LOAD COMMANDS

System save and load commands allow the user to store and load programs via high-speed tape cassettes. In conjunction with the COM (common) feature of the system, this allows extensive user applications and accumulation of library programs without disk allocations.

TERMINAL ENTRY, DIAGNOSTICS & TRACE

Diagnostic error messages point to the exact column in the statement where the error was detected. Syntax diagnostic messages are printed immediately after each line entry.

DEBUGGING

A partial change command allows the correction of one or more columns in a statement without the retyping of the entire statement. RERUN commands allow program execution from any point in the program while maintaining current variables. TRACE ON and TRACE OFF verbs enable selected tracing during BASIC program execution.

BASIC PROGRAM LIBRARY

A standard accessory of the Wang 3300 BASIC system is the BASIC Program Library Abstract Service, which lists BASIC programs available from the Wang 3300 BASIC Reference Library. A wide range of BASIC programs in the fields of Science, Mathematics, Engineering, Statistics, and Business are available to system users.

TERMINAL DEVICES

The Wang 3300 BASIC system allows the user to choose the type of terminal he wishes to use as an input/output device; either teletype terminals or the Wang I/O Typewriter.

3315 TELETYPE ®

One choice of terminal for use with the Wang 3300 is the Model 3315 Teletype terminal. Secondary storage of programs and data with the teletype terminal consists of punched paper tape. A tape punch and tape reader are part of the terminal. The terminal punches and reads the tapes at the rate of ten CPS. Additionally, the 3315 teletype allows for remote locations of terminals in conjunction with the 1103A Acoustic Coupler and standard telephone lines, without telephone hookup charges. (See ACOUSTIC COUPLER). In a hardwired configuration, the 3315 is limited to 500' from the central processor. The 3315 teletype is fully compatable with the Teletype Corporation's 33-ASR Teletype Model TBE.

3316 — Teletype Control — Controls input/output and switching of from one to four Model 3315 Teletype terminals during time-sharing mode. Provision is made within the 3300 Central Processor Chassis for one 3316 Teletype Control. Additional 3316 Teletype Controls require a 3319 Input/Output Extension Control.

3310 INPUT/OUTPUT TYPEWRITER

The standard I/O device for the Wang 3300 is the Wang 3310 Input/Output Writer, a specially modified IBM Selectric ® typewriter. The I/O writer operates at a speed of 15 CPS and has a BASIC compatible character set. Secondary storage for data and programs with the 3310 is the Wang 3320 Cassette Tape Drive. (See CASSETTE DRIVERS.)

3311 — I/O Writer Control — Controls input/output and switching of from one to four 3310 I/O Typewriters during time-sharing operations. Provision is made within the 3300 Central Processor Chassis for one 3311 I/O Writer Control. Additional 3311 Input/Output Writer Controls require a 3319.

3319 — I/O Extension Chassis — Required to handle additional 3311 I/O Writer Controls on 3316 Teletype Controls above four users. One model 3311 or 3316 may be inserted in the 3300 Central Processor. One 3311 or 3316 controls up to four 3310 I/O Writers or 3315 Teletypes. The 3319 I/O Extension Chassis will handle any combination of 3315 or 3310 Terminals up to the maximum 16 system terminals.

CASSETTE DRIVERS — MODEL 3320

Dual magnetic tape cassettes are used for program loading and storing and data storage. Up to 16 pairs of dual cassette readers can be accommodated. Transfer rate is 240 characters per second. Average storage capacity per cassette is 200K bytes.

1103A ACOUSTIC COUPLER

- Fully compatable with the Bell 103A
- Automatic unattended answering
- Half or full duplex
- EIA and teletype interfaces
- Acoustic coupling

MODES

Originate or answer (fully automatic or manually) half or full duplex.

FREQUENCIES	SEND	RECEIVE
Space	1070 Hz	2025 Hz
Mark	1270 Hz	2225 Hz

Frequencies can be manually switched.

OSCILLATOR STABILITY

0.25%

MAXIMUM DATA RATE

300 Baud

MINIMUM BASIC TIME-SHARING SYSTEM

1 — 3300 Central Processor including 4K of Core
2 — 3301 4K Memory Modules
1 — 3315 Teletype Terminal
1 — 3316 Teletype Controller
      BASIC Software Package

ACCESSORY ITEMS

Model 3320 Cassettes
Extension Cables for 3310 I/O Writer
(25′ increments up to 75′)

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