System Monitor Commands

Apple II monitor is a machine level monitor that is useful at the most fundamental level of the 6502 system. This monitor was developed for the Apple II and was ported to the Apple 1 by Winston Gayler. Some additional adaptions were made for this set of versions. The original port was to the space $E500 to $EFFF but this conflicts with Apple 1 Basic. Since the Apple II monitor is well documented it was easy to move the program to other locations which are more appropriate. One of the relocations is at $F400 to $FEFF leaving the Apple 1 monitor at $FF00 to $FFFF. This requires use of different memory in the $Fxxx space but minimizes conflicts.

Command Format	Example	Description
Examine Memory		
adrs	*CØF2	Examines (displays) single memory location of of (adrs)
adrsl.adrs2	*lØ24.lØ48	Examines (displays) range of memory from (adrsl) thru (adrs2)
(return)	*(return)	Examines (displays) next 8 memory locations.
.adrs2	*.4Ø96	Examines (displays) memory from current location through location (adrs2)
Change Memory		
adrs:data data data	*A256:EF 2Ø 43	Deposits data into memory starting at location (adrs).
:data data data	*:FØ A2 l2	Deposits data into memory starting after (adrs) last used for deposits.
Move Memory		
adrs1<adrs2.adrs3M	*1ØØ<BØlØ.B4lØM	Copy the data in the memory range from (adrs2) to (adrs3) into memory locations starting at (adrs1)
Verify Memory		
adrs1<adrs2.adrs3V	*1ØØ<BØlØ.B4lØM	Verify that block of data in memory range from (adrs2) to (adrs3) exactly matches data block starting at memory location (adrsl) and display differences if any.

Command Format	Example	Description
Cassette I/O		
adrs1.adrs2R	*3ØØ.4FFR	Reads cassette data into specified memory (adrs) range. Record length must be same as memory range or an error will occur.
adrs1.adrs2W	*8ØØ.9FFW	Writes onto cassette data from specified memory (adrs) range.
Dis-assembler		
adrsL	*C8ØØL	Decodes 2Ø instructions starting at memory (adrs) into 65Ø2 assembly nmenonic code.
L	*L	Decodes next 2Ø instructions starting at current memory address.
Mini-assembler		
(From Apple II Monitor) (From Apple 1 Monitor)	*(#)666G, F566G *(#)666R, F566R	Turns on mini-assembler. Prompt Character is now a "!" (exclamation point)
$(monitor command)	!$C8ØØL	Executes any monitor command from mini-assembler then returns control to mini-assembler. Note that many monitor commands change current memory address reference so that it is good practice upon return to mini-assembler.
adrs:(6502 mnemonic instruction)	!CØIØ:STA 23FF	Assembles a mnemonic 6502 instruction into machine codes. If error, machine will refuse instruction and reprint line with up arrow under arrow.
(space) (6502 mnemonic instruction	! STA ØIFF	Assembles instruction into next available memory location. (Note space between "!" and instruction)
(Turn-Off)	!(Reset Button) or!$(Monitor Address)	Exits mini-assembler and returns to system monitor.

Command Format	Example	Description
Monitor Program Execution and Debuging		
adrsG	*3ØØG	Runs machine level program starting machine level program starting at memory (adrs).
adrsT	*8ØØT	Traces a program starting at memory location (adrs) and continues trace until hitting a breakpoint. Break occurs on instruction ØØ (BRK), and returns control to system monitor. Opens 65Ø2 status registers (see Note 1).
asrdS	*CØ5ØS	Single steps through program beginning at memory location (adrs). Type a letter S for each additional step that you want displayed. Opens 65Ø2 status registers (see Note l).
(Control E)	*E^C	Displays 65Ø2 status registers and opens them for modification (see Note l)
(Control Y)	*Y^C	Executes user specified machine language subroutine starting at memory location (3F8).

Note 1:

6502 status registers are open if they are last line displayed on screen. To change them type ":" then "data" for each register.

Example: A = 3C   X = FF   Y = ØØ   P = 32   S = F2
*:FF   Changes A register only
*:FF ØØ 33   Changes A, X, and Y registers

To change S register, you must first retype data for A, X, Y and P.

Hexidecimal Arithmetic

data1+data2	*78+*34	Performs hexidecimal sum of data1 plus data2.
data1-data2	*AE-34	Perfroms hexidecimal difference of data1 minus data2

Multiple Commands

	*lØØL 4ØØG AFFT	Multiple monitor commands may be given on same line if separated by a "space".
	*LLLL	Single letter commands may be repeated without spaces.

CHARACTER	DESCRIPTION OF ACTION
Control B	If in the Apple II System Monitor (as indicated by a "*"), a Control B and a carriage return will transfer control to BASIC killing any existing BASIC program.
Control C	If in System Monitor (as indicated by a "*"), a Control B and a carriage return will enter BASIC without killing current program.
Control H or Underscore	Deletes the last active character and prints an Underscore.
Control X or Escape	Immediately deletes current line.

Fxxx Version Only

Control Q	Immediate Jump to Apple 1 Monitor, If in Apple 1 Monitor immediate Jump to Apple II Monitor.