

Appendix A: Loading BASIC-256 on your Windows PC

This chapter will walk you step by step through downloading and installing BASIC-256 on your Microsoft Windows PC. The instructions are written for Windows XP with Firefox as your Web browser. Your specific configuration and installation may be different but the general steps should be similar.

1 – Download:

Connect to the Internet and navigate to the Web site <http://www.basic256.org> and follow the download link. Once you are at the Sourceforge project page click on the green "Download Now!" button (Illustration 41) to start the download process.

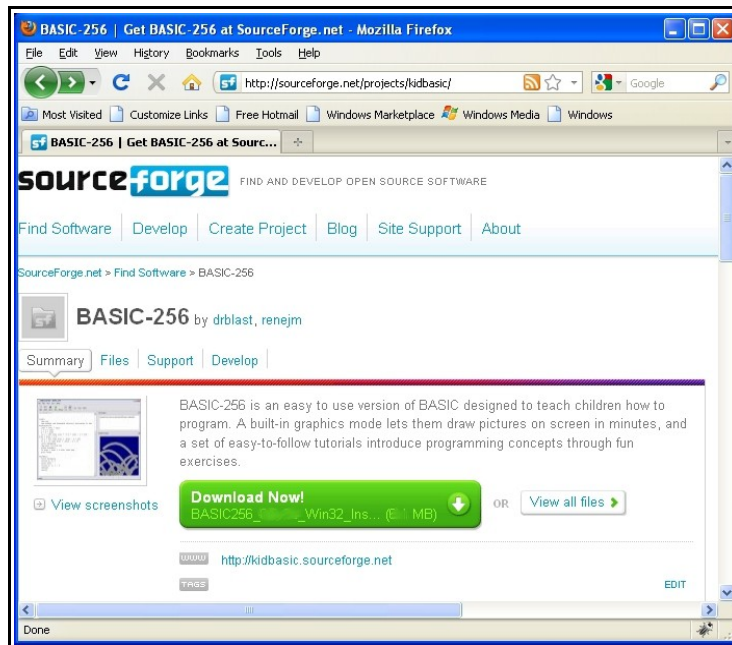


Illustration 41: BASIC-256 on Sourceforge

The download process may ask you what you want to do with the file. Click the "Save File" button (Illustration 42).

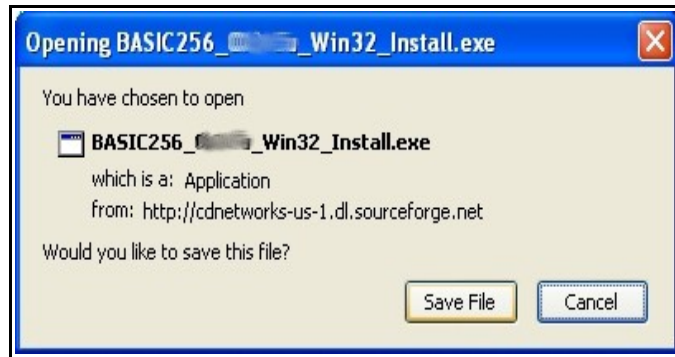


Illustration 42: Saving Install File

Firefox should display the "Downloads" window and actually download the BASIC-256 installer. When it is finished it should look like Illustration 43. Do not close this window quite yet, you will need it to start the Installation.

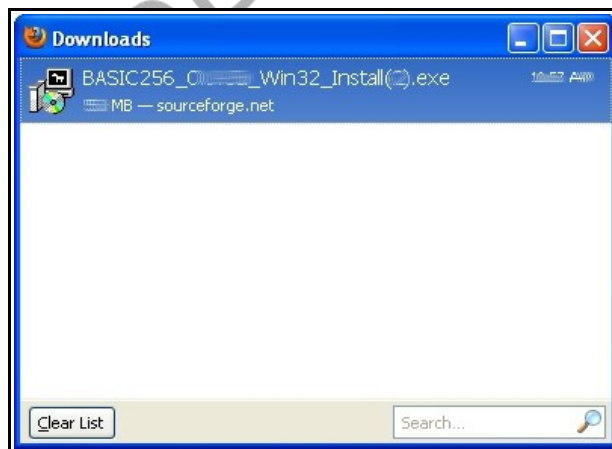


Illustration 43: File Downloaded

2 – Installing:

Once the file has finished downloading (Illustration 43) use your mouse and click on the file from the download list. You will then see one or two dialogs asking if you really want to execute this file (Illustration 44) (Illustration 45). You need to click the "OK" or "Run" buttons on these dialogs.



Illustration 44: Open File Warning



Illustration 45: Open File Security Warning

After the security warnings are cleared you will see the actual BASIC-256 Installer application. Click the "Next>" button on the first screen (Illustration 46).

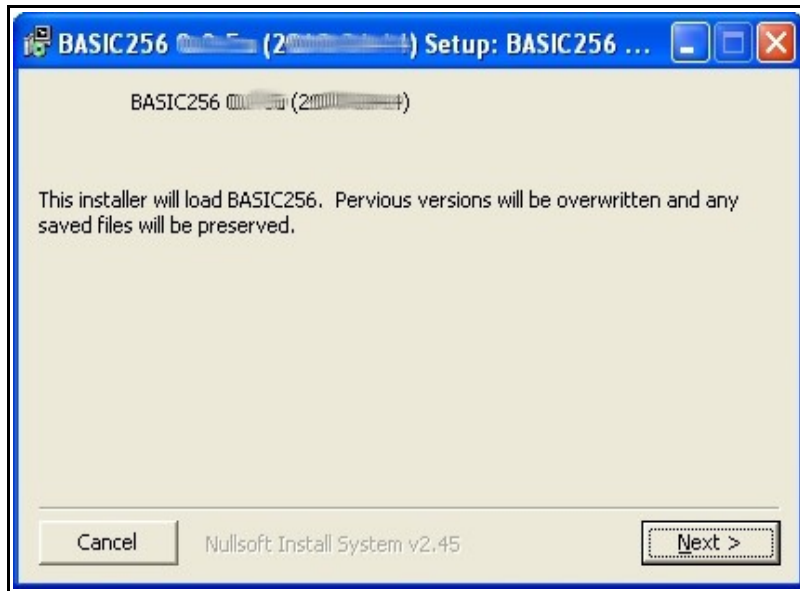


Illustration 46: Installer - Welcome Screen

Read and agree to the GNU GPL software license and click on "I Agree" (Illustration 47). The GNU GPL license is one of the most commonly used "Open Source" and "Free" license to software. You have the right to use, give away, and modify the programs released under the GPL. This license only relates to the BASIC-256 software and not the contents of this book.

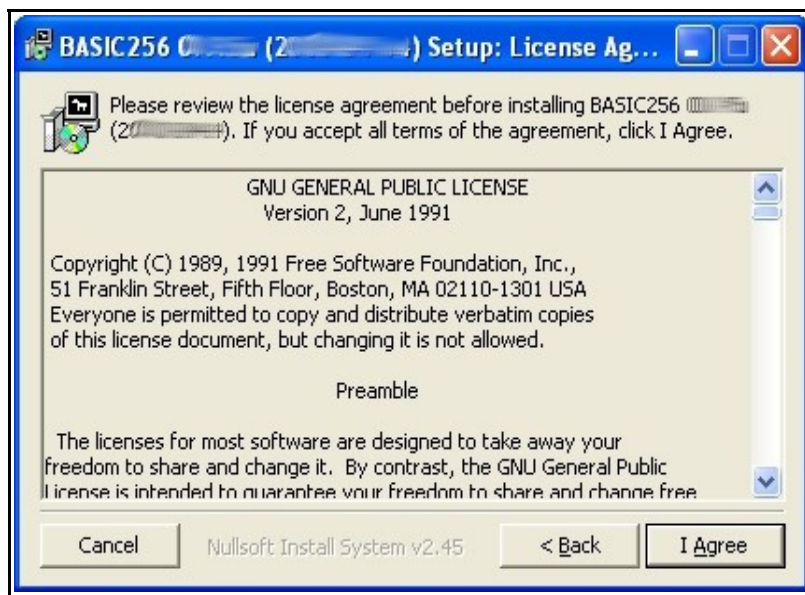


Illustration 47: Installer - GPL License Screen

The next Installer screen asks you what you want to install (Illustration 48). If you are installing BASIC-256 to a USB or other type of removable drive then it is suggested that you un-check the "Start Menu Shortcuts". For most users who are installing to a hard drive, should do a complete install. Click "Next>".

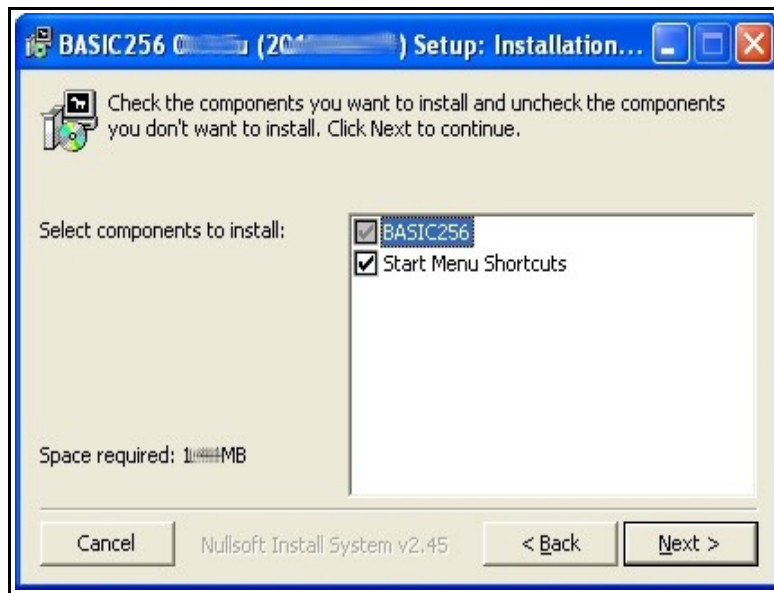


Illustration 48: Installer - What to Install

Illustration 49 shows the last screen before the install begins. This screen asks you what folder to install the BASIC-256 executable files into. If you are installing to your hard drive then you should accept the default path.

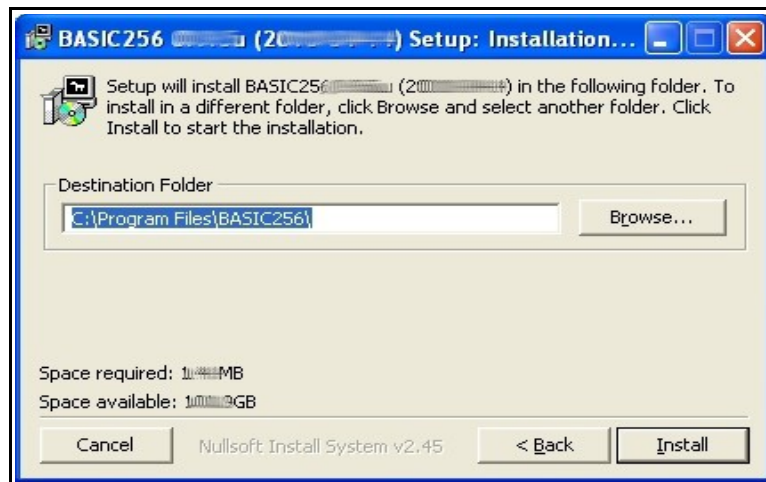


Illustration 49: Installer - Where to Install

The installation is complete when you see this screen (Illustration 50). Click "Close".

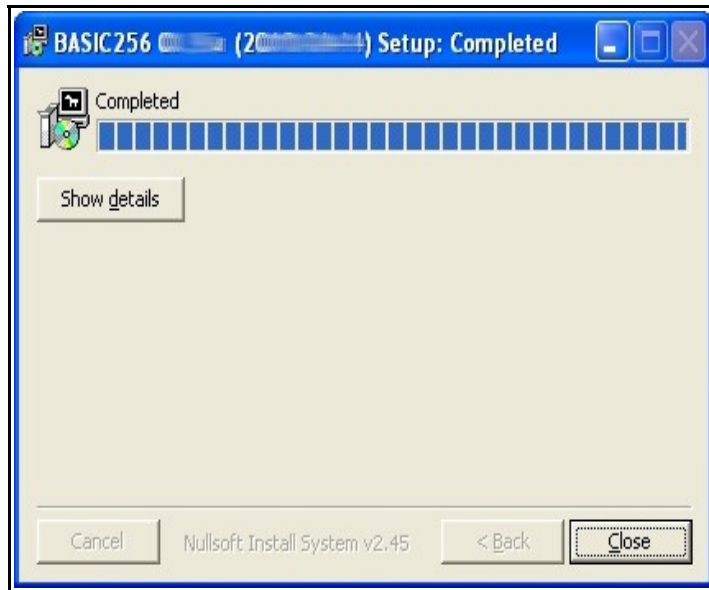


Illustration 50: Installer - Complete

3 – Starting BASIC-256

The installation is complete. You may now click on the Windows "Start" button and then "All Programs >" (Illustration 51).



Illustration 51: XP Start Button

You will then see a menu for BASIC-256. You may open the program by clicking on it, uninstall it, or view the documentation from this menu (Illustration 52).

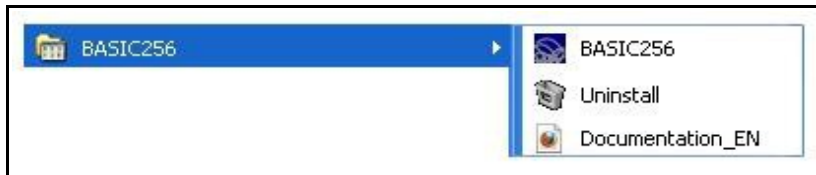





















Illustration 52: BASIC-256 Menu from All Programs

Appendix B: Color Names and Numbers

Listing of standard color names used in the *color* statement. The corresponding RGB values are also listed.

Color	RGB Values	Swatch
black	0, 0, 0	
white	255, 255, 255	
red	255, 0, 0	
darkred	128, 0, 0	
green	0, 255, 0	
darkgreen	0, 128, 0	
blue	0, 0, 255	
darkblue	0, 0, 128	
cyan	0, 255, 255	
darkcyan	0, 128, 128	
purple	255, 0, 255	
darkpurple	128, 0, 128	
yellow	255, 255, 0	
darkyellow	128, 128, 0	
orange	255, 102, 0	
darkorange	176, 61, 0	
gray /grey	160, 160, 160	
darkgray / darkgrey	128, 128, 128	
clear		

Appendix C: Musical Tones

This chart will help you in converting the keys on a piano into frequencies to use in the **sound** statement.

F - 175		F# - 185
G - 196		G# - 208
A - 220		A# - 233
B - 247		
Middle C - 262		C# - 277
D - 294		D# - 311
E - 330		
F - 349		F# - 370
G - 392		G# - 415
A - 440		A# - 466
B - 494		
C - 523		C# - 554
D - 587		D# - 622
E - 659		
F - 698		F# - 740
G - 784		G# - 831
A - 880		A# - 932

Appendix D: Key Values

Key values are returned by the `key()` function and represent the last keyboard key pressed since the key was last read. This table lists the commonly used key values for the standard English keyboard. Other key values exist.

English (EN) Keyboard Codes							
Key	#		Key	#		Key	#
Space	32		A	65		L	76
0	48		B	66		M	77
1	49		C	67		N	78
2	50		D	68		O	79
3	51		E	69		P	80
4	52		F	70		Q	81
5	53		G	71		R	82
6	54		H	72		S	83
7	55		I	73		T	84
8	56		J	74		U	85
9	57		K	75		V	86
						W	87
						X	88
						Y	89
						Z	90
						ESC	16777216
						Backspace	16777219
						Enter	16777220
						Left Arrow	16777234
						Up Arrow	16777235
						Right Arrow	16777236
						Down Arrow	16777237

Appendix E: Unicode Character Values – Latin (English)

This table shows the Unicode character values for standard Latin (English) letters and symbols. These values correspond with the ASCII values that have been used since the 1960's. Additional character sets are available at <http://www.unicode.org>.

CHR	#	CHR	#	CHR	#	CHR	#	CHR	#	CHR	#
NUL	0	SYN	22	,	44	B	66	X	88	n	110
SOH	1	ETB	23	-	45	C	67	Y	89	o	111
STX	2	CAN	24	.	46	D	68	Z	90	p	112
ETX	3	EM	25	/	47	E	69	[	91	q	113
ET	4	SUB	26	0	48	F	70	\	92	r	114
ENQ	5	ESC	27	1	49	G	71	]	93	s	115
ACK	6	FS	28	2	50	H	72	^	94	t	116
BEL	7	GS	28	3	51	I	73	_	95	u	117
BS	8	RS	30	4	52	J	74	`	96	v	118
HT	9	US	31	5	53	K	75	a	97	w	119
LF	10	Space	32	6	54	L	76	b	98	x	120
VT	11	!	33	7	55	M	77	c	99	y	121
FF	12	"	34	8	56	N	78	d	100	z	122
CR	13	#	35	9	57	O	79	e	101	{	123
SO	14	\$	36	:	58	P	80	f	102	|	124
SI	15	%	37	;	59	Q	81	g	103	}	125
DLE	16	&	38	<	60	R	82	h	104	~	126
DC1	17	'	39	=	61	S	83	i	105	DEL	127
DC2	18	(	40	>	62	T	84	j	106		
DC3	19	)	41	?	63	U	85	k	107		
DC4	20	*	42	@	64	V	86	l	108		
NAK	21	+	43	A	65	W	87	m	109		

0-31 and 127 are non-printable.

Adapted from the Unicode Standard 5.2

Appendix F: Reserved Words

These are the words that the BASIC-256 language uses to perform various tasks. You may not use any of these words for variable names or labels for the GOTO and GOSUB statements

#	cyan
abs	dark
acos	darkblue
and	darkcyan
arc	darkgeeen
asc	darkgray
asin	darkgrey
atan	darkorange
black	darkpurple
blue	darkred
call	darkyellow
catch	day
ceil	dbclose
changedir	dbcloseset
chord	dbexecute
chr	dbfloat
circle	dbint
clear	dbnull
clg	dbopen
clickb	dbopenset
clickclear	dbrow
clickx	dbstring
clicky	debuginfo
close	degrees
cls	dim
color	dir
colour	do
confirm	editvisible
continue	else
continuedo	end
continuefor	endfunction
continuewhile	endif
cos	endsubroutine
count	entry
countx	endwhile
currentdir	eof

error_arrayindex	error_none
error_arrayindexmissing	error_nonnumeric
error_arraysizelarge	error_nosuchvariable
error_arraysizesmall	error_notanumber
error_byref	error_notimplemented
error_byreftype	error_penwidth
error_colornumber	error_permission
error_dbcolno	error_polyarray
error_dbconnnumber	error_polypoints
error_dbnotopen	error_printernotoff
error_dbnotset	error_printernoton
error_dbnotsetrow	error_printeropen
error_dbopen	error_putbitformat
error_dbquery	error_radix
error_dbsetnumber	error_radixstring
error_divzero	error_rgb
error_filenotopen	error_spritena
error_filenameumber	error_spritenummer
error_fileopen	error_spriteslice
error_filereset	error_strend
error_filewrite	error_stringmaxlen
error_folder	error_strneglen
error_fontsize	error_strstart
error_fontweight	exists
error_for1	exitdo
error_for2	exitfor
error_freedb	exitwhile
error_freedbset	exp
error_freefile	explode
error_freenet	explodex
error_imagefile	false
error_imagesavetype	fastgraphics
error_imagescale	float
error_infinity	floor
error_logrange	font
error_netaccept	for
error_netbind	freedb
error_netconn	freedbset
error_nethost	freefile
error_netnone	freenet
error_netread	frombinary
error_netsock	fromhex
error_netsocknumber	fromoctal
error_netsockopt	fromradix
error_netwrite	getbrushcolor

getcolor	netconnect
getpenwidth	netdata
getsetting	netlisten
getslice	netread
global	netwritenext
gosub	next
goto	not
graphheight	offerror
graphsize	onerror
graphwidth	open
gray	openb
green	or
grey	orange
hour	ostype
if	outputvisible
imgload	pause
imgsave	penwidth
implode	pi
include	pie
input	pixel
instr	plot
instrx	poly
int	portin
key	portout
kill	print
lasterror	prntercancel
lasterrorextra	printeroff
lasterrorline	printeron
lasterrormessage	printerpage
left	purple
length	putslice
line	radians
log	rand
log10	read
lower	readbyte
md5	readline
mid	rect
minute	red
month	redim
mouseb	ref
mousex	refresh
mousey	rem
msec	replace
netaddress	replacex
netclose	reset

return	tan
rgb	text
right	textheight
say	textwidth
second	then
seek	throwerror
setsetting	to
sin	tobinary
size	tohex
sound	tooctal
spritecollide	toradix
spritedim	true
spriteh	try
spritehide	until
spriteload	upper
spritemove	version
spriteplace	volume
spritepoly	wavplay
spriteshow	wavstop
spriteslice	waywait
spritev	while
spritew	white
spritex	write
spritey	writebyte
sqr	writeline
stamp	xor
step	year
string	yellow
system	

Appendix G: Errors and Warnings

Error #		Error Description (EN)
0	ERROR_NONE	
2	ERROR_FOR1	"Illegal FOR – start number > end number"
3	ERROR_FOR2	"Illegal FOR – start number < end number"
5	ERROR_FILENUMBER	"Invalid File Number"
6	ERROR_FILEOPEN	"Unable to open file"
7	ERROR_FILENOTOPEN	"File not open."
8	ERROR_FILEWRITE	"Unable to write to file"
9	ERROR_FILERESET	"Unable to reset file"
10	ERROR_ARRAYSIZE_LARGE	"Array dimension too large"
11	ERROR_ARRAYSIZE_SMALL	"Array dimension too small"
12	ERROR_NOSUCHVARIABLE	"Unknown variable"
15	ERROR_ARRAYINDEX	"Array index out of bounds"
16	ERROR_STRNEGLN	"Substring length less than zero"
17	ERROR_STRSTART	"Starting position less than zero"
18	ERROR_STREND	"String not long enough for given starting character"
19	ERROR_NONNUMERIC	"Non-numeric value in numeric expression"
20	ERROR_RGB	"RGB Color values must be in the range of 0 to 255."
21	ERROR_PUTBITFORMAT	"String input to putbit incorrect."
22	ERROR_POLYARRAY	"Argument not an array for poly()/stamp()"
23	ERROR_POLYPOINTS	"Not enough points in array for poly()/stamp()"
24	ERROR_IMAGEFILE	"Unable to load image file."
25	ERROR_SPRITENUMBER	"Sprite number out of range."
26	ERROR_SPRITENA	"Sprite has not been assigned."
27	ERROR_SPRITESLICE	"Unable to slice image."
28	ERROR_FOLDER	"Invalid directory name."

29	ERROR_INFINITY	"Operation returned infinity."
30	ERROR_DBOPEN	"Unable to open SQLITE database."
31	ERROR_DBQUERY	"Database query error (message follows)."
32	ERROR_DBNOTOPEN	"Database must be opened first."
33	ERROR_DBCOLNO	"Column number out of range."
34	ERROR_DBNOTSET	"Record set must be opened first."
35	ERROR_TYPECONV	"Unable to convert string to number."
36	ERROR_NETSOCK	"Error opening network socket."
37	ERROR_NETHOST	"Error finding network host."
38	ERROR_NETCONN	"Unable to connect to network host."
39	ERROR_NETREAD	"Unable to read from network connection."
40	ERROR_NETNONE	"Network connection has not been opened."
41	ERROR_NETWRITE	"Unable to write to network connection."
42	ERROR_NETSOCKOPT	"Unable to set network socket options."
43	ERROR_NETBIND	"Unable to bind network socket."
44	ERROR_NETACCEPT	"Unable to accept network connection."
45	ERROR_NETSOCKNUMBER	"Invalid Socket Number"
46	ERROR_PERMISSION	"You do not have permission to use this statement/function."
47	ERROR_IMAGESAVETYPE	"Invalid image save type."
50	ERROR_DIVZERO	"Division by zero"
51	ERROR_BYREF	"Function/Subroutine expecting variable reference in call"
52	ERROR_BYREFTYPE	"Function/Subroutine variable incorrect reference type in call"
53	ERROR_FREEFILE	"There are no free file numbers to allocate"
54	ERROR_FREENET	"There are no free network connections to allocate"
55	ERROR_FREEDB	"There are no free database connections to allocate"
56	ERROR_DBCONNNUMBER	"Invalid Database Connection Number"
57	ERROR_FREEDBSET	"There are no free data sets to allocate for that"

		database connection"
58	ERROR_DBSETNUMBER	"Invalid data set number"
59	ERROR_DBNOTSETROW	"You must advance the data set using DBROW before you can read data from it"
60	ERROR_PENWIDTH	"Drawing pen width must be a non-negative number"
61	ERROR_COLORNUMBER	"Color values must be in the range of -1 to 16,777,215"
62	ERROR_ARRAYINDEXMISSING	"Array variable %VARNAME% has no value without an index"
63	ERROR_IMAGESCALE	"Image scale must be greater than or equal to zero"
64	ERROR_FONTSIZE	"Font size, in points, must be greater than or equal to zero"
65	ERROR_FONTWEIGHT	"Font weight must be greater than or equal to zero"
66	ERROR_RADIXSTRING	"Unable to convert radix string back to a decimal number"
67	ERROR_RADIX	"Radix conversion base must be between 2 and 36"
68	ERROR_LOGRANGE	"Unable to calculate the logarithm or root of a negative number"
69	ERROR_STRINGMAXLEN	"String exceeds maximum length of 16,777,216 characters"
70	ERROR_NOTANUMBER	"Mathematical operation returned an undefined value"
71	ERROR_PRINTERNOTON	"Printer is not on."
72	ERROR_PRINTERNOTOFF	"Printing is already on."
73	ERROR_PRINTEROPEN	"Unable to open printer."
65535	ERROR_NOTIMPLEMENTED	"Feature not implemented in this environment."

WARNING #		Error Description (EN)
65537	WARNING_TYPECONV	"Unable to convert string to number, zero used"

Appendix H: Glossary

Glossary of terms used in this book.

algorithm – A step-by-step process for solving a problem.

angle – An angle is formed when two line segments (or rays) start at the same point on a plane. An angle's measurement is the amount of rotation from one ray to another on the plane and is typically expressed in radians or degrees.

argument – A data value included in a statement or function call used to pass information. In BASIC-256 argument values are not changed by the statement or function.

array – A collection of data, stored in the computer's memory, that is accessed by using one or more integer indexes. See also **numeric array**, **one dimensional array**, **string array**, and **two dimensional array**.

ASCII – (acronym for American Standard Code for Information Interchange) Defines a numeric code used to represent letters and symbols used in the English Language. See also **Unicode**.

asynchronous – Process or statements happening at one after the other.

Boolean Algebra – The algebra of true/false values created by Charles Boole over 150 years ago.

Cartesian Coordinate System – Uniquely identify a point on a plane by a pair of distances from the origin (0,0). The two distances are measured on perpendicular axes.

column (database) – defines a single piece of information that will be common to all rows of a database table.

constant – A value that can not be changed.

data structure – is a way to store and use information efficiently in a computer system

database – An organized collection of data. Most databases are computerized and consist of tables of similar information that are broken into rows and columns. See also: **column**, **row**, **SQL**, and **table**.

degrees – A unit of angular measure. Angles on a plane can have measures in degrees of 0 to 360. A right angle is 90 degrees. See also **angle** and **radians**.

empty string – A string with no characters and a length of zero (0). Represented by two quotation marks (""). See also **string**.

false – Boolean value representing not true. In BASIC-256 it is actually short hand for the integer zero (0). See also **Boolean Algebra** and **true**.

floating-point number – A numeric value that may or may not contain a decimal point. Typically floating-point numbers have a range of $\pm 1.7 \times 10^{\pm 308}$ with 15 digits of precision.

font – A style of drawing letters.

frequency – The number of occurrences of an event over a specific period of time. See also **hertz**.

function – A special type of statement in BASIC-256 that may take zero or more values, make calculations, and return information to your program.

graphics output area – The area on the screen where drawing is displayed.

hertz (hz) – Measure of frequency in cycles per second. Named for German physicist Heinrich Hertz. See also **frequency**.

integer – A numeric value with no decimal point. A whole number. Typically has a range of $-2,147,483,648$ to $2,147,483,647$.

IP address – Short for Internet Protocol address. An IP address is a numeric label assigned to a device on a network.

label – A name associated with a specific place in the program. Used for jumping to with the **goto** and **gosub** statements.

list – A collection of values that can be used to assign arrays and in some statements. In BASIC-256 lists are represented as comma (,) separated values inside a set of curly-braces ({}).

logical error – An error that causes the program to not perform as expected.

named constant – A value that is represented by a name but can not be changed.

numeric array – An array of numbers.

one dimensional array - A structure in memory that holds a list of data that is addressed by a single index. See also **array**.

operator – Acts upon one or two pieces of data to perform an action.

pixel – Smallest addressable point on a computer display screen.

point – Measurement of text – 1 point = $1/72$ ". A character set in 12 point will be $12/72$ " or $1/6$ " tall.

port – A software endpoint number used to create and communicate on a socket.

pseudocode – Description of what a program needs to do in a natural (non-computer) language. This word contains the prefix "pseudo" which means false and "code" for programming text.

radian - A unit of angular measure. Angles on a plane can have measures in radians of 0 to 2π . A right angle is $\pi/2$ degrees. See also **angle** and

degrees.

radius – Distance from a circle to its center. Also, $\frac{1}{2}$ of a circle's diameter.

RGB – Acronym for Red Green Blue. Light is made up of these three colors.

row (database) – Also called a record or tuple. A row can be thought of as a single member of a table.

socket – A software endpoint that allows for bi-directional (2 way) network communications between two processes on a single computer or two computers.

sprite – An image that is integrated into a graphical scene.

SQL – Acronym for Structured Query Language. SQL is the most widely used language to manipulate data in a relational database.

statement – A single complete action. Statements perform something and do not return a value.

string – A sequence of characters (letters, numbers, and symbols). String constants are surrounded by double quotation marks ("").

string array – An array of strings.

sub-string – Part of a larger string.

subroutine – A block of code or portion of a larger program that performs a task independently from the rest of the program. A piece that can be used and re-used by many parts of a program.

syntax error – An error with the structure of a statement so that the program will not execute.

synchronous – Happening at the same time.

table (database) – Data organized into rows and columns. A table has a specific number of defined columns and zero or more rows.

transparent – Able to see through.

text output area – The area of the screen where plain text and errors is displayed.

true – Boolean value representing not false. In BASIC-256 it is actually short hand for the integer one (1). See also **Boolean Algebra** and **false**.

two dimensional array – A structure in memory that will hold rows and columns of data. See also **array**.

Unicode – The modern standard used to represent characters and symbols of all the world's languages as integer numbers.

variable – A named storage location in the computer's memory that can be changed or varied. A variable can store an integer, floating-point number, string, or an array.