

**Slot Allocation:**

Slot	Function	Slot	Function
0	Language card	1	Printer serial port
2	Modem serial port, 3 <sup>rd</sup> and 4 <sup>th</sup> hard drives	3	80 column card
4	Mouse (//c)	5	"Easter Egg" in early ROMs, external floppy/HDD later ROMs
6	Internal and external floppy drives	7	Mouse (//c Plus)

**Memory Map:**

<b>\$0000 - \$BFFF</b>	RAM
\$0000 - \$00FF	Zero Page
\$0100 - \$01FF	Stack
\$0400 - \$07FF	Text/Low Resolution Graphics Video Page 1
\$0800 - \$0BFF	Text/Low Resolution Graphics Video Page 2
\$2000 - \$3FFF	High Resolution Graphics Video Page 1
\$4000 - \$5FFF	High Resolution Graphics Video Page 2
<b>\$C000 - \$CFFF</b>	I/O
\$C000 - \$C0FF	Soft Switches and Status Locations
\$C100 - \$C7FF	Peripheral Card Memory
\$C800 - \$CFFF	Extended Memory for Peripheral Card in Use
<b>\$D000 - \$FFFF</b>	ROM/Bank-Switched RAM
\$D000 - \$DFFF	Bank-Switched RAM (2 Banks RAM, 1 Bank ROM)
\$E000 - \$FFFF	Bank-Switched RAM (1 Bank RAM, 1 Bank ROM)

**Common Addresses:**

Hex	Decimal	Function
\$0020	32	Left margin of text window
\$0021	33	Text window width
\$0022	34	Top margin of text window
\$0023	35	Bottom margin of text window
\$0024	36	Cursor column
\$0025	37	Cursor row
\$004C, 4D	76,77	Integer Basic HIMEM
\$0069, 6A	105, 106	Applesoft and Integer Basic LOMEM
\$0073,74	115,116	Applesoft HIMEM
\$C000	-16384	Read to get keyboard character (>127 means key pressed)
\$C00E	-16370	Read to set primary character set
\$C00F	-16369	Read to set secondary character set

Hex	Decimal	Function
\$C010	-16368	Write to clear keyboard strobe
\$C01A	-16358	Read for mode (<128 graphics, >127 text)
\$C01B	-16357	Read for text window (<128 absent, >127 present)
\$C01C	-16356	Read for screen page (<128 page 1, >127 page 2)
\$C01D	-16355	Read for graphics mode (<128 low-res, >127 hi-res)
\$C01E	-16354	Read for character set status (<128 primary, >127 alternate)
\$C020	-16352	Read to toggle cassette output (not on Apple //c)
\$C030	-16336	Read to toggle speaker
\$C050	-16304	Read to set graphics mode
\$C051	-16303	Read to set text mode
\$C052	-16302	Read to set full screen graphics
\$C053	-16301	Read to set graphics plus text
\$C054	-16300	Read to set graphics page 1
\$C055	-16299	Read to set graphics page 2
\$C056	-16298	Read to set low resolution graphics
\$C057	-16297	Read to set high resolution graphics
\$C058	-16296	Read to set annunciator 0 off
\$C059	-16295	Read to set annunciator 0 on
\$C05A	-16294	Read to set annunciator 1 off
\$C05B	-16293	Read to set annunciator 1 on
\$C05C	-16292	Read to set annunciator 2 off
\$C05D	-16291	Read to set annunciator 2 on
\$C05E	-16290	Read to set annunciator 3 off
\$C05F	-16289	Read to set annunciator 3 on
\$C060	-16288	Read to get cassette tape input level (Not on Apple //c)
\$C061	-16287	Read for pushbutton 0 status (<127 not pressed, >127 pressed)
\$C062	-16286	Read for pushbutton 1 status (<127 not pressed, >127 pressed)
\$C063	-16285	Read for pushbutton 2 status (<127 not pressed, >127 pressed)
\$C064	-16284	Read for pushbutton 3 status (<127 not pressed, >127 pressed)
\$C070	-16272	Read/write to trigger game control connector strobe output once/twice
\$FF69	-151	Enter monitor

**Common Keyboard Commands:**

Key	Function
<Control>-<Reset>	Halt current program
<Control>-<Open Apple>-<Reset>	Halt and reboot
<Esc><Control>-Q	Leave 80-column mode
<Control>-X	Cancel line
<Esc>E	Delete to end of line
<Esc>F	Delete to end of screen
<Esc>@	Clear screen

**BASIC Keywords: (I=Integer BASIC only, A=Applesoft only, D=DOS, P=ProDOS)**

_P	? <sup>A</sup>	APPEND <sup>D,P</sup>	AUTO <sup>I</sup>	BLOAD <sup>D,P</sup>	BRUN <sup>D,P</sup>	BSAVE <sup>D,P</sup>
CALL	CAT <sup>P</sup>	CATALOG <sup>D,P</sup>	CHAIN <sup>I,D,P</sup>	CLEAR <sup>A</sup>	CLOSE <sup>D,P</sup>	CLR <sup>I</sup>
COLOR	CON <sup>I</sup>	CONT <sup>A</sup>	CREATE <sup>P</sup>	DATA	DEFFN <sup>A</sup>	DEL
DELETE <sup>D,P</sup>	DIM	DRAW <sup>A</sup>	DSP <sup>I</sup>	END	EXEC <sup>D,P</sup>	FLASH <sup>A</sup>
FLUSH <sup>P</sup>	FOR	FP <sup>I,D</sup>	FRE <sup>P</sup>	GET <sup>A</sup>	GOSUB	GOTO
GR	HCOLOR <sup>A</sup>	HGR <sup>A</sup>	HGR2 <sup>A</sup>	HLIN	HMEM:	HOME <sup>A</sup>
HPLOT <sup>A</sup>	HTAB <sup>A</sup>	IF-THEN	IN#	INIT <sup>D</sup>	INPUT	INVERSE <sup>A</sup>
LET	LIST	LOAD <sup>D,P</sup>	LOCK <sup>D,P</sup>	LOMEM:	MAN <sup>I</sup>	MAXFILES <sup>D</sup>
MON <sup>D</sup>	NEW	NEXT	NODSP <sup>I</sup>	NOTRACE	NOMON <sup>D</sup>	NORMAL <sup>A</sup>
ON <sup>A</sup>	ONERR <sup>A</sup>	OPEN <sup>D,P</sup>	PDL	PEEK	PLOT	POKE
POP <sup>A</sup>	POSITION <sup>D,P</sup>	PR#	PREFIX <sup>P</sup>	PRINT	READ <sup>D,P</sup>	RECALL <sup>A</sup>
REM	RENAME <sup>D,P</sup>	RESTORE <sup>P</sup>	RESUME <sup>A</sup>	RETURN	RT <sup>A</sup>	RUN <sup>D,P</sup>
SAVE <sup>D,P</sup>	SCALE <sup>A</sup>	SHLOAD <sup>A</sup>	SPEED <sup>A</sup>	STOP <sup>A</sup>	STORE <sup>P</sup>	TAB <sup>I</sup>
TEXT	TRACE	UNLOCK <sup>D,P</sup>	USR	VERIFY <sup>D</sup>	VLIN	VTAB
WAIT <sup>A</sup>	WRITE <sup>D,P</sup>	XDRAW <sup>A</sup>				

**BASIC Functions:**

ABS	ASC	ATN <sup>A</sup>	CHR\$ <sup>A</sup>	COS <sup>A</sup>	EXP <sup>A</sup>	FN <sup>A</sup>
FRE <sup>A</sup>	INT <sup>A</sup>	LEFT\$ <sup>A</sup>	LEN	LOG <sup>A</sup>	MID\$ <sup>A</sup>	PDL
PEEK	POS <sup>A</sup>	RIGHT\$ <sup>A</sup>	RND	SCRN	SGN	SIN <sup>A</sup>
SPC <sup>A</sup>	SQR <sup>A</sup>	STR\$ <sup>A</sup>	TAB <sup>A</sup>	USR <sup>A</sup>	VAL <sup>A</sup>	

**Monitor Commands:**

<Control>-C	Return (e.g. to BASIC)
<slot><Control>-P	Send output to/activate device in slot <slot>
<slot><Control>-K	Accept input from device in slot <slot>

<a>	Display contents of address <a>
<Return>	Display contents of next 8 bytes of memory
<a>.<b>	Display range of memory from <a> to <b>
<Control>-E	Examine registers. Can then change values using : <i>a x y p s</i>
<a>:<b>...	Modify memory locations starting at address <a>. Omit <a> to use next address. Prefix data with ' and follow by space to enter a character.
<start>.<end>W	Write memory to tape (not on Apple //c)
<start>.<end>R	Read memory from tape (not on Apple //c)
<dest><<start>.<end>M	Move (copy) memory
<a>S	Step one instruction from address <a> and display registers. Omit <a> to step next instruction. (later ROMs only)
<a>T	Trace instructions from address <a> until BRK instruction or Closed-Apple key pressed. Press Open-Apple key to slow down speed of trace. (later ROMs only)
<dest><<start>.<end>V	Verify memory
<a>G	Go to address <a>
<a>L	Disassemble code from address <a>
I	Set inverse video
N	Set normal video
<n1>+<n2>	Add hex numbers
<n1>-<n2>	Subtract hex numbers
<Control>-Y	Jump to user-defined routine at \$03F8
!	Enter mini-assembler (later ROMs only)

**Mini-Assembler Commands:**

\$<monitor command>	Run monitor command (early ROM only)
<mnm> <operands...>	Assemble instruction at current address
<addr>:<mnm> <operands...>	Assemble instruction at specific address
<Return>	Empty line returns to monitor

**Common 80 Column Card Control Characters:**

7	Beep speaker	8	Cursor left	10	Cursor down
11	Clear screen from cursor	12	Clear screen	14	Set normal video
15	Set inverse video	17	Set active-40 mode	18	Set active-80 mode
21	Leave 80 column mode	22	Scroll down	23	Scroll up
24	Deactivate Mousetext	25	Cursor home	26	Clear line
27	Activate Mousetext	28	Cursor right	29	Clear to end of line

**Prompts:**

>	Integer BASIC	]	Applesoft	*	Monitor	!	Mini-Assembler
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**Lo-Res Graphics Colors:**

0	Black	1	Magenta	2	Dark Blue	3	Purple
4	Dark Green	5	Grey 1	6	Medium Blue	7	Light Blue
8	Brown	9	Orange	10	Grey 2	11	Pink
12	Light Green	13	Yellow	14	Aqua	15	White

**Hi-Res Graphics Colors:**

0	Black	1	Green	2	Purple	3	White
4	Black	5	Orange	6	Blue	7	White

**DOS and ProDOS Commands:**

Commands common to both DOS 3.3 and ProDOS:

CATALOG	Shows a directory listing.
LOAD <i>filename</i>	Loads an Applesoft BASIC program.
SAVE <i>filename</i>	Saves an Applesoft BASIC program.
RUN <i>filename</i>	Loads and runs an Applesoft BASIC program.
BLOAD <i>filename</i>	Loads a binary file.
BSAVE <i>filename,Aaddr,Llen</i>	Saves a binary file.
BRUN <i>filename</i>	Loads and executes a binary file
OPEN <i>filename</i>	Opens a text file (BASIC programs only).
CLOSE [ <i>filename</i> ]	Closes specified (or all) open text files.
READ <i>filename</i>	Reads from a text file (BASIC programs only).
WRITE <i>filename</i>	Writes to a text file (BASIC programs only).
APPEND <i>filename</i>	Appends to a text file (BASIC programs only).
POSITION <i>filename</i>	Sets position in text file (BASIC programs only).
EXEC <i>filename</i>	Executes a text file, as if every line was typed.
DELETE <i>filename</i>	Attempts to remove a file from disk.
LOCK <i>filename</i>	Quick file protect from change or deletion.
UNLOCK <i>filename</i>	Undoes a LOCK.
RENAME <i>file1,file2</i>	Renames 'file1' to 'file2'.
IN# <i>slotnum</i>	Redirects input from the specified slot.
PR# <i>slotnum</i>	Redirects output to the specified slot.
VERIFY <i>filename</i>	Checks existence; DOS 3.3 checks if is readable.

DOS 3.3 only commands:

INIT <i>filename</i>	Formats disk, current BASIC program saved as boot app.
MON [,C][,I][,O]	Traces DOS 3.3 commands.
NOMON [,C][,I][,O]	Cancels tracing of DOS 3.3 commands.
MAXFILES <i>n</i>	Reserves buffers for disk I/O.
FP	Switches to Applesoft BASIC, erases program in memory.
INT	Switches to Integer BASIC, erases program in memory.

ProDOS BASIC.SYSTEM only commands:

CAT	40-column directory listing.
PREFIX [ <i>dirname</i> ]	Displays current directory or changes current dir.
CREATE <i>filename</i>	Creates a file with optional type.
- <i>filename</i>	Executes Applesoft, binary, text, system file.
BYE	Exits to ProDOS application switcher.
FLUSH	Writes all buffers to disk.
CHAIN <i>filename</i>	Runs another Applesoft program, leaves variables intact.
FRE	Faster Applesoft string garbage collection.
STORE <i>filename</i>	Writes Applesoft variables to a file.
RESTORE <i>filename</i>	Reads Applesoft variables from a file
MTR	Jumps to monitor (same as CALL -151)

### Using ADT Pro with Apple //c:

Serial speed: 9600bps, 8N1, no h/w or s/w handshaking.

Initialize serial port: IN#2 <Control>A 14 B

Serial file transfer from Linux: `ascii-xfr -s -l 50 -c 20 filename >/dev/ttyUSB0`