

# Peeks, Pokes and Pointers

## Apple® Zero-Page

| DECIMAL   | HEX                        |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
|---|----------------------------|--------------------|-----------|---------------------------|----------------------|---------------------|------------------------|-------------------------|---------------------------|--------------------|------------------|----------------|-----------------------|-----------------------------|---------------|---------------------|--------------------|--------------|------------------------|--------------|---------------------|-----------------|---------------------|--------------------------------------|------------------------|--------------------------|---------------------|------------------------|-----------------------|-----------------------|---------------------------|------------------------|------------------------|---------------------|----------------|--------------------|----------------------------|--------------------------|--|----------------|------------------|-------------------------|-----------------|
| 32 <b>Text Window Left-Edge</b> (0-39 / normal is 0) .....  | \$20                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Example: POKE 32, X freezes the left X columns of text.<br>Warning: Don't let PEEK(32)+PEEK(33) exceed the screen width.  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 33 <b>Text Window Width</b> (1-40 or 1-80 / normal is 40 or 80) .....   | \$21                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Note: POKE 33,33 scrunches listings to remove extra spaces.   |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 34 <b>Text Window Top-Edge</b> (0-23 / normal is 0) .....   | \$22                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 35 <b>Text Window Bottom</b> (1-24 / normal is 24) .....  | \$23                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 36 <b>Horizontal Cursor-Position</b> (0-39) .....   | \$24                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Examples: If PEEK(36)=X, then the cursor is in column X+1.<br>POKE 36,X puts the cursor in column X+1 (useful with 80-columns, for positioning the cursor beyond the 40-column limit of HTAB).<br>Note: POKE 1403,X works similarly—and more predictably.   |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 37 <b>Vertical Cursor-Position</b> (0-23) .....   | \$25                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Examples: If PEEK(37)=Y, then the cursor is on text line Y+1.   |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 43 <b>Boot Slot*16</b> (after boot) .....   | \$2B                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 44 <b>Lo-Res Line End-Point</b> .....   | \$2C                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 48 <b>Lo-Res COLOR*17</b> .....   | \$30                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 50 <b>Text Output Format</b> .....  | \$32                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| POKE 50, 63=INVERSE. POKE 50, 255=NORMAL.<br>POKE 50, 127=FLASH (for ASCII 64-95).  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 51 <b>Prompt-Character</b> .....  | \$33                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Note: POKE 51,0: GOTO line# will prevent a false "Not Direct Command" message caused by an immediate GOTO line# command.  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 78-79 <b>Random-Number Field</b> .....  | \$4E.4F                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 103-104 <b>Start of Applesoft Program</b> .....   | \$67.68                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| To Load a program at a non-standard location LOC—<br>POKE LOC-1, 0; POKE 103, LOC-INT(LOC/256);<br>POKE 104, INT(LOC/256). Then LOAD PROGRAM.<br>Note: FP (DOS 3.3 only) sets start-of-program to normal 2049 (\$801).  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 105-106 <b>LOMEM</b> .....  | \$69.6A                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Note: LOMEM is the Start of Variable-Space, equivalent to End-of-Program (approx.) unless changed with the LOMEM: command.  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 107-108 <b>Start of Array-Space</b> .....   | \$6B.6C                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 109-110 <b>End of Array-Space</b> .....   | \$6D.6E                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 111-112 <b>Start of String-Storage</b> .....  | \$6F.70                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 115-116 <b>HIMEM</b> .....  | \$73.74                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Note: HIMEM-1 is the highest address available for use by an Applesoft program. May be changed with the HIMEM: command.   |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 117-118 <b>Line-Number Being Executed</b> .....   | \$75.76                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 119-120 <b>Line-No. Where Program Stopped</b> .....   | \$77.78                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 121-122 <b>Address of Line Executing</b> .....  | \$79.7A                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 123-124 <b>Current DATA Line-Number</b> .....   | \$7B.7C                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 125-126 <b>Next DATA Address</b> .....  | \$7D.7E                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 127-128 <b>INPUT or DATA Address</b> .....  | \$7F.80                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 129-130 <b>Last-Used Variable Name</b> .....  | \$81.82                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 131-132 <b>Last-Used-Variable Address</b> .....   | \$83.84                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 175-176 <b>End of Applesoft Program</b> .....   | \$AF.80                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 214 <b>RUN Flag</b> .....   | \$D6                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Example: POKE 214, 255 makes any command RUN a program.   |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 216 <b>ONERR Flag</b> .....   | \$D8                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Example: POKE 216, 0 cancels the ONERR function.  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 218-219 <b>Line-Number of ONERR Error</b> .....   | \$DA.DB                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 220-221 <b>ONERR Error Address</b> .....  | \$DC.DD                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 222 <b>ONERR Error Code</b> .....   | \$DE                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| <table><tr><th>DOS 3.3 and PRODOS</th><th>APPLESOFT</th></tr><tr><td>1: Language Not Available</td><td>0: ?Next Without For</td></tr><tr><td>2 or 3: Range Error</td><td>16: ?Syntax Error (FP)</td></tr><tr><td>3: No Device Connected?</td><td>22: ?Return Without GOSUB</td></tr><tr><td>4: Write-Protected</td><td>42: ?Out of Data</td></tr><tr><td>5: End of Data</td><td>53: ?Illegal Quantity</td></tr><tr><td>6: File? or Path? Not Found</td><td>69: ?Overflow</td></tr><tr><td>7: Volume Mismatch?</td><td>77: ?Out of Memory</td></tr><tr><td>8: I/O Error</td><td>90: ?Undef'd Statement</td></tr><tr><td>9: Disk Full</td><td>107: ?Bad Subscript</td></tr><tr><td>10: File Locked</td><td>120: ?Redim'd Array</td></tr><tr><td>11: Syntax Error? or Invalid Option?</td><td>133: ?Division by Zero</td></tr><tr><td>12: No Buffers Available</td><td>163: ?Type Mismatch</td></tr><tr><td>13: File Type Mismatch</td><td>176: ?String Too Long</td></tr><tr><td>14: Program Too Large</td><td>191: ?Formula Too Complex</td></tr><tr><td>15: Not Direct Command</td><td>224: ?Undef'd Function</td></tr><tr><td>17: Directory Full?</td><td>254: ?Re-Enter</td></tr><tr><td>18: File Not Open?</td><td>255: (control-C Interrupt)</td></tr><tr><td>19: Duplicate File Name?</td><td></td></tr><tr><td>20: File Busy?</td><td>2: ?DOS 3.3 only</td></tr><tr><td>21: File(s) Still Open?</td><td>3: ?PRODOS only</td></tr></table> |                            | DOS 3.3 and PRODOS | APPLESOFT | 1: Language Not Available | 0: ?Next Without For | 2 or 3: Range Error | 16: ?Syntax Error (FP) | 3: No Device Connected? | 22: ?Return Without GOSUB | 4: Write-Protected | 42: ?Out of Data | 5: End of Data | 53: ?Illegal Quantity | 6: File? or Path? Not Found | 69: ?Overflow | 7: Volume Mismatch? | 77: ?Out of Memory | 8: I/O Error | 90: ?Undef'd Statement | 9: Disk Full | 107: ?Bad Subscript | 10: File Locked | 120: ?Redim'd Array | 11: Syntax Error? or Invalid Option? | 133: ?Division by Zero | 12: No Buffers Available | 163: ?Type Mismatch | 13: File Type Mismatch | 176: ?String Too Long | 14: Program Too Large | 191: ?Formula Too Complex | 15: Not Direct Command | 224: ?Undef'd Function | 17: Directory Full? | 254: ?Re-Enter | 18: File Not Open? | 255: (control-C Interrupt) | 19: Duplicate File Name? |  | 20: File Busy? | 2: ?DOS 3.3 only | 21: File(s) Still Open? | 3: ?PRODOS only |
| DOS 3.3 and PRODOS  | APPLESOFT                  |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 1: Language Not Available   | 0: ?Next Without For       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 2 or 3: Range Error   | 16: ?Syntax Error (FP)     |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 3: No Device Connected?   | 22: ?Return Without GOSUB  |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 4: Write-Protected  | 42: ?Out of Data           |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 5: End of Data  | 53: ?Illegal Quantity      |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 6: File? or Path? Not Found   | 69: ?Overflow              |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 7: Volume Mismatch?   | 77: ?Out of Memory         |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 8: I/O Error  | 90: ?Undef'd Statement     |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 9: Disk Full  | 107: ?Bad Subscript        |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 10: File Locked   | 120: ?Redim'd Array        |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 11: Syntax Error? or Invalid Option?  | 133: ?Division by Zero     |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 12: No Buffers Available  | 163: ?Type Mismatch        |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 13: File Type Mismatch  | 176: ?String Too Long      |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 14: Program Too Large   | 191: ?Formula Too Complex  |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 15: Not Direct Command  | 224: ?Undef'd Function     |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 17: Directory Full?   | 254: ?Re-Enter             |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 18: File Not Open?  | 255: (control-C Interrupt) |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 19: Duplicate File Name?  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 20: File Busy?  | 2: ?DOS 3.3 only           |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 21: File(s) Still Open?   | 3: ?PRODOS only            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 224-225 <b>X of Last HPLOT</b> (0-279) .....  | \$E0.E1                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 226 <b>Y of Last HPLOT</b> (0-191) .....  | \$E2                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 228 <b>HCOLOR Code</b> .....  | \$E4                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 0=0, 42=1, 85=2, 127=3, 128=4, 170=5, 213=6, 255=7  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 230 <b>Hi-Res Plotting Page</b> .....   | \$E6                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| POKE 230,32 selects Page 1. POKE 230,96 selects Page 3.<br>POKE 230,64 selects Page 2.  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 231 <b>SCALE</b> .....  | \$E7                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Note: SCALE=0 is equivalent to a SCALE of 256.  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 232-233 <b>Shape Table Start Address</b> .....  | \$E8.E9                    |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 234 <b>Hi-Res Collision-Check</b> .....   | \$EA                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Example: XDRAW a shape. If PEEK(234)=0 then the shape started at a non-black hi-res point.  |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 241 <b>SPEED</b> .....  | \$F1                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| Note: PEEK(241) is 256 minus the current SPEED.   |                            |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 243 <b>FLASH Mask</b> .....   | \$F3                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |
| 249 <b>ROT</b> .....  | \$F9                       |                    |           |                           |                      |                     |                        |                         |                           |                    |                  |                |                       |                             |               |                     |                    |              |                        |              |                     |                 |                     |                                      |                        |                          |                     |                        |                       |                       |                           |                        |                        |                     |                |                    |                            |                          |  |                |                  |                         |                 |

## Display Switches

| DECIMAL (with negative equivalent)  | HEX    |
|---|--------|
| 49232 (-16304) <b>Graphics</b> .....  | \$C050 |
| 49233 (-16303) <b>Text</b> .....  | \$C051 |
| 49234 (-16302) <b>Full-Graphics</b> .....   | \$C052 |
| 49235 (-16301) <b>Split-Screen</b> .....  | \$C053 |
| 49236 (-16300) <b>Page One</b> .....  | \$C054 |
| 49237 (-16299) <b>Page Two</b> .....  | \$C055 |
| 49238 (-16298) <b>Lo-Res</b> .....  | \$C056 |
| 49239 (-16297) <b>Hi-Res</b> .....  | \$C057 |
| Note: Activate display switches by Poking each location.<br>Example: POKE 49232,0 switches to Graphics display. |        |

## Keyboard, etc.

| DECIMAL (with negative equivalent)  | HEX    |
|---|--------|
| 49152 (-16384) <b>Read Keyboard</b> .....   | \$C000 |
| 49168 (-16368) <b>Clear Keyboard</b> .....  | \$C010 |
| Example: 10 KEY=PEEK(49152); IF KEY<128 THEN 10<br>20 POKE 49168, 0<br>30 PRINT "KEY: "; CHR\$(KEY-128)       |        |
| 49200 (-16336) <b>Click Speaker</b> .....   | \$C030 |
| Example: FOR A=1 TO 99: BUZZ=PEEK(49200): NEXT  |        |
| 49249 (-16287) <b>Button #0</b> .....   | \$C061 |
| Paddle-0 Button or Open (left) Apple key."  |        |
| 49250 (-16286) <b>Button #1</b> .....   | \$C062 |
| Paddle-1 Button or Closed (right) Apple key"  |        |
| 49251 (-16285) <b>Button #2</b> .....   | \$C063 |
| *Example: If PEEK(49249-P) is greater than 127, then Paddle Button #P is being pressed—or it's not connected. |        |

## DOS 3.3 Pokes

(assume DOS loaded in main memory.)  
POKE 40193, PEEK(40193)-N: CALL 42964  
Moves DOS buffers down N\*256 bytes.  
POKE 44452,N+1: POKE 44605,N  
Allows N file names before catalog pause.  
POKE 44608,88: POKE 44461,252  
Clears screen before catalog.  
POKE 44505,234: POKE 44506,234  
Exposes deleted file names in catalog.  
POKE 44596, 234: POKE 44597, 234: POKE 44598, 234  
Cancels catalog pause.  
POKE 49107,234: POKE 49108,234: POKE 49109, 234  
Prevents language card reload.  
POKE 49384,0 Stops drive motor.  
POKE 49385,0 Starts drive motor.

## Notes

Apple's main memory consists of 65,536 bytes, numbered zero to 65535. Every byte has a value in the range 0-255.  
■ You may Peek (look at) the value in byte number-B with the command—PRINT PEEK(B)  
■ You can usually Poke a new value-V into byte-B with the command—POKE B,V  
Values higher than 255 must be stored in two bytes:  
■ To look at the value in consecutive bytes B1-B2—PRINT PEEK(B1)+PEEK(B2)\*256  
■ To Poke a new value V (D-65535) into bytes B1-B2—POKE B1, V-INT(V/256)\*256 and POKE B2, INT(V/256)  
Note: Since almost any memory location can be Peeked or Poked, program listings can reveal thousands of Peeks and Pokes not listed on this chart. Pokes are often used to write machine-language routines that may be activated with the CALL command—the possibilities are infinite.

Let A=PEEK(64435) and B=PEEK(64448).  
If A=6 and B=0 then Apple IIc.  
If A=6 and (B>223 AND B<240) then Apple IIe.  
If A<6 then Apple II or IIx.

## Page-3 DOS Vectors

| DECIMAL   | HEX       |
|---|-----------|
| 976-978 <b>Re-enter-DOS Vector</b> .....  | \$3D0.3D2 |
| 1010-1012 <b>Reset Vector</b> .....   | \$3F2.3F4 |
| Example: POKE 1012, 0 makes Reset boot.<br>(POKE 1012,56 to restore normal Reset function.)   |           |
| 1013-1015 <b>Ampersand Vector</b> .....   | \$3F5.3F7 |
| Examples: POKE 1014, 165: POKE 1015, 214 makes "&" LIST.<br>POKE 1014, 110: POKE 1015, 165 makes "&" CATALOG.<br>POKE 1014, 18: POKE 1015, 217 makes "&" RUN. |           |
| 1016-1018 <b>Control-Y Vector</b> .....   | \$3F8.3FA |

## DOS 3.3 Locations

| DECIMAL  | HEX         |
|--|-------------|
| (All values assume DOS is loaded in main memory.)  |             |
| 42350 <b>Catalog-Routine</b> .....   | \$A56E      |
| Example: CALL 42350 catalogs a disk.   |             |
| 40514 <b>Greeting Program Run-Flag</b> .....   | \$9542      |
| POKE 40514,52 and INIT a disk. When booted, DOS will attempt to BRUN the greeting program. POKE 40514,20 for EXEC. |             |
| 43140-43271 <b>Commands</b> .....  | \$A884.A907 |
| 43378-43582 <b>Error Messages</b> .....  | \$A972.AA3E |
| 43616-43617 <b>Last Blood Length</b> .....   | \$AA60.AA61 |
| 43634-43635 <b>Last Blood Start</b> .....  | \$AA72.AA73 |
| 43624 <b>Drive-Number</b> .....  | \$AA68      |
| Example: POKE 43624, D changes disk input/output to Drive D.   |             |
| 43626 <b>Slot-Number</b> .....   | \$AA6A      |
| Example: POKE 43626, S changes disk input/output to Slot S.  |             |
| 43698 <b>Control-D Command Character</b> .....   | \$AAB2      |
| 44033 <b>Catalog Track Number</b> .....  | \$AC01      |
| 45991-45998 <b>File-Type Codes</b> .....   | \$B3A7.B3AE |
| 45999-46010 <b>Disk Volume Heading</b> .....   | \$B3AF.B3BA |
| 46017 <b>Disk Volume Number</b> .....  | \$B3C1      |

## ProDOS™ Locations

| DECIMAL   | HEX         |
|---|-------------|
| 48944 <b>Slot/Drive Value</b> .....                                 | \$BF30      |
| If PEEK(48944) is greater than 127 then Drive 2, otherwise Drive 1. |             |
| 47313-47422 <b>Commands</b> .....                                   | \$B8D1.B93E |
| 48840-48841 <b>Last Blood Length</b> .....                          | \$BEC8.BEC9 |
| 48825-48826 <b>Last Blood Start</b> .....                           | \$BEB9.BEBA |

## Useful Calls

| DECIMAL (add 65536 for positive equivalent)   | HEX    |
|---|--------|
| CALL-25153 <b>Reconnect DOS 3.3</b> .....   | \$9DBF |
| CALL-3100 <b>Reveal hi-res page 1</b> .....   | \$F3E4 |
| CALL-3086 <b>Clear hi-res screen to black</b> .....   | \$F3F2 |
| CALL-3082 <b>Clear hi-res to last color HPLOTTed</b> .....  | \$F3F6 |
| Example: HGR2: HCOLOR=5; HPLOT 0,0: CALL-3082   |        |
| CALL-2613 <b>Hi-res coordinates to Zero-Page</b> .....  | \$F5CB |
| Example: The X and Y starting coordinates of the next shape table DRAW or XORAW may be determined with a CALL-2613. Then X=PEEK(224)+PEEK(225)*256 and Y=PEEK(226).   |        |
| CALL-1438 <b>Pseudo-Reset</b> .....   | \$FA62 |
| CALL-1370 <b>Boot</b> .....   | \$FAA6 |
| CALL-1321 <b>Display all registers</b> .....  | \$FAD7 |
| CALL-1184 <b>Clear screen and print "Apple..."</b> .....  | \$F860 |
| CALL-1036 <b>Move cursor right</b> .....  | \$F8F4 |
| CALL-1008 <b>Move cursor left</b> .....   | \$FC10 |
| CALL-998 <b>Move cursor up</b> .....  | \$FC1A |
| CALL-958 <b>Clear text from cursor to bottom</b> .....  | \$FC42 |
| CALL-922 <b>Move cursor down</b> .....  | \$FC66 |
| CALL-868 <b>Clear text-line from cursor to right</b> .....  | \$FC9C |
| CALL-756 <b>Wait for any keypress</b> .....   | \$FD0C |
| CALL-678 <b>Wait for a Return keypress</b> .....  | \$FD5A |
| CALL-657 <b>Better Input; commas/colons o.k.</b> .....  | \$FD6F |
| 10 PRINT "NAME (LAST, FIRST) ": CALL-657<br>20 AS\$="": FOR X=512 TO 767: IF PEEK(X)<>141<br>THEN AS\$=AS\$+CHR\$(PEEK(X)-128): NEXT X  |        |
| CALL-468 <b>Memory move</b> .....   | \$FE2C |
| A Basic memory move: OS & OE are the Old-location Start & End, and NS is the New Start. GOSUB 5000 to execute the move—<br>5000 N=OS: LOC=60: GOSUB 5020:<br>N=OE: LOC=62: GOSUB 5020:<br>N=NS: LOC=66: GOSUB 5020<br>5010 POKE 766, 160: POKE 769, 0: POKE 770, 76:<br>POKE 771, 44: POKE 772, 254: CALL 768: RETURN<br>5020 POKE LOC, N-INT(N/256)*256:<br>POKE LOC+1, INT(N/256): RETURN |        |
| CALL-415 <b>Disassembler</b> .....  | \$FE61 |
| Note: Poke start address at locations 58-59 before CALL.  |        |
| CALL-211 <b>Ring bell and print "ERR"</b> .....   | \$FF2D |
| CALL-198 <b>Ring bell</b> .....   | \$FF3A |
| CALL-151 <b>Enter monitor</b> .....   | \$FF69 |
| CALL-144 <b>Scan input buffer</b> .....   | \$FF70 |
| This example uses CALL-144 to execute a machine language routine from Basic (will not work in a subroutine):<br>100 AS\$="300: A9 C1 20 ED FD 18 69 01 C9 DB D0 F6<br>60 300G DB23G<br>110 FOR X=1 TO LEN(AS): POKE 511+X,<br>ASC(MID\$(AS,X,1))+128: NEXT<br>120 POKE 72, 0: CALL-144  |        |



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