

# APPLESOFT II: EXTENDED, FLOATING-POINT BASIC

## QUICK REFERENCE GUIDE

### SIMPLE VARIABLES

| Type    | Name | Range               |
|---------|------|---------------------|
| Real    | AB   | +/- 9.99999999 E+37 |
| Integer | AB%  | +/- 32767           |
| String  | AB\$ | 0 to 255 characters |

Where A is a letter, B is a letter or digit.  
Name may be more than two characters, but  
only first two are significant: AB% and  
AB3QS% are the same integer variable.

### ARRAY VARIABLES

| Type    | Name of typical Element |
|---------|-------------------------|
| Real    | AB(3,12,7)              |
| Integer | AB%(3,12,7)             |
| String  | AB\$(3,12,7)            |

Array size is limited by available memory.

### ALGEBRAIC OPERATORS

= Assign value to variable (LET optional)  
- Negation  
^ Exponentiation  
\* Multiplication  
/ Division  
+ Addition  
- Subtraction

### RELATIONAL AND LOGICAL OPERATORS

= Equal  
<> Not equal  
< Less than  
> Greater than  
<= Less than or equal  
>= Greater than or equal

NOT Logical "not"  
AND Logical "and"  
OR Logical "or"

Relational and logical expressions have value  
1 if true, 0 if false. Relational operators  
can also be used to compare strings.

## SYSTEM AND UTILITY COMMANDS

|            |                                                                                                      |
|------------|------------------------------------------------------------------------------------------------------|
| LOAD       | Loads a program from tape.                                                                           |
| SAVE       | Saves a program to tape.                                                                             |
| NEW        | Deletes current program.                                                                             |
| RUN        | Executes program starting<br>at lowest line number.                                                  |
| RUN 477    | Executes a program starting<br>at line 477.                                                          |
| STOP       | Halts execution and tells<br>in which line.                                                          |
| END        | Halts execution with no<br>message.                                                                  |
| ctrl C     | Used in immediate mode to halt<br>program or listing.                                                |
| reset      | Unconditional jump to monitor.<br>Use ctrl C or 0G to return<br>to APPLESOFT.                        |
| CONT       | Continues program execution<br>stopped by STOP, END or ctrl C.                                       |
| TRACE      | Debugging aid; lists each line<br>number as it is executed.                                          |
| NOTRACE    | Turns off TRACE.                                                                                     |
| PEEK(X)    | Returns content of memory<br>location X.                                                             |
| POKE X,13  | Changes content of memory<br>location X to the value 13.                                             |
| WAIT X,Y,Z | Waits until contents of location<br>X, when XORED with Z and ANDed<br>with Y, gives non-zero result. |
| CALL X     | Goes to machine-language subroutine<br>beginning at memory location X.                               |
| USR(X)     | Passes value X to a machine-language<br>subroutine.                                                  |
| HIMEM:     | Sets highest memory address available<br>to APPLESOFT program use.                                   |
| LOMEM:     | Sets lowest memory address available<br>to APPLESOFT program use.                                    |

### EDITING AND FORMAT-RELATED COMMANDS

|          |                                                                                  |
|----------|----------------------------------------------------------------------------------|
| LIST     | Lists entire program.                                                            |
| LIST X-Y | Lists from line X to line Y.                                                     |
| DEL X,Y  | Deletes from line X to line Y.                                                   |
| REM XYZ  | For writing program comments;<br>ignored by program.                             |
| VTAB Y   | Moves cursor to line Y (1 to 24).                                                |
| HTAB X   | Moves cursor to position X (1 to 40).                                            |
| TAB(X)   | Only in PRINT statement; moves<br>cursor to position X (1 to 40).                |
| POS(0)   | Returns current horizontal position<br>of cursor (0 to 39).                      |
| SPC(X)   | Only in PRINT statement; puts X<br>spaces between last item printed<br>and next. |
| HOME     | Clears screen and puts cursor at top.                                            |
| CLEAR    | Resets all variables to zero.                                                    |

## EDITING AND FORMAT-RELATED COMMANDS (cont'd)

|             |                                                                                     |
|-------------|-------------------------------------------------------------------------------------|
| FRE(0)      | Returns amount of memory still<br>available to user.                                |
| FLASH       | Sets computer output to flashing.                                                   |
| INVERSE     | Sets computer output to black on<br>white.                                          |
| NORMAL      | Turns off flashing and inverse output.                                              |
| SPEED=X     | Sets character output rate<br>(0 to 255).                                           |
| esc A       | Moves cursor one space right.                                                       |
| esc B       | Moves cursor one space left.                                                        |
| esc C       | Moves cursor one space down.                                                        |
| esc D       | Moves cursor one space up.                                                          |
| right-arrow | Enters character under cursor<br>into memory, and moves cursor one<br>space right.  |
| left-arrow  | Deletes one character from line<br>being typed, and moves cursor one<br>space left. |
| ctrl X      | Cancels line currently being typed.                                                 |

### ARRAYS AND STRINGS

|                |                                                                                                                          |
|----------------|--------------------------------------------------------------------------------------------------------------------------|
| DIM A(X,Y,Z)   | Sets maximum subscripts for A;<br>reserves memory space for<br>X+1 * Y+1 * Z+1 real elements, starting<br>with A(0,0,0). |
| DIM A\$(X,Y)   | Sets maximum subscripts for A\$;<br>which may contain X+1 * Y+1 strings<br>elements, each up to 255 characters.          |
| LEN(A\$)       | Returns number of characters in A\$.                                                                                     |
| STR\$(X)       | Returns numeric value of X,<br>converted to a string.                                                                    |
| VAL(A\$)       | Returns A\$, up to the first non-<br>numeric character, as numeric value.                                                |
| CHR\$(X)       | Returns ASCII character whose code<br>is X.                                                                              |
| ASC(A\$)       | Returns ASCII code for first<br>character of A\$.                                                                        |
| LEFT\$(A\$,X)  | Returns leftmost X characters<br>of A\$.                                                                                 |
| RIGHT\$(A\$,X) | Returns rightmost X characters<br>of A\$.                                                                                |
| MID\$(A\$,X,Y) | Returns Y characters of A\$,<br>starting at character X.                                                                 |
| +              | Operator used to concatenate strings.                                                                                    |
| STORE A        | Saves numeric array A on tape.<br>Cannot be used to save string arrays,<br>directly.                                     |
| RECALL B       | Load array back from tape; Array B<br>must have been DIMensioned correctly.                                              |

## INPUT/OUTPUT COMMANDS

(Also see LOAD and SAVE, STORE and RECALL)

INPUT A\$    Puts ? on screen; waits for user to type a string value for A\$.

INPUT "XYZ";A    Prints XYZ on screen; waits for user to type a real number value for A.

GET A\$    Waits for user to type a one-character value for A\$; does not need RETURN key.

DATA X,"Y",Z    Establish list of data elements that can be used by READ statements.

READ A\$    Assigns next DATA element to A\$.

RESTORE    Starts READING from first DATA element again.

PRINT "X=";X    Prints string X= and value of variable X on screen. Semicolons concatenate printed items, commas separate items into three tab fields. The symbol ? also means PRINT.

IN#6    Takes future input from peripheral device in slot#6, instead from keyboard (IN#0).

PR#6    Sends output to peripheral device in slot#6, instead of TV screen (PR#0)

LET X=Y    LET is optional; assigns value of Y to variable X.

DEF FN A(X)=X+23/X    Define a function FNA. In later use, the argument of FNA will be substituted for X in the defined expression. FNA(4) would return 9.75.

## COMMANDS RELATING TO FLOW OF CONTROL

GOTO 347    Branches to line 347.

IF X=3 THEN STOP    If the assertion X=3 is true (non-zero), then execution continues. If the assertion is false (zero), then execution jumps to the next numbered line.

FOR X=1 TO 20 STEP 4    ... NEXT X  
Executes all statements between the FOR statement and the corresponding NEXT, first with X=1, then with X=5, X=9, etc. until X>20, when execution continues after NEXT. STEP size is 1 if not specified.

NEXT X    Defines bottom of FOR...NEXT loop. The X is optional.

GOSUB 33    Branches to the subroutine at line 33.

## COMMANDS RELATING TO FLOW OF CONTROL (cont'd)

RETURN    Marks end of subroutine; returns to statement following most recent GOSUB.

POP    Removes on address from RETURN the address stack.

ON X GOTO 397,12,458    Branches to the Xth line number in the list. If X=2, goes to line 12.

ON X GOSUB 397,12,458    Branches to subroutine at the Xth line number in the list.

ONERR GOTO 4500    Subsequent errors cause branch to error-handling routine at line 4500 instead of message and program halt.

RESUME    In error-handling routine, causes return to statement where error occurred.

## GRAPHICS AND GAME CONTROLS

### Low-Resolution Graphics

GR    Sets low-resolution graphics; clears top 40 x 40 area to black; bottom 4 lines text.

COLOR=X    Sets color (0 to 15) for next plotting.

PLOT X,Y    Places colored dot at horizontal coordinate X and vertical coordinate Y. X and Y are from 0 to 39. 0,0 is top left.

HLIN X1,X2 at Y    Draws horizontal line from the point at X1,Y to the point at X2,Y.

VLIN Y1,Y2 at X    Draws vertical line from the point at X,Y1 to the point at X,Y2.

SCRN(X,Y)    Returns color on screen at the point X,Y.

### High-Resolution Graphics

HGR    Sets high-resolution graphics, page 1; clears top 280 x 160 area to black; bottom 4 lines text.

HGR2    Sets high-resolution graphics, page 2; clears entire 280x192 screen to black.

HCOLOR=X    Sets color (0 to 7) for next plotting.

HPLOT X,Y    Places colored dot at horizontal coordinate X and vertical coordinate Y. X is from 0 to 279; Y is from 0 to 159 (HGR) or 191 (HGR2). 0,0 is top left corner.

## GRAPHICS AND GAME CONTROLS (cont'd)

HPlot X1,Y1 TO X2,Y2    Draws line from the point at X1,Y1 to the point at X2,Y2. Command may be extended to additional points...TO XN,YN.

SHLOAD    Loads a shape table from tape.

DRAW 3 AT X,Y    Draws shape definition #3 from a previously loaded shape table, starting at the point X,Y in color set by HCOLOR.

XDRAW 3 AT X,Y    Draws shape definition #3 from shape table; color of each point plotted is complement of color on screen at that point.

ROT=X    Sets rotation of shape for DRAW or XDRAW. ROT=0 is vertical, ROT=16 is 90 degrees clockwise, ROT=32 is 180 degrees clockwise, etc.

SCALE=X    Sets scale (1 to 255) of shape for DRAW or XDRAW.

### Game Controls

PDL(X)    Returns setting from 0 to 255 of game control X (0 to 3).

PEEK(X-16287)    If >127, button on game control X (0 to 2) is being pressed.

PEEK(-16336)    "Clicks" APPLE's speaker.

## SOME MATH FUNCTIONS

SIN(X)    Returns sine of X radians.

COS(X)    Returns cosine of X radians.

TAN(X)    Returns tangent of X radians.

ATN(X)    Returns arctangent, in radians, of X.

INT(X)    Returns largest integer less than or equal to X.

RND(1)    Returns random real number from 0 to 0.99999999 each time used.

RND(0)    Returns last random number again.

RND(-3)    Returns 4.48217179E-08. A different fixed number is returned for each different negative argument. After this, RND with positive argument will follow a fixed sequence.

SGN(X)    Returns -1 if X<0, 0 if X=0, and 1 if X>0.

ABS(X)    Returns absolute value of X.

SQR(X)    Returns positive square root of X.

EXP(X)    Returns e (2.718289) to the power X.

LOG(X)    Returns natural logarithm of X.