APPLESOFT II

April 17, 1978

Since its initial release, we have corrected and expanded Applesoft Floating Point Basic. Below are the changes, corrections and additions to the original manual dated November, 1977.

I.   Math pack accuracy has been improved and error in randon number generator has been fixed.

II. Unary minus and "NOT" have highest precedence (not "EXP" and "∧")

III. Color graphics syntax has been changed to match Apple Integer Basic format. See Basic Programming Manual (Part No. A2L0005X) for additional details.

Old Format	New Format
PLTG	GR
PLTP X,Y	PLOT X,Y
PLTC I	COLOR =I
PLTH X1,X2,Y	HLIN X1,X2 AT Y
PLTV Y1,Y2,X	VLIN Y1,Y2 AT X
TEX	TEXT
(special rtn)	SCRN (X,Y)
(special rtn)	PDL (X)

"REM and "LET" commands are now always available.

IV. Minor Additional or modified commands

NAME	EXAMPLE	DESCRIPTION
CALL **	10 CALL 300 20 CALL X*Y 30 CALL - 936 40 CALL 64600	Causes execution of a machine level language subroutine at <u>decimal</u> memory location specified. Locations above +32767 <u>may also</u> be specified as a negative number below 65636; i.e., lines 30 and 40 are identical.
DEL*	DEL X,Y	Deletes lines X to Y, inclusive, from the program. Note that both line numbers must be present. This statement may be used inside a program, but will stop program after "DEL" statement is executed.

* Change from original usage
** Not identical to Apple Interger Basic usage

NAME	EXAMPLE	DESCRIPTION
FLASH	50 FLASH	Sets video mode to "Flashing"
HIMEM:**	HIMEN: 16384 60 HIMEM: 2400	Sets last memory location available to BASIC program including variables. Used to protect area of memory for machine language routines or data. Statement may be used inside program.
HOME	70 HOME	Moves cursor to upper left screen position within scrolling window and clears all text within the window. See special controls and features on page 51 of Applesoft manual on how to set scrolling window. Note: This command is identical to CALL-936.
HTAB	80 HTAB 10	Moves cursor to absolute horizontal position independent of current cursor position. Note that "TAB" commands in Applesoft and Apple Integer Basic are not identical.
IN#	100 IN# 6 110 IN# Y+2 120 IN# Ø	Transfers source of data for subsequent "INPUT" statements to peripheral I/O slot (1-7) specified. Slot Ø is not addressable from BASIC. IN# Ø (Example 120) is used to return data source from peripheral I/O to keyboard. If no Apple peripheral is in slot specified, the system will hang up. To recover, hit "RESET" key then type "ØG" and depress "RETURN" key.
INVERSE	130 INVERSE	Sets video mode to inverse; i.e., black letters on white background.
LIST*	LIST X-Y 140 LIST X,Y	Comma (",") may now also be used with "LIST" command as well as dash ("-") LIST Ø is not allowed.
LOMEM:**	150 LOMEM: 16384	Sets starting memory location of first BASIC variable. Normally "LOMEM:" is set automatically to the end of current program by Applesoft. This command is added to allow protection of variables from High Resolution Graphics in large memory size systems. Must be used inside program.
NORMAL	160 NORMAL	Sets video mode to normal; i.e., white letters on black background.

NAME	EXAMPLE	DESCRIPTION
NO TRACE	NO TRACE 170 NO TRACE	Turns off "TRACE" debug mode described below.
POP	180 POP	"POPS" Nested "GOSUB" return stack address by one.
PR#	190 PR#7	Like IN#, transfers output to I/O slot defined by expression after "PR#". PR# Ø returns output to video port and not to slot # Ø.
SPEED	SPEED = 50 200 SPEED = 255	Sets speed at which characters are outputted, either to TV screen or to other I/O devices. Ø is slowest speed; 255 is fastest.
TRACE	TRACE 210 TRACE 220 IF X>Ø THEN TRACE	Sets a debug mode that displays the line number of each statement as it is executed.
VTAB	230 VTAB 18 240 VTAB Z+2	Moves cursor to absolute vertical position as specified by expression after "VTAB". VTAB 1 is top line. VTAB 24 is bottom line.

V. New Major Commands. These new commands add the capability to store and recall data matrixes from cassette, prevent error conditions such as "Illegal Quantity" error from interrupting program execution and allow direct programming in High Resolution Graphics.

A. STORE AND RECALL

Data store and recall commands have been added in Applesoft II. They are similar to "MAT READ A" and "MAT WRITE A". Command formats are:

        250 STORE mvar   (Where mvar is a matrix)

        260 RECALL mvar

Array names are not stored along with their values so that an array may be read back with a different matrix variable name than the one used with the "STORE" command. When "RECALLING" an array, the size must be identical to the original array or the first index only may be larger. For example if A(7,10) is stored, then one may recall A(7,10) or A(20,10) but not A(10,20). Only floating point and integer arrays may be stored. String arrays must be converted to an integer array using the "ASC" function in order to be saved.

B. <u>ERROR INTERUPTION</u>

<u>FORMAT/EXAMPLE</u>   <u>DESCRIPTION</u>

10 ONERRGOTO X   Sets a flag that causes unconditional
                                  jump (later in the program) to program
                                  line number specified by expression X
                                  when an error condition occurs instead
                                  of printing error message and halting
                                  program execution.

1000 RESUME   Causes resumption of program at the point
                                  where an error occured. If "RESUME" is
                                  encountered before an error occurs, program
                                  will be klobbered. If error occurs in an
                                  error handling routine, the use of
                                  "RESUME" will place program in infinite
                                  loop and "RESET" key must be depressed in
                                  order to escape.

1010 X=PEEK (218) +   This statement sets X equal to the line
     PEEK (219) *256   number of the statement where an error
                                  occured

1020 IF PEEK (216) 127 THEN   If Bit 7 at memory (ERRFLG) location
        GOTO 2000   222 has been set true, then an "ONERRGOTO"
                                  statement has been encountered.

1030 POKE 216,Ø   Clears ERRFLG so that normal error
                                  messages will occur.

1040 Y-PEEK (222)   Sets variable Y to a code that describes
                                  type of error that caused an "ONERRGOTO"
                                  jump to occur. Error types are described
                                  below:

Y VALUE	ERROR TYPE ENCOUNTERED
0	Next without for
16	Syntax
22	Return without Gosub
42	Out of Data
53	ILLEGAL QUANTITY
69	Overflow
77	Out of memory
90	Undefined Statement
107	Bad Subscript
120	Redimensioned Array
133	Division by Zero
163	Type Mismatch
176	String too long
191	Formula too complex
224	Undefined Function
254	Bad response to an input state-ment
255	Control-C interrupt attempted

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C. High Resolution Graphics

Applesoft now includes commands that directly control Apple II's
high resolution graphics video mode. In this mode (HIRES),
8k bytes of memory are displayed on the TV screen as an array
of dots 280 horizontal by 192 vertical. Left most horizontal
or x-coordinate is Ø; right most is 279, topmost vertical or
y-coordinate is Ø; bottom most is 191. If mixed graphics
mode is selected (4 lines ASC II TEXT at bottom of screen),
then bottom most y-coordinate is 159. The commands listed below
describe how to plot points, draw lines, and draw shapes. Do
not use them until you have read the applications section after
the commands description.

COMMAND	EXAMPLE	DESCRIPTION
HGR	10 HGR	Sets mixed screen high resolution graphics video mode (280 x 160 + 4 lines of text) and displays page 1 of memory (8k-16k) and clears screen to black. Text screen memory is not affected. DO NOT use this command with cassette tape (RAM) version of Applesoft as it. Example 20 sets all high resolution graphics mode (280 x 192 with no text at bottom of screen.)
HGR2	30 HGR2 40 HGR2: POKE-16301,Ø	Sets all screen high resolution graphics video mode (280 x 192) and displays Page 2 of memory(16k-24k) and clears screen to black. Example 40 sets mixed HIRES mode on page 2. DO NOT use this command with cassette tape (RAM) version.
	50 POKE - 16304, Ø: POKE-16302,0: POKE -16299,Ø: POKE -16297	Set all screen HIRES mode page 2 without clearing screen to black. (See special controls on page 30 of reference manual.)
TEXT	60 TEXT	Returns video display from HIRES mode to all text mode and resets scrolling window to maximum. HIRES screen memory area is not affected.
HCOLOR=	70 HCOLOR=I	Sets high-resolution line color to that specified by expression following "HCOLOR=" which must be in the range of Ø to 7; where: Ø = Black 1 1 = Green 2 = Blue 3 = White 1 4 = Black 2 5 = (depends on TV) 6 = (depends on TV) 7 = White 2

COMMAND	EXAMPLE	DESCRIPTION
HPLOT	80 HPLOT X,Y	Plots a HIRES point in color specified by previous "H COLOR=" command at the position specified by expressions X and Y.
	90 HPLOT X1,Y1 TO X2,Y2	Draws a HIRES line in color specified by previous "H COLOR=" command from coordinates specified by expressions X1 and Y1 TO the coordinate specified by expressions X2 and Y2.
	100 HPLOT TO X2,Y2	Draws a line from last position plotted to coordinates specified by expressions X2 and Y2. NOTE: HCOLOR may not be changed when using this command.
SCALE =	110 SCALE = Z	Sets scale size for shape drawing to factor from 1 to 256 as specified by expression Z.NOTE:SCALE=∅ is maximum size and not a single point.
ROT =	120 ROT = W	Sets angular rotation for shape draw to value in range of ∅ to 63 as specified by expression W. ROT = ∅ is ∅ degrees, ROT =16 is 90 degrees, ROT = 32 is 180 degrees, etc. For SCALE=1 only 4 rotation values are allowed (0,16,32,48); for SCALE = 2, 8 rotations; etc.
SHLOAD	130 SHLOAD	Loads a shape table from cassette tape. Table is loaded from HIMEM: down and HIMEM: is set to just below the shape table to protect it. If a second shape table is loaded, HIMEM: should be reset to avoid wasting memory. Shape table tapes are prepaid using programs supplied on High Resolution Shapes cassette tape (Apple P/N A2T0005X)

COMMAND	EXAMPLE	DESCRIPTION
DRAW	140 DRAW S AT X,Y	Draws a shape starting at the coordinates specified by expressions X and Y. The shape drawn is specified by expression S whose description is in the shape table previously loaded using "SHLOAD command. The color, rotation and scale of shape draw must have been previously specified
	150 DRAW S	Same as above but draws a shape as specified by expressions starting at last point plotted by previous HPLOT, DRAW, or XDRAW command.
XDRAW	160 XDRAW S AT X,Y 170 XDRAW S	Same as DRAW except shape draw color is exclusive - OR-ed with background color or shapes;i.e. color plotted at each point is compliment. Purpose of this is to first draw a shape using XDRAW then at a later time re-draw shape using second identical XDRAW. Since compliment of compliment is original, this will first draw a shape then erase it without erasing background.
(subroutine)	180 CALL 11246	(Cassette tape version)Clears current HIRES screen to black
(subroutine)	190 HCOLOR=I: HPLOT Ø,O:CALL 11250	(Cassette tape version) Sets entire background to color specified by expression I.
(subroutine)	200 CALL 11719: DRAW TO X2,Y2	Draws a line from end of last shape drawn to point X2,Y2
(subroutine)	210 CALL 11719: Y= PEEK (226):X=PEEK (224) + PEEK(225)*256	Finds X and Y coordinates for the end of last shape plotted.

HIGH RESOLUTION GRAPHICS APPLICATION NOTES:

System Size

16K and 20K	HIRES may be used with ROM version of Applesoft only (not tape cassette). Set HIMEM: 8192 prior to use to protect strings from screen display. User space -6k
24K	ROM version of Applesoft: Set HIMEM: 16384 and use HGR2 for user space of 14k.

24k Cassette tape version of Applesoft: First set HIMEM: 24576 prior to loading Applesoft II tape. After "RUN" ing it; set HIMEM: 16384 and use HGR2 for a user space of 4k.

32k and above ROM version: Inside program set LOMEM: 24576 and use HGR2 for user program space of 14k and variable space of 8k to 24k.

Cassette tape: Inside program set LOMEM: 24576 and use HGR2 for user program space of 4k and variable space of 8 to 24k.

IV. If program gets hung up in cassette tape version, depress "RETURN" key - or you have accidently depressed the "RETURN" key, then type:

"ØG" and depress "RETURN" key.

You may recover your program.

If the above does not work, depress "RESET" key and type:

"291FG" and depress "RETURN" Key

this may recover Applesoft II at the expense of your program.

If not, reload Applesoft from cassette or procure the ROM peripheral version (Apple P/N A2B0009X).