

# APPLESOFT II: EXTENDED, FLOATING-POINT BASIC

## QUICK REFERENCE GUIDE

### SIMPLE VARIABLES

Type	Name	Range
Real	AB	+/- 9.99999999 E+37
Integer	ABX	+/- 32767
String	AB\$	Ø 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: ABX and AB3Q\$ are the same integer variable.

### ARRAY VARIABLES

Type	Name of Typical Element
Real	AB(3,12,7)
Integer	ABX(3,12,7)
String	AB\$(3,12,7)

Array size is limited by available memory.

### ALGEBRAIC OPERATORS

- = Assigns 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, Ø 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 on tape.
  - NEW Deletes current program.
  - RUN Executes program starting at lowest line number.
  - RUN 477 Executes program starting at line 477.
  - STOP Halts execution and tells in which line.
  - END Halts execution with no message.
  - ctrl C Used in immediate mode to halt program or listing.
  - reset Unconditional jump to Monitor. Use ctrl C or ØG to return to APPLESOFT.
  - CONT Continues program execution stopped by STOP, END or ctrl C.
  - TRACE Debugging aid; lists each line number as it is executed.
  - NOTRACE Turns off TRACE.
  - PEEK(X) Returns contents of memory location X.
  - POKE X,13 Changes contents of memory location X to the value 13.
  - WAIT X,Y,Z Waits until contents of location X, when XORed with Z and ANDed with Y, gives non-zero result.
  - CALL X Goes to machine-language subroutine beginning at memory location X.
  - USR(X) Passes value X to a machine-language subroutine.
  - HIMEM: Sets highest memory address available to APPLESOFT program use.
  - LOMEM: Sets lowest memory address available 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; ignored by program.
  - VTAB Y Moves cursor to line Y (1 to 24).
  - HTAB X Moves cursor to position X (1 to 4Ø).
  - TAB(X) Only in PRINT statement; moves cursor to position X (1 to 4Ø).
  - POS(Ø) Returns current horizontal position of cursor (Ø to 39).
  - SPC(X) Only in PRINT statement; puts X spaces between last item printed and next.
  - HOME Clears screen and puts cursor at top.
  - CLEAR Resets all variables to zero.

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

- FREE(Ø) Returns amount of memory still available to user.
- FLASH Sets computer output to flashing.
- INVERSE Sets computer output to black on white.
- NORMAL Turns off flashing or inverse output.
- SPEED=X Sets character output rate (Ø 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 into memory, and moves cursor one space right.
- left-arrow Deletes one character from line being typed, and moves cursor one space left.
- ctrl X Cancels line currently being typed.

### ARRAYS AND STRINGS

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

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

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

**DEF FN A(X)=X+23/X** Defines 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 one 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 200 x 160 area to black; bottom 4 lines text.

**HGR2** Sets high-resolution graphics, page 2; clears entire 200 x 192 screen to black.

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

**HPOINT 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 to 191 (HGR2). 0,0 is top left corner.

## GRAPHICS AND GAME CONTROLS (cont'd)

**HPOINT 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.