

## The Apple II Standard

### A SUMMARY OF APPLE LOGO COMMANDS

Notes: The key to using Logo primitives is to concentrate on inputs and outputs as indicated in the top line of each definition. A "#" sign on the left means that the primitive can take any number of inputs if parentheses are used.

*These lists need to be formatted*

### Turtle Graphics

**BACK** One input (Distance). No outputs.  
**BK** Moves turtle backward Distance steps.  
Example: BACK 50

**BACKGROUND** No inputs. One output.  
Outputs a number representing the color of the background:  
0 black; 1 white; 2 green; 3 violet; 4 orange; 5 blue; 6 black (for b&w TV).

**CLEAN** No inputs. No outputs.  
Erases the graphics screen without affecting the turtle (unlike CLEARSCREEN).

**CLEARSCREEN** No inputs. No outputs.  
**CS** Erases screen; centralizes turtle; initializes heading to 0 (north).

**DOT** One input (Position). No output.  
Draws a dot of the current pen color at Position.  
Example: DOT [100 0]  
Places a dot halfway down the right edge of the screen.

**FENCE** No inputs. No outputs.  
Forces turtle to remain within the bounds of the screen.  
Example: FENCE FD 600  
Gives error message "TURTLE OUT OF BOUNDS" .

**FORWARD** One input (Distance). No outputs.  
**FD** Moves turtle forward Distance steps.  
Example: FORWARD 50

**HEADING** No inputs. One output.  
Outputs turtle's heading, with north 0, east 90, south 180, and west 270.  
Example: HEADING  
Outputs 45.

**HIDETURTLE** No inputs. No outputs.  
**HT** Makes turtle invisible.

**HOME** No inputs. No outputs.  
Moves turtle to center of screen and sets heading to 0.

**LEFT** One input (Degrees). No outputs.  
**LT** Moves turtle to center of screen and sets heading to 0.  
Example: LEFT 45  
Turns the turtle 45 degrees left.

**PEN** No inputs. One output (List).  
Outputs a two-word list. The first member is PENDOWN, PENERASE, PENUP, or PENREVERSE. The second member is the color number.  
Example: PEN  
Outputs [PENDOWN 2].

PENCOLOR . No inputs. One output (Number).

PC Outputs number representing current color: 0 black; 1 white; 2 green; 3 violet; 4 orange; 5 blue.

PENDOWN No inputs. No outputs.

PD Puts the turtle's pen down so it draws when moved.

PENERASE No inputs. No outputs.

PE Puts the turtle's eraser down so that it erases when moved.

PENREVERSE No inputs. No outputs.

PX Interchanges pen color and background color, drawing where there aren't lines and erases where there are.

PENUP No inputs. No outputs.

PU Lifts the pen up so no lines are drawn where the turtle moves.

POS No inputs. One output (List).

Outputs the coordinates of the current position of the turtle in the form [x,y].

RIGHT Qne input (Degrees). No outputs.

RT turns the turtle right (clockwise) Degrees.

RIGHT 30

Turns the turtle 30 degrees right.

SCRUNCH No inputs. One output.

Outputs the aspect ratio, the ratio of vertical turtle step size to the horizontal one.

SETBG One input (Colornumber). No outputs.

Sets background color corresponding to Color number.

SETHEADING One input (Degrees). No outputs.

SETH Turns the turtle so it is heading in the direction Degrees.

Example: SETHEADING - 45

Heads the turtle northwest.

SETPC One input (Colornumber). No outputs.

Sets the color of the pen to Colornumber: 0 black; 1 white; 2 green; 3 violet; 4 orange; 5 blue.

SETPEN One input (Pair). No outputs.

Sets pen state to Pair. The first word is PENDOWN, PENERASE, PENUP, or PENREVERSE. The second word is the color number.

Example: SETPEN [PENREVERSE 5]

Has the same effect as PENREVERSE SETPC 5.

SETPOS One input (Position). No outputs.

Moves the turtle to Position.

Example: SETPOS [1000]

Moves the turtle halfway down right edge of the screen.

SETSCRUNCH One input (Ratio). No outputs.

Sets the aspect ratio to Ratio; changes YCOR accordingly.

Example: SETSCRUNCH .75

Makes vertical turtle step % the length of horizontal one.

SETX One input (X). No outputs.

Moves the turtle horizontally to x-coordinate X. Example: SETX 100

Moves turtle horizontally to right edge of screen.

SETY One input (Y). No outputs.

Moves turtle vertically to y-coordinate Y. Example: SETY - 100

Moves the turtle vertically to lower edge of screen.

SHOWNP No inputs. One output (Boolean).  
Outputs TRUE if turtle is shown; FALSE otherwise.

SHOWTURTLE No inputs. No outputs.  
ST Makes turtle visible.

TOWARDS One input (Position). One output (Heading).  
Outputs Heading to make turtle face Position.  
Example: SETHEADING TOWARDS [20 10] Heads the turtle in the direction of position [20 10].

WINDOW No inputs. No outputs.  
Makes the turtle field unbounded.  
Example: WINDOW  
FD 600  
PRINT POS  
30.015 570.105

WRAP No inputs. No outputs.  
Makes turtle field wrap around the edges of screen. Example: WRAP  
FD 700  
PRINT POS  
30.01520.975

XCOR No inputs. One output.  
Outputs the x-coordinate of current position of turtle.

YCOR No inputs. One output.  
Outputs the y-coordinate of current position of turtle.

## Words and Lists -

ASCII One input (character). One output.  
Outputs the ASCII code for character.  
See Appendix B for the full ASCII character set. Example: ASCII "D"  
Outputs 68

BUTFIRST One input (Object). One output.  
BF Outputs all but the first element of Object.  
Example: BUTFIRST [NOW IS THE TIME]  
Outputs IS THE TIME.

BUTLAST One input (Object). One output.  
BL Outputs all but the last element of Object.  
Example: BUTLAST [NOW IS THE TIME] Outputs NOW IS THE.

CHAR One input (N). One output.  
Outputs the character whose ASCII code is N. Example: CHAR 65  
Outputs A.

COUNT One input (List). One output.  
Outputs the number of elements in List.  
Example: COUNT [HOW MANY ARE THERE] Outputs 4.

EMPTYP One input (Object). One output.  
Outputs TRUE if Object is the empty word or the empty list; FALSE otherwise.  
Example: EMPTYP 7  
Outputs FALSE.

EQUALP Two inputs (Object!, Object2). One output.  
Outputs TRUE if Object! and Object2 are equal; FALSE otherwise.  
Example: EQUALP 5 2 + 3  
Outputs TRUE.

FIRST One input (Object). One output.  
Outputs the first element of Object.  
Example: FIRST [A B C]

Outputs A.

FPUT Two inputs (Object, List). One output.  
Outputs a new list formed by putting Object at the beginning of the List.  
Example: FPUT "RAT [BAT HAT]  
Outputs [RAT BAT HAT].

ITEM Two inputs (N, List). One output.  
Outputs the Nth element of List.  
Example: ITEM 2 [ROME CHICAGO MOSCOW] Outputs CHICAGO.

LAST One input (Object). One output.  
Outputs the last element of Object.  
Example: LAST [CAT COW HEN DOG]  
Outputs DOG.

LIST Two inputs (Object!, Object2).  
Outputs a list whose elements are Object! and Object2.  
Example: LIST "HOUSE [BARN CABIN]  
Outputs [HOUSE [BARN CABIN]]  
# (LIST Object! Object2 Object3 . . .)

LISTP One input (Object). One output  
Outputs TRUE if Object is a list, FALSE otherwise  
Example: LISTP [HERE IS A LIST]  
Outputs TRUE.

LPUT Two inputs (Object, List). One output.  
Outputs a new list formed by putting Object at the end of the List.  
Example: LPUT "123 [BAT HAT]  
Outputs [BAT HAT 123].

MEMBERP Two inputs (Item, List). One output.  
Outputs TRUE if Item is a member of List, False otherwise. Item may be any data object.  
Example: MEMBERP [1 2] [[A B] [1 2] [HI THERE]]  
Outputs TRUE.

NUMBERP One input (Object). One output.  
Outputs TRUE if Object is a number; FALSE otherwise.  
Example: NUMBERP 5  
Outputs TRUE.

SENTENCE Two inputs (Object!, Object2). One output (List).  
SE Outputs a list made up of the words in Object! and Object2.  
Example: SENTENCE [NOW IS][THE TIME] Outputs [NOW IS THE TIME].  
# (SENTENCE Object!, Object2, Object3, . . .)

WORD Two inputs (Word I, Word2). One output (Word).  
Outputs a word made up of Word I and Word2. Example: WORD "BAT'MAN  
Outputs BATMAN.  
# (WORD Word 1, Word2, Word3,...)

WORDP One input (Object). One output.  
Outputs TRUE if Object is a word; FALSE otherwise.  
Example: WORDP "XXX  
Outputs TRUE.

## Variables

LOCAL One input (Name). No outputs.  
Makes its inputs local to the procedure where LOCAL occurs.  
# (Local Name1, Name2, Name3, . . .)

MAKE Two inputs (Object, Name). No output.  
Gives the variable Name the value Object.  
Example: MAKE "THIS 475

PR :THIS  
475

NAME Two inputs (Object, Name). No outputs.  
Gives variable Name the value Object.  
Example: NAME "MAN "JOHN  
PR :MAN  
JOHN.

NAMEP One input (Name). One output.  
Outputs TRUE if name has a value; FALSE otherwise.  
PR NAMEP "HOUSE  
Outputs FALSE if HOUSE has not been assigned a value.

THING One input (Name). One output.  
Outputs the value of the variable Name.  
Example: MAKE "SIZE 33  
THING :SIZE  
Outputs 33

### Arithmetic Operations

ARCTAN One input (N). One output.  
Outputs the arctangent (inverse tangent) of N.  
Example: ARCTAN 1  
Outputs 45.

COS One input (N). One output.  
Outputs the cosine of N degrees.  
Example: COS 60  
Outputs .5.

INT One input (X). One output.  
Outputs the integer portion of X (truncates).  
Example: INT6.7  
Outputs 6.

PRODUCT Two inputs (N1, N2). One output.  
Outputs the product of its inputs.  
Example: PRODUCT 8 4  
Outputs 32.  
# (PRODUCTN1, N2, N3, . . .).

QUOTIENT Two inputs (X1, X2). One output.  
Outputs X1 divided by X2, truncated to an integer.  
Example: QUOTIENT 18 4  
Outputs 4.

RANDOM One input (N). One output.  
Outputs a random non-negative integer less than N.  
Example: RANDOM 6  
Outputs 0,1,2,3,4,or5.

REMAINDER Two inputs (X1, X2). One output.  
Outputs the remainder obtained when X1 is divided by X2.  
Example: REMAINDER 17 5  
Outputs 1.

RERANDOM Makes RANDOM produce the same sequences each time.

ROUND One input (N). One output.  
Outputs N rounded to the nearest integer.  
Example: ROUND 5.501  
Outputs 6.

SIN One input (N). One output.  
Outputs the sine of N degrees.

Example: Sin 30  
Outputs .5.

SQRT One input (N). One output.  
Outputs the square root of N, or error message if N is negative.  
Example: SQRT 36  
Outputs 6.

SUM Two inputs (X1, X1). One output.  
Outputs the sum of X1 and X1.  
Example: SUM 6 4  
Outputs 10.  
# (SUM X1, X1, X3, . . .)

+ Two inputs (X1, X1). One output.  
Outputs the sum of its inputs.  
Example: 4+5, 4 + 5, 3+3+3  
All output 9

- Two inputs (X1, X1). One output.  
Outputs the result of X1- X1.  
Example: 5 - 3, 5 - 3, 5 - 3  
All output 1

- One input (X1). One output.  
Outputs the negative of X1.  
Example: - 5  
Outputs - 5

\* Two inputs (X1, X1). One output.  
Outputs the product of its inputs.  
Example: 5\*6, 5 \* 6  
Both output 30

/ Two inputs (X1, X1). One output.  
Outputs X1 divided by X1.  
Example: 8/4, 8 / 4  
Both output 1

> Two inputs (X1, X1). One output.  
Outputs "TRUE if X1 is greater than X1, "FALSE otherwise.  
Example: 5>4, 5 > 4  
Both output "TRUE

< Two inputs (X1, X1). One output.  
Outputs "TRUE if X1 is less than X1, "FALSE otherwise.  
Example: 4<5, 4 < 5  
Both output "TRUE

= Two inputs (Object1, Object1). One output.  
Outputs "TRUE if Object 1 equals Object1, "FALSE otherwise.  
Example: 4=4, 4 = 4, (FIRST "OTHELLO) = "0  
All output "TRUE

## Conditionals and Flow of Control

CO One input (Object-optional). No outputs.  
Resumes running a procedure after a PAUSE or CTRL-Z. If CO has an input, it becomes the output from PAUSE.

IF Inputs: (Pred, Instructionlist1, Instructionlist1 (optional)).  
Outputs-whatever instruction list outputs (if any). If Pred is TRUE, runs Instructionlist1. If Pred is FALSE, runs Instructionlist1.  
Example: IF (FIRST:NAMES) = "MITCH [PR [HI MITCH]] [PR [NOT HERE]]  
Prints HI MITCH if condition is met.

IFFALSE One input (Instructionlist). Outputs: same as

IFF Instructionlist, if any.  
Runs Instructionlist if result of most recent TEST was FALSE.

IFTRUE One input (Instructionlist). Outputs: same as  
IFT Instructionlist, if any.  
Runs Instructionlist if result of most recent TEST was TRUE.  
Example:  
TEST :X > 5  
IFT [PR [THE NUMBER IS GREATER THAN 5]]  
IFF [PR [GIVE ME A BIGGER NUMBER]]

OUTPUT One input (Object). One output (Object).  
OP Makes Object the output of current procedure, and returns control to the caller.  
Example: OUTPUT :SIZE  
Outputs the value of SIZE, which must now be used as input.

PAUSE No inputs. One output (Message).  
Suspends current procedure and outputs Message.

REPEAT Two inputs (N, Instructionlist). Same outputs as Instructionlist, if any.  
Runs Instructionlist N times.  
Example: REPEAT 3 [ FD 30 RT 120] Draws a triangle.

RUN One input (Instructionlist). Same outputs as Instructionlist, if any.  
Runs Instructionlist as if typed directly.  
Example: MAKE "COMMANDS [REPEAT 6 [FD 50 RT 60]  
RUN :COMMANDS  
Draws a hexagon.

STOP No inputs. No outputs.  
Stops the current procedure and returns control to the caller.

TEST One input (Pred). No outputs.  
Stores value of Fred (TRUE or FALSE) for subsequent tests.  
Example: See IFTRUE or IFFALSE.

CTRL-G No inputs. No output.  
Stops current procedure, returns Logo to top level, and prints a ?

CTRL-W No inputs. No outputs.  
Interrupts whatever is running. Typing any other character resumes what was running.

CTRL-Z No inputs. No outputs.  
Interrupts whatever is running, causing a PAUSE.

## Logical Operations

AND Two inputs (Pred!, Pred2). One output (TRUE or FALSE).  
Outputs TRUE if Pred! and Pred2 are true; FALSE otherwise.  
# (ANDPred!,Pred2,Pred3,.. ).  
Example: AND :X>5 :X<10  
Outputs TRUE if X is between 5 and 10.

NOT One input (Pred). One output (TRUE or FALSE).  
Outputs TRUE if Fred is FALSE; TRUE otherwise. Example: NOT EQUAL" ABC" 123  
Outputs TRUE.

OR Two inputs (Pred!, Pred2). One output (TRUE or FALSE).  
Outputs FALSE if both inputs are false. TRUE otherwise. (OR (Pred!, Pred2, Pred3 . . . .)  
# Example: OR :X <5 :X > 10  
Outputs "TRUE if X is outside of 5-10.

## The Outside World

BUTTONP One input (Paddlenumber). One output (TRUE or

FALSE).

Outputs TRUE if button on Paddlenumber is down; FALSE otherwise.

KEYP No inputs. One output (TRUE or FALSE).

Outputs TRUE if there is at least one character waiting to be read; FALSE otherwise.

PADDLE One input (Paddlenumber). One output.

Outputs number between 0 and 255 representing the rotation of the dial on the specified paddle.

PRINT One input (Object). No outputs.

PR Prints its input on the screen, followed by a return.

# (PRINTObject1 Object2 . . .).

Example: (PR [THE NUMBER IS] :X)

Prints THE NUMBER IS 7 if the value of X is 7.

READCHAR No inputs. One output.

RC Outputs the first character typed. Waits for character.

Example: MAKE" ANS RC

READLIST No inputs. One output.

RL Waits for the user to type a line, and outputs in list form.

Example: MAKE" ANS RL

SHOW One input (Object). No output.

Prints Object on the screen, followed by a return.

TYPE One input (object). No output.

Prints its input on the screen without a return.

# (TYPE 23 "HELLO [SKIDDOO]

Example: TYPE [THE PRODUCT OF X\*y IS]

PRINT :X\*:Y

WAIT One input (number). No outputs.

Causes Logo to pause for number/60 seconds.

WAIT 120

## Text and Screen Commands

CLEARTEXT No inputs. No outputs.

Clears text screen and initializes cursor position.

CURSOR No inputs. One output.

Outputs list of column and line numbers of cursor position.

FULLSCREEN Devotes the screen to graphics, with turtle field showing.

SETCURSOR One input (Position). No output.

Sets the cursor to Position (Lines 0--23, cols. 0--39).

Example: SETCURSOR [0 12]

Puts cursor halfway down the left edge of the screen.

SPLITSCREEN Devotes top 20 lines of screen to turtle field. TEXTSCREEN Devotes the entire screen to text.

CTRL-L Devotes the entire screen to graphics.

CTRL-S Devotes the top 20 lines of the screen to graphics.

CTRL- T Devotes the entire screen to text.

## Workspace Management

BURY One input (Packagename). No outputs.

Buries all procedures and names in Package.

ERALL Optional input (Package or Packagelist). No output.  
Erases all unburied procedures and variables (in Package or Packagelist) from the workspace.

ERASE One input (Name or Namelist). No outputs.  
Erases the named procedure(s) from the workspace.  
Example: ERASE [CIRCLE PENT]  
Erases the CIRCLE and PENT procedures

ERN One input (Name or Namelist). No outputs.  
Erases the named variable(s) from workspace. Example: ERN [VI v2]  
Erases VI and V2 variables.

ERNS Optional input (Package or Packagelist). No outputs.  
Erases all variables (in Package or Packagelist) from workspace.

ERPS Optional input (Package or Packagelist).  
Erases all procedures (in Package or Packagelist) from workspace.

PACKAGE Two inputs (Package, Name or Namelist). No outputs.  
Puts each named procedure in Package.  
Example: PACKAGE "ANIMAL [CAT DOG]  
Puts CAT and DOG in the package ANIMAL.

PKGALL One input (Package). No outputs.  
Puts into Package all procedures and variables that are not already in packages.

PO One input (Name or Namelist). No outputs.  
Prints the definitions of the named procedure(s).

POALL Optional input (Package or Packagelist).  
Prints definition of every procedure and value of every variable (in Package or Packagelist).

PONS Optional input (Package or Packagelist). No outputs.  
Prints the name and value of every variable (in Package or Packagelist).

POPS Optional input (Package or Packagelist). No outputs.  
Prints the definition of every procedure in Package or Packagelist.

POTS Optional input (Package or Packagelist). No outputs.  
Prints the title line of every procedure (in Package or Packagelist).

UNBURY One input (Package). No outputs.  
Unburies all procedures and names in Package.

## Files

CATALOG No inputs. No outputs.  
Outputs the names of the N files on the disk.

DISK No inputs. One output.  
Outputs list of 3 numbers: the disk drive number, the slot number of the disk drive, and the volume number of the disk most recently used for

CATALOG or set with SETDISK.

ERASEFILE One input (File). No outputs.  
Erases File named "FILE.LOGO from disk. Example: ?ERASEFILE "NOTES  
- Erases file named NOTES.LOGO.

LOAD One or two inputs (File, Package (optional»). No outputs.  
Loads the contents of FILE.LOGO into the workspace. If Package is input, it specifies the package everything goes into.  
Example: LOAD "TURTLESTUFF  
Loads file called TURTLESTUFF.LOGO into workspace.

SAVE One or two inputs (File, Package (optional)). No outputs.  
Creates a file named FILE. LOGO and saves all procedures and variables in Package if this is input, and of the entire workspace otherwise.

Example: SAVE "TURTLESTUFF"

Saves workspace contents in file called TURTLESTUFF. LOGO

SETDISK One to three inputs (Drive, Slot, Volume (last 2 optional)). No outputs.

Sets the disk drive to Drive, slot to Slot, and volume to Volume.

Files

CATALOG No inputs. No outputs.

Prints the names of all files on the disk.

DISK No inputs. One output. Outputs list of 3 numbers: the disk drive number, the slot number of the disk drive, and the volume number of the disk most recently used for CATALOG or set with SETDISK.

ERASEFILE One input (File). No outputs.

Erases File named FILE. LOGO from disk. Example: ?ERASEFILE "NOTES"

Erases file named NOTES.LOGO.

LOAD One or two inputs (File, Package (optional)). No outputs.

Loads the contents of FILE.LOGO into the workspace. If Package is input, it specifies the package everything goes into.

Example: LOAD "SQUARE"

Loads the file named SQUARE. LOGO from the disk to the workspace.

SAVE One or two inputs (File, Package (optional)). No outputs.

Creates a file named FILE. LOGO and saves all procedures and variables in Package if this is input, and of the entire workspace otherwise.

Example: SAVE "SQUARE"

Saves all the workspace contents in a file called SQUARE.LOGO.

SETDISK One to three inputs (Drive, Slot, Volume (last 2 optional)). No outputs.

Sets the disk drive to Drive, slot to Slot, and volume to Volume.

## Advanced Primitives or Rarely Used Primitives

GPROP Two inputs (Name, Prop). One output.

Outputs the value of Prop property of Name. Example: GPROP "CITY" A4

Outputs SAN FRANCISCO (see below PPROP for reason).

PLIST One input(Name). One output.

Outputs the property list associated with Name.

PPROP Three inputs (Name, Prop, Object). No outputs.

Gives Name the property Prop with value Object. Example: PPROP "CITY" A4 [SAN FRANCISCO]

Gives the value of SAN FRANCISCO to the name A4 in the property list CITY.

PPS Optional input (Package or Packagelist). Variable outputs.

Prints the property list(s) of everything (in Package or Packagelist) in workspace.

REMPROP Two inputs (Name, Prop). No outputs.

Removes property pair Prop from the property list of Name.

Example: REMPROP "CITY" A4

Removes the name A4 and its value from the property list CITY.

CATCH Two inputs (Name, Instructionlist). Same outputs as Instructionlist.

Runs Instructionlist. If a THROW Name is called while Instructionlist is run, control returns to the CATCH.

ERROR No inputs. One output.

Outputs six-element list containing information about the most recent error which has not had a message printed or output by ERROR.

THROW One input (Name). No outputs.  
Used to match name with CATCH name--error if none exists.

COPYDEF Two inputs (Newname, Name). No outputs.  
Copies the definition of Name to that for Newname.  
Example: COPYDEF "F "FORWARD  
Gives the same definition as FORWARD.

DEFINE Two inputs (Name, List). No outputs.  
Makes List the definition of the procedure Name. First list in List must be the inputs to Name. Example:  
DEFINE "BOX [[SIZE] [REPEAT 4 [FD :SIZE RT 90]]]

PRIMITIVEP One input (Name). One output.  
Outputs TRUE if Name is name of primitive; FALSE otherwise.  
Example: PRIMITIVEP "FORWARD  
Outputs TRUE

TEXT One input (Name). One output.  
Outputs the definition of Name as a list of lists.

GO One input (Name). No outputs.  
Used to loop back to instruction following LABEL.  
Example: TO COUNTUP  
MAKE "X 1  
LABEL "LOOP  
PRINT :X  
MAKE "X :X + 1  
GO "LOOP  
END  
It is better to use recursion than to use GO like this.

LABEL One input (Name). No outputs.  
Used to pass control to instruction using GO.

NODES No inputs. One output.  
Outputs the number of free nodes.

RECYCLE No inputs. No outputs.  
Frees as many nodes as possible through a garbage collection.

REPARSE Makes reparsing happen immediately.

. BPT No input. No output.  
Enters the Apple monitor. Logo may be resumed by typing 803G followed by RETURN.

. CONTENTS Outputs list of currently defined objects, including variables, procedures, Logo primitives.

. DEPOSIT Two inputs (N,A). No outputs.  
Writes A into machine address N.

. EXAMINE One input (Object). One output.  
Outputs the contents of machine address Object (decimal) if Object is a number. Otherwise, outputs the address of the first node of Object.

. PRINTER One input (N). No outputs.  
Message to Logo that any subsequent information displayed on the screen is to be printed.  
Example: .PRINTER 1  
If printer card is in slot # I, sends text to printer. yse .PRINTER 0 to return off printer and to return to screen.

## Control Characters

CTRL-A Moves cursor to beginning of line.  
CTRL-B Moves cursor back one character.  
CTRL-C Exits editor, saving changes made.

CTRL-D Deletes character under cursor.  
 CTRL-E Moves cursor to end of line.  
 CTRL-F Moves cursor forward one character.  
 CTRL-G Emergency STOP, aborts procedure or editing.  
 CTRL-H Same as left arrow.  
 CTRL-K Kills all text to right of cursor.  
 CTRL-L Scrolls screen so current line is at center (editor).  
 Same as FULLSCREEN (command level).  
 CTRL-M Same as (RETURN).  
 CTRL-N Moves cursor down one line.  
 CTRL-O Opens a new line at position of cursor.

CTRL-P Moves cursor up one line.  
 CTRL-Q Allows insertion of delimiting characters.  
 CTRL-S Same as SPLITSCREEN.  
 CTRL- T Same as TEXTSCREEN.  
 CTRL-U Same as right arrow.  
 CTRL-V Scrolls cursor down text one page.  
 CTRL-W Temporary stop. Any other key resumes program.  
 Helpful to stop screen scroll.  
 CTRL-Y Inserts previous line erased with CTRL-K.  
 Useful for moving a line in the editor.  
 CTRL-Z Same as PAUSE, except that used during a program.

ESC > Moves cursor to end of editor buffer.  
 ESC < Moves cursor to beginning of editor buffer.

## Editing Primitives

EDIT One input (Name, Namelist). No output.  
 ED Starts up LOGO editor.  
 Use CTRL-C to leave editor, saving changes. Example: ED "BOX

EDNS Zero or one input (Package, Package list). No outputs.  
 With no input, puts all variables in editor.  
 With Package input, puts all variables in package in editor.  
 With Package list as input, puts all variables in list in editor.

TO One input (Name-unquoted). No output  
 Enters procedure editor.  
 Use END to complete procedure definition. Example: TO BOX

## Error Messages

Apple Logo has 42 error messages for your convenience. Here is a complete list of the error messages.  
 (Only in Ref:(2))

Number	Message
1	(procedure) IS ALREADY DEFINED
2	NUMBER TOO BIG
3	(symbol) ISN'T A PROCEDURE
4	(symbol) ISN'T A WORD
5	(procedure) CAN'T BE USED IN A PROCEDURE
6.	(symbol) IS A PRIMITIVE
7	CAN'T FIND LABEL (symbol)
8	CAN'T (symbol) FROM THE EDITOR
9	(symbol) IS UNDEFINED
10	(procedure) DIDN'T OUTPUT TO (symbol)
11	I'M HAVING TROUBLE WITH THE DISK
12	DISK FULL
13	CAN'T DIVIDE BY ZERO
14	END OF DATA
15	FILE ALREADY EXISTS
16	FILE LOCKED
17	FILE NOT FOUND

18 FILE IS WRONG TYPE  
19 TOO FEW ITEMS IN (list)  
20 NO MORE FILE BUFFERS  
21 CAN'T FIND CATCH FOR (symbol)  
22 (symbol) NOT FOUND  
23 OUT OF SPACE  
24 (procedure) CAN'T BE USED IN PROCEDURE  
25 (symbol) IS NOT TRUE OR FALSE  
26 PAUSING. . .  
27 YOU'RE AT TOPLEVEL  
28 STOPPED!  
29 NOT ENOUGH INPUTS TO (procedure)  
30 TOO MANY INPUTS TO (procedure)  
31 TOO MUCH INSIDE PARENTHESIS  
32 TOO FEW ITEMS IN (list)  
33 CAN ONLY DO THAT IN A PROCEDURE  
34 TURTLE OUT OF BOUNDS  
35 I DON'T KNOW HOW TO (symbol)  
36 (symbol) HAS NO VALUE  
37 ) WITHOUT (  
38 I DON'T KNOW WHAT TO DO WITH (symbol)  
39 DISK VOLUME MISMATCH  
40 DISK IS WRITE PROTECTED  
41 (procedure) DOESN'T LIKE (symbol) AS INPUT  
42 (procedure) DIDN'T OUTPUT

## Alphabetical Listing of Logo Primitives

AND  
ARCTAN  
ASCII  
BACK  
BACKGROUND  
BURY  
BUTFIRST  
BUTLAST  
BUTTONP  
CATALOG  
CATCH  
CHAR  
CLEAN  
CLEARSCREEN  
CLEARTEXT  
CO  
COPYDEF  
COS  
COUNT  
CURSOR  
DEFINE  
DEFINEDP  
DISK  
DOT  
EDIT  
EDNS  
EMPTYP  
EQUALP  
ERALL  
ERASE  
ERASEFILE  
ERN  
ERNS  
ERPS  
ERROR  
FENCE  
FIRST

FORWARD  
FPUT  
FULLSCREEN  
GPROP  
GO  
HEADING  
HIDETURTLE  
HOME  
IF  
IFFALSE  
IFTRUE  
INT  
ITEM  
KEYP  
LABEL  
LAST  
LEFT  
LIST  
LISTP  
LOAD  
LOCAL  
LPUT  
MAKE  
MEMBERP  
NAME  
NAMEP  
NODES  
NOT  
NUMBERP  
OR  
OUTPUT  
PACKAGE  
PADDLE  
PAUSE  
PEN  
PENCOLOR  
PENDOWN  
PENERASE  
PENREVERSE  
PENUP  
PKGALL  
PLIST  
PO  
POALL  
PONS  
POPS  
POS  
POTS  
PPROP  
PPS  
PRIMITIVEP  
PRINT  
PRODUCT  
QUOTIENT  
RANDOM  
READCHAR  
READLIST  
RECYCLE  
REMAINDER  
REMPROP  
REPARSE  
REPEAT  
RERANDOM  
RIGHT  
ROUND  
RUN  
SAVE

SCRUNCH  
SENTENCE  
SETBG  
SETCURSOR  
SETDISK  
SETHEADING  
SETPC  
SETPEN  
SETPOS  
SETSCRUNCH  
SETX  
SETY  
SHOW  
SHOWNP  
SHOWTURTLE  
SIN  
SPLITSCREEN  
SQRT  
STOP  
SUM  
TEST  
TEXT  
TEXTSCREEN  
THING  
THROW  
TO  
TOWARDS  
TYPE  
UNBURY  
WAIT  
WINDOW  
WORD  
WORDP  
WRAP  
XCOR  
YCOR

Providence:  
Scanned from:

(1) 88 Apple Logo Programs: Mitchell Waite, Donald Martin, Jennifer Ann Martin. SAMS. The Waite Group 1984. ISBN0-672-22343-0

And also in (2) Apple Logo Programming Primer: Donald Martin, Stephen Prata, Marijane Paulsen.SAMS. The Waite Group 1984. ISBN0-672-22342-2