

LANGUAGE DATA SHEET

INTRODUCTION

Wang BASIC-3, a greatly enhanced version of the popular BASIC language, is a high-level programming language that is especially well suited for the interactive computing environment. BASIC-3 provides easy access to number crunching power and easy-to-use input/output (I/O) commands.

Wang BASIC-3 is highly compatible with Wang BASIC-2, which is currently available on all 2200 Series MVP/LVP/SVP/VP Systems. Most BASIC-2 features are implemented, including the following.

- Interactive Operation
- Incremental Compilation
- Full Set of Numeric Functions
- Powerful Editing and Debugging Capabilities
- Comprehensive Alphanumeric String and Bit Manipulation Facilities
- Efficient Memory Utilization
- Operating System Highly Integrated with Language

In addition to these general features, BASIC-3 offers a variety of extensions and unique capabilities. The following extensions have been added in order to provide facilities for better program structure; to improve program readability and documentation; to facilitate the task of writing, documenting, and debugging programs; and to provide access to new file management services.

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BASIC-3

- Extensive File Management Capabilities
- Powerful Editing and Debugging Features
- Interactive Operation
- Print Spooling
- Efficient Memory Utilization
- High Performance

```
      : ON VAL(K1)*1 GOTO ENTER, ADDTRANS,*,300,200
      : ELSE GOTO 300
0400 REM %

Display totals

0410 TOTALS: PRINT CLEAR: TAB(30); "TOTALS"
0420 SCALE = MAX( PERIODS( ) )
      : I = MIN( PERIODS( ) )
      : SCALE = 2 * MAX(SCALE, ABS(I) / 30)
      : SCALE = ROUND(SCALE * MIN(10, -LOG10(SCALE)))
0430 SCALE = (2 * SCALE, YEAR, MONTH, SCROLL)
0440 FOR I = I TO 30
      : GOTO DEF PERIODS(I)
      : NEXT I
0450 RETURN
0500 REM %

DRAW AXIS

0510 DEF AXIS(SCALE, Y, M, SCROLL)
0520 PRINT AT(2,70); LABEL$(1)
0530 PRINT AT(12,70); LABEL$(2)
      :
```



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- Multicharacter Variable Names and Program Labels
- Extended Loop Control
- Descriptive Error Messages
- Program and Data Security
- Indexed Files
- Shared Files

The Wang 2200 BASIC language processor incrementally compiles BASIC-3 programs. Incremental compilation distributes compilation time, making syntax error correction an easy task and decreasing the wait for program execution. When the BASIC-3 program is entered, it is condensed into a form that optimizes execution and uses significantly less storage space than in its original form. At this time, syntax errors are immediately reported to the user with descriptive error messages. The original source text is automatically regenerated from its condensed form, eliminating the need for separate source and object files. When the program is run, it is resolved: space is set up for variables and program consistency is ensured.

BASIC-3 operates on the enhanced versions of the 2200MVP and 2200LVP Systems. These versions have an expanded operating system and support, as an option, the 2200 COBOL language.

System memory is divided into control memory and user memory. The language processor and operating system, shared by all users, reside in the dedicated internal control memory. User memory is thus free for the storage of user programs and data. As a result, 2200 systems support larger user programs than most other systems of comparable size.

LANGUAGE FEATURES

BASIC-3 incorporates the major characteristics of BASIC-2 as well as numerous new features and enhancements. The result is a

programming language that is powerful, extremely versatile, and well suited for both technical and commercial applications.

Numeric Functions and Alphanumeric Manipulation

BASIC-3 provides an extensive capability for processing both numeric values and alphanumeric character strings. A full set of numeric functions is provided for the programmer's use, including arithmetic, matrix arithmetic, trigonometric, exponential, and programmer-defined functions; the results obtained are accurate to 13 digits and may be either rounded or truncated.

A complete set of matrix arithmetic statements is provided, including statements to perform matrix inversion and matrix multiplication. Internal matrix searching and sorting may be performed by means of a single statement.

Alphanumeric data can be compared, analyzed, and modified with an extensive array of data manipulation statements. These statements permit the programmer to manipulate characters at the bit and byte levels and to perform various Boolean and binary arithmetic operations.

General Purpose Statements and System Commands

The set of general-purpose BASIC-3 statements includes statements to facilitate common programming tasks such as formatting printed output, making decisions, branching, looping, passing data to subroutines, controlling the format of the CRT display, overlaying program modules, and accepting and processing operator-entered data.

A series of system commands allows each user to control system operations from the terminal keyboard. Commands enable a user to perform functions such as initiating program execution, clearing system memory, and renumbering a program. The system commands also serve as powerful debugging tools.

Special Statements and Resource Control

The BASIC-3 language also includes statements used to control resources in a multiuser environment. Among these statements are functions used by a program to determine terminal assignment and location of current running program. A number of special statements is provided to perform operations such as seizing and releasing control of shared resources, temporarily suspending program execution to provide more processing time to other programs, and controlling more than one program from a single terminal. Additional Operating System features employ efficient use of multiuser system resources.

Program Control and Structure

BASIC-3 provides several statements that increase program efficiency, control, and structure. Within a loop construction, WHILE/UNTIL allows statements to be executed repeatedly until the specified condition becomes true or false. Additionally, a group of statements can be specified for conditional execution with IF/THEN/ELSE and ERROR constructs.

Program Readability and Documentation

A program listing can be generated and specified comments can be displayed in highlighted form. A cross-reference of variables, referenced lines, or specified text strings can be generated by a single command.

Multicharacter names, up to 64 characters, can be used to identify program variables and program labels. Since statements can be identified with labels, all program transfers of control can be directed to alphanumeric labels, as well as to line numbers.

EDITING AND DEBUGGING FEATURES

BASIC-3, like BASIC-2, contains a variety of error handling and editing functions to aid the programmer in developing and correcting programs. Commands enable a user to recall lines from memory for editing, insert and delete characters, and concatenate two or more program lines.

When a BASIC-3 line is entered, an immediate syntax check is performed. If an error is found, the line containing the error is displayed and an arrow points to the particular entry that caused the error. An error message, consisting of an error code and a description of the error, is also displayed. Immediate syntax checking saves the programmer considerable time and effort during program development.

```
0190 FOR I=1 TO 19
: R=MOD(I-1,R9)
: C=INT((I-1)/R9)
: IF R=0 AND C=0 THEN CO=CO*(C)*T
: C*(I,1)=BIN(R*RO)
: C*(I,2)=BIN(CO)
: NEXT I
0200 REM %

DISPLAY NODE

: RECALL LINE 0990,5*H
: FOR C=1 TO 21
: GOSUB 400
: PRINT AT(VAL(C)-I,1),VAL(C*(I,2))"; *F115
: NEXT I
: I=1
-0010 REM %
:000 IF C:09 OR R:-(R5-R4)/2 THEN X = X(A) - X(B)

0020 IF C:09 OR R:-(R5-R4)/2 THEN X = X(A) - X(B)
↑
ERROR 5010: Missing ')'
:
=
```

Descriptive Error Message

The process of locating, identifying, and correcting errors is simplified by several commands. With interactive commands and statements, a user can list all or selected portions of a program; cross-reference program line numbers, variables, subroutines, and text strings; and examine and modify variables during program execution.

HALT/STEP allows the user to temporarily halt program execution and step through a program, executing one statement at a time. The user can then examine the value of variables, modify variables if necessary, and continue processing. Tracing monitors internal operations such as variable assignments and program branches.

DISK FILE MANAGEMENT SYSTEM

The BASIC-3 operating system contains a file management system that provides efficient volume management on the disk. A shared file management system frees users from the responsibility of disk operations and enhances interprogram communication, facilitating the language-independent sharing of data files created by BASIC-3 and COBOL. The file management system uses efficient buffer strategies to maximize performance. A large number of files may be open simultaneously.

Files are named using a node-based tree structure, enabling the creation of libraries and sub-libraries. The system automatically maps the location of each file, allowing it to be accessed by name without regard for the particular location on the disk. File space is dynamically allocated depending upon program need, within the limits set up by the user at configuration time. A user can move, rename, or delete files at any level in the tree; reuse the space occupied by deleted files; and expand and shorten existing files.

The file management system supports indexed files as well as non-keyed files. Both fixed-length and variable-length records are allowed.

Disk operations are controlled by file commands to create, open, close, and delete files. A query file command can be used to return all current details and facts about a file. An open-for-direct-control command is provided for absolute access.

The file management system integrates security and concurrency checks to ensure file protection. Passwords may be assigned to individual files for specific groups of privileges. When a file is opened, the file sharing mode is checked against password rights and for possible conflicts with other users having the same file open. Shared and exclusive are among the file sharing modes supported.

Recovery procedures ensure the integrity of the system at the file level. If damage is discovered, utilities are available to reconstruct the catalog and contents map.

PRINT SPOOLING

Print spooling optimizes printer usage by placing printer output in a disk file instead of sending it directly to a printer. The individual terminal or background program is thus freed from operating at printer speed, and the user can continue processing at the terminal without interruption. As a result, several users can create printer data simultaneously. Print spooling enables printers to be scheduled to handle total system requirements most efficiently.

COMPATIBILITY BETWEEN BASIC-2 AND BASIC-3

The language differences between BASIC-2 and BASIC-3 are mainly due to the changes in the file management system. File and record I/O, data organization, and internal representation of program text are the major differences between these languages. Translation facilities, supplied by Wang Laboratories, Inc., aid in the conversion of data files and program files from BASIC-2 to BASIC-3.

Although the enhanced versions of the 2200MVP and 2200LVP can support BASIC-2 as well as BASIC-3, these languages cannot be co-resident.

INTERPROGRAM COMMUNICATION

The enhanced versions of the 2200MVP and 2200LVP now support both the BASIC-3 and COBOL languages. Since each language provides singular features for performing certain jobs, functional portions of a system may be implemented in the language best suited to the specific problem. The 2200 provides facilities for communicating with programs written in BASIC-3 or COBOL. Programs written in one language may call subprograms written in the other language. A BASIC-3 program can load and execute another program without operator intervention.

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This document was set on a Wang typesetter.*



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Printed in U.S.A.
700-6815