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CIMPLICITY® Monitoring and Control Products

CIMPLICITY HMI

Basic Control Engine

Language Reference Manual

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Following is a list of documentation icons:

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in the equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution provides information when careful attention must be taken in order to avoid damaging results.

Important flags important information.

To do calls attention to a procedure.

Note calls attention to information that is especially significant to understanding and operating the equipment.

Tip provides a suggestion.

Guide provides additional directions for selected topics.

This manual was produced using *Doc-To-Help*®, by WexTech Systems, Inc.

Preface

Contents of this Manual

Chapter 23. W: Discusses language elements - Weekday through WriteIni.

Chapter 24. X: Discusses language elements - Xor.

Chapter 25. Y: Discusses language elements - Year.

Chapter 26. CIMPLICITY Extensions to Basic: Discusses the CIMPLICITY extensions to the Basic Control Engine language - Acquire through TraceEnable.

Related Publications

For more information, refer to these publications:

CIMPLICITY MMI and MES/SCADA Products User Manual (GFK-1180)

CIMPLICITY MMI and MES/SCADA Products Basic Control Engine Program Editor Operation Manual (GFK-1305)

CIMPLICITY MMI and MES/SCADA Products Event Editor Operation Manual (GFK-1282)

Contents

Introduction

About the Basic Control Syntax

This chapter contains a complete, alphabetical listing of all keywords in the Basic Control Engine script language. When syntax is described, the following notations are used:

Notation	Description
`While...Wend`	Elements belonging to the Basic Control Engine script language, referred to in this manual as keywords, appear in the typeface shown to the left.
variable	Items that are to be replaced with information that you supply appear in italics. The type of replacement is indicated in the following description.
text$	The presence of a type-declaration character following a parameter signifies that the parameter must be a variable of that type or an expression that evaluates to that type. If a parameter does not appear with a type-declaration character, then its type is described in the text.

[*parameter*]	Square brackets indicate that the enclosed items are optional.
	
	In Basic Control Engine script language, you cannot end a statement with a comma, even if the parameters are optional:
	`MsgBox "Hello",,"Message"   '<--OK`
	`MsgBox "Hello",,            '<-- Not valid`

`{Input | Binary}`	Braces indicate that you must choose one of the enclosed items, which are separated by a vertical bar.
`...`	Ellipses indicate that the preceding expression can be repeated any number of times.

Using the Basic Control Engine Language Reference

The Reference chapter is organized like a dictionary containing an entry for each language element. The language elements are categorized as follows:

Category	**Description**
data type	Any of the support data types, such as **`Integer`**, **`String`**, and so on.
function	Language element that takes zero or more parameters, performs an action, and returns a value
keyword	Language element that doesn't fit into any of the other categories
operator	Language elements that cause an evaluation to be performed either on one or two operands
statement	Language element that takes zero or more parameters and performs an action.
topic	Describes information about a topic rather than a language element

Each entry in the Reference chapter contains the following headings:

Heading	**Description**
Syntax	The syntax of the language element. The conventions used in describing the syntax are described in Chapter 1.
Description	Contains a one-line description of that language element.
Comments	Contains any other important information about that language keyword.
Example	Contains an example of that language keyword in use. An example is provided for every language keyword.
See Also	Contains a list of other entries in the Reference section that relate either directly or indirectly to that language element.

Language Elements By Category

The following subsections list Basic Control Engine language elements by category.

Arrays

ArrayDims	Return the number of dimensions of an array
ArraySort	Sort an array
Erase	Erase the elements in one or more arrays
LBound	Return the lower bound of a given array dimension
Option Base	Change the default lower bound for array declarations
ReDim	Re-establish the dimensions of an array
UBound	Return the upper bound of a dimension of an array

Clipboard

Clipboard$ (function)	Return the content of the clipboard as a string
Clipboard$ (statement)	Set the content of the clipboard
Clipboard.Clear	Clear the clipboard
Clipboard.GetFormat	Get the type of data stored in the clipboard
Clipboard.GetText	Get text from the clipboard
Clipboard.SetText	Set the content of the clipboard to text

Comments

'	Comment to end-of-line
REM	Add a comment

Comparison operators

<	Less than
<=	Less than or equal to
<>	Not equal
=	Equal
>	Greater than
>=	Greater than or equal to

Controlling other programs

AppActivate	Activate an application
AppClose	Close an application
AppFind	Return the full name of an application
AppGetActive$	Return the name of the active application
AppGetPosition	Get the position and size of an application
AppGetState	Get the window state of an application
AppHide	Hide an application
AppList	Fill an array with a list of running applications
AppMaximize	Maximize an application
AppMinimize	Minimize an application
AppMove	Move an application
AppRestore	Restore an application
AppSetState	Set the state of an application's window
AppShow	Show an application
AppSize	Change the size of an application
AppType	Return the type of an application
SendKeys	Send keystrokes to another application
Shell	Execute another application

Controlling program flow

Call	Call a subroutine
Choose	Return a value at a given index
Do...Loop	Execute a group of statements repeatedly
DoEvents (function)	Yield control to other applications
DoEvents (statement)	Yield control to other applications
End	Stop execution of a script
Exit Do	Exit a Do loop
Exit For	Exit a For loop
For...Next	Repeat a block of statement a specified number of times
GoSub	Execute at a specific label, allowing control to return later
Goto	Execute at a specific label
If...Then...Else	Conditionally execute one or more statements
IIf	Return one of two values depending on a condition

Main	Define a subroutine where execution begins
Return	Continue execution after the most recent GoSub
Select...Case	Execute one of a series of statements
Sleep	Pause for a specified number of milliseconds
Stop	Suspend execution, returning to a debugger (if present)
Switch	Return one of a series of expressions depending on a condition
While...Wend	Repeat a group of statements while a condition is True

Controlling the operating environment

Command, Command$	Return the command line
Environm Environ$	Return a string from the environment

Conversion

Asc	Return the value of a character
CBool	Convert a value to a Boolean
CCur	Convert a value to Currency
CDate	Convert a value to a Date
CDbl	Convert a value to a Double
Chr, Chr$	Convert a character value to a string
CInt	Convert a value to an Integer
CLng	Convert a value to a Long
CSng	Convert a value to a Single
CStr	Convert a value to a String
CVar	Convert a value to a Variant
CVDate	Convert a value to a Date
CVErr	Convert a value to an error
Hex, Hex$	Convert a number to a hexadecimal string
IsDate	Determine if an expression is convertible to a date
IsError	Determine if a variant contains a user-defined error value
IsNumeric	Determine if an expression is convertible to a number
Oct, Oct$	Convert a number to an octal string
Str, Str$	Convert a number to a string
Val	Convert a string to a number

Data types

Boolean	Data type representing True of False values
Currency	Data type used to hold monitary values
Date	Data type used to hold dates and times
Double	Data type used to hold real number with 15-16 digits of precision
HWND	Data type used to hold windows
Integer	Data type used to hold whole numbers with 4 digits of precision
Long	Data type used to hold whole numbers with 10 digits of precision
Object	Data type used to hold OLE automation objects
Single	Data type used to hold real number with 7 digits of precision
String	Data type used to hold sequences of characters
Variant	Data type that holds a number, string, or OLE automation objects

Database

SQLBind	Specify where to place results with SQLRetrieve
SQLClose	Close a connection to a database
SQLError	Return error information when an SQL function fails
SQLExecQuery	Execute a query on a database
SQLGetSchema	Return information about the structure of a database
SQLOpen	Establishes a connection with a database
SQLRequest	Run a query on a database
SQLRetrieve	Retrieve all or part of a query
SQLRetrieveToFile	Retrieve all or part of a query, placing results in a file

Date/time

Date, Date$ (functions)	Return the current date
Date, Date$ (statements)	Change the system date
DateAdd	Add a number of date intervals to a date
DateDiff	Subtract a number of date intervals from a date
DatePart	Return a portion of a date
DateSerial	Assemble a date from date parts
DateValue	Convert a string to a date

Day	Return the day component of a date value
Hour	Return the hour part of a date value
Minute	Return the minute part of a date value
Month	Return the month part of a date value
Now	Return the date and time
Second	Return the seconds part of a date value
Time, Time$ (functions)	Return the current system time
Time, Time$ (statements)	Set the system time
Timer	Return the number of elapsed seconds since midnight
TimeSerial	Assemble a date/time value from time components
TimeValue	Convert a string to a date/time value
Weekday	Return the day of the week of a date value
Year	Return the year part of a date value

DDE

DDEExecute	Execute a command in another application
DDEInitiate	Initiate a DDE conversation with another application
DDEPoke	Set a value in another application
DDERequest, DDERequest$	Return a value from another application
DDESend	Establishe a DDE conversation, then sets a value in another application
DDETerminate	Terminate a conversation with another application
DDETerminateAll	Terminate all conversations
DDETimeOut	Set the timeout used for non-responding applications

Error handling

Erl	Return the line with the error
Err (function)	Return the error that caused the current error trap
Err (statement)	Set the value of the error
Error	Simulate a trappable runtime error
Error, Error$	Return the text of a given error
On Error	Trap an error
Resume	Continue execution after an error trap

File I/O

Close	Close one or more files
Eof	Determine if the end-of-file has been reached
FreeFile	Return the next available file number
Get	Read data from a random or binary file
Input#	Read data from a sequential file into variables
Input, Input$	Read a specified number of bytes from a file
Line Input #	Read a line of text from a sequential file
Loc	Return the record position of the file pointer within a file
Lock	Lock a section of a file
Lof	Return the number of bytes in an open file
Open	Open a file for reading or writing
Print #	Print data to a file
Put	Write data to a binary or random file
Reset	Close all open files
Seek	Return the byte position of the file pointer within a file
Seek	Set the byte position of the file pointer which a file
UnLock	Unlock part of a file
Width#	Specify the line width for sequential files
Write #	Write data to a sequential file

File system

ChDir	Change the current directory
ChDrive	Change the current drive
CurDir, CurDir$	Return the current directory
Dir, Dir$	Return files in a directory
DiskDrives	Fill an array with valid disk drive letters
DiskFree	Return the free space on a given disk drive
FileAttr	Return the mode in which a file is open
FileCopy	Copy a file
FileDateTime	Return the date and time when a file was last modified
FileDirs	Fill an array with a subdirectory list
FileExists	Determine if a file exists
FileLen	Return the length of a file in bytes
FileList	Fill an array with a list of files
FileParse$	Return a portion of a filename

GetAttr	Return the attributes of a file
Kill	Delete files from disk
MkDir	Create a subdirectory
Name	Rename a file
RmDir	Remove a subdirectory
SetAttr	Change the attributes of a file

Financial

DDB	Return depreciation of an asset using double-declining balance method
Fv	Return the future value of an annuity
IPmt	Return the interest payment for a given period of an annuity
IRR	Return the internal rate of return for a series of payments and receipts
MIRR	Return the modified internal rate of return
NPer	Return the number of periods of an annuity
Npv	Return the net present value of an annuity
Pmt	Return the payment for an annuity
PPmt	Return the principal payment for a given period of an annuity
Pv	Return the present value of an annuity
Rate	Return the interest rate for each period of an annuity
Sln	Return the straight-line depreciation of an asset
SYD	Return the Sum of Years' Digits depreciation of an asset

Getting information from Basic Control Engine

Basic.Capability	Return capabilities of the platform
Basic.Eoln$	Return the end-of-line character for the platform
Basic.FreeMemory	Return the available memory
Basic.HomeDir$	Return the directory where Basic Control Engine is located
Basic.OS	Return the platform id
Basic.PathSeparator$	Return the path separator character for the platform
Basic.Version$	Return the version of Basic Control Engine

INI Files

ReadIni$	Read a string from an INI file
ReadIniSection	Read all the item names from a given section of an INI file
WriteIni	Write a new value to an INI file

Logical/binary operators

And	Logical or binary conjunction
Eqv	Logical or binary equivalence
Imp	Logical or binary implication
Not	Logical or binary negation
Or	Logical or binary disjunction
Xor	Logical or binary exclusion

Math

Abs	Return the absolute value of a number
Atn	Return the arc tangent of a number
Cos	Return the cosine of an angle
Exp	Return e raised to a given power
Fix	Return the integer part of a number
Int	Return the integer portion of a number
Log	Return the natural logarithm of a number
Random	Return a random number between two values
Randomize	Initialize the random number generator
Rnd	Generate a random number between 0 and 1
Sgn	Return the sign of a number
Sin	Return the sine of an angle
Sqr	Return the square root of a number
Tan	Return the tangent of an angle

Miscellaneous

()	Force parts of an expression to be evaluated before others
_	Line continuation
Beep	Make a sound
Inline	Allow execution or interpretation of a block of text

Numeric operators

*	Multiply
+	Add
-	Subtract
/	Divide
\	Integer divide
^	Power
Mod	Remainder

Objects

CreateObject	Instantiate an OLE automation object
GetObject	Return an OLE automation object from a file, or returns a previously instantiated OLE automation object
Is	Compare two object variables
Nothing	Value indicating no valid object

Parsing

Item$	Return a range of items from a string
ItemCount	Return the number of items in a string
Line$	Retrieve a line from a string
LineCount	Return the number of lines in a string
Word$	Return a sequence of words from a string
WordCount	Return the number of words in a string

Predefined dialogs

AnswerBox	Display a dialog asking a question
AskBox$	Display a dialog allowing the user to type a response
AskPassword$	Display a dialog allowing the user to type a password
InputBox, InputBox$	Display a dialog allowing the user to type a response
MsgBox (function)	Display a dialog containing a message and some buttons
MsgBox (statement)	Display a dialog containing a message and some buttons
OpenFilename$	Display a dialog requesting a file to open
SaveFilename$	Display a dialog requesting the name of a new file
SelectBox	Display a dialog allowing selection of an item from an array

Printing

Print	Print data to the screen
Spc	Print a number of spaces within a Print statement
Tab	Used with Print to print spaces up to a column position

Procedures

Declare	An external routine or a forward reference
Exit Function	Exit a function
Exit Sub	Exit a subroutine
Function...End	Create a user-defined function
Sub...End	Create a user-defined subroutine

String operators

&	Concatenate two strings
Like	Compare a string against a pattern

Strings

Format, Format$	Return a string formatted to a given specification
InStr	Return the position of one string within another
LCase, LCase$	Convert a string to lower case
Left, Left$	Return the left portion of a string
Len	Return the length of a string or the size of a data item
LSet	Left align a string or user-defined type within another
LTrim, LTrim$	Remove leading spaces from a string
Mid, Mid$	Return a substring from a string
Mid, Mid$	Replace one part of a string with another
Option Compare	Change the default comparison between text and binary
Option CStrings	Allow interpretation of C-style escape sequences in strings
Right, Right$	Return the right portion of a string
RSet	Right align a string within another
RTrim, RTrim$	Remove trailing spaces from a string
Space, Space$	Return a string os spaces
StrComp	Compare two strings
String, String$	Return a string consisting of a repeated character
Trim, Trim$	Trim leading and trailing spaces from a string
UCase, UCase$	Return the upper case of a string

User dialogs

Begin Dialog	Begin definition of a dialog template
CancelButton	Define a Cancel button within a dialog template
CheckBox	Define a combo box in a dialog template
ComboBox	Define a combo box in a dialog template
Dialog (function)	Invoke a user-dialog, returning which button was selected
Dialog (statement)	Invoke a user-dialog
DlgControlId	Return the id of a control in a dynamic dialog
DlgEnable	Determine if a control is enabled in a dynamic dialog
DlgEnable	Enable or disables a control in a dynamic dialog
DlgFocus	Return the control with the focus in a dynamic dialog
DlgFocus	Set focus to a control in a dynamic dialog
DlgListBoxArray	Set the content of a list box or combo box in a dynamic dialog
DlgListBoxArray	Set the content of a list box or combo box in a dynamic dialog
DlgSetPicture	Set the picture of a control in a dynamic dialog
DlgText (statement)	Set the content of a control in a dynamic dialog
DlgText$ (function)	Return the content of a control in a dynamic dialog
DlgValue (function)	Return the value of a control in a dynamic dialog
DlgValue (statement)	Set the value of a control in a dynamic dialog
DlgVisible (function)	Determine if a control is visible in a dynamic dialog
DlgVisible (statement)	Set the visibility of a control in a dynamic dialog
DropListBox	Define a drop list box in a dialog template
GroupBox	Define a group box in a dialog template
ListBox	Add a list box to a dialog template
OKButton	Add an OK button to a dialog template
OptionButton	Add an option button to a dialog template
OptionGroup	Add an option group to a dialog template
Picture	Add a picture control to a dialog template
PictureButton	Add a picture button to a dialog template
PushButton	Add a push button to a dialog template
Text	Add a text control to a dialog template
TextBox	Add a text box to a dialog template

Variables and constants

=	Assignment
Const	Define a constant
DefBool	Set the default data type to Boolean
DefCur	Set the default data type to Currency
DefDate	Set the default data type to Date
DefDbl	Set the default data type to Double
DefInt	Set the default data type to Integer
DefLng	Set the default data type to Long
DefObj	Set the default data type to Object
DefSng	Set the default data type to Single
DefStr	Set the default data type to String
DefVar	Set the default data type to Variant
Dim	Declare a local variable
Global	Declare variables for sharing between scripts
Let	Assign a value to a variable
Private	Declare variables accessible to all routines in a script
Public	Declare variables accessible to all routines in all scripts
Set	Assign an object variable
Type	Declare a user-defined data type

Variants

IsEmpty	Determine if a variant has been initialized
IsError	Determine if a variant contains a user-defined error
IsMissing	Determine if an optional parameter was specified
IsNull	Determine if a variant contains valid data
IsObject	Determine if an expression contains an object
VarType	Return the type of data stored in a variant

Symbols

& (operator)

Syntax *expression1* **&** *expression2*

Description Returns the concatenation of *expression1* and *expression2*.

Comments If both expressions are strings, then the type of the result is **`String`**. Otherwise, the type of the result is a **`String`** variant.

When nonstring expressions are encountered, each expression is converted to a **`String`** variant. If both expressions are **`Null`**, then a **`Null`** variant is returned. If only one expression is **`Null`**, then it is treated as a zero-length string. **`Empty`** variants are also treated as zero-length strings.

In many instances, the plus (+) operator can be used in place of **&**. The difference is that **+** attempts addition when used with at least one numeric expression, whereas **&** always concatenates.

Example This example assigns a concatenated string to variable s$ and a string to s2$, then concatenates the two variables and displays the result in a dialog box.

```
Sub Main()
  s$ = "This string" & " is concatenated"
  s2$ = " with the '&' operator."
  MsgBox s$ & s2$
End Sub
```

See Also **+** (operator); Operator Precedence (topic).

' (keyword)

Syntax **'***text*

Description Causes the compiler to skip all characters between this character and the end of the current line.

Comments This is very useful for commenting your code to make it more readable.

Example

```
Sub Main()
  'This whole line is treated as a comment.
  i$ = "Strings"      'This is a valid assignment with a mment.
  This line will cause an error (the apostrophe is missing).
End Sub
```

See Also **Rem** (statement); Comments (topic).

() (keyword)

Syntax 1 ...**(**_expression_**)**...

Syntax 2 ...,**(**_parameter_**)**,...

Description Forces parts of an expression to be evaluated before others or forces a parameter to be passed by value.

Comments

Parentheses within Expressions

Parentheses override the normal precedence order of the scripts operators, forcing a subexpression to be evaluated before other parts of the expression. For example, the use of parentheses in the following expressions causes different results:

```
i = 1 + 2 * 3     'Assigns 7.
i = (1 + 2) * 3   'Assigns 9.
```

Use of parentheses can make your code easier to read, removing any ambiguity in complicated expressions.

Parentheses Used in Parameter Passing

Parentheses can also be used when passing parameters to functions or subroutines to force a given parameter to be passed by value, as shown below:

```
ShowForm i      'Pass i by reference.
ShowForm (i)      'Pass i by value.
```

Enclosing parameters within parentheses can be misleading. For example, the following statement appears to be calling a function called **`ShowForm`** without assigning the result:

```
ShowForm(i)
```

The above statement actually calls a subroutine called **`ShowForm`**, passing it the variable **`i`** by value. It may be clearer to use the **`ByVal`** keyword in this case, which accomplishes the same thing:

```
ShowForm ByVal i
```

The result of an expression is always passed by value.

Example This example uses parentheses to clarify an expression.

```
Sub Main()
  bill = False
  dave = True
  jim = True

  If (dave And bill) Or (jim And bill) Then
    Msgbox "The required parties for the meeting are here."
  Else
    MsgBox "Someone is late for the meeting!"
  End If
End Sub
```

See Also **`ByVal`** (keyword); Operator Precedence (topic).

* (operator)

Syntax *expression1* **`*`** *expression2*

Description Returns the product of *expression1* and *expression2*.

Comments The result is the same type as the most precise expression, with the following exceptions:

If one expression is	and the other expression is	then the type the result is
`Single`	**`Long`**	**`Double`**
`Boolean`	**`Boolean`**	**`Integer`**
`Date`	**`Date`**	**`Double`**

When the **`*`** operator is used with variants, the following additional rules apply:

- **`Empty`** is treated as 0.
- If the type of the result is an **`Integer`** variant that overflows, then the result is automatically promoted to a **`Long`** variant.
- If the type of the result is a **`Single`**, **`Long`**, or **`Date`** variant that overflows, then the result is automatically promoted to a **`Double`** variant.
- If *expression1* is **`Null`** and *expression2* is **`Boolean`**, then the result is **`Empty`**. Otherwise, If either expression is **`Null`**, then the result is **`Null`**.

Example This example assigns values to two variables and their product to a third variable, then displays the product of s# * t#.

```
Sub Main()
  s# = 123.55
  t# = 2.55
  u# = s# * t#
  MsgBox s# & " * " & t# & " = " & s# * t#
End Sub
```

See Also Operator Precedence (topic).

+ (operator)

Syntax *expression1* **+** *expression2*

Description Adds or concatenates two expressions.

Comments Addition operates differently depending on the type of the two expressions:

If one expression is	and the other expression is	then
Numeric	Numeric	Perform a numeric add (see below).
`String`	**`String`**	Concatenate, returning a string.
`Numeric`	**`String`**	A runtime error is generated.
`Variant`	**`String`**	Concatenate, returning a **`String`** variant.
`Variant`	**`Numeric`**	Perform a variant add (see below).
`Empty` variant	**`Empty`** variant	Return an **`Integer`** variant, value **`0`**.
`Empty` variant	**`Boolean`** variant	Return an **`Integer`** variant (value **`0`** or **`-1`**)
`Empty` variant	Any data type	Return the non-**`Empty`** expression unchanged.
`Null` variant	Any data type	Return **`Null`**.
`Variant`	**`Variant`**	If either is numeric, add; otherwise, concatenate.

When using **+** to concatenate two variants, the result depends on the types of each variant at runtime. You can remove any ambiguity by using the **&** operator.

Numeric Add

A numeric add is performed when both expressions are numeric (i.e., not variant or string). The result is the same type as the most precise expression, with the following exceptions:.

If one expression is	and the other expression is	then the type the result is
`Single`	**`Long`**	**`Double`**
`Boolean`	**`Boolean`**	**`Integer`**

A runtime error is generated if the result overflows its legal range

Variant Add

If both expressions are variants, or one expression is numeric and the other expression is **`Variant`**, then a variant add is performed. The rules for variant add are the same as those for normal numeric add, with the following exceptions:

- If the type of the result is an **`Integer`** variant that overflows, then the result is a **`Long`** variant.
- If the type of the result is a **`Long`**, **`Single`**, or **`Date`** variant that overflows, then the result is a **`Double`** variant.

Example This example assigns string and numeric variable values and then uses the **+** operator to concatenate the strings and form the sums of numeric variables.

```
Sub Main()
  i$ = "concatenate " + "strings!"
  j% = 95 + 5     'Addition of numeric literals
  k# = j% + j%    'Addition of numeric variable
  MsgBox "You can " + i$
  MsgBox "You can add literals or variables:" + Str(j%) + ", " + Str(k#)
End Sub
```

See Also **&** (operator); Operator Precedence (topic).

- (operator)

Syntax 1 *expression1* **–** *expression2*

Syntax 2 **–***expression*

Description Returns the difference between *expression1* and *expression2* or, in the second syntax, returns the negation of *expression*.

Comments

Syntax 1

The type of the result is the same as that of the most precise expression, with the following exceptions:

If one expression is	and the other expression is	then the type the result is
`Long`	`Single`	`Double`
`Boolean`	`Boolean`	`Integer`

A runtime error is generated if the result overflows its legal range.

When either or both expressions are **`Variant`**, then the following additional rules apply:

- If *expression1* is **`Null`** and *expression2* is **`Boolean`**, then the result is **`Empty`**. Otherwise, if either expression is **`Null`**, then the result is **`Null`**.
- **`Empty`** is treated as an **`Integer`** of value **`0`**.
- If the type of the result is an **`Integer`** variant that overflows, then the result is a **`Long`** variant.
- If the type of the result is a **`Long`**, **`Single`**, or **`Date`** variant that overflows, then the result is a **`Double`** variant.

Syntax 2

If *expression* is numeric, then the type of the result is the same type as *expression*, with the following exception:

- If *expression* is **`Boolean`**, then the result is **`Integer`**.

In 2's compliment arithmetic, unary minus may result in an overflow with **`Integer`** and **`Long`** variables when the value of *expression* is the largest negative number representable for that data type. For example, the following generates an overflow error:

```
Sub Main()
  Dim a As Integer
  a = -32768
  a = -a       '<-- Generates overflow here.
End Sub
```

When negating variants, overflow will never occur because the result will be automatically promoted: integers to longs and longs to doubles.

Example This example assigns values to two numeric variables and their difference to a third variable, then displays the result.

```
Sub Main()
  i% = 100
  j# = 22.55
  k# = i% - j#
  MsgBox "The difference is: " & k#
End Sub
```

See Also Operator Precedence (topic).

. (keyword)

Syntax 1 *object*`.`*property*

Syntax 2 *structure.member*

Description Separates an object from a property or a structure from a structure member.

Examples This example uses the period to separate an object from a property.

```
Sub Main()
  MsgBox "The clipboard text is: " & Clipboard.GetText()
End Sub
```

This example uses the period to separate a structure from a member.

```
Type Rect
  left As Integer
  top As Integer
  right As Integer
  bottom As Integer
End Type
```

```
Sub Main()
  Dim r As Rect
  r. left = 10
  r. rigth = 12
  Msgbox "r.left = "& r.left & ", r.right = " & r.right
End Sub
```

See Also Objects (topic).

/ (operator)

Syntax *expression1* **/** *expression2*

Description Returns the quotient of *expression1* and *expression2*.

Comments The type of the result is **`Double`**, with the following exceptions:

If one expression is	and the other expression is	then the type the result is
`Integer`	**`Integer`**	**`Single`**
`Single`	**`Single`**	**`Single`**
`Boolean`	**`Boolean`**	**`Single`**

A runtime error is generated if the result overflows its legal range.

When either or both expressions is **`Variant`**, then the following additional rules apply:

- If *expression1* is **`Null`** and *expression2* is **`Boolean`**, then the result is **`Empty`**. Otherwise, if either expression is **`Null`**, then the result is **`Null`**.
- **`Empty`** is treated as an **`Integer`** of value **`0`**.
- If both expressions are either **`Integer`** or **`Single`** variants and the result overflows, then the result is automatically promoted to a **`Double`** variant.

Example This example assigns values to two variables and their quotient to a third variable, then displays the result.

```
Sub Main()
  i% = 100
  j# = 22.55
  k# = i% / j#
  MsgBox "The quotient of i/j is: " & k#
End Sub
```

See Also \ (operator); Operator Precedence (topic).

< (operator)

See Comparison Operators (topic).

<= (operator)

See Comparison Operators (topic).

<> (operator)

See Comparison Operators (topic).

= (statement)

Syntax *variable* **=** *expression*

Description Assigns the result of an expression to a variable.

Comments When assigning expressions to variables, internal type conversions are performed automatically between any two numeric quantities. Thus, you can freely assign numeric quantities without regard to type conversions. However, it is possible for an overflow error to occur when converting from larger to smaller types. This occurs when the larger type contains a numeric quantity that cannot be represented by the smaller type. For example, the following code will produce a runtime error:

```
Dim amount As Long
Dim quantity As Integer

amount = 400123   'Assign a value out of range for int.
quantity = amount   'Attempt to assign to Integer.
```

When performing an automatic data conversion, underflow is not an error.

The assignment operator (**=**) cannot be used to assign objects. Use the **Set** statement instead.

Example

```
Sub Main()
  a$ = "This is a string"
  b% = 100
  c# = 1213.3443
  MsgBox a$ & "," & b% & "," & c#
End Sub
```

See Also **Let** (statement); Operator Precedence (topic); **Set** (statement); Expression Evaluation (topic).

= (operator)

See Comparison Operators (topic).

> (operator)

See Comparison Operators (topic).

>= (operator)

See Comparison Operators (topic).

\ (operator)

Syntax *expression1* \ *expression2*

Description Returns the integer division of *expression1* and *expression2*.

Comments Before the integer division is performed, each expression is converted to the data type of the most precise expression. If the type of the expressions is either **`Single, Double, Date,`** or **`Currency`**, then each is rounded to **`Long`**.

If either expression is a **`Variant`**, then the following additional rules apply:

- If either expression is **`Null`**, then the result is **`Null`**.
- **`Empty`** is treated as an **`Integer`** of value **`0`**.

Example This example assigns the quotient of two literals to a variable and displays the result.

```
Sub Main()
  s% = 100.99 \ 2.6
  MsgBox "Integer division of 100.99\2.6 is: " & s%
End Sub
```

See Also **`/`** (operator); Operator Precedence (topic).

^ (operator)

Syntax *expression1* **^** *expression2*

Description Returns *expression1* raised to the power specified in *expression2*.

Comments The following are special cases:

Special Case	**Value**
n^0	1
0^-n	Undefined
0^+n	0
1^n	1

The type of the result is always **Double**, except with **Boolean** expressions, in which case the result is **Boolean**. Fractional and negative exponents are allowed.

If either expression is a **Variant** containing **Null**, then the result is **Null**.

It is important to note that raising a number to a negative exponent produces a fractional result.

Example

```
Sub Main()
  s# = 2 ^ 5        'Returns 2 to the 5th power.
  r# = 16 ^ .5      'Returns the square root of 16.
  MsgBox "2 to the 5th power is: " & s#
  MsgBox "The square root of 16 is: " & r#
End Sub
```

See Also Operator Precedence (topic).

_ (keyword)

Syntax

```
s$ = "This is a very long line that I want to split " & _
  "onto two lines"
```

Description Line-continuation character, which allows you to split a single script onto more than one line.

Comments The line-continuation character cannot be used within strings and must be preceded by white space (either a space or a tab).

The line-continuation character can be followed by a comment, as shown below:

```
  i = 5 + 6 & _   'Continue on the next line.
    "Hello"
```

Example

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  'The line-continuation operator is useful when concatenating
  'long strings.

  msg1 = "This line is a line of text that" & crlf & "extends beyond " _
      & "the borders of the editor" & crlf & "so it is split into " _
      & "multiple lines"

  'It is also useful for separating and continuing long calculation lines.

  b# = .124
  a# = .223
  s# = ( (((Sin(b#) ^ 2) + (Cos(a#) ^ 2)) ^ .5) / _
       (((Sin(a#) ^ 2) + (Cos(b#) ^ 2)) ^ .5) ) * 2.00
  MsgBox msg1 & crlf & crlf & "The value of s# is: " & s#
End Sub
```

A

Abs (function)

Syntax **`Abs`**(*expression*)

Description Returns the absolute value of *expression*.

Comments If *expression* is **`Null`**, then **`Null`** is returned. **`Empty`** is treated as **`0`**.

The type of the result is the same as that of *expression*, with the following exceptions:

- If *expression* is an **`Integer`** that overflows its legal range, then the result is returned as a **`Long`**. This only occurs with the largest negative **`Integer`**:

```
Dim a As Variant
Dim i As Integer
i = -32768
a = Abs(i)      'Result is a Long.
i = Abs(i)      'Overflow!
```

- If *expression* is a **`Long`** that overflows its legal range, then the result is returned as a **`Double`**. This only occurs with the largest negative **`Long`**:

```
Dim a As Variant
Dim l As Long
l = -2147483648
a = Abs(l)      'Result is a Double.
l = Abs(l)      'Overflow!
```

- If *expression* is a **`Currency`** value that overflows its legal range, an overflow error is generated.

Example This example assigns absolute values to variables of four types and displays the result.

```
Sub Main()
  s1% = Abs(-10.55)
  s2& = Abs(-10.55)
  s3! = Abs(-10.55)
  s4# = Abs(-10.55)
  MsgBox "The absolute values are: " & s1% & "," & s2& & "," & s3! & "," & s4#
End Sub
```

See Also **Sgn** (function).

And (operator)

Syntax *expression1* And *expression2*

Description Performs a logical or binary conjunction on two expressions.

Comments If both expressions are either **`Boolean, Boolean`** variants, or **`Null`** variants, then a logical conjunction is performed as follows:

If the first expression is	and the second expression is	then the result is
`True`	**`True`**	**`True`**
`True`	**`False`**	**`False`**
`True`	**`Null`**	**`Null`**
`False`	**`True`**	**`False`**
`False`	**`False`**	**`False`**
`False`	**`Null`**	**`Null`**
`Null`	**`True`**	**`Null`**
`Null`	**`False`**	**`False`**
`Null`	**`Null`**	**`Null`**

Binary Conjunction

If the two expressions are **`Integer`**, then a binary conjunction is performed, returning an **`Integer`** result. All other numeric types (including **`Empty`** variants) are converted to **`Long`**, and a binary conjunction is then performed, returning a **`Long`** result.

Binary conjunction forms a new value based on a bit-by-bit comparison of the binary representations of the two expressions according to the following table:

1	And	1	=	1	Example:
0	And	1	=	0	5 00001001
1	And	0	=	0	6 00001010
0	And	0	=	0	And 00001000

Example

```
Sub Main()
  n1 = 1001
  n2 = 1000
  b1 = True
  b2 = False
  'This example performs a numeric bitwise And operation and stores
  'the result in N3.
  n3 = n1 And n2
'This example performs a logical And comparing b1 and b2 and displays
'the result.
  If b1 And b2 Then
    MsgBox "b1 And b2 are True; n3 is: " & n3
  Else
    MsgBox "b1 And b2 are False; n3 is: " & n3
  End If
End Sub
```

See Also Operator Precedence (topic); **`Or`** (operator); **`Xor`** (operator); **`Eqv`** (operator); **`Imp`** (operator).

AnswerBox (function)

Syntax **`AnswerBox`**(*prompt* [,[*button1*] [,[*button2*] [,*button3*]]]]])

Description Displays a dialog box prompting the user for a response and returns an **`Integer`** indicating which button was clicked (1 for the first button, 2 for the second, and so on).

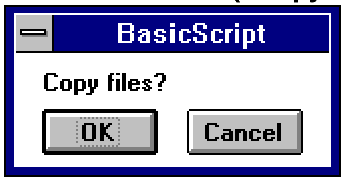
Comments The **`AnswerBox`** function takes the following parameters:

Parameter	Description
prompt	Text to be displayed above the text box. The *prompt* parameter can be any expression convertible to a **`String`**. The Basic Control Engine script resizes the dialog box to hold the entire contents of *prompt*, up to a maximum width of 5/8 of the width of the screen and a maximum height of 5/8 of the height of the screen. It also word-wraps any lines too long to fit within the dialog box and truncates all lines beyond the maximum number of lines that fit in the dialog box. You can insert a carriage-return/line-feed character in a string to cause a line break in your message. A runtime error is generated if this parameter is **`Null`**.
button1	Text for the first button. If omitted, then "OK" and "Cancel" are used. A runtime error is generated if this parameter is **`Null`**.
button2	Text for the second button. A runtime error is generated if this parameter is **`Null`**.
button3	Text for the third button. A runtime error is generated if this parameter is **`Null`**.

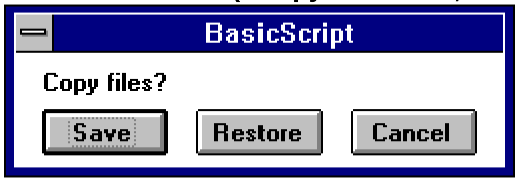
The width of each button is determined by the width of the widest button.

The **`AnswerBox`** function returns 0 if the user selects Cancel.

```
r% = AnswerBox("Copy files?")
```



```
r% = AnswerBox("Copy files?","Save","Restore","Cancel")
```



Example This example displays a dialog box containing three buttons. It displays an additional message based on which of the three buttons is selected.

```
Sub Main()
  r% = AnswerBox("Temporary File Operation?","Save","Remove","Cancel")
  Select Case r%
    Case 1
      MsgBox "Files will be saved."
    Case 2
      MsgBox "Files will be removed."
    Case Else
      MsgBox "Operation canceled."
  End Select
End Sub
```

See Also `MsgBox` (statement); `AskBox$` (function); `AskPassword$` (function); `InputBox, InputBox$` (functions); `OpenFilename$` (function); `SaveFilename$` (function); `SelectBox` (function).

Notes: `AnswerBox` displays all text in its dialog box in 8-point MS Sans Serif.

Any (data type)

Description Used with the `Declare` statement to indicate that type checking is not to be performed with a given argument.

Comments Given the following declaration:

```
Declare Sub Foo Lib "FOO.DLL" (a As Any)
```

the following calls are valid:

```
Foo 10
Foo "Hello, world."
```

Example The following example calls the FindWindow to determine if Program Manager is running.

This example uses the Any keyword to pass a NULL pointer, which is accepted by the FindWindow function.

```
Declare Function FindWindow16 Lib "user" Alias "FindWindow" (ByVal Class _
  As Any,ByVal Title As Any) As Integer
Declare Function FindWindow32 Lib "user32" Alias "FindWindowA" (ByVal Class _
  As Any,ByVal Title As Any) As Long
Sub Main()
  Dim hWnd As Variant
  If Basic.Os = ebWin16 Then
    hWnd = FindWindow16("PROGMAN",0&)
  ElseIf Basic.Os = ebWin32 Then
    hWnd = FindWindow32("PROGMAN",0&)
  Else
    hWnd = 0
  End If
  If hWnd <> 0 Then
    MsgBox "Program manager is running, window handle is " & hWnd
  End If
End Sub
```

See Also `Declare` (statement).

AppActivate (statement)

Syntax **`AppActivate`** *name$* | *taskID*

Description Activates an application given its name or task ID.

Comments The **`AppActivate`** statement takes the following parameters:

Parameter	Description
name$	**`String`** containing the name of the application to be activated.
taskID	Number specifying the task ID of the application to be activated. Acceptable task IDs are returned by the **`Shell`** function

When activating applications using the task ID, it is important to declare the variable used to hold the task ID as a **`Variant`**. The type of the ID depends on the platform on which The Basic Control Engine script is running.

Examples This example activates Program Manager.

```
Sub Main()
  AppActivate "Program Manager"
End Sub
```

This example runs another application, activates it, and maximizes it.

```
Sub Main()
  Dim id as variant
  id = Shell("notepad.exe")       'Run Notepad minimized.
  AppActivate id              'Now activate Notepad.
  AppMaximize
End Sub
```

See Also **`Shell`** (function); **`SendKeys`** (statement); **`WinActivate`** (statement).

Notes: The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

Minimized applications are not restored before activation. Thus, activating a minimized DOS application will not restore it; rather, it will highlight its icon.

A runtime error results if the window being activated is not enabled, as is the case if that application is currently displaying a modal dialog box.

AppClose (statement)

Syntax **`AppClose`** [*name$*]

Description Closes the named application.

Comments The *name$* parameter is a **`String`** containing the name of the application. If the *name$* parameter is absent, then the **`AppClose`** statement closes the active application.

Example This example activates Excel, then closes it.

```
Sub Main()
  If AppFind$("Microsoft Excel") = "" Then 'Make sure Excel is there.
    MsgBox "Excel is not running."
    Exit Sub
  End If
  AppActivate "Microsoft Excel"       'Activate it (unnecessary).
  AppClose "Microsoft Excel"          'Close it.
End Sub
```

See Also **`AppMaximize`** (statement); **`AppMinimize`** (statement); **`AppRestore`** (statement); **`AppMove`** (statement); **`AppSize`** (statement).

Notes: A runtime error results if the application being closed is not enabled, as is the case if that application is currently displaying a modal dialog box.

The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppFind$ (function)

Syntax **`AppFind$(`***partial_name$*)

Description Returns a **`String`** containing the full name of the application matching the *partial_name$*.

Comments The *partial_name$* parameter specifies the title of the application to find. If there is no exact match, the script will find an application whose title begins with *partial_name$*.

`AppFind$` returns a zero-length string if the specified application cannot be found.

`AppFind$` is generally used to determine whether a given application is running. The following expression returns **`True`** if Microsoft Word is running:

```
  AppFind$("Microsoft Word")
```

Example This example checks to see whether Excel is running before activating it.

```
Sub Main()
  If AppFind$("Microsoft Excel") <> "" Then
    AppActivate "Microsoft Excel"
  Else
    MsgBox "Excel is not running."
  End If
End Sub
```

See Also **`AppFileName$`** (function).

Notes: This function returns a **`String`** containing the exact text appearing in the title bar of the active application's main window.

AppGetActive$ (function)

Syntax **`AppGetActive$()`**

Description Returns a **`String`** containing the name of the application.

Comments If no application is active, the **`AppGetActive$`** function returns a zero-length string.

You can use **`AppGetActive$`** to retrieve the name of the active application. You can then use this name in calls to routines that require an application name.

Example

```
Sub Main()
  n$ = AppGetActive$()
  AppMinimize n$
End Sub
```

See Also **`AppActivate`** (statement); **`WinFind`** (function).

Notes: This function returns a **`String`** containing the exact text appearing in the title bar of the active application's main window.

AppGetPosition (statement)

Syntax **`AppGetPosition`** *X*,*Y*,*width*,*height* [,*name$*]

Description Retrieves the position of the named application.

Comments The AppGetPosition statement takes the following parameters:

Parameter	Description
X, Y	Names of **`Integer`** variables to receive the position of the application's window.
width, height	Names of **`Integer`** variables to receive the size of the application's window.
name$	**`String`** containing the name of the application. If the *name$* parameter is omitted, then the active application is used.

The *x*, *y*, *width*, and *height* variables are filled with the position and size of the application's window. If an argument is not a variable, then the argument is ignored, as in the following example, which only retrieves the *x* and *y* parameters and ignores the *width* and *height* parameters:

```
  Dim x As Integer,y As Integer
  AppGetPosition x,y,0,0,"Program Manager"
```

Example

```
Sub Main()
  Dim x As Integer,y As Integer
  Dim cx As Integer,cy As Integer
  AppGetPosition x,y,cx,cy,"Program Manager"
End Sub
```

See Also **`AppMove`** (statement); **`AppSize`** (statement).

Notes: The position and size of the window are returned in twips.

The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppGetState (function)

Syntax **`AppGetState`**[([*name$*])]

Description Returns an **`Integer`** specifying the state of the top-level window.

Comments The **`AppGetState`** function returns any of the following values:

If the window is	**then AppGetState returns**
Maximized	**`ebMaximized`**
Minimized	**`ebMinimized`**
Restored	**`ebRestored`**

The *name$* parameter is a **`String`** containing the name of the desired application. If it is omitted, then the **`AppGetState`** function returns the name of the active application.

Examples This example saves the state of Program Manager, changes it, then restores it to its original setting.

```
Sub Main()
  If AppFind$("Program Manager") = "" Then
    MsgBox "Can't find Program Manager."
    Exit Sub
  End If
  AppActivate "Program Manager"     'Activate Program Manager.
  state = AppGetState             'Save its state.
  AppMinimize                   'Minimize it.
  MsgBox "Program Manager is now minimized. Select OK to restore it."
  AppActivate "Program Manager"
  AppSetState state               'Restore it.
End Sub
```

See Also **`AppMaximize`** (statement); **`AppMinimize`** (statement); **`AppRestore`** (statement).

Notes: The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppHide (statement)

Syntax **AppHide** [*name$*]

Description Hides the named application.

Comments If the named application is already hidden, the **AppHide** statement will have no effect.

The *name$* parameter is a **String** containing the name of the desired application. If it is omitted, then the **AppHide** statement hides the active application.

AppHide generates a runtime error if the named application is not enabled, as is the case if that application is displaying a modal dialog box.

Example This example hides Program Manager.

```
Sub Main()
  'See whether Program Manager is running.
  If AppFind$("Program Manager") = "" Then Exit Sub
  AppHide "Program Manager"
  MsgBox "Program Manager is now hidden. Press OK to show it once again."
  AppShow "Program Manager"
End Sub
```

See Also **AppShow** (statement).

Notes: The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppList (statement)

Syntax **`AppList`** *AppNames$*()

Description Fills an array with the names of all open applications.

Comments The *AppNames$* parameter must specify either a zero- or one-dimensioned dynamic **`String`** array or a one-dimensional fixed **`String`** array. If the array is dynamic, then it will be redimensioned to match the number of open applications. For fixed arrays, **`AppList`** first erases each array element, then begins assigning application names to the elements in the array. If there are fewer elements than will fit in the array, then the remaining elements are unused. The script returns a runtime error if the array is too small to hold the new elements.

After calling this function, you can use **`LBound`** and **`UBound`** to determine the new size of the array.

Example This example minimizes all applications on the desktop.

```
Sub Main()
  Dim apps$()
  AppList apps
  'Check to see whether any applications were found.
  If ArrayDims(apps) = 0 Then Exit Sub
  For i = LBound(apps) To UBound(apps)
    AppMinimize apps(i)
  Next i
End Sub
```

Notes: The name of an application is considered to be the exact text that appears in the title bar of the application's main window.

AppMaximize (statement)

Syntax **AppMaximize** [*name$*]

Description Maximizes the named application.

Comments The *name$* parameter is a **String** containing the name of the desired application. If it is omitted, then the **AppMaximize** function maximizes the active application.

Example

```
Sub Main()
  AppMaximize "Program Manager"   'Maximize Program Manager.

  If AppFind$("NotePad") <> "" Then
    AppActivate "NotePad"      'Set the focus to NotePad.
    AppMaximize            'Maximize it.
  End If
End Sub
```

See Also **AppMinimize** (statement); **AppRestore** (statement); **AppMove** (statement); **AppSize** (statement); **AppClose** (statement).

Notes: If the named application is maximized or hidden, the **AppMaximize** statement will have no effect.

The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppMaximize generates a runtime error if the named application is not enabled, as is the case if that application is displaying a modal dialog box.

AppMinimize (statement)

Syntax **AppMinimize** [*name$*]

Description Minimizes the named application.

Comments The *name$* parameter is a **String** containing the name of the desired application. If it is omitted, then the **AppMinimize** function minimizes the active application.

Example

```
Sub Main()
  AppMinimize "Program Manager"   'Maximize Program Manager.

  If AppFind$("NotePad") <> "" Then
    AppActivate "NotePad"      'Set the focus to NotePad.
    AppMinimize            'Maximize it.
  End If
End Sub
```

See Also **AppMaximize** (statement); **AppRestore** (statement); **AppMove** (statement); **AppSize** (statement); **AppClose** (statement).

Notes: If the named application is minimized or hidden, the **AppMinimize** statement will have no effect.

The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppMinimize generates a runtime error if the named application is not enabled, as is the case if that application is displaying a modal dialog box.

AppMove (statement)

Syntax **AppMove** *X*, *Y* [,*name$*]

Description Sets the upper left corner of the named application to a given location.

Comments The **AppMove** statement takes the following parameters:

Parameter	Description
X, *Y*	**Integer** coordinates specifying the upper left corner of the new location of the application, relative to the upper left corner of the display.
name$	**String** containing the name of the application to move. If this parameter is omitted, then the active application is moved.

Example This example activates Program Manager, then moves it 10 pixels to the right.

```
Sub Main()
  Dim x%,y%
  AppActivate "Program Manager"       'Activate Program Manager.
  AppGetPosition x%,y%,0,0            'Retrieve its position.
  x% = x% + Screen.TwipsPerPixelX * 10  'Add 10 pixels.
  AppMove x% + 10,y%                  'Nudge it 10 pixels to the right.
End Sub
```

See Also **AppMaximize** (statement); **AppMinimize** (statement); **AppRestore** (statement); **AppSize** (statement); **AppClose** (statement).

Notes: If the named application is maximized or hidden, the **AppMove** statement will have no effect.

The *X* and *Y* parameters are specified in twips.

AppMove will accept *X* and *Y* parameters that are off the screen.

The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppMove generates a runtime error if the named application is not enabled, as is the case if that application is currently displaying a modal dialog box.

AppRestore (statement)

Syntax **`AppRestore`** [*name$*]

Description Restores the named application.

Comments The *name$* parameter is a **`String`** containing the name of the application to restore. If this parameter is omitted, then the active application is restored.

Example This example minimizes Program Manager, then restores it.

```
Sub Main()
  If AppFind$("Program Manager") = "" Then Exit Sub
  AppActivate "Program Manager"
  AppMinimize "Program Manager"
  MsgBox "Program Manager is now minimized. Press OK to restore it."
  AppRestore "Program Manager"
End Sub
```

See Also **`AppMaximize`** (statement); **`AppMinimize`** (statement); **`AppMove`** (statement); **`AppSize`** (statement); **`AppClose`** (statement).

Notes: The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

`AppRestore` will have an effect only if the main window of the named application is either maximized or minimized.

`AppRestore` will have no effect if the named window is hidden.

`AppRestore` generates a runtime error if the named application is not enabled, as is the case if that application is currently displaying a modal dialog box.

AppSetState (statement)

Syntax **`AppSetState`** *newstate* [,*name$*]

Description Maximizes, minimizes, or restores the named application, depending on the value of *newstate*.

Comments The **`AppSetState`** statement takes the following parameters:

Parameter	Description
newstate	**`Integer`** specifying the new state of the window. It can be any of the following values
name$	**`String`** containing the name of the application to change. If this parameter is omitted, then the active application is used.

Value	Description
`ebMaximized`	The named application is maximized.
`ebMinimized`	The named application is minimized.
`ebRestored`	The named application is restored.

Example This example saves the state of Program Manager, changes it, then restores it to its original setting.

```
Sub Main()
  If AppFind$("Program Manager") = "" Then
    MsgBox "Can't find Program Manager."
    Exit Sub
  End If
  AppActivate "Program Manager"     'Activate Program Manager.
  state = AppGetState              'Save its state.
  AppMinimize                    'Minimize it.
  MsgBox "Program Manager is now minimized. Select OK to restore it."
  AppActivate "Program Manager"
  AppSetState state               'Restore it.
End Sub
```

See Also **`AppGetState`** (function); **`AppMinimize`** (statement); **`AppMaximize`** (statement); **`AppRestore`** (statement).

Notes: The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppShow (statement)

Syntax **AppShow** [*name$*]

Description Makes the named application visible.

Comments The *name$* parameter is a **String** containing the name of the application to show. If this parameter is omitted, then the active application is shown.

Example This example hides Program Manager.

```
Sub Main()
  'See whether Program Manager is running.
  If AppFind$("Program Manager") = "" Then Exit Sub
  AppHide "Program Manager"
  MsgBox "Program Manager is now hidden. Press OK to show it once again."
  AppShow "Program Manager"
End Sub
```

See Also **AppHide** (statement).

Notes: If the named application is already visible, **AppShow** will have no effect.

The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

AppShow generates a runtime error if the named application is not enabled, as is the case if that application is displaying a modal dialog box.

AppSize (statement)

Syntax **`AppSize`** *width,height* [,*name$*]

Description Sets the width and height of the named application.

Comments The **`AppSize`** statement takes the following parameters:

Parameter	Description
width, height	**`Integer`** coordinates specifying the new size of the application.
name$	**`String`** containing the name of the application to resize. If this parameter is omitted, then the active application is used.

Example This example enlarges the active application by 10 pixels in both the vertical and horizontal directions.

```
Sub Main()
  Dim w%,h%
  AppGetPosition 0,0,w%,h%            'Get current width/height.
  x% = x% + Screen.TwipsPerPixelX * 10  'Add 10 pixels.
  y% = y% + Screen.TwipsPerPixelY * 10  'Add 10 pixels.
  AppSize w%,h%                     'Change to new size.
End Sub
```

See Also **`AppMaximize`** (statement); **`AppMinimize`** (statement); **`AppRestore`** (statement); **`AppMove`** (statement); **`AppClose`** (statement).

Notes: The *width* and *height* parameters are specified in twips.

This statement will only work if the named application is restored (i.e., not minimized or maximized).

The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

A runtime error results if the application being resized is not enabled, which is the case if that application is displaying a modal dialog box when an **`AppSize`** statement is executed.

AppType (function)

Syntax **AppType** [(*name$*)]

Description Returns an **Integer** indicating the executable file type of the named application:

ebDos	DOS executable
ebWindows	Windows executable

Comments The *name$* parameter is a **String** containing the name of the application. If this parameter is omitted, then the active application is used.

Example This example creates an array of strings containing the names of all the running Windows applications. It uses the AppType command to determine whether an application is a Windows application or a DOS application.

```
Sub Main()
  Dim apps$(),wapps$()
  AppList apps    'Retrieve a list of all Windows and DOS apps.
  If ArrayDims(apps) = 0 Then
    MsgBox "There are no running applications."
    Exit Sub
  End If
  'Create an array to hold only the Windows apps.
  ReDim wapps$(UBound(apps))
  n = 0  'Copy the Windows apps from one array to the target array.
  For i = LBound(apps) to UBound(apps)
    If AppType(apps(i)) = ebWindows Then
      wapps(n) = apps(i)
      n = n + 1
    End If
  Next I
  If n = 0 Then   'Make sure at least one Windows app was found.
    MsgBox "There are no running Windows applications."
    Exit Sub
  End If
  ReDim Preserve wapps(n - 1)  'Resize to hold the exact number.
  'Let the user pick one.
  index% = SelectBox("Windows Applications","Select a Windows application:",wapps)
End Sub
```

See Also **AppFilename$** (function).

Notes: The *name$* parameter is the exact string appearing in the title bar of the named application's main window. If no application is found whose title exactly matches *name$*, then a second search is performed for applications whose title string begins with *name$*. If more than one application is found that matches *name$*, then the first application encountered is used.

ArrayDims (function)

Syntax

ArrayDims(*arrayvariable*)

Description

Returns an **Integer** containing the number of dimensions of a given array.

Comments

This function can be used to determine whether a given array contains any elements or if the array is initially created with no dimensions and then redimensioned by another function, such as the **FileList** function, as shown in the following example.

Example

This example allocates an empty (null-dimensioned) array; fills the array with a list of filenames, which resizes the array; then tests the array dimension and displays an appropriate message.

```
Sub Main()
  Dim f$()
  FileList f$,"c:\*.bat"
  If ArrayDims(f$) = 0 Then
    MsgBox "The array is empty."
  Else
    MsgBox "The array size is: " & (UBound(f$) - UBound(f$) + 1)
  End If
End Sub
```

See Also

LBound (function); **UBound** (function); Arrays (topic).

Arrays (topic)

Declaring Array Variables

Arrays in a Basic Control Engine script are declared using any of the following statements:

```
Dim
Public
Private
```

For example:

```
Dim a(10) As Integer
Public LastNames(1 to 5,-2 to 7) As Variant
Private
```

Arrays of any data type can be created, including **`Integer, Long, Single, Double, Boolean, Date, Variant, Object,`** user-defined structures, and data objects.

The lower and upper bounds of each array dimension must be within the following range:

`-32768 <=` ***bound*** **`<= 32767`**

Arrays can have up to 60 dimensions.

Arrays can be declared as either fixed or dynamic, as described below.

Fixed Arrays

The dimensions of fixed arrays cannot be adjusted at execution time. Once declared, a fixed array will always require the same amount of storage. Fixed arrays can be declared with the **`Dim, Private`**, or **`Public`** statement by supplying explicit dimensions. The following example declares a fixed array of ten strings:

```
Dim a(10) As String
```

Fixed arrays can be used as members of user-defined data types. The following example shows a structure containing fixed-length arrays:

```
Type Foo
  rect(4) As Integer
  colors(10) As Integer
End Type
```

Only fixed arrays can appear within structures.

Dynamic Arrays

Dynamic arrays are declared without explicit dimensions, as shown below:

```
Public Ages() As Integer
```

Dynamic arrays can be resized at execution time using the **`Redim`** statement:

```
Redim Ages$(100)
```

Subsequent to their initial declaration, dynamic arrays can be redimensioned any number of times. When redimensioning an array, the old array is first erased unless you use the **`Preserve`** keyword, as shown below:

```
Redim Preserve Ages$(100)
```

Dynamic arrays cannot be members of user-defined data types.

Passing Arrays

Arrays are always passed by reference.

Querying Arrays

The following table describes the functions used to retrieve information about arrays.

Use this function	to
`LBound`	Retrieve the lower bound of an array. A runtime error is generated if the array has no dimensions.
`UBound`	Retrieve the upper bound of an array. A runtime error is generated if the array has no dimensions.
`ArrayDims`	Retrieve the number of dimensions of an array. This function returns 0 if the array has no dimensions

Operations on Arrays

The following table describes the function that operate on arrays:

Use this command	to
`ArraySort`	Sort an array of integers, longs, singles, doubles, currency, Booleans, dates, or variants.
`FileList`	Fill an array with a list of files in a given directory.
`DiskDrives`	Fill an array with a list of valid drive letters.
`AppList`	Fill an array with a list of running applications.
`SelectBox`	Display the contents of an array in a list box.
`PopupMenu`	Display the contents of an array in a pop-up menu.
`ReadIniSection`	Fill an array with the item names from a section in an ini file.
`FileDirs`	Fill an array with a list of subdirectories.
`Erase`	Erase all the elements of an array.
`ReDim`	Establish the bounds and dimensions of an array.
`Dim`	Declare an array.

ArraySort (statement)

Syntax **`ArraySort`** *array*()

Description Sorts a single-dimensioned array in ascending order.

Comments If a string array is specified, then the routine sorts alphabetically in ascending order using case-sensitive string comparisons. If a numeric array is specified, the **`ArraySort`** statement sorts smaller numbers to the lowest array index locations.

The script generates a runtime error if you specify an array with more than one dimension.

When sorting an array of variants, the following rules apply:

- A runtime error is generated if any element of the array is an object.
- **`String`** is greater than any numeric type.
- **`Null`** is less than **`String`** and all numeric types.
- **`Empty`** is treated as a number with the value 0.
- String comparison is case-sensitive (this function is not affected by the **`Option Compare`** setting).

Example This example dimensions an array and fills it with filenames using FileList, then sorts the array and displays it in a select box.

```
Sub Main()
  Dim f$()
  FileList f$,"c:\*.*"
  ArraySort f$
  r% = SelectBox("Files","Choose one:",f$)
End Sub
```

See Also **`ArrayDims`** (function); **`LBound`** (function); **`UBound`** (function).

Asc (function)

Syntax **`Asc`**(*text$*)

Description Returns an **`Integer`** containing the numeric code for the first character of *text$*.

Comments The return value is an integer between 0 and 255.

Example This example fills an array with the ASCII values of the string s components and displays the result.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  s$ = InputBox("Please enter a string.","Enter String")
  If s$ = "" Then End   'Exit if no string entered.
 msg1 = ""

For i = 1 To Len(s$)
    msg1 = msg1 & Asc(Mid(s$,i,1)) & crlf
  Next i
  MsgBox "The Asc values of the string are:" & msg1
End Sub
```

See Also **`Chr, Chr$`** (functions).

AskBox$ (function)

Syntax **AskBox$**(*prompt$* [,*default$*])

Description Displays a dialog box requesting input from the user and returns that input as a **String.**

Comments The **AskBox$** function takes the following parameters:

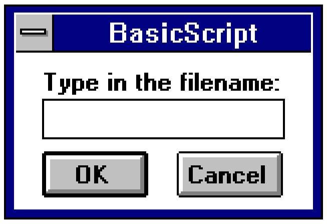
Parameter	Description
prompt$	**String** containing the text to be displayed above the text box. The dialog box is sized to the appropriate width depending on the width of *prompt$*. A runtime error is generated if *prompt$* is **Null**.
default$	**String** containing the initial content of the text box. The user can return the default by immediately selecting OK. A runtime error is generated if *default$* is **Null**.

The **AskBox$** function returns a **String** containing the input typed by the user in the text box. A zero-length string is returned if the user selects Cancel.

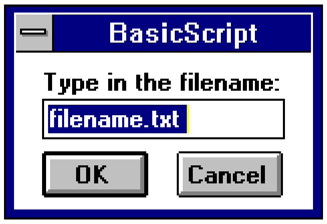
When the dialog box is displayed, the text box has the focus.

The user can type a maximum of 255 characters into the text box displayed by **AskBox$.**

s$ = **AskBox$("**Type in the filename:"**)**



s$ = **AskBox$**("Type in the filename:"**,**"filename.txt"**)**



Example This example asks the user to enter a filename and then displays what he or she has typed.

```
Sub Main()
  s$ = AskBox$("Type in the filename:")
  MsgBox "The filename was: " & s$
End Sub
```

See Also **MsgBox** (statement); **AskPassword$** (function); **InputBox, InputBox$** (functions); **OpenFilename$** (function); **SaveFilename$** (function); **SelectBox** (function).

Notes: The text in the dialog box is displayed in 8-point MS Sans Serif.

AskPassword$ (function)

Syntax **`AskPassword$`**(*prompt$*)

Description Returns a **`String`** containing the text that the user typed.

Comments Unlike the **`AskBox$`** function, the user sees asterisks in place of the characters that are actually typed. This allows the hidden input of passwords.

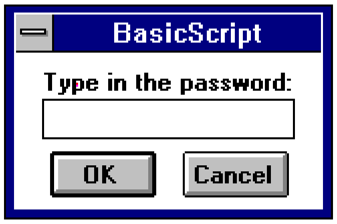
The *prompt$* parameter is a **`String`** containing the text to appear above the text box. The dialog box is sized to the appropriate width depending on the width of *prompt$*.

When the dialog box is displayed, the text box has the focus.

A maximum of 255 characters can be typed into the text box.

A zero-length string is returned if the user selects Cancel.

s$ = **`AskPassword$(`**"Type in the password:"**)**



Example

```
Sub Main()
  s$ = AskPassword$("Type in the password:")
  MsgBox "The password entered is: " & s$
End Sub
```

See Also **`MsgBox`** (statement); **`AskBox$`** (function); **`InputBox, InputBox$`** (functions); **`OpenFilename$`** (function); **`SaveFilename$`** (function); **`SelectBox`** (function); **`AnswerBox`** (function).

Notes: The text in the dialog box is displayed in 8-point MS Sans Serif.

Atn (function)

Syntax **`Atn`**(*number*)

Description Returns the angle (in radians) whose tangent is *number*.

Comments Some helpful conversions:

- Pi (3.1415926536) radians = 180 degrees.
- radian = 57.2957795131 degrees.
- degree = .0174532925 radians.

Example This example finds the angle whose tangent is 1 (45 degrees) and displays the result.

```
Sub Main()
  a# = Atn(1.00)
  MsgBox "1.00 is the tangent of " & a# & " radians (45 degrees)."
End Sub
```

See Also **`Tan`** (function); **`Sin`** (function); **`Cos`** (function).

B

Basic.Capability (method)

Syntax `Basic.Capability`(*which*)

Description Returns **`True`** if the specified capability exists on the current platform; returns **`False`** otherwise.

Comments The *which* parameter is an **`Integer`** specifying the capability for which to test. It can be any of the following values:

Value	Returns True If the Platform Supports
1	Disk drives
2	System file attribute (**`ebSystem`**)
3	Hidden file attribute (**`ebHidden`**)
4	Volume label file attribute (**`ebVolume`**)
5	Archive file attribute (**`ebArchive`**)
6	Denormalized floating-point math
7	File locking (i.e., the **`Lock`** and **`Unlock`** statements)
8	Big endian byte ordering

Example This example tests to see whether your current platform supports disk drives and hidden file attributes and displays the result.

```
Sub Main()
  msg1 = "This operating system "
  If Basic.Capability(1) Then
    msg1 = msg1 & "supports disk drives."
  Else
    msg1 = msg1 & "does not support disk drives."
  End If
  MsgBox msg1
End Sub
```

See Also Cross-Platform Scripting (topic); **`Basic.OS`** (property).

Basic.Eoln$ (property)

Syntax **`Basic.Eoln$`**

Description Returns a **`String`** containing the end-of-line character sequence appropriate to the current platform.

Comments This string will be either a carriage return, a carriage return/line feed, or a line feed.

Example This example writes two lines of text in a message box.

```
Sub Main()
  MsgBox "This is the first line of text." & Basic.Eoln$ & "This is the second
line of text."
End Sub
```

See Also Cross-Platform Scripting (topic); **`Basic.PathSeparator$`** (property).

Basic.FreeMemory (property)

Syntax **`Basic.FreeMemory`**

Description Returns a **`Long`** representing the number of bytes of free memory in the script's data space.

Comments This function returns the size of the largest free block in the script's data space. Before this number is returned, the data space is compacted, consolidating free space into a single contiguous free block.

The script's data space contains strings and dynamic arrays.

Example This example displays free memory in a dialog box.

```
Sub Main()
  MsgBox "The largest free memory block is: " & Basic.FreeMemory
End Sub
```

See Also **`System.TotalMemory`** (property); **`System.FreeMemory`** (property); **`System.FreeResources`** (property); **`Basic.FreeMemory`** (property).

Basic.HomeDir$ (property)

Syntax **`Basic.HomeDir$`**

Description Returns a **`String`** specifying the directory containing the Basic Control Engine scripts.

Comments This method is used to find the directory in which the Basic Control Engine script files are located.

Example This example assigns the home directory to HD and displays it.

```
Sub Main()
  hd$ = Basic.HomeDir$
  MsgBox "The Basic Control Engine home directory is: " & hd$
End Sub
```

See Also **`System.WindowsDirectory$`** (property).

Basic.OS (property)

Syntax `Basic.OS`

Description Returns an **`Integer`** indicating the current platform.

Comments

Value	Constant	Platform
2	**`ebWin32`**	Microsoft Windows 95, Microsoft Windows NT Workstation (Intel, Alpha, MIPS, PowerPC), Microsoft Windows NT Server (Intel, Alpha, MIPS, PowerPC), Microsoft Win32s running under Windows 3.1

The value returned is not necessarily the platform under which the Basic Control Language script is running but rather an indicator of the platform for which the script was created.

Example This example determines the operating system for which this version was created and displays the appropriate message.

```
Sub Main()
  Select Case Basic.OS
    Case ebWin32
      s = "Windows 95 or Windows NT"
    Case Else
      s = "not Windows 95 or Wndows NT"
  End Select
  MsgBox "You are currently running " & s
End Sub
```

See Also Cross-Platform Scripting (topic).

Basic.PathSeparator$ (property)

Syntax `Basic.PathSeparator$`

Description Returns a **`String`** containing the path separator appropriate for the current platform.

Comments The returned string is any one of the following characters: **`/`** (slash), **`\`** (back slash), **`:`** (colon)

Example

```
Sub Main()
  MsgBox "The path separator for this platform is: " & Basic.PathSeparator$
End Sub
```

See Also **`Basic.Eoln$`** (property); Cross-Platform Scripting (topic).

Basic.Version$ (property)

Syntax `Basic.Version$`

Description Returns a **`String`** containing the version of Basic Control Engine.

Comments This function returns the major and minor version numbers in the format *major.minor.BuildNumber,* as in "2.00.30."

Example This example displays the current version of the Basic Control Engine.

```
Sub Main()
  MsgBox "Version " & Basic.Version$ & " of Basic Control Engine is running"
End Sub
```

Beep (statement)

Syntax `Beep`

Description Makes a single system beep.

Example This example causes the system to beep five times and displays a reminder message.

```
Sub Main()
  For i = 1 To 5
    Beep
    Sleep 200
  Next i
  MsgBox "You have an upcoming appointment!"
End Sub
```

Begin Dialog (statement)

Syntax	**`Begin Dialog`** *DialogName* [*x*],[*y*],*width*,*height*,*title$* [,[.*DlgProc*] [,[*PicName$*] [,*style*]]] *Dialog Statements* **`End Dialog`**
Description	Defines a dialog box template for use with the **`Dialog`** statement and function.

Comments

A dialog box template is constructed by placing any of the following statements between the **`Begin Dialog`** and **`End Dialog`** statements (no other statements besides comments can appear within a dialog box template):

`Picture`	**`OptionButton`**	**`OptionGroup`**
`CancelButton`	**`Text`**	**`TextBox`**
`GroupBox`	**`DropListBox`**	**`ListBox`**
`ComboBox`	**`CheckBox`**	**`PictureButton`**
`PushButton`	**`OKButton`**	

The **`Begin Dialog`** statement requires the following parameters:

Parameter	Description
x, *y*	**`Integer`** coordinates specifying the position of the upper left corner of the dialog box relative to the parent window. These coordinates are in dialog units. If either coordinate is unspecified, then the dialog box will be centered in that direction on the parent window.
width, height	**`Integer`** coordinates specifying the width and height of the dialog box (in dialog units).
DialogName	Name of the dialog box template. Once a dialog box template has been created, a variable can be dimensioned using this name.
title$	**`String`** containing the name to appear in the title bar of the dialog box. If this parameter specifies a zero-length string, then the name "Basic Control Engine" is used.
.DlgProc	Name of the dialog function. The routine specified by *.DlgProc* will be called by the script when certain actions occur during processing of the dialog box. (See **`DlgProc [prototype]`** for additional information about dialog functions.) If this omitted, then the script processes the dialog box using the default dialog box processing behavior.
style	Specifies extra styles for the dialog. It can be any of the following values:

Value	Meaning
`0`	Dialog does not contain a title or close box.
`1`	Dialog contains a title and no close box.
`2` (or omitted)	Dialog contains both the title and close box.

The script generates an error if the dialog box template contains no controls.

A dialog box template must have at least one **`PushButton`**, **`OKButton`**, or **`CancelButton`** statement. Otherwise, there will be no way to close the dialog box.

Dialog units are defined as ¼ the width of the font in the horizontal direction and 1/8 the height of the font in the vertical direction.

Any number of user dialog boxes can be created, but each one must be created using a different name as the *DialogName*. Only one user dialog box may be invoked at any time.

Expression Evaluation within the Dialog Box Template

The **`Begin Dialog`** statement creates the template for the dialog box. Any expression or variable name that appears within any of the statements in the dialog box template is not evaluated until a variable is dimensioned of type *DialogName*. The following example shows this behavior:

```
Sub Main()
  MyTitle$ = "Hello, World"
  Begin Dialog MyTemplate 16,32,116,64,MyTitle$
    OKButton 12,40,40,14
  End Dialog
  MyTitle$ = "Sample Dialog"
  Dim dummy As MyTemplate
  rc% = Dialog(dummy)
End Sub
```

The above example creates a dialog box with the title **`"Sample Dialog".`**

Expressions within dialog box templates cannot reference external subroutines or functions.

All controls within a dialog box use the same font. The fonts used for text and text box control can be changed explicitly by setting the font parameters in the **`Text`** and **`TextBox`** statements. A maximum of 128 fonts can be used within a single dialog, although the practical limitation may be less.

Example This example creates an exit dialog box.

```
Sub Main()
  Begin Dialog QuitDialogTemplate 16,32,116,64,"Quit"
    Text 4,8,108,8,"Are you sure you want to exit?"
    CheckBox 32,24,63,8,"Save Changes",.SaveChanges
    OKButton 12,40,40,14
    CancelButton 60,40,40,14
  End Dialog
  Dim QuitDialog As QuitDialogTemplate
  rc% = Dialog(QuitDialog)
  Select Case rc%
    Case -1
      MsgBox "OK was pressed!"
    Case 1
      MsgBox "Cancel was pressed!"
  End Select
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`DlgProc`** (function).

Notes: Within user dialog boxes, the default font is 8-point MS Sans Serif.

Boolean (data type)

Syntax **`Boolean`**

Description A data type capable of representing the logical values **`True`** and **`False.`**

Comments **`Boolean`** variables are used to hold a binary value—either **`True`** or **`False`**. Variables can be declared as **`Boolean`** using the **`Dim`**, **`Public`**, or **`Private`** statement.

Variants can hold **`Boolean`** values when assigned the results of comparisons or the constants **`True`** or **`False`**.

Internally, a **`Boolean`** variable is a 2-byte value holding –1 (for **`True`**) or 0 (for **`False`**).

Any type of data can be assigned to **`Boolean`** variables. When assigning, non-0 values are converted to **`True,`** and 0 values are converted to **`False`**.

When appearing as a structure member, **`Boolean`** members require 2 bytes of storage.

When used within binary or random files, 2 bytes of storage are required.

When passed to external routines, **`Boolean`** values are sign-extended to the size of an integer on that platform (either 16 or 32 bits) before pushing onto the stack.

There is no type-declaration character for **`Boolean`** variables.

`Boolean` variables that have not yet been assigned are given an initial value of **`False`**.

See Also **`Currency`** (data type); **`Date`** (data type); **`Double`** (data type); **`Integer`** (data type); **`Long`** (data type); **`Object`** (data type); **`Single`** (data type); **`String`** (data type); **`Variant`** (data type); **`Def`***Type* (statement); **`CBool`** (function); **`True`** (constant); **`False`** (constant).

ByRef (keyword)

Syntax **`...,ByRef`** *parameter,...*

Description Used within the **`Sub...End Sub, Function...End Function`**, or **`Declare`** statement to specify that a given parameter can be modified by the called routine.

Comments Passing a parameter by reference means that the caller can modify that variable's value.

Unlike the **`ByVal`** keyword, the **`ByRef`** keyword cannot be used when passing a parameter. The absence of the **`ByVal`** keyword is sufficient to force a parameter to be passed by reference:

```
  MySub ByVal I     '<-- Pass i by value.
  MySub ByRef i     '<-- Illegal (will not compile).
  MySub i           '<-- Pass i by reference.
```

Example

```
Sub Test(ByRef a As Variant)
  a = 14
End Sub

Sub Main()
  b = 12
  Test b
  MsgBox "The ByRef value is: " & b     ' <-- Displays 14.
End Sub
```

See Also **`()`** (keyword), **`ByVal`** (keyword).

ByVal (keyword)

Syntax **...ByVal** *parameter...*

Description Forces a parameter to be passed by value rather than by reference.

Comments The **ByVal** keyword can appear before any parameter passed to any function, statement, or method to force that parameter to be passed by value. Passing a parameter by value means that the caller cannot modify that variable's value.

Enclosing a variable within parentheses has the same effect as the **ByVal** keyword:

```
  Foo ByVal i     'Forces i to be passed by value.
  Foo(i)          'Forces i to be passed by value.
```

When calling external statements and functions (that is, routines defined using the **Declare** statement), the **ByVal** keyword forces the parameter to be passed by value regardless of the declaration of that parameter in the **Declare** statement. The following example shows the effect of the **ByVal** keyword used to passed an **Integer** to an external routine:

```
  Declare Sub Foo Lib "MyLib" (ByRef i As Integer)

  i% = 6
  Foo ByVal i%    'Pass a 2-byte Integer.
  Foo i%       'Pass a 4-byte pointer to an Integer.
```

Since the **Foo** routine expects to receive a pointer to an **Integer**, the first call to **Foo** will have unpredictable results.

Example This example demonstrates the use of the ByVal keyword.

```
Sub Foo(a As Integer)
  a = a + 1
End Sub

Sub Main()
  Dim i As Integer
  i = 10
  Foo i
  MsgBox "The ByVal value is: " & i   'Displays 11 (Foo changed the value).
  Foo ByVal i
  MsgBox "The ByVal value is still: " & i    'Displays 11 (Foo did not change the
value).
End Sub
```

See Also **()** (keyword), **ByRef** (keyword).

C

Call (statement)

Syntax `Call` *subroutine_name* [(*arguments*)]

Description Transfers control to the given subroutine, optionally passing the specified arguments.

Comments Using this statement is equivalent to:

subroutine_name [*arguments*]

Use of the `Call` statement is optional. The `Call` statement can only be used to execute subroutines; functions cannot be executed with this statement. The subroutine to which control is transferred by the `Call` statement must be declared outside of the `Main` procedure, as shown in the following example.

Example This example demonstrates the use of the Call statement to pass control to another function.

```
Sub Example_Call(s$)
  'This subroutine is declared externally to Main and displays the text
  'passed in the parameter s$.
  MsgBox "Call: " & s$
End Sub

Sub Main()
  'This example assigns a string variable to display, then calls subroutine
  'Example_Call, passing parameter S$ to be displayed in a message box
  'within the subroutine.
  s$ = "DAVE"
  Example_Call s$
  Call Example_Call("SUSAN")
End Sub
```

See Also `Goto` (statement); `GoSub` (statement); `Declare` (statement).

CancelButton (statement)

Syntax **`CancelButton`** *X*, *Y*, *width*, *height* [,.*Identifier*]

Description Defines a Cancel button that appears within a dialog box template.

Comments This statement can only appear within a dialog box template (i.e., between the **`Begin Dialog`** and **`End Dialog`** statements).

Selecting the Cancel button (or pressing Esc) dismisses the user dialog box, causing the **`Dialog`** function to return **`0`**. (Note: A dialog function can redefine this behavior.) Pressing the Esc key or double-clicking the close box will have no effect if a dialog box does not contain a **`CancelButton`** statement.

The **`CancelButton`** statement requires the following parameters:

Parameter	Description
X, *Y*	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
.Identifier	Optional parameter specifying the name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**). If omitted, then the word **`Cancel`** is used.

A dialog box must contain at least one **`OKButton, CancelButton, or PushButton`** statement; otherwise, the dialog box cannot be dismissed.

Example This example creates a sample dialog box with OK and Cancel buttons.

```
Sub Main()
  Begin Dialog QuitDialogTemplate 16,32,116,64,"Quit"
    Text 4,8,108,8,"Are you sure you want to exit?"
    CheckBox 32,24,63,8,"Save Changes",.SaveChanges
    OKButton 12,40,40,14
    CancelButton 60,40,40,14
  End Dialog
  Dim QuitDialog As QuitDialogTemplate
  rc% = Dialog(QuitDialog)
  Select Case rc%
    Case -1
      MsgBox "OK was pressed!"
    Case 1
      MsgBox "Cancel was pressed!"
  End Select
End Sub
```

See Also **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

CBool (function)

Syntax **`CBool`**(*expression*)

Description Converts *expression* to **`True`** or **`False`**, returning a **`Boolean`** value.

Comments The *expression* parameter is any expression that can be converted to a **`Boolean`**. A runtime error is generated if *expression* is **`Null`**.

All numeric data types are convertible to **`Boolean`**. If *expression* is zero, then the **`CBool`** returns **`False`**; otherwise, **`CBool`** returns **`True`**. **`Empty`** is treated as **`False`**.

If *expression* is a **`String`**, then **`CBool`** first attempts to convert it to a number, then converts the number to a **`Boolean`**. A runtime error is generated if *expression* cannot be converted to a number.

A runtime error is generated if *expression* cannot be converted to a **`Boolean`**.

Example This example uses CBool to determine whether a string is numeric or just plain text.

```
Sub Main()
  Dim IsNumericOrDate As Boolean
  s$ = 34224.54
  IsNumeric = CBool(IsNumeric(s$))
  If IsNumeric = True Then
    MsgBox s$ & “ is either a valid number!”
  Else
    MsgBox s$ & “ is not a valid number!”
  End If
End Sub
```

See Also **`CCur`** (function); **`CDate, CVDate`** (functions); **`CDbl`** (function); **`CInt`** (function); **`CLng`** (function); **`CSng`** (function); **`CStr`** (function); **`CVar`** (function); **`CVErr`** (function); **`Boolean`** (data type).

CCur (function)

Syntax	**`CCur`**(*expression*)
Description	Converts any expression to a **`Currency`**.
Comments	This function accepts any expression convertible to a **`Currency`**, including strings. A runtime error is generated if *expression* is **`Null`** or a **`String`** not convertible to a number. **`Empty`** is treated as 0.

When passed a numeric expression, this function has the same effect as assigning the numeric expression *number* to a **`Currency`**.

When used with variants, this function guarantees that the variant will be assigned a **`Currency`** (**`VarType`** 6).

Example This example displays the value of a String converted into a Currency value.

```
Sub Main()
  i$ = "100.44"
  MsgBox "The currency value is: " & CCur(i$)
End Sub
```

See Also **`CBool`** (function); **`CDate, CVDate`** (functions); **`CDbl`** (function); **`CInt`** (function); **`CLng`** (function); **`CSng`** (function); **`CStr`** (function); **`CVar`** (function); **`CVErr`** (function); **`Currency`** (data type).

CDate, CVDate (functions)

Syntax

`CDate`(*expression*)

`CVDate`(*expression*)

Description

Converts *expression* to a date, returning a **`Date`** value.

Comments

The *expression* parameter is any expression that can be converted to a **`Date`**. A runtime error is generated if *expression* is **`Null`**.

If *expression* is a **`String`**, an attempt is made to convert it to a **`Date`** using the current country settings. If *expression* does not represent a valid date, then an attempt is made to convert *expression* to a number. A runtime error is generated if *expression* cannot be represented as a date.

These functions are sensitive to the date and time formats of your computer.

The **`CDate`** and **`CVDate`** functions are identical.

Example

This example takes two dates and computes the difference between them.

```
Sub Main()

  Dim date1 As Date
  Dim date2 As Date
  Dim diff As Date

  date1 = CDate(#1/1/1994#)
  date2 = CDate("February 1, 1994")
  diff = DateDiff("d",date1,date2)

  MsgBox "The date difference is " & CInt(diff) & " days."
End Sub
```

See Also

`CCur` (function); **`CBool`** (function); **`CDbl`** (function); **`CInt`** (function); **`CLng`** (function); **`CSng`** (function); **`CStr`** (function); **`CVar`** (function); **`CVErr`** (function); **`Date`** (data type).

CDbl (function)

Syntax **`CDbl`**(*expression*)

Description Converts any expression to a **`Double`**.

Comments This function accepts any expression convertible to a **`Double`**, including strings. A runtime error is generated if *expression* is **`Null`**. **`Empty`** is treated as **`0.0`**.

When passed a numeric expression, this function has the same effect as assigning the numeric expression *number* to a **`Double`**.

When used with variants, this function guarantees that the variant will be assigned a **`Double`** (**`VarType 5`**).

Example This example displays the result of two numbers as a Double.

```
Sub Main()
  i% = 100
  j! = 123.44
  MsgBox "The double value is: " & CDbl(i% * j!)
End Sub
```

See Also **`CCur`** (function); **`CBool`** (function); **`CDate, CVDate`** (functions); **`CInt`** (function); **`CLng`** (function); **`CSng`** (function); **`CStr`** (function); **`CVar`** (function); **`CVErr`** (function); **`Double`** (data type).

ChDir (statement)

Syntax **`ChDir`** *newdir$*

Description Changes the current directory of the specified drive to *newdir$.*

This routine will not change the current drive. (See **`ChDrive`** [statement].)

Example This example saves the current directory, then changes to the root directory, displays the old and new directories, restores the old directory, and displays it.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  save$ = CurDir$
  ChDir(Basic.PathSeparator$)
  MsgBox "Old directory: " & save$ & crlf & "New directory: " & CurDir$
  ChDir(save$)
  MsgBox "Directory restored to: " & CurDir$
End Sub
```

See Also **`ChDrive`** (statement); **`CurDir, CurDir$`** (functions); **`Dir, Dir$`** (functions); **`MkDir`** (statement); **`RmDir`** (statement); **`DirList`** (statement).

ChDrive (statement)

Syntax `ChDrive` *DriveLetter$*

Description Changes the default drive to the specified drive.

Comments Only the first character of *DriveLetter$* is used.

DriveLetter$ is not case-sensitive.

If *DriveLetter$ is* empty, then the current drive is not changed.

Example This example allows the user to select a new current drive and uses ChDrive to make their choice the new current drive.

```
Const crlf$ = Chr$(13) + Chr$(10)

Sub Main()
  Dim d()
  old$ = FileParse$(CurDir,1)
  DiskDrives d
Again:
  r = SelectBox("Available Drives","Select new current drive:",d)
  On Error Goto Error_Trap
  If r <> -1 Then ChDrive d®
  MsgBox "Old Current Drive: " & old$ & crlf & "New Current Drive: " & CurDir
  End
Error_Trap:
  MsgBox Error(err)
  Resume Again
End Sub
```

See Also **`ChDir`** (statement); **`CurDir, CurDir$`** (functions); **`Dir, Dir$`** (functions); **`MkDir`** (statement); **`RmDir`** (statement); **`DiskDrives`** (statement).

CheckBox (statement)

Syntax **CheckBox** *X*, *Y*, *width*, *height*, *title$*, *.Identifier*

Description Defines a check box within a dialog box template.

Comments Check box controls are either on or off, depending on the value of *.Identifier*.

This statement can only appear within a dialog box template (i.e., between the **Begin Dialog** and **End Dialog** statements).

The **CheckBox** statement requires the following parameters:

Parameter	Description
X, *Y*	**Integer** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**Integer** coordinates specifying the dimensions of the control in dialog units.
title$	**String** containing the text that appears within the check box. This text may contain an ampersand character to denote an accelerator letter, such as **"&Font"** for **Font** (indicating that the Font control may be selected by pressing the F accelerator key).
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **DlgFocus** and **DlgEnable**). This parameter also creates an integer variable whose value corresponds to the state of the check box (1 = checked; 0 = unchecked). This variable can be accessed using the syntax: *DialogVariable.Identifier*.

When the dialog box is first created, the value referenced by *.Identifier* is used to set the initial state of the check box. When the dialog box is dismissed, the final state of the check box is placed into this variable. By default, the *.Identifier* variable contains 0, meaning that the check box is unchecked.

Example This example displays a dialog box with two check boxes in different states.

```
Sub Main()
  Begin Dialog SaveOptionsTemplate 36,32,151,52,"Save"
    GroupBox 4,4,84,40,"GroupBox"
    CheckBox 12,16,67,8,"Include heading",.IncludeHeading
    CheckBox 12,28,73,8,"Expand keywords",.ExpandKeywords
    OKButton 104,8,40,14,.OK
    CancelButton 104,28,40,14,.Cancel
  End Dialog
  Dim SaveOptions As SaveOptionsTemplate
  SaveOptions.IncludeHeading = 1    'Check box initially on.
  SaveOptions.ExpandKeywords = 0    'Check box initially off.
  r% = Dialog(SaveOptions)
  If r% = -1 Then
    MsgBox "OK was pressed."
  End If
End Sub
```

See Also **CancelButton** (statement); **Dialog** (function); **Dialog** (statement); **DropListBox** (statement); **GroupBox** (statement); **ListBox** (statement); **OKButton** (statement); **OptionButton** (statement); **OptionGroup** (statement); **Picture** (statement); **PushButton** (statement); **Text** (statement); **TextBox** (statement); **Begin Dialog** (statement), **PictureButton** (statement).

Notes: Accelerators are underlined, and the accelerator combination Alt+*letter* is used.

Choose (function)

Syntax `Choose`(*index*,*expression1*,*expression2*,...,*expression13*)

Description Returns the expression at the specified index position.

Comments The *index* parameter specifies which expression is to be returned. If *index* is 1, then *expression1* is returned; if *index* is 2, then *expression2* is returned, and so on. If index is less than 1 or greater than the number of supplied expressions, then `Null` is returned.

The `Choose` function returns the expression without converting its type. Each expression is evaluated before returning the selected one.

Example This example assigns a variable of indeterminate type to a.

```
Sub Main()
  Dim a As Variant
  Dim c As Integer
  c% = 2
  a = Choose(c%,"Hello, world",#1/1/94#,5.5,False)
  MsgBox "Item " & c% & " is '" & a & "'"    'Displays the date passed as parameter 2.
End Sub
```

See Also `Switch` (function); `IIf` (function); `If...Then...Else` (statement); `Select...Case` (statement).

Chr, Chr$ (functions)

Syntax **`Chr[$]`** (*Code*)

Description Returns the character whose value is *Code*.

Comments *Code* must be an **`Integer`** between 0 and 255.

`Chr$` returns a string, whereas **`Chr`** returns a **`String`** variant.

The **`Chr$`** function can be used within constant declarations, as in the following example:

```
Const crlf = Chr$(13) + Chr$(10)
```

Some common uses of this function are:

```
Chr$(9)              Tab
Chr$(13) + Chr$(10)    End-of-line (carriage return, linefeed)
Chr$(26)            End-of-file
Chr$(0)              Null
```

Example

```
Sub Main()
  'Concatenates carriage return (13) and linefeed (10) to CRLF$,
  'then displays a multiple-line message using CRLF$ to separate lines.
  crlf$ = Chr$(13) + Chr$(10)
  MsgBox "First line." & crlf$ & "Second line."
  'Fills an array with the ASCII characters for ABC and displays their
  'corresponding characters.
  Dim a%(2)
  For i = 0 To 2
    a%(i) = (65 + i)
  Next i
  MsgBox "The first three elements of the array are: " & Chr$(a%(0)) & Chr$(a%(1))
& Chr$(a%(2))
End Sub
```

See Also **`Asc`** (function); **`Str, Str$`** (functions).

CInt (function)

Syntax **`CInt`**(*expression*)

Description Converts *expression* to an **`Integer`**.

Comments This function accepts any expression convertible to an **`Integer`**, including strings. A runtime error is generated if *expression* is **`Null`**. **`Empty`** is treated as **`0`**.

The passed numeric expression must be within the valid range for integers:

–32768 <= ***expression*** **<= 32767**

A runtime error results if the passed expression is not within the above range.

When passed a numeric expression, this function has the same effect as assigning a numeric expression to an **`Integer`**. Note that integer variables are rounded before conversion.

When used with variants, this function guarantees that the expression is converted to an **`Integer`** variant (**`VarType`** 2).

Example This example demonstrates the various results of integer manipulation with CInt.

```
Sub Main()
  '(1) Assigns i# to 100.55 and displays its integer representation (101).
  i# = 100.55
  MsgBox "The value of CInt(i) = " & CInt(i#)

  '(2) Sets j# to 100.22 and displays the CInt representation (100).
  j# = 100.22
  MsgBox "The value of CInt(j) = " & CInt(j#)

  '(3) Assigns k% (integer) to the CInt sum of j# and k% and displays k% '(201).
  k% = CInt(i# + j#)
   MsgBox "The integer sum of 100.55 and 100.22 is: " & k%

  '(4) Reassigns i# to 50.35 and recalculates k%, then displays the result
  '(note rounding).

  i# = 50.35
  k% = CInt(i# + j#)
  MsgBox "The integer sum of 50.35 and 100.22 is: " & k%
End Sub
```

See Also **`CCur`** (function); **`CBool`** (function); **`CDate, CVDate`** (functions); **`CDbl`** (function); **`CLng`** (function); **`CSng`** (function); **`CStr`** (function); **`CVar`** (function); **`CVErr`** (function); **`Integer`** (data type).

Clipboard$ (function)

Syntax
`Clipboard$[()]`

Description
Returns a `String` containing the contents of the Clipboard.

Comments
If the Clipboard doesn't contain text or the Clipboard is empty, then a zero-length string is returned.

Example
This example puts text on the Clipboard, displays it, clears the Clipboard, and displays the Clipboard again.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Clipboard$ "Hello out there!"
  MsgBox "The text in the Clipboard is:" & crlf & Clipboard$
  Clipboard.Clear
  MsgBox "The text in the Clipboard is:" & crlf & Clipboard$
End Sub
```

See Also
`Clipboard$` (statement); `Clipboard.GetText` (method); `Clipboard.SetText` (method).

Clipboard$ (statement)

Syntax
`Clipboard$` *NewContent$*

Description
Copies *NewContent$* into the Clipboard.

Example
This example puts text on the Clipboard, displays it, clears the Clipboard, and displays the Clipboard again.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Clipboard$ "Hello out there!"
  MsgBox "The text in the Clipboard is:" & crlf & Clipboard$
  Clipboard.Clear
  MsgBox "The text in the Clipboard is now:" & crlf & Clipboard$
End Sub
```

See Also
`Clipboard$` (function); `Clipboard.GetText` (method); `Clipboard.SetText` (method).

Clipboard.Clear (method)

Syntax `Clipboard.Clear`

Description This method clears the Clipboard by removing any content.

Example This example puts text on the Clipboard, displays it, clears the Clipboard, and displays the Clipboard again.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Clipboard$ "Hello out there!"
  MsgBox "The text in the Clipboard before clearing:" & crlf & Clipboard$
  Clipboard.Clear
  MsgBox "The text in the Clipboard after clearing:" & crlf & Clipboard$
End Sub
```

Clipboard.GetFormat (method)

Syntax *WhichFormat* = `Clipboard.GetFormat`(*format*)

Description Returns `True` if data of the specified format is available in the Clipboard; returns `False` otherwise.

Comments This method is used to determine whether the data in the Clipboard is of a particular format. The *format* parameter is an `Integer` representing the format to be queried:

Format	Description
1	Text
2	Bitmap
3	Metafile
8	Device-independent bitmap (DIB)
9	Color palette

Example This example checks to see whether there is any text on the Clipboard, if so, it searches the text for a string matching what the user entered.

```
Option Compare Text

Sub Main()
  r$ = InputBox("Enter a word to search for:","Scan Clipboard")

  If Clipboard.GetFormat(1) Then
    If Instr(Clipboard.GetText(1),r) = 0 Then
      MsgBox """" & r & """" & " was not found in the clipboard."
    Else
      MsgBox """" & r & """" & " is definitely in the clipboard."
    End If
  Else
    MsgBox "The Clipboard does not contain any text."
  End If
End Sub
```

See Also `Clipboard$` (function); `Clipboard$` (statement).

Clipboard.GetText (method)

Syntax *text$* = **`Clipboard.GetText`**([*format*])

Description Returns the text contained in the Clipboard.

Comments The *format* parameter, if specified, must be **`1`**.

Example This example checks to see whether there is any text on the Clipboard, if so, it searches the text for a string matching what the user entered.

```
Option Compare Text

Sub Main()
  r$ = InputBox("Enter a word to search for:","Scan Clipboard")

  If Clipboard.GetFormat(1) Then
    If Instr(Clipboard.GetText(1),r) = 0 Then
      MsgBox """" & r & """" & " was not found in the clipboard."
    Else
      MsgBox """" & r & """" & " is definitely in the clipboard."
    End If
  Else
    MsgBox "The Clipboard does not contain any text."
  End If
End Sub
```

See Also **`Clipboard$`** (statement); **`Clipboard$`** (function); **`Clipboard.SetText`** (method).

Clipboard.SetText (method)

Syntax **`Clipboard.SetText`** *data$* [,*format*]

Description Copies the specified text string to the Clipboard.

Comments The *data$* parameter specifies the text to be copied to the Clipboard. The *format* parameter, if specified, must be **`1`**.

Example This example gets the contents of the Clipboard and uppercases it.

```
Sub Main()
  If Not Clipboard.GetFormat(1) Then Exit Sub
  Clipboard.SetText UCase(Clipboard.GetText(1)),1
End Sub
```

See Also **`Clipboard$`** (statement); **`Clipboard.GetText`** (method); **`Clipboard$`** (function).

CLng (function)

Syntax **`CLng`**(*expression*)

Description Converts *expression* to a **`Long`**.

Comments This function accepts any expression convertible to a **`Long`**, including strings. A runtime error is generated if *expression* is **`Null`**. **`Empty`** is treated as **`0`**.

The passed expression must be within the following range:

`–2147483648 <=` ***expression*** **`<= 2147483647`**

A runtime error results if the passed expression is not within the above range.

When passed a numeric expression, this function has the same effect as assigning the numeric expression to a **`Long`**. Note that long variables are rounded before conversion.

When used with variants, this function guarantees that the expression is converted to a **`Long`** variant (**`VarType 3`**).

Example This example displays the results for various conversions of i and j (note rounding).

```
Sub Main()
  i% = 100
  j& = 123.666
  MsgBox "The result of i * j is: " & CLng(i% * j&)    'Displays 12367.
  MsgBox "The new variant type of i is: " & Vartype(CLng(i%))
End Sub
```

See Also **`CCur`** (function); **`CBool`** (function); **`CDate, CVDate`** (functions); **`CDbl`** (function); **`CInt`** (function); **`CSng`** (function); **`CStr`** (function); **`CVar`** (function); **`CVErr`** (function); **`Long`** (data type).

Close (statement)

Syntax **`Close`** [[#] *filenumber* [,[#] *filenumber*]...]

Description Closes the specified files.

Comments If no arguments are specified, then all files are closed.

Example This example opens four files and closes them in various combinations.

```
Sub Main()
  Open "test1" For Output As #1
  Open "test2" For Output As #2
  Open "test3" For Random As #3
  Open "test4" For Binary As #4
  MsgBox "The next available file number is: " & FreeFile()
  Close #1        'Closes file 1 only.
  Close #2,#3      'Closes files 2 and 3.
  Close            'Closes all remaining files(4).
  MsgBox "The next available file number is: " & FreeFile()
End Sub
```

See Also **`Open`** (statement); **`Reset`** (statement); **`End`** (statement).

ComboBox (statement)

Syntax **`ComboBox`** *X,Y,width,height,ArrayVariable,.Identifier*

Description This statement defines a combo box within a dialog box template.

Comments When the dialog box is invoked, the combo box will be filled with the elements from the specified array variable.

This statement can only appear within a dialog box template (i.e., between the **`Begin Dialog`** and **`End Dialog`** statements).

The **`ComboBox`** statement requires the following parameters:

Parameter	Description
X, Y	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, height	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
ArrayVariable	Single-dimensioned array used to initialize the elements of the combo box. If this array has no dimensions, then the combo box will be initialized with no elements. A runtime error results if the specified array contains more than one dimension. *ArrayVariable* can specify an array of any fundamental data type (structures are not allowed). **`Null`** and **`Empty`** values are treated as zero-length strings.
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**). This parameter also creates a string variable whose value corresponds to the content of the edit field of the combo box. This variable can be accessed using the syntax: *DialogVariable.Identifier*.

When the dialog box is invoked, the elements from *ArrayVariable* are placed into the combo box. The *.Identifier* variable defines the initial content of the edit field of the combo box. When the dialog box is dismissed, the *.Identifier* variable is updated to contain the current value of the edit field.

Example This example creates a dialog box that allows the user to select a day of the week.

```
Sub Main()
  Dim days$(6)
  days$(0) = "Monday"
  days$(1) = "Tuesday"
  days$(2) = "Wednesday"
  days$(3) = "Thursday"
  days$(4) = "Friday"
  days$(5) = "Saturday"
  days$(6) = "Sunday"

  Begin Dialog DaysDialogTemplate 16,32,124,96,"Days"
    OKButton 76,8,40,14,.OK
    Text 8,10,39,8,"&Weekdays:"
    ComboBox 8,20,60,72,days$,.Days
  End Dialog
  Dim DaysDialog As DaysDialogTemplate
  DaysDialog.Days = Format(Now,"dddd")  'Set to today.
  r% = Dialog(DaysDialog)
  MsgBox "You selected: " & DaysDialog.Days
End Sub
```

See Also **CancelButton** (statement); **CheckBox** (statement); **Dialog** (function); **Dialog** (statement); **DropListBox** (statement); **GroupBox** (statement); **ListBox** (statement); **OKButton** (statement); **OptionButton** (statement); **OptionGroup** (statement); **Picture** (statement); **PushButton** (statement); **Text** (statement); **TextBox** (statement); **Begin Dialog** (statement), **PictureButton** (statement).

Command, Command$ (functions)

Syntax **Command[$][()]**

Description Returns the argument from the command line used to start the application.

Comments **Command$** returns a string, whereas **Command** returns a **String** variant.

Example This example checks to see if any command line parameters were used. If parameters were used they are displayed and a check is made to see if the user used the "/s" switch.

```
Sub Main()
  cmd$ = Command

  If cmd$ <> "" Then
    If (InStr(cmd$,"/s")) <> 0 Then
      MsgBox "Safety Mode On!"
    Else
      MsgBox "Safety Mode Off!"
    End If
    MsgBox "The command line startup options were: " & cmd$
  Else
    MsgBox "No command line startup options were used!"
  End If
End Sub
```

See Also **Environ, Environ$** (functions).

Comments (topic)

Comments can be added to Basic Control Engine script code in the following manner:

All text between a single quotation mark and the end of the line is ignored:

```
  MsgBox "Hello"      'Displays a message box.
```

The **REM** statement causes the compiler to ignore the entire line:

```
  REM This is a comment.
```

The Basic Control Engine supports C-style multiline comment blocks **/*...*/**, as shown in the following example:

```
  MsgBox "Before comment"
  /* This stuff is all commented out.
  This line, too, will be ignored.
  This is the last line of the comment. */
  MsgBox "After comment"
```

C-style comments can be nested.

Comparison Operators (topic)

Syntax *expression1* **`[< | > | <= | >= | <> | =]`** *expression2*

Description Comparison operators return **`True`** or **`False`** depending on the operator.

Comments The comparison operators are listed in the following table:

Operator	Returns True If
`>`	*expression1* is greater than *expression2*
`<`	*expression1* is less than *expression2*
`<=`	*expression1* is less than or equal to *expression2*
`>=`	expression1 is greater than or equal to *expression2*
`<>`	*expression1* is not equal to *expression2*
`=`	*expression1* is equal to *expression2*

This operator behaves differently depending on the types of the expressions, as shown in the following table:

If one expression is	and the other expression is	then
Numeric	Numeric	A numeric comparison is performed (see below).
`String`	**`String`**	A string comparison is performed (see below).
`Numeric`	**`String`**	A compile error is generated.
`Variant`	**`String`**	A string comparison is performed (see below).
`Variant`	Numeric	A variant comparison is performed (see below).
`Null` variant	Any data type	Returns **`Null`**.
`Variant`	**`Variant`**	A variant comparison is performed (see below).

String Comparisons

If the two expressions are strings, then the operator performs a text comparison between the two string expressions, returning **`True`** if *expression1* is less than *expression2*. The text comparison is case-sensitive if **`Option Compare`** is **`Binary`**; otherwise, the comparison is case-insensitive.

When comparing letters with regard to case, lowercase characters in a string sort greater than uppercase characters, so a comparison of "a" and "A" would indicate that "a" is greater than "A".

Numeric Comparisons

When comparing two numeric expressions, the less precise expression is converted to be the same type as the more precise expression.

Dates are compared as doubles. This may produce unexpected results as it is possible to have two dates that, when viewed as text, display as the same date when, in fact, they are different. This can be seen in the following example:

```
Sub Main()
  Dim date1 As Date
  Dim date2 As Date

  date1 = Now
  date2 = date1 + 0.000001  'Adds a fraction of a second.

  MsgBox date2 = date1    'Prints False (the dates are different).
  MsgBox date1 & "," & date2    'Prints two dates that are the same.
End Sub
```

Variant Comparisons

When comparing variants, the actual operation performed is determined at execution time according to the following table:

If one variant is	and the other variant is	then
Numeric	Numeric	The variants are compared as numbers.
`String`	`String`	The variants are compared as text.
Numeric	`String`	The number is less than the string.
`Null`	Any other data type	`Null`.
Numeric	`Empty`	The number is compared with 0.
`String`	`Empty`	The string is compared with a zero-length string.

Example

```
Sub Main()

  'Tests two literals and displays the result.
  If 5 < 2 Then
    MsgBox "5 is less than 2."
  Else
    MsgBox "5 is not less than 2."
  End If

  'Tests two strings and displays the result.
  If "This" < "That" Then
    MsgBox "'This' is less than 'That'."
  Else
    MsgBox "'That' is less than 'This'."
  End If
End Sub
```

See Also Operator Precedence (topic); **`Is`** (operator); **`Like`** (operator); **`Option Compare`** (statement).

Const (statement)

Syntax `Const` *name* **`[As type]`** = *expression* [,*name* [**`As`** *type*] = *expression*]...

Description Declares a constant for use within the current script.

Comments The *name* is only valid within the current Basic Control Engine script. Constant names must follow these rules:

1. Must begin with a letter.
2. May contain only letters, digits, and the underscore character.
3. Must not exceed 80 characters in length.
4. Cannot be a reserved word.

Constant names are not case-sensitive.

The *expression* must be assembled from literals or other constants. Calls to functions are not allowed except calls to the **`Chr$`** function, as shown below:

```
Const s$ = "Hello, there" + Chr(44)
```

Constants can be given an explicit type by declaring the *name* with a type-declaration character, as shown below:

```
Const a% = 5            'Constant Integer whose value is 5
Const b# = 5            'Constant Double whose value is 5.0
Const c$ = "5"          'Constant String whose value is "5"
Const d! = 5            'Constant Single whose value is 5.0
Const e& = 5            'Constant Long whose value is 5
```

The type can also be given by specifying the **`As`** *type* clause:

```
Const a As Integer = 5    'Constant Integer whose value is 5
Const b As Double = 5      'Constant Double whose value is 5.0
Const c As String = "5"    'Constant String whose value is "5"
Const d As Single = 5      'Constant Single whose value is 5.0
Const e As Long = 5      'Constant Long whose value is 5
```

You cannot specify both a type-declaration character and the *type*:

```
Const a% As Integer = 5    'THIS IS ILLEGAL.
```

If an explicit type is not given, then the Basic Control Engine script will choose the most imprecise type that completely represents the data, as shown below:

```
Const a = 5            'Integer constant
Const b = 5.5            'Single constant
Const c = 5.5E200        'Double constant
```

Constants defined within a **`Sub`** or **`Function`** are local to that subroutine or function. Constants defined outside of all subroutines and function can be used anywhere within that script. The following example demonstrates the scoping of constants:

```
Const DefFile = "default.txt"

Sub Test1
  Const DefFile = "foobar.txt"
  MsgBox DefFile      'Displays "foobar.txt".
End Sub

Sub Test2
  MsgBox DefFile      'Displays "default.txt".
End Sub
```

Example

This example displays the declared constants in a dialog box (crlf produces a new line in the dialog box).

```
Const crlf = Chr$(13) + Chr$(10)
Const greeting As String = "Hello, "
Const question1 As String = "How are you today?"

Sub Main()
  r = InputBox("Please enter your name","Enter Name")
  MsgBox greeting & r & crlf & crlf & question1
End Sub
```

See Also

`Def`*Type* (statement); **`Let`** (statement); **`=`** (statement); **`Constants`** (topic).

Constants (topic)

Constants are variables that cannot change value during script execution. The following constants are predefined by the Basic Control Engine:

`True`	**`False`**	**`Empty`**
`Pi`	**`ebRightButton`**	**`ebLeftButton`**
`ebPortrait`	**`ebLandscape`**	**`ebDOS`**
`ebWindows`	**`ebMaximized`**	**`ebMinimized`**
`ebRestored`	**`ebNormal`**	**`ebReadOnly`**
`ebHidden`	**`ebSystem`**	**`ebVolume`**
`ebDirectory`	**`ebArchive`**	**`ebNone`**
`ebOKOnly`	**`ebOKCancel`**	**`ebAbortRetryIgnore`**
`ebYesNoCancel`	**`ebYesNo`**	**`ebRetryCancel`**
`ebCritical`	**`ebQuestion`**	**`ebExclamation`**
`ebInformation`	**`ebApplicationModal`**	**`ebDefaultButton1`**
`ebDefaultButton2`	**`ebDefaultButton3`**	**`ebSystemModal`**
`ebOK`	**`ebCancel`**	**`ebAbort`**
`ebRetry`	**`ebIgnore`**	**`ebYes`**
`ebNo`	**`ebWin16`**	**`ebWin32`**
`ebDOS16`	**`ebSunOS`**	**`ebSolaris`**
`ebHPUX`	**`ebUltrix`**	**`ebIrix`**
`ebAIX`	**`ebNetWare`**	**`ebMacintosh`**
`ebOS2`	**`ebEmpty`**	**`ebNull`**
`ebInteger`	**`ebLong`**	**`ebSingle`**
`ebDouble`	**`ebDate`**	**`ebBoolean`**
`ebObject`	**`ebDataObject`**	**`ebVariant`**
`ebDOS32`	**`ebCurrency`**	

You can define your own constants using the Const statement.

Cos (function)

Syntax **`Cos`**(*angle*)

Description Returns a **`Double`** representing the cosine of *angle*.

Comments The *angle* parameter is a **`Double`** specifying an angle in radians.

Example This example assigns the cosine of pi/4 radians (45 degrees) to C# and displays its value.

```
Sub Main()
  c# = Cos(3.14159 / 4)
  MsgBox "The cosine of 45 degrees is: " & c#
End Sub
```

See Also **`Tan`** (function); **`Sin`** (function); **`Atn`** (function).

CreateObject (function)

Syntax **`CreateObject`**(*class$*)

Description Creates an OLE automation object and returns a reference to that object.

Comments The *class$* parameter specifies the application used to create the object and the type of object being created. It uses the following syntax:

"*application.class*",

where *application* is the application used to create the object and *class* is the type of the object to create.

At runtime, **`CreateObject`** looks for the given application and runs that application if found. Once the object is created, its properties and methods can be accessed using the dot syntax (e.g., *object.property* = *value*).

There may be a slight delay when an automation server is loaded (this depends on the speed with which a server can be loaded from disk). This delay is reduced if an instance of the automation server is already loaded.

Examples This first example instantiates Microsoft Excel. It then uses the resulting object to make Excel visible and then close Excel.

```
Sub Main()
  Dim Excel As Object

  On Error GoTo Trap1                               'Set error trap.
  Set Excel = CreateObject("excel.application")  'Instantiate object.
  Excel.Visible = True                            'Make Excel visible.
  Sleep 5000                                        'Wait 5 seconds.
  Excel.Quit                                           'Close Excel.
  Exit Sub                                    'Exit before error trap.

Trap1:
  MsgBox "Can't create Excel object."      'Display error message.
  Exit Sub                                     'Reset error handler.
End Sub
```

This second example uses CreateObject to instantiate a Visio object. It then uses the resulting object to create a new document.

```
Sub Main()
  Dim Visio As Object
  Dim doc As Object
  Dim page As Object
  Dim shape As Object

  On Error Goto NO_VISIO
  Set Visio = CreateObject("visio.application")  'Create Visio object.
  On Error Goto 0

  Set doc = Visio.Documents.Add("")          'Create a new document.
  Set page = doc.Pages(1)                            'Get first page.
  Set shape = page.DrawRectangle(1,1,4,4)      'Create a new shape.
  shape.text = "Hello, world."            'Set text within shape.
  End
NO_VISIO:
  MsgBox "'Visio' cannot be found!",ebExclamation
End Sub
```

See Also **`GetObject`** (function); **`Object`** (data type).

CSng (function)

Syntax **`CSng`**(*expression*)

Description Converts *expression* to a **`Single`**.

Comments This function accepts any expression convertible to a **`Single`**, including strings. A runtime error is generated if *expression* is **`Null`**. **`Empty`** is treated as **`0.0`**.

A runtime error results if the passed expression is not within the valid range for **`Single`**.

When passed a numeric expression, this function has the same effect as assigning the numeric expression to a **`Single`**.

When used with variants, this function guarantees that the expression is converted to a **`Single`** variant (**`VarType 4`**).

Example This example displays the value of a String converted to a Single.

```
Sub Main()
  s$ = "100"
  MsgBox "The single value is: " & CSng(s$)
End Sub
```

See Also **`CCur`** (function); **`CBool`** (function); **`CDate, CVDate`** (functions); **`CDbl`** (function); **`CInt`** (function); **`CLng`** (function); **`CStr`** (function); **`CVar`** (function); **`CVErr`** (function); **`Single`** (data type).

CStr (function)

Syntax **CStr**(*expression*)

Description Converts *expression* to a **String**.

Comments Unlike **Str$** or **Str**, the string returned by **CStr** will not contain a leading space if the expression is positive. Further, the **CStr** function correctly recognizes thousands and decimal separators for your locale.

Different data types are converted to **String** in accordance with the following rules:

Data Type	CStr Returns
Any numeric type	A string containing the number without the leading space for positive values.
Date	A string converted to a date using the short date format.
Boolean	A string containing either "True" or "False".
Null variant	A runtime error.
Empty variant	A zero-length string.

Example This example displays the value of a Double converted to a String.

```
Sub Main()
  s# = 123.456
  MsgBox "The string value is: " & CStr(s#)
End Sub
```

See Also **CCur** (function); **CBool** (function); **CDate, CVDate** (functions); **CDbl** (function); **CInt** (function); **CLng** (function); **CSng** (function); **CVar** (function); **CVErr** (function); **String** (data type); **Str, Str$** (functions).

CurDir, CurDir$ (functions)

Syntax **`CurDir[$]`**[(*drive$*)]

Description Returns the current directory on the specified drive. If no *drive$* is specified or *drive$* is zero-length, then the current directory on the current drive is returned.

Comments **`CurDir$`** returns a **`String`**, whereas **`CurDir`** returns a **`String`** variant.

The script generates a runtime error if *drive$* is invalid.

Example This example saves the current directory, changes to the next higher directory, and displays the change; then restores the original directory and displays the change. Note: The dot designators will not work with all platforms.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  save$ = CurDir
  ChDir ("..")
  MsgBox "Old directory: " & save$ & crlf & "New directory: " & CurDir
  ChDir (save$)
  MsgBox "Directory restored to: " & CurDir
End Sub
```

See Also **`ChDir`** (statement); **`ChDrive`** (statement); **`Dir, Dir$`** (functions); **`MkDir`** (statement); **`RmDir`** (statement).

Currency (data type)

Syntax **`Currency`**

Description A data type used to declare variables capable of holding fixed-point numbers with 15 digits to the left of the decimal point and 4 digits to the right.

Comments **`Currency`** variables are used to hold numbers within the following range:

`–922,337,203,685,477.5808 <=` ***currency*** **`<= 922,337,203,685,477.5807`**

Due to their accuracy, **`Currency`** variables are useful within calculations involving money.

The type-declaration character for **`Currency`** is **`@`**.

Storage

Internally, currency values are 8-byte integers scaled by 10000. Thus, when appearing within a structure, currency values require 8 bytes of storage. When used with binary or random files, 8 bytes of storage are required.

See Also **`Date`** (data type); **`Double`** (data type); **`Integer`** (data type); **`Long`** (data type); **`Object`** (data type); **`Single`** (data type); **`String`** (data type); **`Variant`** (data type); **`Boolean`** (data type); **`Def`***Type* (statement); **`CCur`** (function).

CVar (function)

Syntax **`CVar`**(*expression*)

Description Converts *expression* to a **`Variant`**.

Comments This function is used to convert an expression into a variant. Use of this function is not necessary (except for code documentation purposes) because assignment to variant variables automatically performs the necessary conversion:

```
Sub Main()
  Dim v As Variant
  v = 4 & "th"      'Assigns "4th" to v.
  MsgBox "You came in: " & v
  v = CVar(4 & "th")    'Assigns "4th" to v.
  MsgBox "You came in: " & v
End Sub
```

Example This example converts an expression into a Variant.

```
Sub Main()
  Dim s As String
  Dim a As Variant
  s = CStr("The quick brown fox ")
  msg1 = CVar(s & "jumped over the lazy dog.")
  MsgBox msg1
End Sub
```

See Also **`CCur`** (function); **`CBool`** (function); **`CDate, CVDate`** (functions); **`CDbl`** (function); **`CInt`** (function); **`CLng`** (function); **`CSng`** (function); **`CStr`** (function); **`CVErr`** (function); **`Variant`** (data type).

CVErr (function)

Syntax **`CVErr`**(*expression*)

Description Converts *expression* to an error.

Comments This function is used to convert an expression into a user-defined error number.

A runtime error is generated under the following conditions:

If *expression* is **`Null`**.

If *expression* is a number outside the legal range for errors, which is as follows:

`0 <=` ***expression*** **`<= 65535`**

If *expression* is **`Boolean`**.

If *expression* is a **`String`** that can't be converted to a number within the legal range.

`Empty` is treated as 0.

Example This example simulates a user-defined error and displays the error number.

```
Sub Main()
  MsgBox "The error is: " & CStr(CVErr(2046))
End Sub
```

See Also **`CCur`** (function); **`CBool`** (function); **`CDate, CVDate`** (functions); **`CDbl`** (function); **`CInt`** (function); **`CLng`** (function); **`CSng`** (function); **`CStr`** (function); **`CVar`** (function), **`IsError`** (function).

D

Date (data type)

Syntax **`Date`**

Description A data type capable of holding date and time values.

Comments **`Date`** variables are used to hold dates within the following range:

`January 1, 100 00:00:00 <=` ***date*** **`<= December 31, 9999 23:59:59`**

`–6574340 <=` ***date*** **`<= 2958465.99998843`**

Internally, dates are stored as 8-byte IEEE double values. The integer part holds the number of days since December 31, 1899, and the fractional part holds the number of seconds as a fraction of the day. For example, the number 32874.5 represents January 1, 1990 at 12:00:00.

When appearing within a structure, dates require 8 bytes of storage. Similarly, when used with binary or random files, 8 bytes of storage are required.

There is no type-declaration character for **`Date`**.

`Date` variables that haven't been assigned are given an initial value of 0 (i.e., December 31, 1899).

Date Literals

Literal dates are specified using number signs, as shown below:

```
Dim d As Date
d = #January 1, 1990#
```

The interpretation of the date string (i.e., **`January 1, 1990`** in the above example) occurs at runtime, using the current country settings. This is a problem when interpreting dates such as 1/2/1990. If the date format is M/D/Y, then this date is January 2, 1990. If the date format is D/M/Y, then this date is February 1, 1990. To remove any ambiguity when interpreting dates, use the universal date format:

date_variable = #*YY*/*MM*/*DD* *HH*:*MM*:*SS*#

The following example specifies the date June 3, 1965 using the universal date format:

```
Dim d As Date
d = #1965/6/3 10:23:45#
```

See Also **`Currency`** (data type); **`Double`** (data type); **`Integer`** (data type); **`Long`** (data type); **`Object`** (data type); **`Single`** (data type); **`String`** (data type); **`Variant`** (data type); **`Boolean`** (data type); **`Def`***Type* (statement); **`CDate, CVDate`** (functions).

Date, Date$ (functions)

Syntax **Date[$]**[()]

Description Returns the current system date.

Comments The **Date$** function returns the date using the short date format. The **Date** function returns the date as a **Date** variant.

Use the **Date/Date$** statements to set the system date.

The date is returned using the current short date format (defined by the operating system).

Important

The **Date$** function does not properly support international formats. Use the **Date** function instead.

Example This example saves the current date to **TheDate$,** then changes the date and displays the result. It then changes the date back to the saved date and displays the restored date.

```
' When run with non-US Regional or International settings,
' the two message boxes may display different dates.
' One set of International Date Formats which shows this is:
'    Short Date Format:  dd.M.yy (ex: 02.01.97 for 2 January 1997)
'    Long Date Format:   ddddd, dd M, yyyy (Thursday, 02 January 1997)
Sub Main()
   ' Save the current date
   TheDate$ = Date

' Set the date to one that may confuse the library functions
   ' (month and day < 12)
   Date = "01/02/97"                     ' 1 Feb 1997
   MsgBox(Format$ (Date$, "dddddd"))   ' This may show 2 Jan
   MsgBox(Format$ (Date, "dddddd"))   ' This may show 1 Feb

   ' Restore the date
   Date = TheDate$
End Sub
```

See Also **CDate, CVDate** (functions); **Time, Time$** (functions); **Date, Date$** (statements); **Now** (function); **Format, Format$** (functions); **DateSerial** (function); **DateValue** (function).

Date, Date$ (statements)

Syntax **`Date[$]`** = *newdate*

Description Sets the system date to the specified date.

Comments The **`Date$`** statement requires a string variable using one of the following formats:

MM-DD-YYYY
MM-DD-YY
MM/*DD*/*YYYY*
MM/*DD*/*YY*,

where *MM* is a two-digit month between 1 and 31, *DD* is a two-digit day between 1 and 31, and *YYYY* is a four-digit year between 1/1/100 and 12/31/9999.

The **`Date`** statement converts any expression to a date, including string and numeric values. Unlike the **`Date$`** statement, **`Date`** recognizes many different date formats, including abbreviated and full month names and a variety of ordering options. If *newdate* contains a time component, it is accepted, but the time is not changed. An error occurs if *newdate* cannot be interpreted as a valid date.

Example This example saves the current date to Cdate$, then changes the date and displays the result. It then changes the date back to the saved date and displays the result.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  TheDate$ = Date
  Date = "01/01/95"
  MsgBox "Saved date is: " & TheDate$ & crlf & "Changed date is: " & Date
  Date = TheDate$
  MsgBox "Restored date to: " & TheDate$
End Sub
```

See Also **`Date, Date$`** (functions); **`Time, Time$`** (statements).

Platform Notes If you do not have permission to change the date, runtime error 70 will be generated.

DateAdd (function)

Syntax **`DateAdd`**(*interval$, increment&, date*)

Description Returns a **`Date`** variant representing the sum of *date* and a specified number (*increment*) of time intervals (*interval$*).

Comments This function adds a specified number (*increment*) of time intervals (*interval$*) to the specified date (*date*). The following table describes the parameters to the **`DateAdd`** function:

Parameter	Description
interval$	**`String`** expression indicating the time interval used in the addition.
increment	**`Integer`** indicating the number of time intervals you wish to add. Positive values result in dates in the future; negative values result in dates in the past.
date	Any expression convertible to a **`Date`**.

The *interval$* parameter specifies what unit of time is to be added to the given date. It can be any of the following:

Time	Interval
`"y"`	Day of the year
`"yyyy"`	Year
`"d"`	Day
`"m"`	Month
`"q"`	Quarter
`"ww"`	Week
`"h"`	Hour
`"n"`	Minute
`"s"`	Second
`"w"`	Weekday

To add days to a date, you may use either day, day of the year, or weekday, as they are all equivalent ("**`d`**", "**`y`**", "**`w`**").

The **`DateAdd`** function will never return an invalid date/time expression. The following example adds two months to December 31, 1992:

```
s# = DateAdd("m",2,"December 31,1992")
```

In this example, **`s`** is returned as the double-precision number equal to "**`February 28, 1993`**", not "**`February 31, 1993`**".

A runtime error is generated if you try to subtract a time interval that is larger than the time value of the date.

Example

This example gets today's date using the Date$ function; adds three years, two months, one week, and two days to it; and then displays the result in a dialog box.

```
Sub Main()
  Dim sdate$
  sdate$ = Date$
  NewDate# = DateAdd("yyyy",4,sdate$)
  NewDate# = DateAdd("m",3,NewDate#)
  NewDate# = DateAdd("ww",2,NewDate#)
  NewDate# = DateAdd("d",1,NewDate#)
  s$ = "Four years, three months, two weeks, and one day from now will be: "
  s$ = s$ & Format(NewDate#,"long date")
  MsgBox s$
End Sub
```

See Also

`DateDiff` (function).

DateDiff (function)

Syntax **`DateDiff`**(*interval$*,*date1*,*date2*)

Description Returns a **`Date`** variant representing the number of given time intervals between *date1* and *date2*.

Comments The following table describes the parameters:

Parameter	**Description**
interval$	**`String`** expression indicating the specific time interval you wish to find the difference between.
date1	Any expression convertible to a **`Date`**. An example of a valid date/time string would be "**`January 1, 1994`**".
date2	Any expression convertible to a **`Date`**. An example of a valid date/time string would be "**`January 1, 1994`**".

The following table lists the valid time interval strings and the meanings of each. The **`Format$`** function uses the same expressions.

Time	**Interval**
`"y"`	Day of the year
`"yyyy"`	Year
`"d"`	Day
`"m"`	Month
`"q"`	Quarter
`"ww"`	Week
`"h"`	Hour
`"n"`	Minute
`"s"`	Second
`"w"`	Weekday

To find the number of days between two dates, you may use either day or day of the year, as they are both equivalent **`("d", "y").`**

The time interval weekday ("**`w`**") will return the number of weekdays occurring between *date1* and *date2*, counting the first occurrence but not the last. However, if the time interval is week ("**`ww`**"), the function will return the number of calendar weeks between *date1* and *date2*, counting the number of Sundays. If *date1* falls on a Sunday, then that day is counted, but if *date2* falls on a Sunday, it is not counted.

The **`DateDiff`** function will return a negative date/time value if *date1* is a date later in time than *date2*.

Example This example gets today's date and adds ten days to it. It then calculates the difference between the two dates in days and weeks and displays the result.

```
Sub Main()
  today$ = Format(Date$,"Short Date")
  NextWeek = Format(DateAdd("d",14,today$),"Short Date")
  DifDays# = DateDiff("d",today$,NextWeek)
  DifWeek# = DateDiff("w",today$,NextWeek)
  s$ = "The difference between " & today$ & " and " & NextWeek
  s$ = s$ & " is: " & DifDays# & " days or " & DifWeek# & " weeks"
  MsgBox s$
End Sub
```

See Also **`DateAdd`** (function).

DatePart (function)

Syntax **`DatePart`**(*interval$*,*date*)

Description Returns an **`Integer`** representing a specific part of a date/time expression.

Comments The **`DatePart`** function decomposes the specified date and returns a given date/time element. The following table describes the parameters:

Parameter	Description
interval$	**`String`** expression that indicates the specific time interval you wish to identify within the given date.
date	Any expression convertible to a **`Date`**. An example of a valid date/time string would be "**`January 1, 1995`**".

The following table lists the valid time interval strings and the meanings of each. The **`Format$`** function uses the same expressions.

Time	Interval
`"y"`	Day of the year
`"yyyy"`	Year
`"d"`	Day
`"m"`	Month
`"q"`	Quarter
`"ww"`	Week
`"h"`	Hour
`"n"`	Minute
`"s"`	Second
`"w"`	Weekday

The weekday expression starts with Sunday as 1 and ends with Saturday as 7.

Example This example displays the parts of the current date.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  today$ = Date$
  qt = DatePart("q",today$)
  yr = DatePart("yyyy",today$)
  mo = DatePart("m",today$)
  wk = DatePart("ww",today$)
  da = DatePart("d",today$)
  s$ = "The current date is:" & crlf & crlf
  s$ = s$ & "Quarter     : " & qt & crlf
  s$ = s$ & "Year   : " & yr & crlf
  s$ = s$ & "Month    : " & mo & crlf
  s$ = s$ & "Week   : " & wk & crlf
  s$ = s$ & "Day    : " & da & crlf
  MsgBox s$
End Sub
```

See Also **`Day`** (function); **`Minute`** (function); **`Second`** (function); **`Month`** (function); **`Year`** (function); **`Hour`** (function); **`Weekday`** (function), **`Format`** (function).

DateSerial (function)

Syntax **`DateSerial`**(*year*,*month*,*day*)

Description Returns a **`Date`** variant representing the specified date.

Comments The **`DateSerial`** function takes the following parameters:

Parameter	Description
year	**`Integer`** between 100 and 9999
month	**`Integer`** between 1 and 12
day	**`Integer`** between 1 and 31

Example This example converts a date to a real number representing the serial date in days since December 30, 1899 (which is day 0).

```
Sub Main()
  tdate# = DateSerial(1993,08,22)
  MsgBox "The DateSerial value for August 22, 1993, is: " & tdate#
End Sub
```

See Also **`DateValue`** (function); **`TimeSerial`** (function); **`TimeValue`** (function); **`CDate, CVDate`** (functions).

DateValue (function)

Syntax **`DateValue`***(date_string$)*

Description Returns a Date variant representing the date contained in the specified string argument.

Example This example returns the day of the month for today's date.

```
Sub Main()
  tdate$ = Date$
  tday$ = DateValue(tdate$)
  MsgBox "The date value of " & tdate$ & " is: " & tday$
End Sub
```

See Also **`TimeSerial`** (function); **`TimeValue`** (function); **`DateSerial`** (function).

Platform(s) All.

Day (function)

Syntax **`Day`**(*date*)

Description Returns the day of the month specified by date.

Comments The value returned is an **`Integer`** between 0 and 31 inclusive.

The *date* parameter is any expression that converts to a **`Date`**.

Example This example gets the current date and then displays it.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  CurDate = Now()
  MsgBox "Today is day " & Day(CurDate) & " of the month." & crlf &  "Tomorrow is
day " & Day(CurDate + 1) & "."
End Sub
```

See Also **`Minute`** (function); **`Second`** (function); **`Month`** (function); **`Year`** (function); **`Hour`** (function); **`Weekday`** (function); **`DatePart`** (function).

DDB (function)

Syntax **DDB**(*Cost, Salvage, Life, Period*)

Description Calculates the depreciation of an asset for a specified *Period* of time using the double-declining balance method.

Comments The double-declining balance method calculates the depreciation of an asset at an accelerated rate. The depreciation is at its highest in the first period and becomes progressively lower in each additional period. **DDB** uses the following formula to calculate the depreciation:

DDB = ((*Cost* – *Total_depreciation_from_all_other_periods*) * 2) / *Life*

The **DDB** function uses the following parameters:

Parameter	Description
Cost	**Double** representing the initial cost of the asset
Salvage	**Double** representing the estimated value of the asset at the end of its predicted useful life
Life	**Double** representing the predicted length of the asset's useful life
Period	**Double** representing the period for which you wish to calculate the depreciation

Life and *Period* must be expressed using the same units. For example, if *Life* is expressed in months, then *Period* must also be expressed in months.

Example This example calculates the depreciation for capital equipment that cost $10,000, has a service life of ten years, and is worth $2,000 as scrap. The dialog box displays the depreciation for each of the first four years.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  s$ = "Depreciation Table" & crlf & crlf
  For yy = 1 To 4
    CurDep# = DDB(10000.0,2000.0,10,yy)
    s$ = s$ & "Year " & yy & " : " & CurDep# & crlf
  Next yy
  MsgBox s$
End Sub
```

See Also **Sln** (function); **SYD** (function).

DDEExecute (statement)

Syntax **`DDEExecute`** *channel, command$*

Description Executes a command in another application.

Comments The **`DDEExecute`** statement takes the following parameters:

Parameter	Description
channel	**`Integer`** containing the DDE channel number returned from **`DDEInitiate`**. An error will result if *channel* is invalid.
command$	**`String`** containing the command to be executed. The format of *command$* depends on the receiving application.

If the receiving application does not execute the instructions, a runtime error is generated.

Example This example sets and retrieves a cell in an Excel spreadsheet. The command strings being created contain Microsoft Excel macro commands and may be concatenated and sent as one string to speed things up.

```
Sub Main()
  Dim cmd,q,ch%
  q = Chr(34)' Define quotation marks.

  id = Shell("c:\excel5\excel.exe",3) 'Start Excel.
  ch% = DDEInitiate("Excel","Sheet1")

  On Error Resume Next
  cmd = "[ACTIVATE(" & q &"SHEET1" & q & ")]"  'Activate worksheet.
  DDEExecute ch%,cmd

  DDEPoke ch%,"R1C1","$1000.00"     'Send value to cell.
  'Retrieve value and display.
  MsgBox "The value of Row 1, Cell 1 is: " & DDERequest(ch%,"R1C1")

  DDETerminate ch%
  Msgbox "Finished..."
End Sub
```

See Also **`DDEInitiate`** (function); **`DDEPoke`** (statement); **`DDERequest, DDERequest$`** (functions); **`DDESend`** (function); **`DDETerminate`** (statement); **`DDETerminateAll`** (statement); **`DDETimeout`** (statement).

DDEInitiate (function)

Syntax **`DDEInitiate`**(*application$*, *topic$*)

Description Initializes a DDE link to another application and returns a unique number subsequently used to refer to the open DDE channel.

Comments The **`DDEInitiate`** statement takes the following parameters:

Parameter	Description
application$	**`String`** containing the name of the application (the server) with which a DDE conversation will be established.
topic$	**`String`** containing the name of the topic for the conversation. The possible values for this parameter are described in the documentation for the server application.

This function returns 0 if the link cannot be established. This will occur under any of the following circumstances:

- The specified application is not running.
- The topic was invalid for that application.
- Memory or system resources are insufficient to establish the DDE link.

Example This example sets and retrieves a cell in an Excel spreadsheet.

```
Sub Main()
  Dim cmd,q,ch%
  q = Chr(34) ' Define quotation marks.

  id = Shell("c:\excel5\excel.exe",3) 'Start Excel.
  ch% = DDEInitiate("Excel","Sheet1")

  On Error Resume Next
  cmd = "[ACTIVATE(" & q &"SHEET1" & q & ")]"  'Activate worksheet.
  DDEExecute ch%,cmd

  DDEPoke ch%,"R1C1","$1000.00"     'Send value to cell.
  'Retrieve value and display.
  MsgBox "The value of Row 1, Cell 1 is: " & DDERequest(ch%,"R1C1")

  DDETerminate ch%
  Msgbox "Finished..."
End Sub
```

See Also **`DDEExecute`** (statement); **`DDEPoke`** (statement); **`DDERequest, DDERequest$`** (functions); **`DDESend`** (function); **`DDETerminate`** (statement); **`DDETerminateAll`** (statement); **`DDETimeout`** (statement).

DDEPoke (statement)

Syntax **`DDEPoke`** *channel, DataItem, value*

Description Sets the value of a data item in the receiving application associated with an open DDE link.

Comments The **`DDEPoke`** statement takes the following parameters:

Parameter	Description
channel	**`Integer`** containing the DDE channel number returned from **`DDEInitiate`**. An error will result if *channel* is invalid.
DataItem	Data item to be set. This parameter can be any expression convertible to a **`String`**. The format depends on the server.
value	The new value for the data item. This parameter can be any expression convertible to a **`String`**. The format depends on the server. A runtime error is generated if *value* is **`Null`**.

Example This example sets and retrieves a cell in an Excel spreadsheet.

```
Sub Main()
  Dim cmd,q,ch%
  q = Chr(34)' Define quotation marks.

  id = Shell("c:\excel5\excel.exe",3) 'Start Excel.
  ch% = DDEInitiate("Excel","Sheet1")

  On Error Resume Next
  cmd = "[ACTIVATE(" & q &"SHEET1" & q & ")]"  'Activate worksheet.
  DDEExecute ch%,cmd

  DDEPoke ch%,"R1C1","$1000.00"     'Send value to cell.
  'Retrieve value and display.
  MsgBox "The value of Row 1, Cell 1 is: " & DDERequest(ch%,"R1C1")

  DDETerminate ch%
  Msgbox "Finished..."
End Sub
```

See Also **`DDEExecute`** (statement); **`DDEInitiate`** (function); **`DDERequest, DDERequest$`** (functions); **`DDESend`** (function); **`DDETerminate`** (statement); **`DDETerminateAll`** (statement); **`DDETimeout`** (statement).

DDERequest, DDERequest$ (functions)

Syntax **`DDERequest`**[$](*channel*,*DataItem$*)

Description Returns the value of the given data item in the receiving application associated with the open DDE channel.

Comments **`DDERequest$`** returns a **`String`**, whereas **`DDERequest`** returns a **`String`** variant.

The **`DDERequest/DDERequest$`** functions take the following parameters:

Parameter	Description
channel	**`Integer`** containing the DDE channel number returned from **`DDEInitiate`**. An error will result if *channel* is invalid.
DataItem$	**`String`** containing the name of the data item to request. The format for this parameter depends on the server.

The format for the returned value depends on the server.

Example This example sets and retrieves a cell in an Excel spreadsheet.

```
Sub Main()
  Dim cmd,q,ch%
  q = Chr(34)' Define quotation marks.

  id = Shell("c:\excel5\excel.exe",3) 'Start Excel.
  ch% = DDEInitiate("Excel","Sheet1")

  On Error Resume Next
  cmd = "[ACTIVATE(" & q &"SHEET1" & q & ")]"  'Activate worksheet.
  DDEExecute ch%,cmd

  DDEPoke ch%,"R1C1","$1000.00"     'Send value to cell.
  'Retrieve value and display.
  MsgBox "The value of Row 1, Cell 1 is: " & DDERequest(ch%,"R1C1")

  DDETerminate ch%
  Msgbox "Finished..."
End Sub
```

See Also **`DDEExecute`** (statement); **`DDEInitiate`** (function); **`DDEPoke`** (statement); **`DDESend`** (function); **`DDETerminate`** (statement); **`DDETerminateAll`** (statement); **`DDETimeout`** (statement).

DDESend (statement)

Syntax **`DDESend`** *application$, topic$, DataItem, value*

Description Initiates a DDE conversation with the server as specified by *application$* and *topic$* and sends that server a new value for the specified item.

Comments The **`DDESend`** statement takes the following parameters:

Parameter	Description
application$	**`String`** containing the name of the application (the server) with which a DDE conversation will be established.
topic$	**`String`** containing the name of the topic for the conversation. The possible values for this parameter are described in the documentation for the server application.
DataItem	Data item to be set. This parameter can be any expression convertible to a **`String`**. The format depends on the server.
value	New value for the data item. This parameter can be any expression convertible to a **`String`**. The format depends on the server. A runtime error is generated if *value* is **`Null`**.

The **`DDESend`** statement performs the equivalent of the following statements:

```
  ch% = DDEInitiate(application$,topic$)
  DDEPoke ch%,item,data
  DDETerminate ch%
```

Example This example sets the content of the first cell in an Excel spreadsheet.

```
Sub Main()
  Dim cmd,ch%
  id = Shell("c:\excel5\excel.exe",3) 'Start Excel.

  On Error Goto ExcelError
  DDESend "Excel","Sheet1","R1C1","Payroll For August 1995"
  Msgbox "Finished..."
  Exit Sub

ExcelError:
  MsgBox "Error sending data to Excel."
  Exit Sub 'Reset error handler.
End Sub
```

See Also **`DDEExecute`** (statement); **`DDEInitiate`** (function); **`DDEPoke`** (statement); **`DDERequest, DDERequest$`** (functions); **`DDETerminate`** (statement); **`DDETerminateAll`** (statement); **`DDETimeout`** (statement).

DDETerminate (statement)

Syntax **`DDETerminate`** *channel*

Description Closes the specified DDE channel.

Comments The *channel* parameter is an **`Integer`** containing the DDE channel number returned from **`DDEInitiate`**. An error will result if *channel* is invalid.

All open DDE channels are automatically terminated when the script ends.

Example This example sets and retrieves a cell in an Excel spreadsheet.

```
Sub Main()
  Dim cmd,q,ch%
  q = Chr(34)' Define quotation marks.

  id = Shell("c:\excel5\excel.exe",3) 'Start Excel.
  ch% = DDEInitiate("Excel","Sheet1")

  On Error Resume Next
  cmd = "[ACTIVATE(" & q &"SHEET1" & q & ")]"  'Activate worksheet.
  DDEExecute ch%,cmd

  DDEPoke ch%,"R1C1","$1000.00"     'Send value to cell.
  'Retrieve value and display.
  MsgBox "The value of Row 1, Cell 1 is: " & DDERequest(ch%,"R1C1")

  DDETerminate ch%
  Msgbox "Finished..."
End Sub
```

See Also **`DDEExecute`** (statement); **`DDEInitiate`** (function); **`DDEPoke`** (statement); **`DDERequest, DDERequest$`** (functions); **`DDESend`** (function); **`DDETerminateAll`** (statement); **`DDETimeout`** (statement).

DDETerminateAll (statement)

Syntax `DDETerminateAll`

Description Closes all open DDE channels.

Comments All open DDE channels are automatically terminated when the script ends.

Example This example sets and retrieves a cell in an Excel spreadsheet.

```
Sub Main()
  Dim cmd,q,ch%
  q = Chr(34)' Define quotation marks.

  id = Shell("c:\excel5\excel.exe",3) 'Start Excel.
  ch% = DDEInitiate("Excel","Sheet1")

  On Error Resume Next
  cmd = "[ACTIVATE(" & q &"SHEET1" & q & ")]"  'Activate worksheet.
  DDEExecute ch%,cmd

  DDEPoke ch%,"R1C1","$1000.00"     'Send value to cell.
  'Retrieve value and display.
  MsgBox "The value of Row 1, Cell 1 is: " & DDERequest(ch%,"R1C1")

  DDETerminateAll
  Msgbox "Finished..."
End Sub
```

See Also **`DDEExecute`** (statement); **`DDEInitiate`** (function); **`DDEPoke`** (statement); **`DDERequest, DDERequest$`** (functions); **`DDESend`** (function); **`DDETerminate`** (statement); **`DDETimeout`** (statement).

DDETimeout (statement)

Syntax `DDETimeout` *milliseconds*

Description Sets the number of milliseconds that must elapse before any DDE command times out.

Comments The *milliseconds* parameter is a **`Long`** and must be within the following range:

0 <= *milliseconds* <= 2,147,483,647

The default is 10,000 (10 seconds).

Example This example sets and retrieves a cell in an Excel spreadsheet. The timeout has been set to wait 2 seconds for Excel to respond before timing out.

```
Sub Main()
  Dim cmd,q,ch%
  q = Chr(34)' Define quotation marks.

  id = Shell("c:\excel5\excel.exe",3) 'Start Excel.
  ch% = DDEInitiate("Excel","Sheet1")
  DDETimeout 2000   'Wait 2 seconds for Excel to respond

  On Error Resume Next
  cmd = "[ACTIVATE(" & q &"SHEET1" & q & ")]"  'Activate worksheet.
  DDEExecute ch%,cmd

  DDEPoke ch%,"R1C1","$1000.00"     'Send value to cell.
  'Retrieve value and display.
  MsgBox "The value of Row 1, Cell 1 is: " & DDERequest(ch%,"R1C1")

  DDETerminate ch%
  Msgbox "Finished..."
End Sub
```

See Also **`DDEExecute`** (statement); **`DDEInitiate`** (function); **`DDEPoke`** (statement); **`DDERequest, DDERequest$`** (functions); **`DDESend`** (function); **`DDETerminate`** (statement); **`DDETerminateAll`** (statement).

Declare (statement)

Syntax **`Declare {Sub | Function}`** *name*[*TypeChar*] **`[CDecl | Pascal | System | StdCall]`** _
`[Lib "`*LibName$***`" [Alias "`***AliasName$***`"]] [([`***ParameterList***`])] [As`** *type***`]`**

Where *ParameterList* is a comma-separated list of the following (up to 30 parameters are allowed):

`[Optional] [ByVal | ByRef]` *ParameterName*[()] [As *ParameterType*]

Description Creates a prototype for either an external routine or a Basic Control Engine routine that occurs later in the source module or in another source module.

Comments **`Declare`** statements must appear outside of any **`Sub`** or **`Function`** declaration.

`Declare` statements are only valid during the life of the script in which they appear.

The **`Declare`** statement uses the following parameters:

Parameter	Description
name	Any valid script name. When you declare functions, you can include a type-declaration character to indicate the return type. This name is specified as a normal script keyword—i.e., it does not appear within quotes.
TypeChar	An optional type-declaration character used when defining the type of data returned from functions. It can be any of the following characters: **#**, **!**, **$**, **@**, **%**, or **&**. For external functions, the **@** character is not allowed. Type-declaration characters can only appear with function declarations, and take the place of the **`As`** *type* clause. **Note: `Currency`** data cannot be returned from external functions. Thus, the **@** type-declaration character cannot be used when declaring external functions.
`CDecl`	Optional keyword indicating that the external subroutine or function uses the C calling convention. With C routines, arguments are pushed right to left on the stack and the caller performs stack cleanup.
`Pascal`	Optional keyword indicating that this external subroutine or function uses the Pascal calling convention. With Pascal routines, arguments are pushed left to right on the stack and the called function performs stack cleanup.
`System`	Optional keyword indicating that the external subroutine or function uses the System calling convention. With System routines, arguments are pushed right to left on the stack, the caller performs stack cleanup, and the number of arguments is specified in the **`AL`** register.
`StdCall`	Optional keyword indicating that the external subroutine or function uses the StdCall calling convention. With StdCall routines, arguments are pushed right to left on the stack and the called function performs stack cleanup.
LibName$	Must be specified if the routine is external. This parameter specifies the name of the library or code resource containing the external routine and must appear within quotes. The *LibName$* parameter can include an optional path specifying the exact location of the library or code resource..

AliasName$	Alias name that must be given to provide the name of the routine if the *name* parameter is not the routine's real name. For example, the following two statements declare the same routine:

```
Declare Function GetCurrentTime Lib "user" () As Integer

Declare Function GetTime Lib "user" Alias "GetCurrentTime" _
  As Integer
```

Use an alias when the name of an external routine conflicts with the name of an internal routine or when the external routine name contains invalid characters.

The *AliasName$* parameter must appear within quotes.

type Indicates the return type for functions.

For external functions, the valid return types are: **`Integer`**, **`Long`**, **`String`**, **`Single`**, **`Double`**, **`Date`**, **`Boolean`**, and data objects.

Note: `Currency`, **`Variant`**, fixed-length strings, arrays, user-defined types, and OLE automation objects cannot be returned by external functions.

`Optional` Keyword indicating that the parameter is optional. All optional parameters must be of type **`Variant`**. Furthermore, all parameters that follow the first optional parameter must also be optional.

If this keyword is omitted, then the parameter being defined is required when calling this subroutine or function.

`ByVal` Optional keyword indicating that the caller will pass the parameter by value. Parameters passed by value cannot be changed by the called routine.

`ByRef` Optional keyword indicating that the caller will pass the parameter by reference. Parameters passed by reference can be changed by the called routine. If neither **`ByVal`** or **`ByRef`** are specified, then **`ByRef`** is assumed.

ParameterName Name of the parameter, which must follow the script's naming conventions:

1. Must start with a letter.
2. May contain letters, digits, and the underscore character (_). Punctuation and type-declaration characters are not allowed. The exclamation point (**`!`**) can appear within the name as long as it is not the last character, in which case it is interpreted as a type-declaration character.
3. Must not exceed 80 characters in length.

Additionally, *ParameterName* can end with an optional type-declaration character specifying the type of that parameter (that is, any of the following characters: **`%`**, **`&`**, **`!`**, **`#`**, **`@`**).

`()` Indicates that the parameter is an array.

ParameterType Specifies the type of the parameter (e.g., **`Integer`**, **`String`**, **`Variant`**, and so on). The **`As`** *ParameterType* clause should only be included if *ParameterName* does not contain a type-declaration character.

In addition to the default data types, *ParameterType* can specify any user-defined structure, data object, or OLE automation object. If the data type of the parameter is not known in advance, then the **`Any`** keyword can be used. This forces the compiler to relax type checking, allowing any data type to be passed in place of the given argument.

```
Declare Sub Convert Lib "mylib" (a As Any)
```

The **`Any`** data type can only be used when passing parameters to external routines.

Passing Parameters

By default, arguments are passed by reference. Many external routines require a value rather than a reference to a value. The **`ByVal`** keyword does this. For example, this C routine

```
  void MessageBeep(int);
```

would be declared as follows:

```
  Declare Sub MessageBeep Lib "user" (ByVal n As Integer)
```

As an example of passing parameters by reference, consider the following C routine which requires a pointer to an integer as the third parameter:

```
  int SystemParametersInfo(int,int,int *,int);
```

This routine would be declared as follows (notice the **`ByRef`** keyword in the third parameter):

```
Declare Function SystemParametersInfo Lib "user" (ByVal action As Integer,_
    ByVal uParam As Integer,ByRef pInfo As Integer,_
    ByVal updateINI As Integer) As Integer
```

Strings can be passed by reference or by value. When they are passed by reference, a pointer to the internal handle to the string is passed. When they are passed by value, the script passes a 32-bit pointer to a null-terminated string (that is., a C string). If an external routine modifies a passed string variable, then there must be sufficient space within the string to hold the returned characters. This can be accomplished using the **`Space`** function, as shown in the following example:

```
Declare Sub GetWindowsDirectory Lib "kernel" (ByVal dirname$,ByVal length%)
     :
  Dim s As String
  s = Space(128)
  GetWindowsDirectory s,128
```

Another alternative to ensure that a string has sufficient space is to declare the string with a fixed length:

```
Declare Sub GetWindowsDirectory Lib "kernel" (ByVal dirname$,ByVal length%)
     :
  Dim s As String * 128      'Declare a fixed-length string.
  GetWindowsDirectory s,len(s) 'Pass it to an external subroutine.
```

Calling Conventions with External Routines

For external routines, the argument list must exactly match that of the referenced routine. When calling an external subroutine or function, the script needs to be told how that routine expects to receive its parameters and who is responsible for cleanup of the stack.

The following table describes which calling conventions are supported on which platform, and indicates what the default calling convention is when no explicit calling convention is specified in the **`Declare`** statement.

Passing Null Pointers

To pass a null pointer to an external procedure, declare the parameter that is to receive the null pointer as type **Any**, then pass a long value **0** by value:

```
Declare Sub Foo Lib "sample" (ByVal lpName As Any)

Sub Main()
  Sub Foo "Hello"   'Pass a 32-bit pointer to a null-terminated string
  Sub Foo ByVal 0&    'Pass a null pointer
End Sub
```

Passing Data to External Routines

The following table shows how the different data types are passed to external routines:

Data Type	Is Passed As
ByRef Boolean	A 32-bit pointer to a 2-byte value containing –1 or 0.
ByVal Boolean	A 2-byte value containing –1 or 0.
ByVal Integer	A 32-bit pointer to a 2-byte short integer.
ByRef Integer	A 2-byte short integer.
ByVal Long	A 32-bit pointer to a 4-byte long integer.
ByRef Long	A 4-byte long integer.
ByRef Single	A 32-bit pointer to a 4-byte IEEE floating-point value (a float).
ByVal Single	A 4-byte IEEE floating-point value (a float).
ByRef Double	A 32-bit pointer to an 8-byte IEEE floating-point value (a double).
ByVal Double	An 8-byte IEEE floating-point value (a double).
ByVal String	A 32-bit pointer to a null-terminated string. With strings containing embedded nulls (**Chr$(0)**), it is not possible to determine which null represents the end of the string. Therefore, the first null is considered the string terminator. An external routine can freely change the content of a string. It cannot, however, write beyond the end of the null terminator.
ByRef String	A 32-bit pointer to a 2-byte internal value representing the string. This value can only be used by external routines written specifically for the Basic Control Engine.
ByRef Date	A 32-bit pointer to an 8-byte IEEE floating-point value (a double).
ByVal Date	An 8-byte IEEE floating-point value (a double).
ByRef Currency	A 32-bit pointer to an 8-byte integer scaled by 10000.
ByVal Currency	An 8-byte integer scaled by 10000.
ByRef Variant	A 32-bit pointer to a 16-byte internal variant structure. This structure contains a 2-byte type (the same as that returned by the **VarType** function), followed by 6 bytes of slop (for alignment), followed by 8 bytes containing the value.
ByVal Variant	A 16-byte variant structure. This structure contains a 2-byte type (the same as that returned by the **VarType** function), followed by 6 bytes of slop (for alignment), followed by 8 bytes containing the value.

`ByVal Object`	For data objects, a 32-bit pointer to a 4-byte unsigned long integer. This value can only be used by external routines written specifically for the Basic Control Engine. For OLE automation objects, a 32-bit pointer to an **`LPDISPATCH`** handle is passed.
`ByRef Object`	For data objects, a 32-bit pointer to a 4-byte unsigned long integer that references the object. This value can only be used by external routines written specifically for the Basic Control Engine. For OLE automation objects, a 32-bit pointer to a 4-byte internal ID is passed. This value can only be used by external routines written specifically for the Basic Control Engine.
User-defined type	A 32-bit pointer to the structure. User-defined types can only be passed by reference. It is important to remember that structures in Basic Control Engine scripts are packed on 2-byte boundaries, meaning that the individual structure members may not be aligned consistently with similar structures declared in C.
Arrays	A 32-bit pointer to a packed array of elements of the given type. Arrays can only be passed by reference.
Dialogs	Dialogs cannot be passed to external routines.

Only variable-length strings can be passed to external routines; fixed-length strings are automatically converted to variable-length strings.

The Basic Control Engine passes data to external functions consistent with that routine's prototype as defined by the **`Declare`** statement. There is one exception to this rule: you can override **`ByRef`** parameters using the **`ByVal`** keyword when passing individual parameters. The following example shows a number of different ways to pass an **`Integer`** to an external routine called **`Foo`**:

```
Declare Sub Foo Lib "MyLib" (ByRef i As Integer)

Sub Main
  Dim i As Integer
  i = 6
  Foo 6       'Passes a temporary integer (value 6) by reference
  Foo i       'Passes variable "i" by reference
  Foo (i)     'Passes a temporary integer (value 6) by reference
  Foo i + 1     'Passes temporary integer (value 7) by reference
  Foo ByVal i'Passes i by value
End Sub
```

The above example shows that the only way to override passing a value by reference is to use the **`ByVal`** keyword.

Note

Use caution when using the **`ByVal`** keyword in this way. The external routine **`Foo`** expects to receive a pointer to an **`Integer`**—a 32-bit value; using **`ByVal`** causes the Basic Control Engine to pass the **`Integer`** by value—a 16-bit value. Passing data of the wrong size to any external routine will have unpredictable results.

Example

```
Declare Function IsLoaded% Lib "Kernel" Alias "GetModuleHandle" (ByVal KName$)
```

```
Declare Function GetProfileString Lib "Kernel" (ByVal SName$,ByVal KName$,ByVal
Def$,ByVal Ret$,ByVal Size%) As Integer
```

```
Sub Main()
  SName$ = "Intl"        'Win.ini section name.
  KName$ = "sCountry"      'Win.ini country setting.
  ret$ = String(255,0)   'Initialize return string.

  If GetProfileString(SName$,KName$,"",ret$,Len(ret$)) Then
    MsgBox "Your country setting is: " & ret$
  Else
    MsgBox "There is no country setting in your win.ini file."
  End If

  If IsLoaded("Progman") Then
    MsgBox "Progman is loaded."
  Else
    MsgBox "Progman is not loaded."
  End If
End Sub
```

See Also **`Call`** (statement), **`Sub...End Sub`** (statement), **`Function...End Function`** (statement).

Notes: Under Win32, eternal routines are contained in DLLs. The libraries containing the routines are loaded when the routine is called for the first time (that is, not when the script is loaded). This allows a script to reference external DLLs that potentially do not exist.

All the Win32 API routines are contained in DLLs, such as "user32", "kernel32", and "gdi32". The file extension ".exe" is implied if another extension is not given.

The **`Pascal`** and **`StdCall`** calling conventions are identical on Win32 platforms. Furthermore, on this platform, the arguments are passed using C ordering regardless of the calling convention -- right to left on the stack.

If the *libname$* parameter does not contain an explicit path to the DLL, the following search will be performed for the DLL (in this order):

1. The directory containing the Basic Control Engine scripts
2. The current directory
3. The Windows system directory
4. The Windows directory
5. All directories listed in the path environment variable

If the first character of *aliasname$* is **`#`**, then the remainder of the characters specify the ordinal number of the routine to be called. For example, the following two statements are equivalent (under Win32, **`GetCurrentTime`** is defined as **`GetTickCount`**, ordinal 300, in kernel32.dll):

```
Declare Function GetTime Lib "kernel32.dll" Alias "GetTickCount" () As Long
```

```
Declare Function GetTime Lib "kernel32.dll" Alias "#300" () As Long
```

DefType (statement)

Syntax

`DefInt` *letterrange*
`DefLng` *letterrange*
`DefStr` *letterrange*
`DefSng` *letterrange*
`DefDbl` *letterrange*
`DefCur` *letterrange*
`DefObj` *letterrange*
`DefVar` *letterrange*
`DefBool` *letterrange*
`DefDate` *letterrange*

Description

Establishes the default type assigned to undeclared or untyped variables.

Comments

The **`Def`***Type* statement controls automatic type declaration of variables. Normally, if a variable is encountered that hasn't yet been declared with the **`Dim`**, **`Public`**, or **`Private`** statement or does not appear with an explicit type-declaration character, then that variable is declared implicitly as a variant (**`DefVar A–Z)`**. This can be changed using the **`Def`***Type* statement to specify starting letter ranges for *type* other than integer. The *letterrange* parameter is used to specify starting letters. Thus, any variable that begins with a specified character will be declared using the specified *Type*.

The syntax for *letterrange* is:

letter [-*letter*] [,*letter* [-*letter*]]...

`Def`*Type* variable types are superseded by an explicit type declaration—using either a type-declaration character or the **`Dim`**, **`Public`**, or **`Private`** statement.

The **`Def`***Type* statement only affects how the Basic Control Engine compiles scripts and has no effect at runtime.

The **`Def`***Type* statement can only appear outside all **`Sub`** and **`Function`** declarations.

The following table describes the data types referenced by the different variations of the **`Def`***Type* statement:

Statement	Data Type
`DefInt`	**`Integer`**
`DefLng`	**`Long`**
`DefStr`	**`String`**
`DefSng`	**`Single`**
`DefDbl`	**`Double`**
`DefCur`	**`Currency`**
`DefObj`	**`Object`**
`DefVar`	**`Variant`**
`DefBool`	**`Boolean`**
`DefDate`	**`Date`**

Example

```
DefStr a-m
DefLng n-r
DefSng s-u
DefDbl v-w
DefInt x-z

Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a = 100.52
  n = 100.52
  s = 100.52
  v = 100.52
  x = 100.52
  msg1 = "The values are:" & crlf & crlf
  msg1 = msg1 & "(String) a: " & a & crlf
  msg1 = msg1 & "(Long) n: " & n & crlf
  msg1 = msg1 & "(Single) s: " & s & crlf
  msg1 = msg1 & "(Double) v: " & v & crlf
  msg1 = msg1 & "(Integer) x: " & x & crlf
  MsgBox msg1
End Sub
```

See Also

`Currency` (data type); **`Date`** (data type); **`Double`** (data type); **`Long`** (data type); **`Object`** (data type); **`Single`** (data type); **`String`** (data type); **`Variant`** (data type); **`Boolean`** (data type); **`Integer`** (data type).

Dialog (function)

Syntax **`Dialog`**(*DialogVariable* [,[*DefaultButton*] [,*Timeout*]])

Description Displays the dialog box associated with *DialogVariable*, returning an **`Integer`** indicating which button was clicked.

Comments The function returns any of the following values:

`-1`	The OK button was clicked.
`0`	The Cancel button was clicked.
`>0`	A push button was clicked. The returned number represents which button was clicked based on its order in the dialog box template (1 is the first push button, 2 is the second push button, and so on).

The **`Dialog`** function accepts the following parameters:

Parameter	**Description**
DialogVariable	Name of a variable that has previously been dimensioned as a user dialog box. This is accomplished using the **`Dim`** statement: **`Dim MyDialog As MyTemplate`** All dialog variables are local to the **`Sub`** or **`Function`** in which they are defined. Private and public dialog variables are not allowed.
DefaultButton	An **`Integer`** specifying which button is to act as the default button in the dialog box. The value of *DefaultButton* can be any of the following: **`-2`** This value indicates that there is no default button. **`-1`** This value indicates that the OK button, if present, should be used as the default. **`0`** This value indicates that the Cancel button, if present, should be used as the default. **`>0`** This value indicates that the *N*th button should be used as the default. This number is the index of a push button within the dialog box template. If *DefaultButton* is not specified, then **`-1`** is used. If the number specified by *DefaultButton* does not correspond to an existing button, then there will be no default button. The default button appears with a thick border and is selected when the user presses Enter on a control other than a push button.
Timeout	An **`Integer`** specifying the number of milliseconds to display the dialog box before automatically dismissing it. If *TimeOut* is not specified or is equal to **`0`**, then the dialog box will be displayed until dismissed by the user. If a dialog box has been dismissed due to a timeout, the **`Dialog`** function returns **`0`**.

Example This example displays an abort/retry/ignore disk error dialog box.

```
Sub Main()
  Begin Dialog DiskErrorTemplate 16,32,152,48,"Disk Error"
    Text 8,8,100,8,"The disk drive door is open."
    PushButton 8,24,40,14,"Abort",.Abort
    PushButton 56,24,40,14,"Retry",.Retry
    PushButton 104,24,40,14,"Ignore",.Ignore
  End Dialog
  Dim DiskError As DiskErrorTemplate
  r% = Dialog(DiskError,3,0)
  MsgBox "You selected button: " & r%
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

Dialog (statement)

Syntax **`Dialog`** *DialogVariable* [,[*DefaultButton*] [,*Timeout*]]

Description Same as the **`Dialog`** function, except that the **`Dialog`** statement does not return a value. (See **`Dialog`** [function].)

Example This example displays an Abort/Retry/Ignore disk error dialog box.

```
Sub Main()
  Begin Dialog DiskErrorTemplate 16,32,152,48,"Disk Error"
    Text 8,8,100,8,"The disk drive door is open."
    PushButton 8,24,40,14,"Abort",.Abort
    PushButton 56,24,40,14,"Retry",.Retry
    PushButton 104,24,40,14,"Ignore",.Ignore
  End Dialog
  Dim DiskError As DiskErrorTemplate
  Dialog DiskError,3,0
End Sub
```

See Also **`Dialog`** (function).

Dim (statement)

Syntax **`Dim`** *name* [(<*subscripts*>)] [**`As`** [**`New`**] *type*] [,*name* [(<*subscripts*>)] [**`As`** [**`New`**] *type*]]...

Description Declares a list of local variables and their corresponding types and sizes.

Comments If a type-declaration character is used when specifying *name* (such as **`%`**, **`@`**, **`&`**, **`$`**, or **`!`**), the optional **`[As`** *type***`]`** expression is not allowed. For example, the following are allowed:

```
Dim Temperature As Integer
Dim Temperature%
```

The *subscripts* parameter allows the declaration of dynamic and fixed arrays. The *subscripts* parameter uses the following syntax:

`[`*lower* **`to]`** *upper* **`[,[`***lower* **`to]`** *upper***`]...`**

The *lower* and *upper* parameters are integers specifying the lower and upper bounds of the array. If *lower* is not specified, then the lower bound as specified by **`Option Base`** is used (or 1 if no **`Option Base`** statement has been encountered). The Basic Control Engine supports a maximum of 60 array dimensions.

The total size of an array (not counting space for strings) is limited to 64K.

Dynamic arrays are declared by not specifying any bounds:

```
Dim a()
```

The *type* parameter specifies the type of the data item being declared. It can be any of the following data types: **`String`**, **`Integer`**, **`Long`**, **`Single`**, **`Double`**, **`Currency`**, **`Object`**, data object, built-in data type, or any user-defined data type.

A **`Dim`** statement within a subroutine or function declares variables local to that subroutine or function. If the **`Dim`** statement appears outside of any subroutine or function declaration, then that variable has the same scope as variables declared with the **`Private`** statement.

Fixed-Length Strings

Fixed-length strings are declared by adding a length to the **`String`** type-declaration character:

`Dim` *name* **`As String *`** *length*

where *length* is a literal number specifying the string's length.

Implicit Variable Declaration

If the Basic Control Engine encounters a variable that has not been explicitly declared with **`Dim`**, then the variable will be implicitly declared using the specified type-declaration character (**`#`**, **`%`**, **`@`**, **`$`**, or **`&`**). If the variable appears without a type-declaration character, then the first letter is matched against any pending **`Def`** *Type* statements, using the specified type if found. If no **`Def`***Type* statement has been encountered corresponding to the first letter of the variable name, then **`Variant`** is used.

Creating New Objects

The optional **`New`** keyword is used to declare a new instance of the specified data object. This keyword can only be used with data object types. Furthermore, this keyword cannot be used when declaring arrays.

At runtime, the application or extension that defines that object type is notified that a new object is being defined. The application responds by creating a new physical object (within the appropriate context) and returning a reference to that object, which is immediately assigned to the variable being declared.

When that variable goes out of scope (That is, the **`Sub`** or **`Function`** procedure in which the variable is declared ends), the application is notified. The application then performs some appropriate action, such as destroying the physical object.

Initial Values

All declared variables are given initial values, as described in the following table:

Data Type	Initial Value
`Integer`	**`0`**
`Long`	**`0`**
`Double`	**`0.0`**
`Single`	**`0.0`**
`Date`	**`December 31, 1899 00:00:00`**
`Currency`	**`0.0`**
`Boolean`	**`False`**
`Object`	**`Nothing`**
`Variant`	**`Empty`**
`String`	**`""`** (zero-length string)
User-defined type	Each element of the structure is given an initial value, as described above.
Arrays	Each element of the array is given an initial value, as described above

.

Naming Conventions

Variable names must follow these naming rules:

1. Must start with a letter.
2. May contain letters, digits, and the underscore character (_); punctuation is not allowed. The exclamation point (**`!`**) can appear within the name as long as it is not the last character, in which case it is interpreted as a type-declaration character.
3. The last character of the name can be any of the following type-declaration characters: **`#`**, **`@`**, **`%`**, **`!`**, **`&`**, and **`$`**.
4. Must not exceed 80 characters in length.
5. Cannot be a reserved word.

Examples The following examples use the Dim statement to declare various variable types.

```
Sub Main()
  Dim i As Integer
  Dim l&                    'long
  Dim s As Single
  Dim d#                    'double
  Dim c$                    'string
  Dim MyArray(10) As Integer      '10 element integer array
  Dim MyStrings$(2,10)        '2-10 element string arrays
  Dim Filenames$(5 To 10)         '6 element string array
  Dim Values(1 To 10,100 To 200)  '111 element variant array
End Sub
```

See Also **`Redim`** (statement); **`Public`** (statement); **`Private`** (statement); **`Option Base`** (statement).

Dir, Dir$ (functions)

Syntax	**`Dir$`**[(*filespec$* [,*attributes*])]
Description	Returns a **`String`** containing the first or next file matching *filespec$*.
	If *filespec$* is specified, then the first file matching that *filespec$* is returned. If *filespec$* is not specified, then the next file matching the initial *filespec$* is returned.
Comments	**`Dir$`** returns a **`String`**, whereas **`Dir`** returns a **`String`** variant.

The **`Dir$`**/**`Dir`** functions take the following parameters:

Parameter	**Description**
filespec$	**`String`** containing a file specification. If this parameter is specified, then **`Dir$`** returns the first file matching this file specification. If this parameter is omitted, then the next file matching the initial file specification is returned. If no path is specified in *filespec$*, then the current directory is used.
attributes	**`Integer`** specifying attributes of files you want included in the list, as described below. If omitted, then only the normal, read-only, and archive files are returned.

An error is generated if **`Dir$`** is called without first calling it with a valid *filespec$*.

If there is no matching *filespec$*, then a zero-length string is returned.

Wildcards

The *filespec$* argument can include wildcards, such as **`*`** and **`?`**. The **`*`** character matches any sequence of zero or more characters, whereas the **`?`** character matches any single character. Multiple **`*`**'s and **`?`**'s can appear within the expression to form complete searching patterns. The following table shows some examples:

This pattern	**Matches these files**	**Doesn't match these files**

`*S*.TXT`	`SAMPLE.TXT`
	`GOOSE.TXT`
	`SAMS.TXT`
		`SAMPLE`
		`SAMPLE.DAT`

`C*T.TXT`	`CAT.TXT`	`CAP.TXT` `ACATS.TXT`
`C*T`	`CAT` `CAP.TXT`	`CAT.DOC`

`C?T`	`CAT`
	`CUT`
		`CAT.TXT`
		`CAPIT`
		`CT`

*	(All files)	

Attributes

You can control which files are included in the search by specifying the optional *attributes* parameter. The **`Dir, Dir$`** functions always return all normal, read-only, and archive files (**`ebNormal Or ebReadOnly Or ebArchive`**). To include additional files, you can specify any combination of the following attributes (combined with the **`Or`** operator):

Constant	Value	Includes
`ebNormal`	**0**	Normal, Read-only, and archive files
`ebHidden`	**2**	Hidden files
`ebSystem`	**4**	System files
`ebVolume`	**8**	Volume label
`ebDirectory`	**16**	DOS subdirectories

Example

This example uses Dir to fill a SelectBox with the first 10 directory entries.

```
Const crlf = Chr$(13) + Chr$(10)
Option Base 1

Sub Main()
  Dim a$(10)
  i% = 1
  a(i%) = Dir("*.*")

  While (a(i%) <> "") and (i% < 10)
    i% = i% + 1
    a(i%) = Dir
  Wend

  r = SelectBox("Top 10 Directory Entries",,a)
End Sub
```

See Also

`ChDir` (statement); **`ChDrive`** (statement); **`CurDir, CurDir$`** (functions); **`MkDir`** (statement); **`RmDir`** (statement); **`FileList`** (statement).

DiskDrives (statement)

Syntax **`DiskDrives`** *array*()

Description Fills the specified **`String`** or **`Variant`** array with a list of valid drive letters.

Comments The *array*`()` parameter specifies either a zero- or a one-dimensioned array of strings or variants. The array can be either dynamic or fixed.

If *array*`()` is dynamic, then it will be redimensioned to exactly hold the new number of elements. If there are no elements, then the array will be redimensioned to contain no dimensions. You can use the **`LBound`**, **`UBound`**, and **`ArrayDims`** functions to determine the number and size of the new array's dimensions.

If the array is fixed, each array element is first erased, then the new elements are placed into the array. If there are fewer elements than will fit in the array, then the remaining elements are initialized to zero-length strings (for **`String`** arrays) or **`Empty`** (for **`Variant`** arrays). A runtime error results if the array is too small to hold the new elements.

Example This example builds and displays an array containing the first three available disk drives.

```
Sub Main()
  Dim drive$()
  DiskDrives drive$
  r% = SelectBox("Available Disk Drives",,drive$)
End Sub
```

See Also **`ChDrive`** (statement); **`DiskFree`** (function).

DiskFree (function)

Syntax **`DiskFree&`**([*drive$*])

Description Returns a **`Long`** containing the free space (in bytes) available on the specified drive.

Comments If *drive$* is zero-length or not specified, then the current drive is assumed.

Only the first character of the *drive$* string is used.

Example This example uses DiskFree to set the value of i and then displays the result in a message box.

```
Sub Main()
  s$ = "c"
  i# = DiskFree(s$)
  MsgBox "Free disk space on drive '" & s$ & "' is: " & i#
End Sub
```

See Also **`ChDrive`** (statement); **`DiskDrives`** (statement).

DlgControlId (function)

Syntax **`DlgControlId`**(*ControlName$*)

Description Returns an **`Integer`** containing the index of the specified control as it appears in the dialog box template.

Comments The first control in the dialog box template is at index 0, the second is at index 1, and so on.

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with that control in the dialog box template.

The Basic Control Engine statements and functions that dynamically manipulate dialog box controls identify individual controls using either the *.Identifier* name of the control or the control's index. Using the index to refer to a control is slightly faster but results in code that is more difficult to maintain.

Example This example uses DlgControlId to verify which control was triggered and branches the dynamic dialog script accordingly.

```
Function DlgProc(ControlName$,Action%,SuppValue%) As Integer
  If Action% = 2 Then
    'Enable the next three controls.
    If DlgControlId(ControlName$) = 2 Then
      For i = 3 to 5
        DlgEnable i,DlgValue("CheckBox1")
      Next i
      DlgProc = 1   'Don't close the dialog box.
    End If
  ElseIf Action% = 1 Then
    'Set initial state upon startup
    For i = 3 to 5
      DlgEnable i,DlgValue("CheckBox1")
    Next i
  End If
End Function

Sub Main()
  Begin Dialog UserDialog ,,180,96,"Untitled",.DlgProc
    OKButton 132,8,40,14
    CancelButton 132,28,40,14
    CheckBox 24,16,72,8,"Click Here",.CheckBox1
    CheckBox 36,32,60,8,"Sub Option 1",.CheckBox2
    CheckBox 36,44,72,8,"Sub Option 2",.CheckBox3
    CheckBox 36,56,60,8,"Sub Option 3",.CheckBox4
    CheckBox 24,72,76,8,"Main Option 2",.CheckBox5
  End Dialog
  Dim d As UserDialog
  Dialog d
End Sub
```

See Also **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgEnable (function)

Syntax **DlgEnable**(*ControlName$* | *ControlIndex*)

Description Returns **True** if the specified control is enabled; returns **False** otherwise.

Comments Disabled controls are dimmed and cannot receive keyboard or mouse input.

The *ControlName$* parameter contains the name of the .*Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specific control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

You cannot disable the control with the focus.

Example This example checks the status of a checkbox at the end of the dialog procedure and notifies the user accordingly.

```
Function DlgProc(ControlName$,Action%,SuppValue%) As Integer
  If Action% = 2 Then
    'Enable the next three controls.
    If DlgControlId(ControlName$) = 2 Then
      For i = 3 to 5
        DlgEnable i,DlgValue("CheckBox1")
      Next i
      DlgProc = 1   'Don't close the dialog box.
    End If
  ElseIf Action% = 1 Then
    'Set initial state upon startup
    For i = 3 to 5
      DlgEnable i,DlgValue("CheckBox1")
    Next i
  End If

  If  DlgEnable(i) = True Then
    MsgBox "You do not have the required disk space.",ebExclamation,"Insufficient
Disk Space"
  End If
End Function

Sub Main()
  Begin Dialog UserDialog ,,180,96,"Untitled",.DlgProc
    OKButton 132,8,40,14
    CancelButton 132,28,40,14
    CheckBox 24,16,72,8,"Click Here",.CheckBox1
    CheckBox 36,32,60,8,"Sub Option 1",.CheckBox2
    CheckBox 36,44,72,8,"Sub Option 2",.CheckBox3
    CheckBox 36,56,60,8,"Sub Option 3",.CheckBox4
    CheckBox 24,72,76,8,"Main Option 2",.CheckBox5
  End Dialog
  Dim d As UserDialog
  Dialog d
End Sub
```

See Also **DlgControl** (statement); **DlgEnable** (statement); **DlgFocus** (function); **DlgFocus** (statement); **DlgListBoxArray** (function); **DlgListBoxArray** (statement); **DlgSetPicture** (statement); **DlgText** (statement); **DlgText** (function); **DlgValue** (function); **DlgValue** (statement); **DlgVisible** (statement); **DlgVisible** (function).

DlgEnable (statement)

Syntax **`DlgEnable`** {*ControlName$* | *ControlIndex*} [,*isOn*]

Description Enables or disables the specified control.

Comments Disabled controls are dimmed and cannot receive keyboard or mouse input.

The *isOn* parameter is an **`Integer`** specifying the new state of the control. It can be any of the following values:

0	The control is disabled.
1	The control is enabled.
Omitted	Toggles the control between enabled and disabled.

Option buttons can be manipulated individually (by specifying an individual option button) or as a group (by specifying the name of the option group).

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

Example This example uses DlgEnable to turn on/off various dialog options.

```
Function DlgProc(ControlName$,Action%,SuppValue%) As Integer
  If Action% = 2 Then
    'Enable the next three controls.
    If DlgControlId(ControlName$) = 2 Then
      For i = 3 to 5
        DlgEnable i,DlgValue("CheckBox1")
      Next i
      DlgProc = 1   'Don't close the dialog box.
    End If
  ElseIf Action% = 1 Then
    'Set initial state upon startup
    For i = 3 to 5
      DlgEnable i,DlgValue("CheckBox1")
    Next i
  End If
End Function

Sub Main()
  Begin Dialog UserDialog ,,180,96,"Untitled",.DlgProc
    OKButton 132,8,40,14
    CancelButton 132,28,40,14
    CheckBox 24,16,72,8,"Click Here",.CheckBox1
    CheckBox 36,32,60,8,"Sub Option 1",.CheckBox2
    CheckBox 36,44,72,8,"Sub Option 2",.CheckBox3
    CheckBox 36,56,60,8,"Sub Option 3",.CheckBox4
    CheckBox 24,72,76,8,"Main Option 2",.CheckBox5
  End Dialog
  Dim d As UserDialog
  Dialog d
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgFocus (function)

Syntax **`DlgFocus$[()]`**

Description Returns a **`String`** containing the name of the control with the focus.

Comments The name of the control is the *.Identifier* parameter associated with the control in the dialog box template.

Example This code fragment makes sure that the control being disabled does not currently have the focus (otherwise, a runtime error would occur).

```
Sub Main()
  If DlgFocus = "Files" Then   'Does it have the focus?
    DlgFocus "OK"            'Change the focus to another control.
  End If
  DlgEnable "Files",False      'Now we can disable the control.
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgFocus (statement)

Syntax **`DlgFocus`** *ControlName$* | *ControlIndex*

Description Sets focus to the specified control.

Comments A runtime error results if the specified control is hidden, disabled, or nonexistent.

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specific control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

Example This code fragment makes sure the user enters a correct value. If not, the control returns focus back to the TextBox for correction.

```
Function DlgProc(ControlName$,Action%,SuppValue%) As Integer
  If Action% = 2 and ControlName$ = "OK" Then
    If IsNumeric(DlgText$("TextBox1")) Then
      Msgbox "Duly Noted."
    Else
      Msgbox "Sorry, you must enter a number."
      DlgFocus "TextBox1"
      DlgProc = 1
    End If
  End If
End Function

Sub Main()
  Dim ListBox1$()
  Begin Dialog UserDialog ,,112,74,"Untitled",.DlgProc
    TextBox 12,20,88,12,.TextBox1
    OKButton 12,44,40,14
    CancelButton 60,44,40,14
    Text 12,11,88,8,"Enter Desired Salary:",.Text1
  End Dialog
  Dim d As UserDialog
  Dialog d
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgListBoxArray (function)

Syntax **`DlgListBoxArray`**({*ControlName$* | *ControlIndex*}, *ArrayVariable*)

Description Fills a list box, combo box, or drop list box with the elements of an array, returning an **`Integer`** containing the number of elements that were actually set into the control.

Comments The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specific control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

The *ArrayVariable* parameter specifies a single-dimensioned array used to initialize the elements of the control. If this array has no dimensions, then the control will be initialized with no elements. A runtime error results if the specified array contains more than one dimension. *ArrayVariable* can specify an array of any fundamental data type (structures are not allowed). **`Null`** and **`Empty`** values are treated as zero-length strings.

Example This dialog function refills an array with files.

```
Function DlgProc(ControlName$,Action%,SuppValue%) As Integer
  If Action% = 1 Then
    Dim NewFiles$()            'Create a new dynamic array.
    FileList NewFiles$,"c:\*.*"     'Fill the array with files.
    r% = DlgListBoxArray("Files",NewFiles$)  'Set items in the list box.
    DlgValue "Files",0       'Set the selection to the first item.
    DlgProc = 1         'Don't close the dialog box.
  End If
End Function

Sub Main()
  Dim ListBox1$()
  Begin Dialog UserDialog ,,180,96,"Untitled",.DlgProc
    OKButton 132,8,40,14
    CancelButton 132,28,40,14
    ListBox 8,12,112,72,ListBox1$,.Files
  End Dialog
  Dim d As UserDialog
  Dialog d
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgListBoxArray (statement)

Syntax **`DlgListBoxArray`** {*ControlName$* | *ControlIndex*}, *ArrayVariable*

Description Fills a list box, combo box, or drop list box with the elements of an array.

Comments The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specific control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

The *ArrayVariable* parameter specifies a single-dimensioned array used to initialize the elements of the control. If this array has no dimensions, then the control will be initialized with no elements. A runtime error results if the specified array contains more than one dimension. *ArrayVariable* can specify an array of any fundamental data type (structures are not allowed). **`Null`** and **`Empty`** values are treated as zero-length strings.

Example This dialog function refills an array with files.

```
Function DlgProc(ControlName$,Action%,SuppValue%) As Integer
  If Action% = 1 Then
    Dim NewFiles$()                'Create a new dynamic array.
    FileList NewFiles$,"c:\*.*"       'Fill the array with files.
    DlgListBoxArray "Files",NewFiles$ 'Set items in the list box.
    DlgValue "Files",0             'Set the selection to the first item.


 = 1                'Don't close the dialog box.
  End If
End Function

Sub Main()
  Dim ListBox1$()
  Begin Dialog UserDialog ,,180,96,"Untitled",.DlgProc
    OKButton 132,8,40,14
    CancelButton 132,28,40,14
    ListBox 8,12,112,72,ListBox1$,.Files
  End Dialog
  Dim d As UserDialog
  Dialog d
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgProc (function)

Syntax	`Function` *DlgProc*(*ControlName$*, *Action*, *SuppValue*) `[As Integer]`
Description	Describes the syntax, parameters, and return value for dialog functions.

Comments Dialog functions are called by a script during the processing of a custom dialog box. The name of a dialog function (*DlgProc*) appears in the `Begin Dialog` statement as the .*DlgProc* parameter.

Dialog functions require the following parameters:

Parameter	Description
ControlName$	`String` containing the name of the control associated with *Action*.
Action	`Integer` containing the action that called the dialog function.
SuppValue	`Integer` of extra information associated with *Action*. For some actions, this parameter is not used.

When a script displays a custom dialog box, the user may click on buttons, type text into edit fields, select items from lists, and perform other actions. When these actions occur, the Basic Control Engine calls the dialog function, passing it the action, the name of the control on which the action occurred, and any other relevant information associated with the action.

The following table describes the different actions sent to dialog functions:

Action **Description**

1 This action is sent immediately before the dialog box is shown for the first time. This gives the dialog function a chance to prepare the dialog box for use. When this action is sent, *ControlName$* contains a zero-length string, and *SuppValue* is 0.

The return value from the dialog function is ignored in this case.

Before Showing the Dialog Box

After action 1 is sent, the Basic Control Engine performs additional processing before the dialog box is shown. Specifically, it cycles though the dialog box controls checking for visible picture or picture button controls. For each visible picture or picture button control, the Basic Control Engine attempts to load the associated picture.

In addition to checking picture or picture button controls, the Basic Control Engine will automatically hide any control outside the confines of the visible portion of the dialog box. This prevents the user from tabbing to controls that cannot be seen. However, it does not prevent you from showing these controls with the `DlgVisible` statement in the dialog function.

2 This action is sent when:

- A button is clicked, such as OK, Cancel, or a push button. In this case, *ControlName$* contains the name of the button. *SuppValue* contains 1 if an OK button was clicked and 2 if a Cancel button was clicked; *SuppValue* is undefined otherwise.

  If the dialog function returns 0 in response to this action, then the dialog box will be closed. Any other value causes the Basic Control Engine to continue dialog processing.

- A check box's state has been modified. In this case, *ControlName$* contains the name of the check box, and *SuppValue* contains the new state of the check box (1 if on, 0 if off).
- An option button is selected. In this case, *ControlName$* contains the name of the option button that was clicked, and *SuppValue* contains the index of the option button within the option button group (0-based).
- The current selection is changed in a list box, drop list box, or combo box. In this case, *ControlName$* contains the name of the list box, combo box, or drop list box, and *SuppValue* contains the index of the new item (0 is the first item, 1 is the second, and so on).

3 This action is sent when the content of a text box or combo box has been changed. This action is only sent when the control loses focus. When this action is sent, *ControlName$* contains the name of the text box or combo box, and *SuppValue* contains the length of the new content.

The dialog function's return value is ignored with this action.

4 This action is sent when a control gains the focus. When this action is sent, *ControlName$* contains the name of the control gaining the focus, and *SuppValue* contains the index of the control that lost the focus (0-based).

The dialog function's return value is ignored with this action.

5 This action is sent continuously when the dialog box is idle. If the dialog function returns 1 in response to this action, then the idle action will continue to be sent. If the dialog function returns 0, then the Basic Control Engine will not send any additional idle actions.

When the idle action is sent, *ControlName$* contains a zero-length string, and *SuppValue* contains the number of times the idle action has been sent so far.

Note

Not returning zero will cause your application to use all available CPU time and may adversely affect your CIMPLICITY System.

6 This action is sent when the dialog box is moved. The *ControlName$* parameter contains a zero-length string, and *SuppValue* is 0.

The dialog function's return value is ignored with this action.

User-defined dialog boxes cannot be nested. In other words, the dialog function of one dialog box cannot create another user-defined dialog box. You can, however, invoke any built-in dialog box, such as **`MsgBox`** or **`InputBox$`**.

Within dialog functions, you can use the following additional statements and functions. These statements allow you to manipulate the dialog box controls dynamically.

```
DlgVisible      DlgText$        DlgText
DlgSetPicture   DlgListBoxArray DlgFocus
DlgEnable         DlgControlId
```

The dialog function can optionally be declared to return a **`Variant`**. When returning a variable, the Basic Control Engine will attempt to convert the variant to an **`Integer`**. If the returned variant cannot be converted to an **`Integer`**, then 0 is assumed to be returned from the dialog function.

Example This dialog function enables/disables a group of option buttons when a check box is clicked.

```
Function SampleDlgProc(ControlName$,Action%,SuppValue%)

  If Action% = 2 And ControlName$ = "Printing" Then
    DlgEnable "PrintOptions",SuppValue%
    SampleDlgProc = 1 'Don't close the dialog box.
  End If
End Function

Sub Main()
  Begin Dialog SampleDialogTemplate 34,39,106,45,"Sample",.SampleDlgProc
    OKButton 4,4,40,14
    CancelButton 4,24,40,14
    CheckBox 56,8,38,8,"Printing",.Printing
    OptionGroup .PrintOptions
      OptionButton 56,20,51,8,"Landscape",.Landscape
      OptionButton 56,32,40,8,"Portrait",.Portrait
  End Dialog
  Dim SampleDialog As SampleDialogTemplate
  SampleDialog.Printing = 1
  r% = Dialog(SampleDialog)
End Sub
```

See Also **`Begin Dialog`** (statement).

DlgSetPicture (statement)

Syntax **`DlgSetPicture`** {*ControlName$* | *ControlIndex*},*PictureName$*,*PictureType*

Description Changes the content of the specified picture or picture button control.

Comments The **`DlgSetPicture`** statement accepts the following parameters:

Parameter	Description
ControlName$	**`String`** containing the name of the .*Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specified control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).
PictureName$	**`String`** containing the name of the picture. If *PictureType* is 0, then this parameter specifies the name of the file containing the image. If *PictureType* is 10, then *PictureName$* specifies the name of the image within the resource of the picture library. If *PictureName$* is empty, then the current picture associated with the specified control will be deleted. Thus, a technique for conserving memory and resources would involve setting the picture to empty before hiding a picture control.
PictureType	**`Integer`** specifying the source for the image. The following sources are supported:

`0`	The image is contained in a file on disk.
`10`	The image is contained in the picture library specified by the **`Begin Dialog`** statement. When this type is used, the *PictureName$* parameter must be specified with the **`Begin Dialog`** statement.

Examples

```
Sub Main()
  DlgSetPicture "Picture1","\windows\checks.bmp",0  'Set picture from a file.
  DlgSetPicture 27,"FaxReport",10   'Set control 10's image
                                    'from a library.
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function), **`Picture`** (statement), **`PictureButton`** (statement).

Notes: Picture controls can contain either bitmaps or WMFs (Windows metafiles). When extracting images from a picture library, the Basic Control Engine assumes that the resource type for metafiles is 256.

Picture libraries are implemented as DLLs on the Windows and Win32 platforms.

DlgText (statement)

Syntax **`DlgText`** {*ControlName$* | *ControlIndex*}, *NewText$*

Description Changes the text content of the specified control.

Comments The effect of this statement depends on the type of the specified control:

Control Type	Effect of DlgText
Picture	Runtime error.
Option group	Runtime error.
Drop list box	Sets the current selection to the item matching *NewText$*. If an exact match cannot be found, the **`DlgText`** statement searches from the first item looking for an item that starts with *NewText$*. If no match is found, then the selection is removed.
OK button	Sets the label of the control to *NewText$*.
Cancel button	Sets the label of the control to *NewText$*.
Push button	Sets the label of the control to *NewText$*.
List box	Sets the current selection to the item matching *NewText$*. If an exact match cannot be found, the **`DlgText`** statement searches from the first item looking for an item that starts with *NewText$*. If no match is found, then the selection is removed.
Combo box	Sets the content of the edit field of the combo box to *NewText$*.
Text	Sets the label of the control to *NewText$*.
Text box	Sets the content of the text box to *NewText$*.
Group box	Sets the label of the control to *NewText$*.
Option button	Sets the label of the control to *NewText$*.

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specific control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

Example

```
Sub Main()
  DlgText "GroupBox1","Save Options"    'Change text of group box 1.

  If DlgText$(9) = "Save Options" Then
    DlgText 9,"Editing Options"      'Change text to "Editing Options".
  End If
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgText$ (function)

Syntax **`DlgText$(`***ControlName$* | *ControlIndex*)

Description Returns the text content of the specified control.

Comments The text returned depends on the type of the specified control:

Control Type	**Value Returned by DlgText$**
Picture	No value is returned. A runtime error occurs.
Option group	No value is returned. A runtime error occurs.
Drop list box	Returns the currently selected item. A zero-length string is returned if no item is currently selected.
OK button	Returns the label of the control.
Cancel button	Returns the label of the control.
Push button	Returns the label of the control.
List box	Returns the currently selected item. A zero-length string is returned if no item is currently selected.
Combo box	Returns the content of the edit field portion of the combo box.
Text	Returns the label of the control.
Text box	Returns the content of the control.
Group box	Returns the label of the control.
Option button	Returns the label of the control.

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specific control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

Example This code fragment makes sure the user enters a correct value. If not, the control returns focus back to the TextBox for correction.

```
Function DlgProc(ControlName$,Action%,SuppValue%) As Integer
  If Action% = 2 and ControlName$ = "OK" Then
    If IsNumeric(DlgText$("TextBox1")) Then
      Msgbox "Duly Noted."
    Else
      Msgbox "Sorry, you must enter a number."
      DlgFocus "TextBox1"
      DlgProc = 1
    End If
  End If
End Function
```

```
Sub Main()
  Dim ListBox1$()
  Begin Dialog UserDialog ,,112,74,"Untitled",.DlgProc
    TextBox 12,20,88,12,.TextBox1
    OKButton 12,44,40,14
    CancelButton 60,44,40,14
    Text 12,11,88,8,"Enter Desired Salary:",.Text1
  End Dialog
  Dim d As UserDialog
  Dialog d
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgValue (function)

Syntax **`DlgValue`**(*ControlName$* | *ControlIndex*)

Description Returns an **`Integer`** indicating the value of the specified control.

Comments The value of any given control depends on its type, according to the following table:

Control Type	DlgValue Returns
Option group	The index of the selected option button within the group (0 is the first option button, 1 is the second, and so on).
List box	The index of the selected item.
Drop list box	The index of the selected item.
Check box	1 if the check box is checked; 0 otherwise.

A runtime error is generated if **`DlgValue`** is used with controls other than those listed in the above table.

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

Example This code fragment toggles the value of a check box.

```
Sub Main()
  If DlgValue("MyCheckBox") = 1 Then
    DlgValue "MyCheckBox",0
  Else
    DlgValue "MyCheckBox",1
  End If
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgValue (statement)

Syntax **`DlgValue`** {*ControlName$* | *ControlIndex*},*Value*

Description Changes the value of the given control.

Comments The value of any given control is an **`Integer`** and depends on its type, according to the following table:

Control Type	Description of Value
Option group	The index of the new selected option button within the group (0 is the first option button, 1 is the second, and so on).
List box	The index of the new selected item.
Drop list box	The index of the new selected item.
Check box	1 if the check box is to be checked; 0 if the check is to be removed.

A runtime error is generated if **`DlgValue`** is used with controls other than those listed in the above table.

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specific control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

Example This code fragment toggles the value of a check box.

```
Sub Main()
  If DlgValue("MyCheckBox") = 1 Then
    DlgValue "MyCheckBox",0
  Else
    DlgValue "MyCheckBox",1
  End If
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgVisible`** (statement); **`DlgVisible`** (function).

DlgVisible (function)

Syntax **`DlgVisible`**(*ControlName$* | *ControlIndex*)

Description Returns **`True`** if the specified control is visible; returns **`False`** otherwise**.**

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the template (0 is the first control in the template, 1 is the second, and so on).

A runtime error is generated if **`DlgVisible`** is called with no user dialog is active.

Example

```
Sub Main()
  If DlgVisible("Portrait") Then Beep

  If DlgVisible(10) And DlgVisible(12) Then
    MsgBox "The 10th and 12th controls are visible."
  End If
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (function).

DlgVisible (statement)

Syntax **`DlgVisible`** {*ControlName$* | *ControlIndex*} [,*isOn*]

Description Hides or shows the specified control.

Comments Hidden controls cannot be seen in the dialog box and cannot receive the focus using Tab.

The *isOn* parameter is an **`Integer`** specifying the new state of the control. It can be any of the following values:

`1`	The control is shown.
`0`	The control is hidden.
Omitted	Toggles the visibility of the control.

Option buttons can be manipulated individually (by specifying an individual option button) or as a group (by specifying the name of the option group).

The *ControlName$* parameter contains the name of the *.Identifier* parameter associated with a control in the dialog box template. A case-insensitive comparison is used to locate the specific control within the template. Alternatively, by specifying the *ControlIndex* parameter, a control can be referred to using its index in the dialog box template (0 is the first control in the template, 1 is the second, and so on).

Picture Caching

When the dialog box is first created and before it is shown, the Basic Control Engine calls the dialog function with *action* set to 1. At this time, no pictures have been loaded into the picture controls contained in the dialog box template. After control returns from the dialog function and before the dialog box is shown, the Basic Control Engine will load the pictures of all visible picture controls. Thus, it is possible for the dialog function to hide certain picture controls, which prevents the associated pictures from being loaded and causes the dialog box to load faster. When a picture control is made visible for the first time, the associated picture will then be loaded.

Example This example creates a dialog box with two panels. The DlgVisible statement is used to show or hide the controls of the different panels.

```
Sub EnableGroup(start%,finish%)
  For i = 6 To 13              'Disable all options.
    DlgVisible i,False
  Next i
  For i = start% To finish%        'Enable only the right ones.
    DlgVisible i,True
  Next i
End Sub
```

```
Function DlgProc(ControlName$,Action%,SuppValue%)
  If Action% = 1 Then
    DlgValue "WhichOptions",0    'Set to save options.
    EnableGroup 6,8         'Enable the save options.
  End If
  If Action% = 2 And ControlName$ = "SaveOptions" Then
    EnableGroup 6,8         'Enable the save options.
    DlgProc = 1           'Don't close the dialog box.
  End If
  If Action% = 2 And ControlName$ = "EditingOptions" Then
    EnableGroup 9,13           'Enable the editing options.
    DlgProc = 1           'Don't close the dialog box.
  End If
End Function

Sub Main()
  Begin Dialog OptionsTemplate 33,33,171,134,"Options",.DlgProc
    'Background (controls 0-5)
    GroupBox 8,40,152,84,""
    OptionGroup .WhichOptions
      OptionButton 8,8,59,8,"Save Options",.SaveOptions
      OptionButton 8,20,65,8,"Editing Options",.EditingOptions
    OKButton 116,7,44,14
    CancelButton 116,24,44,14

    'Save options (controls 6-8)
    CheckBox 20,56,88,8,"Always create backup",.CheckBox1
    CheckBox 20,68,65,8,"Automatic save",.CheckBox2
    CheckBox 20,80,70,8,"Allow overwriting",.CheckBox3

    'Editing options (controls 9-13)
    CheckBox 20,56,65,8,"Overtype mode",.OvertypeMode
    CheckBox 20,68,69,8,"Uppercase only",.UppercaseOnly
    CheckBox 20,80,105,8,"Automatically check syntax",.AutoCheckSyntax
    CheckBox 20,92,73,8,"Full line selection",.FullLineSelection
    CheckBox 20,104,102,8,"Typing replaces selection",.TypingReplacesText
  End Dialog

  Dim OptionsDialog As OptionsTemplate
  Dialog OptionsDialog
End Sub
```

See Also **`DlgControl`** (statement); **`DlgEnable`** (function); **`DlgEnable`** (statement); **`DlgFocus`** (function); **`DlgFocus`** (statement); **`DlgListBoxArray`** (function); **`DlgListBoxArray`** (statement); **`DlgSetPicture`** (statement); **`DlgText`** (statement); **`DlgText`** (function); **`DlgValue`** (function); **`DlgValue`** (statement); **`DlgVisible`** (statement).

Do...Loop (statement)

Syntax 1 `Do {While | Until}` *condition statements* `Loop`

Syntax 2
```
Do
  statements
Loop {While | Until} condition
```

Syntax 3
```
Do
  statements
Loop
```

Description Repeats a block of Basic Control Engine statements while a condition is `True` or until a condition is `True`.

Comments If the `{While | Until}` conditional clause is not specified, then the loop repeats the statements forever (or until the script encounters an `Exit Do` statement).

The *condition* parameter specifies any `Boolean` expression.

Examples

```
Sub Main()
  'This first example uses the Do...While statement, which performs
  'the iteration, then checks the condition, and repeats if the
  'condition is True.

  Dim a$(100)
  i% = -1
  Do
    i% = i% + 1
    If i% = 0 Then
      a(i%) = Dir("*")
    Else
      a(i%) = Dir
    End If
  Loop While(a(i%) <> "" And i% <= 99)
  r% = SelectBox(i% & " files found",,a)
End Sub
```

```
Sub Main()
  'This second example uses the Do While...Loop, which checks the
  'condition and then repeats if the condition is True.

  Dim a$(100)
  i% = 0
  a(i%) = Dir("*")
  Do While (a(i%) <> "") And (i% <= 99)
    i% = i% + 1
    a(i%) = Dir
  Loop
  r% = SelectBox(i% & " files found",,a)
End Sub
```

```
Sub Main()
  'This third example uses the Do Until...Loop, which does the
  'iteration and then checks the condition and repeats if the
  'condition is True.

  Dim a$(100)
  i% = 0
  a(i%) = Dir("*")
  Do Until (a(i%) = "") Or (i% = 100)
    i% = i% + 1
    a(i%) = Dir
  Loop
  r% = SelectBox(i% & " files found",,a)
End Sub
```

```
Sub Main()
  'This last example uses the Do...Until Loop, which performs the
  'iteration first, checks the condition, and repeats if the
  'condition is True.

  Dim a$(100)
  i% = -1
  Do
    i% = i% + 1
    If i% = 0 Then
      a(i%) = Dir("*")
    Else
      a(i%) = Dir
    End If
  Loop Until (a(i%) = "") Or (i% = 100)
  r% = SelectBox(i% & " files found",,a)
End Sub
```

See Also `For...Next` (statement); `While ...WEnd` (statement).

Notes: Due to errors in program logic, you can inadvertently create infinite loops in your code. You can break out of infinite loops using Ctrl+Break.

DoEvents (function)

Syntax `DoEvents[()]`

Description Yields control to other applications, returning an `Integer` 0.

Comments This statement yields control to the operating system, allowing other applications to process mouse, keyboard, and other messages.

If a `SendKeys` statement is active, this statement waits until all the keys in the queue have been processed.

Example The following routine explicitly yields to allow other applications to execute and refresh on a regular basis.

```
Sub Main()
  Open "test.txt" For Output As #1
  For i = 1 To 10000
    Print #1,"This is a test of the system and such."
    r = DoEvents
  Next i
  MsgBox "The DoEvents return value is: " & r
  Close #1
End Sub
```

See Also `DoEvents` (statement).

DoEvents (statement)

Syntax `DoEvents`

Description Yields control to other applications.

Comments This statement yields control to the operating system, allowing other applications to process mouse, keyboard, and other messages.

If a `SendKeys` statement is active, this statement waits until all the keys in the queue have been processed.

Examples This first example shows a script that takes a long time and hogs the system. The following routine explicitly yields to allow other applications to execute and refresh on a regular basis.

```
Sub Main()
  Open "test.txt" For Output As #1
  For i = 1 To 10000
    Print #1,"This is a test of the system and stuff."
    DoEvents
  Next i
  Close #1
End Sub
```

In this second example, the DoEvents statement is used to wait until the queue has been completely flushed.

```
Sub Main()
  id = Shell("notepad.exe",3)     'Start new instance of Notepad.
  SendKeys "This is a test.",False  'Send some keys.
  DoEvents                  'Wait for the keys to play back.
End Sub
```

See Also `DoEvents` (function).

Double (data type)

Syntax	**`Double`**
Description	A data type used to declare variables capable of holding real numbers with 15–16 digits of precision.

Comments **`Double`** variables are used to hold numbers within the following ranges:

Sign	**Range**
Negative	–**`1.797693134862315E308 <=`** *double* **`<= -4.94066E-324`**
Positive	**`4.94066E-324 <=`** *double* **`<= 1.797693134862315E308`**

The type-declaration character for **`Double`** is #.

Storage

- Internally, doubles are 8-byte (64-bit) IEEE values. Thus, when appearing within a structure, doubles require 8 bytes of storage. When used with binary or random files, 8 bytes of storage are required.

Each **`Double`** consists of the following

- A 1-bit sign
- An 11-bit exponent
- A 53-bit significand (mantissa)

See Also **`Currency`** (data type); **`Date`** (data type); **`Integer`** (data type); **`Long`** (data type); **`Object`** (data type); **`Single`** (data type); **`String`** (data type); **`Variant`** (data type); **`Boolean`** (data type); **`Def`***Type* (statement); **`CDbl`** (function).

DropListBox (statement)

Syntax	**`DropListBox`** *X*, *Y*, *width*, *height*, *ArrayVariable*, *.Identifier*
Description	Creates a drop list box within a dialog box template.

Comments

When the dialog box is invoked, the drop list box will be filled with the elements contained in *ArrayVariable*. Drop list boxes are similar to combo boxes, with the following exceptions:

- The list box portion of a drop list box is not opened by default. The user must open it by clicking the down arrow.
- The user cannot type into a drop list box. Only items from the list box may be selected. With combo boxes, the user can type the name of an item from the list directly or type the name of an item that is not contained within the combo box.

This statement can only appear within a dialog box template (i.e., between the **`Begin Dialog`** and **`End Dialog`** statements).

The **`DropListBox`** statement requires the following parameters:

Parameter	Description
X, *Y*	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
ArrayVariable	Single-dimensioned array used to initialize the elements of the drop list box. If this array has no dimensions, then the drop list box will be initialized with no elements. A runtime error results if the specified array contains more than one dimension. *ArrayVariable* can specify an array of any fundamental data type (structures are not allowed). **`Null`** and **`Empty`** values are treated as zero-length strings.
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**). This parameter also creates an integer variable whose value corresponds to the index of the drop list box's selection (0 is the first item, 1 is the second, and so on). This variable can be accessed using the following syntax: *DialogVariable.Identifier*

Example This example allows the user to choose a field name from a drop list box.

```
Sub Main()
  Dim FieldNames$(4)
  FieldNames$(0) = "Last Name"
  FieldNames$(1) = "First Name"
  FieldNames$(2) = "Zip Code"
  FieldNames$(3) = "State"
  FieldNames$(4) = "City"
  Begin Dialog FindTemplate 16,32,168,48,"Find"
    Text 8,8,37,8,"&Find what:"
    DropListBox 48,6,64,80,FieldNames,.WhichField
    OKButton 120,7,40,14
    CancelButton 120,27,40,14
  End Dialog
  Dim FindDialog As FindTemplate
  FindDialog.WhichField = 1
  Dialog FindDialog
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

E

ebAbort (constant)

Description Returned by the **`MsgBox`** function when the Abort button is chosen.

Comments This constant is equal to 3.

Example This example displays a dialog box with Abort, Retry, and Ignore buttons.

```
Sub Main()
Again:
  rc% = MsgBox("Do you want to continue?",ebAbortRetryIgnore)
  If rc% = ebAbort or rc% = ebIgnore Then
    End
  ElseIf rc% = ebRetry Then
    Goto Again
  End If
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebAbortRetryIgnore (constant)

Description Used by the **`MsgBox`** statement and function.

Comments This constant is equal to 2.

Example This example displays a dialog box with Abort, Retry, and Ignore buttons.

```
Sub Main()
Again:
  rc% = MsgBox("Do you want to continue?",ebAbortRetryIgnore)
  If rc% = ebAbort or rc% = ebIgnore Then
    End
  ElseIf rc% = ebRetry Then
    Goto Again
  End If
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebApplicationModal (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 0.

Example This example displays an application-modal dialog box (which is the default).

```
Sub Main()
  MsgBox "This is application-modal.",ebOKOnly Or ebApplicationModal
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebArchive (constant)

Description Bit position of a file attribute indicating that a file hasn't been backed up.

Comments This constant is equal to 32.

Example This example dimensions an array and fills it with filenames with the Archive bit set.

```
Sub Main()
  Dim s$()
  FileList s$,"*",ebArchive
  a% = SelectBox("Archived Files", "Choose one", s$)
  If a% >= 0 Then     'If a% is -1, then the user pressed Cancel.
    MsgBox "You selected Archive file: " & s$(a)
  Else
    MsgBox "No selection made."
  End If
End Sub
```

See Also **`Dir, Dir$`** (functions); **`FileList`** (statement); **`SetAttr`** (statement); **`GetAttr`** (function); **`FileAttr`** (function).

ebBold (constant)

Description Used with the **`Text`** and **`TextBox`** statement to specify a bold font.

Comments This constant is equal to 2.

Example

```
Sub Main()
  Begin Dialog UserDialog 16,32,232,132,"Bold Font Demo"
    Text 10,10,200,20,"Hello, world.",,"Helv",24,ebBold
    TextBox 10,35,200,20,.Edit,,"Times New Roman",16,ebBold
    OKButton 96,110,40,14
  End Dialog
  Dim a As UserDialog
  Dialog a
End Sub
```

See Also **`Text`** (statement), **`TextBox`** (statement).

ebBoldItalic (constant)

Description Used with the **`Text`** and **`TextBox`** statement to specify a bold-italic font.

Comments This constant is equal to 6.

Example

```
Sub Main()
  Begin Dialog UserDialog 16,32,232,132,"Bold-Italic Font Demo"
    Text 10,10,200,20,"Hello, world.",,"Helv",24,ebBoldItalic
    TextBox 10,35,200,20,.Edit,,"Times New Roman",16,ebBoldItalic
    OKButton 96,110,40,14
  End Dialog
  Dim a As UserDialog
  Dialog a
End Sub
```

See Also **`Text`** (statement), **`TextBox`** (statement).

ebBoolean (constant)

Description Number representing the type of a **`Boolean`** variant.

Comments This constant is equal to 11.

Example

```
Sub Main()
  Dim MyVariant as variant
  MyVariant = True
  If VarType(MyVariant) = ebBoolean Then
    MyVariant = 5.5
  End If
End Sub
```

See Also **`VarType`** (function); **`Variant`** (data type).

ebCancel (constant)

Description Returned by the **`MsgBox`** function when the Cancel button is chosen.

Comments This constant is equal to 2.

Example

```
Sub Main()
  'Invoke MsgBox and check whether the Cancel button was pressed.
  rc% = MsgBox("Are you sure you want to quit?",ebOKCancel)
  If rc% = ebCancel Then
    MsgBox "The user clicked Cancel."
  End If
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebCritical (constant)

Description Used with the **MsgBox** statement and function.

Comments This constant is equal to 16.

Example

```
Sub Main()
'Invoke MsgBox with Abort, Retry, and Ignore buttons and a Stop icon.
  rc% = MsgBox("Disk drive door is open.",ebAbortRetryIgnore Or  ebCritical)
   If rc% = 3 Then
    'The user selected Abort from the dialog box.
    MsgBox "The user clicked Abort."
  End If
End Sub
```

See Also **MsgBox** (function); **MsgBox** (statement).

ebCurrency (constant)

Description Number representing the type of a **Currency** variant.

Comments This constant is equal to 6.

Example This example checks to see whether a variant is of type Currency.

```
Sub Main()
  Dim MyVariant
  If VarType(MyVariant) = ebCurrency Then
    MsgBox "Variant is Currency."
  End If
End Sub
```

See Also **VarType** (function); **Variant** (data type).

ebDataObject (constant)

Description Number representing the type of a data object variant.

Comments This constant is equal to 13.

Example This example checks to see whether a variable is a data object.

```
Sub Main()
  Dim MyVariant as Variant
  If VarType(MyVariant) = ebDataObject Then
    MsgBox "Variant contains a data object."
  End If
End Sub
```

See Also **VarType** (function); **Variant** (data type).

ebError (constant)

Description Number representing the type of an error variant.

Comments This constant is equal to 10.

Example This example checks to see whether a variable is an error.

```
Function Div(ByVal a As Variant,ByVal b As Variant) As Variant
  On Error Resume Next
  Div = a / b
  If Err <> 0 Then Div = CVErr(Err)
End Function

Sub Main()
  a = InputBox("Please enter 1st number","Division Sample")
  b = InputBox("Please enter 2nd number","Division Sample")

  res = Div(a,b)

  If VarType(res) = ebError Then
    res = CStr(res)
    res = Error(Mid(res,7,Len(res)))
    MsgBox "'" & res & "' occurred"
  Else
    MsgBox "The result of the division is: " & res
  End If
End Sub
```

See Also `VarType` (function); `Variant` (data type).

ebDate (constant)

Description Number representing the type of a `Date` variant.

Comments This constant is equal to 7.

Example

```
Sub Main()
  Dim MyVariant as Variant
  If VarType(MyVariant) = ebDate Then
    MsgBox "This variable is a Date type!"
  Else
    MsgBox "This variable is not a Date type!"
  End If
End Sub
```

See Also `VarType` (function); `Variant` (data type).

ebDefaultButton1 (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 0.

Example This example invokes **`MsgBox`** with the focus on the OK button by default.

```
Sub Main()
  rc% = MsgBox("Are you sure you want to quit?",ebOKCancel Or  ebDefaultButton1)
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebDefaultButton2 (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 256.

Example This example invokes **`MsgBox`** with the focus on the Cancel button by default.

```
Sub Main()
  rc% = MsgBox("Are you sure you want to quit?",ebOKCancel Or  ebDefaultButton2)
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebDefaultButton3 (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 512.

Example This example invokes **`MsgBox`** with the focus on the Ignore button by default.

```
Sub Main()
  rc% = MsgBox("Disk drive door open.",ebAbortRetryIgnore Or   ebDefaultButton3)
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebDirectory (constant)

Description Bit position of a file attribute indicating that a file is a directory entry.

Comments This constant is equal to 16.

Example This example dimensions an array and fills it with directory names using the ebDirectory constant.

```
Sub Main()
  Dim s$()
  FileList s$,"c:\*",ebDirectory
  a% = SelectBox("Directories", "Choose one:", s$)
  If a% >= 0 Then
    MsgBox "You selected directory: " & s(a%)
  Else
    MsgBox "No selection made."
  End If
End Sub
```

See Also `Dir, Dir$` (functions); `FileList` (statement); `SetAttr` (statement); `GetAttr` (function); `FileAttr` (function).

ebDos (constant)

Description Used with the `AppType` or `FileType` functions to indicate a DOS application.

Comments This constant is equal to 1.

Example This example detects whether a DOS program was selected.

```
Sub Main()
  s$ = OpenFilename$("Run","Programs:*.exe")
  If s$ <> "" Then
    If FileType(s$) = ebDos Then
      MsgBox "You selected a DOS exe file."
    End If
  End If
End Sub
```

See Also `AppType` (function); `FileType` (function).

ebDouble (constant)

Description Number representing the type of a **`Double`** variant.

Comments This constant is equal to 5.

Example See **`ebSingle`** (constant).

See Also **`MsgBox`** (function); **`MsgBox`** (statement); **`VarType`** (function); **`Variant`** (data type).

ebEmpty (constant)

Description Number representing the type of an **`Empty`** variant.

Comments This constant is equal to 0.

Example

```
Sub Main()
  Dim MyVariant as Variant
  If VarType(MyVariant) = ebEmpty Then
    MsgBox "This variant has not been assigned a value yet!"
  End If
End Sub
```

See Also **`VarType`** (function); **`Variant`** (data type).

ebExclamation (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 48.

Example This example displays a dialog box with an OK button and an exclamation icon.

```
Sub Main()
  MsgBox "Out of memory saving to disk.",ebOKOnly Or ebExclamation
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebHidden (constant)

Description Bit position of a file attribute indicating that a file is hidden.

Comments This constant is equal to 2.

Example This example dimensions an array and fills it with filenames using the ebHidden attribute.

```
Sub Main()
  Dim s$()
  FileList s$,"*",ebHidden
  If ArrayDims(s$) = 0 Then
    MsgBox "No hidden files found!"
    End
  End If
  a% = SelectBox("Hidden Files","Choose one", s$)
  If a% >= 0 Then
    MsgBox "You selected hidden file " & s(a%)
  Else
    MsgBox "No selection made."
  End If
End Sub
```

See Also **`Dir, Dir$`** (functions); **`FileList`** (statement); **`SetAttr`** (statement); **`GetAttr`** (function); **`FileAttr`** (function).

ebIgnore (constant)

Description Returned by the **`MsgBox`** function when the Ignore button is chosen.

Comments This constant is equal to 5.

Example This example displays a critical error dialog box and sees what the user wants to do.

```
Sub Main()
  rc% = MsgBox("Printer out of paper.",ebAbortRetryIgnore)
  If rc% = ebIgnore Then
    'Continue printing here.
  End If
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebInformation (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 64.

Example This example displays a dialog box with the Information icon.

```
Sub Main()
  MsgBox "You just deleted your file!",ebOKOnly Or ebInformation
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebInteger (constant)

Description Number representing the type of an **`Integer`** variant.

Comments This constant is equal to 2.

Example This example defines a function that returns True if a variant contains an Integer value (either a 16-bit or 32-bit Integer).

```
Function IsInteger(v As Variant) As Boolean
  If VarType(v) = ebInteger Or VarType(v) = ebLong Then
    IsInteger = True
  Else
    IsInteger = False
  End If
End Function

Sub Main()
  Dim i as Integer
  i = 123
  If IsInteger(i) then
    Msgbox "i is an Integer."
  End If
End Sub
```

See Also **`VarType`** (function); **`Variant`** (data type).

ebItalic (constant)

Description Used with the **`Text`** and **`TextBox`** statement to specify an italic font.

Comments This constant is equal to 4.

Example

```
Sub Main()
  Begin Dialog UserDialog 16,32,232,132,"Italic Font Demo"
    Text 10,10,200,20,"Hello, world.",,"Helv",24,ebItalic
    TextBox 10,35,200,20,.Edit,,"Times New Roman",16,ebItalic
    OKButton 96,110,40,14
  End Dialog

  Dim a As UserDialog
  Dialog a
End Sub
```

See Also **`Text`** (statement), **`TextBox`** (statement).

ebLong (constant)

Description Number representing the type of a **`Long`** variant.

Comments This constant is equal to 3.

Example See **`ebInteger`** (constant).

See Also **`VarType`** (function); **`Variant`** (data type).

ebNo (constant)

Description Returned by the **`MsgBox`** function when the No button is chosen.

Comments This constant is equal to 7.

Example This example asks a question and queries the user's response.

```
Sub Main()
  rc% = MsgBox("Do you want to update the glossary?",ebYesNo)
  If rc% = ebNo Then
    MsgBox "The user clicked 'No'."   'Don't update glossary.
  End If
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebNone (constant)

Description Bit value used to select files with no other attributes.

Comments This value can be used with the **`Dir$`** and **`FileList`** commands. These functions will return only files with no attributes set when used with this constant. This constant is equal to 64.

Example This example dimensions an array and fills it with filenames with no attributes set.

```
Sub Main()
  Dim s$()
  FileList s$,"*",ebNone
  If ArrayDims(s$) = 0 Then
    MsgBox "No files found without attributes!"
    End
  End If
  a% = SelectBox("No Attributes", "Choose one", s$)
  If a% >= 0 Then
    MsgBox "You selected file " & s(a%)
  Else
    MsgBox "No selection made."
  End If
End Sub
```

See Also **`Dir, Dir$`** (functions); **`FileList`** (statement); **`SetAttr`** (statement); **`GetAttr`** (function); **`FileAttr`** (function).

ebNormal (constant)

Description Used to search for "normal" files.

Comments This value can be used with the **`Dir$`** and **`FileList`** commands and will return files with the Archive, Volume, ReadOnly, or no attributes set. It will not match files with Hidden, System, or Directory attributes. This constant is equal to 0.

Example This example dimensions an array and fills it with filenames with Normal attributes.

```
Sub Main()
  Dim s$()
  FileList s$,"*", ebNormal
  If ArrayDims(s$) = 0 Then
    MsgBox "No filesfound!"
    End
  End If
  a% = SelectBox("Normal Files", "Choose one", s$)
  If a% >= 0 Then
    MsgBox "You selected file " & s(a%)
  Else
    MsgBox "No selection made."
  End If
End Sub
```

See Also **`Dir, Dir$`** (functions); **`FileList`** (statement); **`SetAttr`** (statement); **`GetAttr`** (function); **`FileAttr`** (function).

ebNull (constant)

Description Number representing the type of a **`Null`** variant.

Comments This constant is equal to 1.

Example

```
Sub Main()
  Dim MyVariant
  MyVariant = Null
  If VarType(MyVariant) = ebNull Then
    MsgBox "This variant is Null"
  End If
End Sub
```

See Also **`VarType`** (function); **`Variant`** (data type).

ebObject (constant)

Description Number representing the type of an **`Object`** variant (an OLE automation object).

Comments This constant is equal to 9.

Example

```
Sub Main()
  Dim MyVariant
  If VarType(MyVariant) = ebObject Then
    MsgBox MyVariant.Value
  Else
    MsgBox "'MyVariant' is not an object."
  End If
End Sub
```

See Also **`VarType`** (function); **`Variant`** (data type).

ebOK (constant)

Description Returned by the **`MsgBox`** function when the OK button is chosen.

Comments This constant is equal to 1.

Example This example displays a dialog box that allows the user to cancel.

```
Sub Main()
  rc% = MsgBox("Are you sure you want to exit Windows?",ebOKCancel)
  If rc% = ebOK Then System.Exit
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebOKCancel (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 1.

Example This example displays a dialog box that allows the user to cancel.

```
Sub Main()
  rc% = MsgBox("Are you sure you want to exit Windows?",ebOKCancel)
  If rc% = ebOK Then System.Exit
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebOKOnly (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 0.

Example This example informs the user of what is going on (no options).

```
Sub Main()
  MsgBox "The system has been reset.",ebOKOnly
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebQuestion (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 32.

Example This example displays a dialog box with OK and Cancel buttons and a question icon.

```
Sub Main()
  rc% = MsgBox("OK to delete file?",ebOKCancel Or ebQuestion)
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebReadOnly (constant)

Description Bit position of a file attribute indicating that a file is read-only.

Comments This constant is equal to 1.

Example This example dimensions an array and fills it with filenames with ReadOnly attributes.

```
Sub Main()
  Dim s$()
  FileList s$, "*", ebReadOnly
  If ArrayDims(s$) = 0 Then
    MsgBox "No read only files found!"
    End
  End If
  a% = SelectBox("ReadOnly", "Choose one", s$)
  If a% >= 0 Then
    MsgBox "You selected file " & s(a%)
  Else
    MsgBox "No selection made."
  End If
End Sub
```

See Also `Dir, Dir$` (functions); `FileList` (statement); `SetAttr` (statement); `GetAttr` (function); `FileAttr` (function).

ebRegular (constant)

Description Used with the `Text` and `TextBox` statement to specify an normal-styled font (i.e., neither bold or italic).

Comments This constant is equal to 1.

Example

```
Sub Main()
  Begin Dialog UserDialog 16,32,232,132,"Regular Font Demo"
    Text 10,10,200,20,"Hello, world.",,"Helv",24,ebRegular
    TextBox 10,35,200,20,.Edit,,"Times New Roman",16,ebRegular
    OKButton 96,110,40,14
  End Dialog
  Dim a As UserDialog
  Dialog a
End Sub
```

See Also `Text` (statement), `TextBox` (statement).

ebRetry (constant)

Description Returned by the **`MsgBox`** function when the Retry button is chosen.

Comments This constant is equal to 4.

Example This example displays a Retry message box.

```
Sub Main()
  rc% = MsgBox("Unable to open file.",ebRetryCancel)
  If rc% = ebRetry Then
    MsgBox "User selected Retry."
  End If
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebRetryCancel (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 5.

Example This example invokes a dialog box with Retry and Cancel buttons.

```
Sub Main()
  rc% = MsgBox("Unable to open file.",ebRetryCancel)
End Sub
```

See Also **`MsgBox`** (function); **`MsgBox`** (statement).

ebSingle (constant)

Description Number representing the type of a **`Single`** variant.

Comments This constant is equal to 4.

Example This example defines a function that returns True if the passed variant is a Real number.

```
Function IsReal(v As Variant) As Boolean
  If VarType(v) = ebSingle Or VarType(v) = ebDouble Then
    IsReal = True
  Else
    IsReal = False
  End If
End Function

Sub Main()
  Dim i as Integer
  i = 123
  If IsReal(i) then
    Msgbox "i is Real."
  End If
End Sub
```

See Also **`VarType`** (function); **`Variant`** (data type).

ebString (constant)

Description Number representing the type of a **`String`** variant.

Comments This constant is equal to 8.

Example

```
Sub Main()
  Dim MyVariant as variant
  MyVariant = "This is a test."
  If VarType(MyVariant) = ebString Then
    MsgBox "Variant is a string."
  End If
End Sub
```

See Also **`VarType`** (function); **`Variant`** (data type).

ebSystem (constant)

Description Bit position of a file attribute indicating that a file is a system file.

Comments This constant is equal to 4.

Example This example dimensions an array and fills it with filenames with System attributes.

```
Sub Main()
  Dim s$()
  FileList s$,"*",ebSystem
  a% = SelectBox("System Files", "Choose one", s$)
  If a% >= 0 Then
    MsgBox "You selected file " & s(a%)
  Else
    MsgBox "No selection made."
  End If
End Sub
```

See Also **`Dir, Dir$`** (functions); **`FileList`** (statement); **`SetAttr`** (statement); **`GetAttr`** (function); **`FileAttr`** (function).

ebSystemModal (constant)

Description Used with the **`MsgBox`** statement and function.

Comments This constant is equal to 4096.

Example

```
Sub Main()
  MsgBox "All applications are halted!",ebSystemModal
End Sub
```

See Also **`ebApplicationModal`** (constant); Constants (topic); **`MsgBox`** (function); **`MsgBox`** (statement).

ebVariant (constant)

Description Number representing the type of a **`Variant`**.

Comments Currently, it is not possible for variants to use this subtype. This constant is equal to 12.

See Also **`VarType`** (function); **`Variant`** (data type).

ebVolume (constant)

Description Bit position of a file attribute indicating that a file is the volume label.

Comments This constant is equal to 8.

Example This example dimensions an array and fills it with filenames with Volume attributes.

```
Sub Main()
  Dim s$()
  FileList s$, "*", ebVolume
  If ArrayDims(s$) > 0 Then
    MsgBox "The volume name is: " & s(1)
  Else
    MsgBox "No volumes found."
  End If
End Sub
```

See Also **`Dir, Dir$`** (functions); **`FileList`** (statement); **`SetAttr`** (statement); **`GetAttr`** (function); **`FileAttr`** (function).

ebWin32 (constant)

Description Used with the **`Basic.OS`** property to indicate the 32-bit Windows version of the Basic Control Engine.

Comments This constant is equal to 2.

The **`Basic.OS`** property returns this value when running under any of the following operating systems:

- Microsoft Windows 95
- Microsoft Windows NT Workstation (Intel, Alpha, MIPS, PowerPC)
- Microsoft Windows NT Server (Intel, Alpha, MIPS, PowerPC)
- Microsoft Win32s running under Windows 3.1

Example

```
Sub Main()
  If Basic.OS = ebWin32 Then MsgBox "Running under Win32."
End Sub
```

See Also **`Basic.OS`** (property).

ebYes (constant)

Description Returned by the **MsgBox** function when the Yes button is chosen.

Comments This constant is equal to 6.

Example This example queries the user for a response.

```
Sub Main()
  rc% = MsgBox("Overwrite file?",ebYesNoCancel)
  If rc% = ebYes Then
    MsgBox "You elected to overwrite the file."
  End If
End Sub
```

See Also **MsgBox** (function); **MsgBox** (statement).

ebYesNo (constant)

Description Used with the **MsgBox** statement and function.

Comments This constant is equal to 4.

Example This example displays a dialog box with Yes and No buttons.

```
Sub Main()
  rc% = MsgBox("Are you sure you want to remove all formatting?",ebYesNo)
End Sub
```

See Also **MsgBox** (function); **MsgBox** (statement).

ebYesNoCancel (constant)

Description Used with the **MsgBox** statement and function.

Comments This constant is equal to 3.

Example This example displays a dialog box with Yes, No, and Cancel buttons.

```
Sub Main()
  rc% = MsgBox("Format drive C:?",ebYesNoCancel)
  If rc% = ebYes Then
    MsgBox "The user chose Yes."
  End If
End Sub
```

See Also **MsgBox** (function); **MsgBox** (statement).

Empty (constant)

Description Constant representing a variant of type 0.

Comments The **`Empty`** value has special meaning indicating that a **`Variant`** is uninitialized.

When **`Empty`** is assigned to numbers, the value 0 is assigned. When **`Empty`** is assigned to a **`String`**, the string is assigned a zero-length string.

Example

```
Sub Main()
  Dim a As Variant
  a = Empty
  MsgBox "This string is" & a & "concatenated with Empty"
  MsgBox "5 + Empty = " & (5 + a)
End Sub
```

See Also **`Null`** (constant); **`Variant`** (data type); **`VarType`** (function).

End (statement)

Syntax **End**

Description Terminates execution of the current script, closing all open files.

Example This example uses the End statement to stop execution.

```
Sub Main()
  MsgBox "The next line will terminate the script."
  End
End Sub
```

See Also **`Close`** (statement); **`Stop`** (statement); **`Exit For`** (statement); **`Exit Do`** (statement); **`Exit Function`** (statement); **`Exit Sub`** (function).

Environ, Environ$ (functions)

Syntax `Environ[$](`*variable$* | *VariableNumber*)

Description Returns the value of the specified environment variable.

Comments **`Environ$`** returns a **`String`**, whereas **`Environ`** returns a **`String`** variant.

If *variable$* is specified, then this function looks for that *variable$* in the environment. If the *variable$* name cannot be found, then a zero-length string is returned.

If *VariableNumber* is specified, then this function looks for the *N*th variable within the environment (the first variable being number 1). If there is no such environment variable, then a zero-length string is returned. Otherwise, the entire entry from the environment is returned in the following format:

```
variable = value
```

Example This example looks for the DOS Comspec variable and displays the value in a dialog box.

```
Sub Main()
  Dim a$(1)
  a$(1) = Environ("SITE_Root")
  MsgBox "My CIMPLICITY project directory is: " & a$(1)
End Sub
```

See Also **`Command, Command$`** (functions).

EOF (function)

Syntax **`EOF`**(*filenumber*)

Description Returns **`True`** if the end-of-file has been reached for the given file; returns **`False`** otherwise.

Comments The *filenumber* parameter is an **`Integer`** used by the Basic Control Engine to refer to the open file—the number passed to the **`Open`** statement.

With sequential files, **`EOF`** returns **`True`** when the end of the file has been reached (i.e., the next file read command will result in a runtime error).

With **`Random`** or **`Binary`** files, **`EOF`** returns **`True`** after an attempt has been made to read beyond the end of the file. Thus, **`EOF`** will only return **`True`** when **`Get`** was unable to read the entire record.

Example This example opens the autoexec.bat file and reads lines from the file until the end-of-file is reached.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  file$ = "c:\autoexec.bat"
  Open file$ For Input As #1
  Do While Not EOF(1)
    Line Input #1,newline
  Loop
  Close
  MsgBox "The last line of '" & file$ "' is:" & crlf & crlf & newline
End Sub
```

See Also **`Open`** (statement); **`LOF`** (function).

Eqv (operator)

Syntax *expression1* **`Eqv`** *expression2*

Description Performs a logical or binary equivalence on two expressions.

Comments If both expressions are either **`Boolean`**, **`Boolean`** variants, or **`Null`** variants, then a logical equivalence is performed as follows:

If the first expression is	and the second expression is	then the result is
`True`	**`True`**	**`True`**
`True`	**`False`**	**`False`**
`False`	**`True`**	**`False`**
`False`	**`False`**	**`True`**

If either expression is **`Null`**, then **`Null`** is returned.

Binary Equivalence

If the two expressions are **`Integer`**, then a binary equivalence is performed, returning an **`Integer`** result. All other numeric types (including **`Empty`** variants) are converted to **`Long`** and a binary equivalence is then performed, returning a **`Long`** result.

Binary equivalence forms a new value based on a bit-by-bit comparison of the binary representations of the two expressions, according to the following table:

1	Eqv	1	=	1	Example:
0	Eqv	1	=	0	5 01101001
1	Eqv	0	=	0	6 10101010
0	Eqv	0	=	1	Eqv 00101000

Example This example assigns False to A, performs some equivalent operations, and displays a dialog box with the result. Since A is equivalent to False, and False is equivalent to 0, and by definition, A = 0, then the dialog box will display "A is False."

```
Sub Main()
  a = False
  If ((a Eqv False) And (False Eqv 0) And (a = 0)) Then
    MsgBox "a is False."
  Else
    MsgBox "a is True."
  End If
End Sub
```

See Also Operator Precedence (topic); **`Or`** (operator); **`Xor`** (operator); **`Imp`** (operator); **`And`** (operator).

Erase (statement)

Syntax	**`Erase`** *array1 [,array2]...*
Description	Erases the elements of the specified arrays.

Comments

For dynamic arrays, the elements are erased, and the array is redimensioned to have no dimensions (and therefore no elements). For fixed arrays, only the elements are erased; the array dimensions are not changed.

After a dynamic array is erased, the array will contain no elements and no dimensions. Thus, before the array can be used by your program, the dimensions must be reestablished using the **`Redim`** statement.

Up to 32 parameters can be specified with the **`Erase`** statement.

The meaning of erasing an array element depends on the type of the element being erased:

Element Type	What Erase Does to That Element
`Integer`	Sets the element to 0.
`Boolean`	Sets the element to **`False`**.
`Long`	Sets the element to 0.
`Double`	Sets the element to 0.0.
`Date`	Sets the element to December 30, 1899.
`Single`	Sets the element to 0.0.
`String` (variable-length)	Frees the string, then sets the element to a zero-length string.
`String` (fixed-length)	Sets every character of each element to zero (**`Chr$(0)`**).
`Object`	Decrements the reference count and sets the element to **`Nothing`**.
`Variant`	Sets the element to **`Empty`**.
User-defined type	Sets each structure element as a separate variable.

Example

This example fills an array with a list of available disk drives, displays the list, erases the array and then redisplays the list.

```
Sub Main()
  Dim a$(10)    'Declare an array.
  DiskDrives a    'Fill element 1 with a list of available disk drives.
  r = SelectBox("Array Before Erase",,a)
  Erase a$        'Erase all elements in the array.
  r = SelectBox("Array After Erase",,a)
End Sub
```

See Also

`Redim` (statement); Arrays (topic).

Erl (function)

Syntax `Erl[()]`

Description Returns the line number of the most recent error.

Comments The first line of the script is 1, the second line is 2, and so on.

The internal value of **`Erl`** is reset to 0 with any of the following statements: **`Resume`**, **`Exit Sub`**, **`Exit Function`**. Thus, if you want to use this value outside an error handler, you must assign it to a variable.

Example This example generates an error and then determines the line on which the error occurred.

```
Sub Main()
  Dim i As Integer
  On Error Goto Trap1
  i = 32767         'Generate an error--overflow.
  i = i + 1
  Exit Sub
Trap1:
  MsgBox "Error on line: " & Erl
  Exit Sub       'Reset the error handler.
End Sub
```

See Also **`Err`** (function); **`Error, Error$`** (functions); Error Handling (topic).

Err (function)

Syntax **`Err[()]`**

Description Returns a **`Long`** representing the error that caused the current error trap.

Comments The **`Err`** function can only be used while within an error trap.

The internal value of **`Err`** is reset to 0 with any of the following statements: **`Resume`**, **`Exit Sub`**, **`Exit Function`**. Thus, if you want to use this value outside an error handler, you must assign it to a variable.

Example This example forces error 10, with a subsequent transfer to the TestError label. TestError tests the error and, if not error 55, resets Err to 999 (user-defined error) and returns to the Main subroutine.

```
Sub Main()
  On Error Goto TestError
  Error 10
  MsgBox "The returned error is: '" & Err & " - " & Error$ & "'"
  Exit Sub

TestError:
  If Err = 55 Then       'File already open.
    MsgBox "Cannot copy an open file. Close it and try again."
  Else
    MsgBox "Error '" & Err & "' has occurred!"
    Err = 999
  End If
  Resume Next
End Sub
```

See Also **`Erl`** (function); **`Error, Error$`** (functions); Error Handling (topic).

Err (statement)

Syntax **`Err =`** *value*

Description Sets the value returned by the **`Err`** function to a specific **`Integer`** value.

Comments Only positive values less than or equal to 32767 can be used.

Setting *value* to **`-1`** has the side effect of resetting the error state. This allows you to perform error trapping within an error handler. The ability to reset the error handler while within an error trap is not standard Basic. Normally, the error handler is reset only with the **`Resume`**, **`Exit Sub`**, or **`Exit Function`** statement.

Example This example forces error 10, with a subsequent transfer to the TestError label. TestError tests the error and, if not error 55, resets Err to 999 (user-defined error) and returns to the Main subroutine.

```
Sub Main()
  On Error Goto TestError
  Error 10
  MsgBox "The returned error is: '" & Err() & " - " & Error$ & "'"
  Exit Sub

TestError:
  If Err = 55 Then      'File already open.
    MsgBox "Cannot copy an open file. Close it and try again."
  Else
    MsgBox "Error '" & Err & "' has occurred."
    Err = 999
  End If
  Resume Next
End Sub
```

See Also **`Error`** (statement); Error Handling (topic).

Error (statement)

Syntax **`Error`** *errornumber*

Description Simulates the occurrence of the given runtime error.

Comments The *errornumber* parameter is any **`Integer`** containing either a built-in error number or a user-defined error number. The **`Err`** function can be used within the error trap handler to determine the value of the error.

Example This example forces error 10, with a subsequent transfer to the TestError label. TestError tests the error and, if not error 55, resets Err to 999 (user-defined error) and returns to the Main subroutine.

```
Sub Main()
  On Error Goto TestError
  Error 10
  MsgBox "The returned error is: '" & Err() & " - " & Error$ & "'"
  Exit Sub

TestError:
  If Err = 55 Then      'File already open.
    MsgBox "Cannot copy an open file. Close it and try again."
  Else
    MsgBox "Error '" & Err & "' has occurred."
    Err = 999
  End If
  Resume Next
End Sub
```

See Also **`Err`** (statement); Error Handling (topic).

Error Handling (topic)

Error Handlers

The Basic Control Engine supports nested error handlers. When an error occurs within a subroutine, the Basic Control Engine checks for an **`On Error`** handler within the currently executing subroutine or function. An error handler is defined as follows:

```
Sub foo()
  On Error Goto catch
  'Do something here.
  Exit Sub

catch:
  'Handle error here.
End Sub
```

Error handlers have a life local to the procedure in which they are defined. The error is reset when (1) another **`On Error`** statement is encountered, (2) an error occurs, or (3) the procedure returns.

Cascading Errors

If a runtime error occurs and no **`On Error`** handler is defined within the currently executing procedure, then the Basic Control Engine returns to the calling procedure and executes the error handler there. This process repeats until a procedure is found that contains an error handler or until there are no more procedures. If an error is not trapped or if an error occurs within the error handler, then the Basic Control Engine displays an error message, halting execution of the script.

Once an error handler has control, it must address the condition that caused the error and resume execution with the **`Resume`** statement. This statement resets the error handler, transferring execution to an appropriate place within the current procedure. An error is displayed if a procedure exits without first executing **`Resume`** or **`Exit`**.

Visual Basic Compatibility

Where possible, the Basic Control Engine has the same error numbers and error messages as Visual Basic. This is useful for porting scripts between environments.

Handling errors in the Basic Control Engine involves querying the error number or error text using the **`Error$`** or **`Err`** function. Since this is the only way to handle errors in the Basic Control Engine, compatibility with Visual Basic's error numbers and messages is essential.

Errors fall into three categories:

1. **Visual Basic–compatible errors:** These errors, numbered between 0 and 799, are numbered and named according to the errors supported by Visual Basic.
2. **Basic Control Engine script errors:** These errors, numbered from 800 to 999, are unique to the Basic Control Engine..
3. **User-defined errors:** These errors, equal to or greater than 1,000, are available for use by extensions or by the script itself.

You can intercept trappable errors using the Basic Control Engine's **`On Error`** construct. Almost all errors in the Basic Control Engine are trappable except for various system errors.

Error, Error$ (functions)

Syntax

`Error[$][(`*errornumber***`)]`**

Description

Returns a **`String`** containing the text corresponding to the given error number or the most recent error.

Comments

`Error$` returns a **`String`**, whereas **`Error`** returns a **`String`** variant.

The *errornumber* parameter is an **`Integer`** containing the number of the error message to retrieve. If this parameter is omitted, then the function returns the text corresponding to the most recent runtime error. If no runtime error has occurred, then a zero-length string is returned.

If the **`Error`** statement was used to generate a user-defined runtime error, then this function will return a zero-length string (**`""`**).

Example

This example forces error 10, with a subsequent transfer to the TestError label. TestError tests the error and, if not error 55, resets Err to 999 (user-defined error) and returns to the Main subroutine.

```
Sub Main()
  On Error Goto TestError
  Error 10
  MsgBox "The returned error is: '" & Err & " - " & Error & "'"
  Exit Sub

TestError:
  If Err = 55 Then       'File already open.
    MsgBox "Cannot copy an open file. Close it and try again."
  Else
    MsgBox "Error '" & Err & "' has occurred."
    Err = 999
  End If
  Resume Next
End Sub
```

See Also

`Erl` (function); **`Err`** (function); Error Handling (topic).

Exit Do (statement)

Syntax `Exit Do`

Description Causes execution to continue on the statement following the **Loop** clause.

Comments This statement can only appear within a **Do...Loop** statement.

Example This example will load an array with directory entries unless there are more than ten entries-in which case, the Exit Do terminates the loop.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim a$(5)
  Do
    i% = i% + 1
    If i% = 1 Then
      a(i%) = Dir("*")
    Else
      a(i%) = Dir
    End If
    If i% >= 5 Then Exit Do
  Loop While (a(i%) <> "")

  If i% = 5 Then
    MsgBox i% & " directory entries processed!"
  Else
    MsgBox "Less than " & i% & " entries processed!"
  End If
End Sub
```

See Also **Stop** (statement); **Exit For** (statement); **Exit Function** (statement); **Exit Sub** (statement); **End** (function); **Do...Loop** (statement).

Exit For (statement)

Syntax `Exit For`

Description Causes execution to exit the innermost **`For`** loop, continuing execution on the line following the **`Next`** statement.

Comments This statement can only appear within a **`For...Next`** block.

Example This example enters a large user-defined cycle, performs a calculation and exits the For...Next loop when the result exceeds a certain value.

```
Const critical_level = 500

Sub Main()
  num = InputBox("Please enter the number of cycles","Cycles")
  For i = 1 To Val(num)
    newpressure = i * 2
    If newpressure >= critical_level Then Exit For
  Next i

  MsgBox "The valve pressure is: " & newpressure
End Sub
```

See Also **`Stop`** (statement); **`Exit Do`** (statement); **`Exit Function`** (statement); **`Exit Sub`** (statement); **End** (statement); **`For...Next`** (statement).

Exit Function (statement)

Syntax `Exit Function`

Description Causes execution to exit the current function, continuing execution on the statement following the call to this function.

Comments This statement can only appear within a function.

Example This function displays a message and then terminates with Exit Function.

```
Function Test_Exit() As Integer
  MsgBox "Testing function exit, returning to Main()."
  Test_Exit = 0
  Exit Function
  MsgBox "This line should never execute."
End Function

Sub Main()
  a% = Test_Exit()
  MsgBox "This is the last line of Main()."
End Sub
```

See Also **`Stop`** (statement); **`Exit For`** (statement); **`Exit Do`** (statement); **`Exit Sub`** (statement); **End** (statement); **`Function...End Function`** (statement).

Exit Sub (statement)

Syntax `Exit Sub`

Description Causes execution to exit the current subroutine, continuing execution on the statement following the call to this subroutine.

Comments This statement can appear anywhere within a subroutine. It cannot appear within a function.

Example This example displays a dialog box and then exits. The last line should never execute because of the Exit Sub statement.

```
Sub Main()
  MsgBox "Terminating Main()."
  Exit Sub
  MsgBox "Still here in Main()."
End Sub
```

See Also **`Stop`** (statement); **`Exit For`** (statement); **`Exit Do`** (statement); **`Exit Function`** (statement); **`End`** (function); **`Sub...End Sub`** (statement).

Exp (function)

Syntax **`Exp`**(*value*)

Description Returns the value of *e* raised to the power of *value.*

Comments The *value* parameter is a **`Double`** within the following range:

`0 <=` ***value*** **`<= 709.782712893.`**

A runtime error is generated if *value* is out of the range specified above.

The value of e is **`2.71828`**.

Example This example assigns a to e raised to the 12.4 power and displays it in a dialog box.

```
Sub Main()
  a# = Exp(12.4)
  MsgBox "e to the 12.4 power is: " & a#
End Sub
```

See Also **`Log`** (function).

Expression Evaluation (topic)

Basic Control Engine scripts allows expressions to involve data of different types. When this occurs, the two arguments are converted to be of the same type by promoting the less precise operand to the same type as the more precise operand. For example, the Basic Control Engine will promote the value of **`i%`** to a **`Double`** in the following expression:

```
result# = i% * d#
```

In some cases, the data type to which each operand is promoted is different than that of the most precise operand. This is dependent on the operator and the data types of the two operands and is noted in the description of each operator.

If an operation is performed between a numeric expression and a **`String`** expression, then the **`String`** expression is usually converted to be of the same type as the numeric expression. For example, the following expression converts the **`String`** expression to an **`Integer`** before performing the multiplication:

```
result = 10 * "2"   'Result is equal to 20.
```

There are exceptions to this rule as noted in the description of the individual operators.

Type Coercion

The Basic Control Engine performs numeric type conversion automatically. Automatic conversions sometimes result in overflow errors, as shown in the following example:

```
d# = 45354
i% = d#
```

In this example, an overflow error is generated because the value contained in **`d#`** is larger than the maximum size of an **`Integer`**.

Rounding

When floating-point values (**`Single`** or **`Double`**) are converted to integer values (**`Integer`** or **`Long`**), the fractional part of the floating-point number is lost, rounding to the nearest integer value. The Basic Control Engine uses Baker's rounding:

- If the fractional part is larger than .5, the number is rounded up.
- If the fractional part is smaller than .5, the number is rounded down.
- If the fractional part is equal to .5, then the number is rounded up if it is odd and down if it is even.

The following table shows sample values before and after rounding:

Before Rounding	After Rounding to Whole Number
2.1	2
4.6	5
2.5	2
3.5	4

Default Properties

When an OLE object variable or an **`Object`** variant is used with numerical operators such as addition or subtraction, then the default property of that object is automatically retrieved. For example, consider the following:

```
Dim Excel As Object
Set Excel = GetObject(,"Excel.Application")
MsgBox "This application is " & Excel
```

The above example displays **This application is Microsoft Excel** in a dialog box. When the variable **`Excel`** is used within the expression, the default property is automatically retrieved, which, in this case, is the string **Microsoft Excel.** Considering that the default property of the **`Excel`** object is **`.Value`**, then the following two statements are equivalent:

```
MsgBox "This application is " & Excel
MsgBox "This application is " & Excel.Value
```

F

False (constant)

Description **`Boolean`** constant whose value is **`False`**.

Comments Used in conditionals and **`Boolean`** expressions.

Example This example assigns False to a, performs some equivalent operations, and displays a dialog box with the result. Since a is equivalent to False, and False is equivalent to 0, and by definition, a = 0, then the dialog box will display "**a is False**."

```
Sub Main()
  a = False
  If ((a = False) And (False Eqv 0) And (a = 0)) Then
    MsgBox "a is False."
  Else
    MsgBox "a is True."
  End If
End Sub
```

See Also **`True`** (constant); Constants (topic); **`Boolean`** (data type).

FileAttr (function)

Syntax **`FileAttr`**(*filenumber, attribute*)

Description Returns an **`Integer`** specifying the file mode (if *attribute* is 1) or the operating system file handle (if *attribute* is 2).

Comments The **`FileAttr`** function takes the following parameters:

Parameter	Description
filenumber	**`Integer`** value used by Basic Control Engine to refer to the open file—the number passed to the **`Open`** statement.
attribute	**`Integer`** specifying the type of value to be returned. If *attribute* is 1, then one of the following values is returned:

1	**Input**
2	**Output**
4	**Random**
8	**Append**
32	**Binary**

If *attribute* is 2, then the operating system file handle is returned. On most systems, this is a special **`Integer`** value identifying the file.

Example This example opens a file for input, reads the file attributes, and determines the file mode for which it was opened. The result is displayed in a dialog box.

```
Sub Main()
  Open "c:\autoexec.bat" For Input As #1
  a% = FileAttr(1,1)
  Select Case a%
    Case 1
      MsgBox "Opened for input."
    Case 2
      MsgBox "Opened for output."
    Case 4
      MsgBox "Opened for random."
    Case 8
      MsgBox "Opened for append."
    Case 32
      MsgBox "Opened for binary."
    Case Else
      MsgBox "Unknown file mode."
    End Select
  a% = FileAttr(1,2)
  MsgBox "File handle is: " & a%
  Close
End Sub
```

See Also **`FileLen`** (function); **`GetAttr`** (function); **`FileType`** (function); **`FileExists`** (function); **`Open`** (statement); **`SetAttr`** (statement).

FileCopy (statement)

Syntax **`FileCopy`** *source$, destination$*

Description Copies a *source$* file to a *destination$* file.

Comments The **`FileCopy`** function takes the following parameters:

Parameter	**Description**
source$	**`String`** containing the name of a single file to copy. The *source$* parameter cannot contain wildcards (**`?`** or **`*`**) but may contain path information.
destination$	**`String`** containing a single, unique destination file, which may contain a drive and path specification.

The file will be copied and renamed if the *source$* and *destination$* filenames are not the same.

Some platforms do not support drive letters and may not support dots to indicate current and parent directories.

Example This example copies the autoexec.bat file to "autoexec.sav", then opens the copied file and tries to copy it again--which generates an error.

```
Sub Main()
  On Error Goto ErrHandler
  FileCopy "c:\autoexec.bat","c:\autoexec.sav"
  Open "c:\autoexec.sav" For Input As # 1
  FileCopy "c:\autoexec.sav","c:\autoexec.sv2"
  Close
  Exit Sub

ErrHandler:
  If Err = 55 Then       'File already open.
    MsgBox "Cannot copy an open file. Close it and try again."
  Else
    MsgBox "An unspecified file copy error has occurred."
  End If
  Resume Next
End Sub
```

See Also **`Kill`** (statement); **`Name`** (statement).

FileDateTime (function)

Syntax **`FileDateTime`**(*filename$*)

Description Returns a **`Date`** variant representing the date and time of the last modification of a file.

Comments This function retrieves the date and time of the last modification of the file specified by *filename$* (wildcards are not allowed). A runtime error results if the file does not exist. The value returned can be used with the date/time functions (i.e., **`Year`**, **`Month`**, **`Day`**, **`Weekday`**, **`Minute`**, **`Second`**, **`Hour`**) to extract the individual elements.

Example This example gets the file date/time of the autoexec.bat file and displays it in a dialog box.

```
Sub Main()
  If FileExists("c:\autoexec.bat") Then
    a# = FileDateTime("c:\autoexec.bat")
    MsgBox "The date/time information for the file is: " & Year(a#) & "-" &
Month(a#) & "-" & Day(a#)
  Else
    MsgBox "The file does not exist."
  End If
End Sub
```

See Also **`FileLen`** (function); **`GetAttr`** (function); **`FileType`** (function); **`FileAttr`** (function); **`FileExists`** (function).

Notes: The Win32 operating system stores the file creation date, last modification date, and the date the file was last written to. The **`FileDateTime`** function only returns the last modification date.

FileDirs (statement)

Syntax **`FileDirs`** *array()* [,*dirspec$*]

Description Fills a **`String`** or **`Variant`** *array* with directory names from disk.

Comments The **`FileDirs`** statement takes the following parameters:

Parameter	Description
array()	Either a zero- or a one-dimensioned array of strings or variants. The array can be either dynamic or fixed. If *array()* is dynamic, then it will be redimensioned to exactly hold the new number of elements. If there are no elements, then the array will be redimensioned to contain no dimensions. You can use the **`LBound`**, **`UBound`**, and **`ArrayDims`** functions to determine the number and size of the new array's dimensions. If the array is fixed, each array element is first erased, then the new elements are placed into the array. If there are fewer elements than will fit in the array, then the remaining elements are initialized to zero-length strings (for **`String`** arrays) or **`Empty`** (for **`Variant`** arrays). A runtime error results if the array is too small to hold the new elements.

dirspec$	**`String`** containing the file search mask, such as:
	
	`t*.`
	`c:\*`
	
	If this parameter is omitted, then **`*`** is used, which fills the array with all the subdirectory names within the current directory.

Example This example fills an array with directory entries and displays the first one.

```
Sub Main()
  Dim a$()
  FileDirs a$,"c:\*"
  MsgBox "The first directory is: " & a$(0)
End Sub
```

See Also **`FileList`** (statement); **`Dir, Dir$`** (functions); **`CurDir, CurDir$`** (functions); **`ChDir`** (statement).

FileExists (function)

Syntax **`FileExists`**(*filename$*)

Description Returns **`True`** if *filename$* exists; returns **`False`** otherwise.

Comments This function determines whether a given *filename$* is valid.

This function will return **`False`** if *filename$* specifies a subdirectory.

Example This example checks to see whether there is an autoexec.bat file in the root directory of the C drive, then displays either its creation date and time or the fact that it does not exist.

```
Sub Main()
  If FileExists("c:\autoexec.bat") Then
    Msgbox "This file exists!"
  Else
    MsgBox "File does not exist."
  End If
End Sub
```

See Also **`FileLen`** (function); **`GetAttr`** (function); **`FileType`** (function); **`FileAttr`** (function); **`FileParse$`** (function).

FileLen (function)

Syntax **`FileLen`**(*filename$*)

Description Returns a **`Long`** representing the length of *filename$* in bytes.

Comments This function is used in place of the **`LOF`** function to retrieve the length of a file without first opening the file. A runtime error results if the file does not exist.

Example This example checks to see whether there is a c:\autoexec.bat file and, if there is, displays the length of the file.

```
Sub Main()
  file$ = "c:\autoexec.bat"
  If FileExists(file$) And FileLen(file$) <> 0) Then
    b% = FileLen(file$)
    MsgBox "'" & file$ & "' is " & b% & " bytes."
  Else
    MsgBox "'" & file$ & "' does not exist."
  End If
End Sub
```

See Also **`GetAttr`** (function); **`FileType`** (function); **`FileAttr`** (function); **`FileParse$`** (function); **`FileExists`** (function); **`Loc`** (function).

FileList (statement)

Syntax **`FileList`** *array()* [,[*filespec$*] [,[*include_attr*] [,*exclude_attr*]]]

Description Fills a **`String`** or **`Variant`** array with filenames from disk.

Comments The **`FileList`** function takes the following parameters:

Parameter	Description
array()	Either a zero- or a one-dimensioned array of strings or variants. The array can be either dynamic or fixed. If *array()* is dynamic, then it will be redimensioned to exactly hold the new number of elements. If there are no elements, then the array will be redimensioned to contain no dimensions. You can use the **`LBound`**, **`UBound`**, and **`ArrayDims`** functions to determine the number and size of the new array's dimensions. If the array is fixed, each array element is first erased, then the new elements are placed into the array. If there are fewer elements than will fit in the array, then the remaining elements are initialized to zero-length strings (for **`String`** arrays) or **`Empty`** (for **`Variant`** arrays). A runtime error results if the array is too small to hold the new elements.
filespec$	**`String`** specifying which filenames are to be included in the list. The *filespec$* parameter can include wildcards, such as **`*`** and **`?`**. If this parameter is omitted, then **`*`** is used.
include_attr	**`Integer`** specifying attributes of files you want included in the list. It can be any combination of the attributes listed below. If this parameter is omitted, then the value **`97`** is used (**`ebReadOnly Or ebArchive Or ebNone`**).
exclude_attr	**`Integer`** specifying attributes of files you want excluded from the list. It can be any combination of the attributes listed below. If this parameter is omitted, then the value 18 is used (**`ebHidden Or ebDirectory`**). In other words, hidden files and subdirectories are excluded from the list.

Wildcards

The **`*`** character matches any sequence of zero or more characters, whereas the **`?`** character matches any single character. Multiple **`*`**'s and **`?`**'s can appear within the expression to form complete searching patterns. The following table shows some examples:

This Pattern	Matches These Files	Doesn't Match These Files
`*S*.TXT`	**`SAMPLE.TXT`** **`GOOSE.TXT`** **`SAMS.TXT`**	**`SAMPLE`** **`SAMPLE.DAT`**
`C*T.TXT`	**`CAT.TXT`**	**`CAP.TXT`** **`ACATS.TXT`**
`C*T`	**`CAT`** **`CAP.TXT`**	**`CAT.DOC`**

C?T	**CAT** **CUT**	**CAT.TXT** **CAPIT** **CT**
*****	(All files)	

File Attributes

These numbers can be any combination of the following:

Constant	Value	Includes
ebNormal	**0**	Read-only, archive, subdir, none
ebReadOnly	**1**	Read-only files
ebHidden	**2**	Hidden files
ebSystem	**4**	System files
ebVolume	**8**	Volume label
ebDirectory	**16**	DOS subdirectories
ebArchive	**32**	Files that have changed since the last backup
ebNone	**64**	Files with no attributes

Example

This example fills an array a with the directory of the current drive for all files that have normal or no attributes and excludes those with system attributes. The dialog box displays four filenames from the array.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim a$()
  FileList a$,"*.*",(ebNormal + ebNone),ebSystem
  If ArrayDims(a$) > 0 Then
    r = SelectBox("FileList","The files you filtered are:",a$)
  Else
    MsgBox "No files found."
  End If
End Sub
```

See Also

FileDirs (statement); **Dir, Dir$** (functions).

FileParse$ (function)

Syntax **`FileParse$(`***filename$*[, *operation*])

Description Returns a **`String`** containing a portion of *filename$* such as the path, drive, or file extension.

Comments The *filename$* parameter can specify any valid filename (it does not have to exist). For example:

```
..\test.dat
c:\sheets\test.dat
test.dat
```

A runtime error is generated if *filename$* is a zero-length string.

The optional *operation* parameter is an **`Integer`** specifying which portion of the *filename$* to extract. It can be any of the following values.

Value	Meaning	Example
0	Full name	**`c:\sheets\test.dat`**
1	Drive	**`c`**
2	Path	**`c:\sheets`**
3	Name	**`test.dat`**
4	Root	**`test`**
5	Extension	**`dat`**

If *operation* is not specified, then the full name is returned. A runtime error will result if *operation* is not one of the above values.

A runtime error results if *filename$* is empty.

Example This example parses the file string **`c:\temp\autoexec.bat`** into its component parts and displays them in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim a$(5)
  file$ = "c:\temp\autoexec.bat"
  For i = 1 To 5
    a$(i) = FileParse$(file$,i)
  Next i

  msg1 = "The breakdown of '" & file$ & "' is:" & crlf & crlf
  msg1 = msg & a$(1) & crlf & a$(2) & crlf & a$(3) & crlf & a$(4) & crlf & a$(5)
  MsgBox msg1
End Sub
```

See Also **`FileLen`** (function); **`GetAttr`** (function); **`FileType`** (function); **`FileAttr`** (function); **`FileExists`** (function).

Notes: The backslash and forward slash can be used interchangeably. For example, "c:\test.dat" is the same as "c:/test.dat".

Fix (function)

Syntax **`Fix`**(*number*)

Description Returns the integer part of *number*.

Comments This function returns the integer part of the given value by removing the fractional part. The sign is preserved.

The **`Fix`** function returns the same type as *number*, with the following exceptions:

- If *number* is **`Empty`**, then an **`Integer`** variant of value 0 is returned.
- If *number* is a **`String`**, then a **`Double`** variant is returned.
- If *number* contains no valid data, then a **`Null`** variant is returned.

Example This example returns the fixed part of a number and assigns it to b, then displays the result in a dialog box.

```
Sub Main()
  a# = -19923.45
  b% = Fix(a#)
  MsgBox "The fixed portion of -19923.45 is: " & b%
End Sub
```

See Also **`Int`** (function); **`CInt`** (function).

For...Next (statement)

Syntax **For** *counter* **=** *start* **To** *end* **[Step** *increment***]**

[*statements***]**

[Exit For]

[*statements***]**

Next [*counter* **[,***nextcounter***]...]**

Description Repeats a block of statements a specified number of times, incrementing a loop counter by a given increment each time through the loop.

Comments The **For** statement takes the following parameters:

Parameter	Description
counter	Name of a numeric variable. Variables of the following types can be used: **Integer**, **Long**, **Single**, **Double**, **Variant**.
start	Initial value for *counter*. The first time through the loop, *counter* is assigned this value.
end	Final value for *counter*. The *statements* will continue executing until *counter* is equal to *end*.
increment	Amount added to *counter* each time through the loop. If *end* is greater than *start*, then *increment* must be positive. If *end* is less than *start*, then *increment* must be negative. If *increment* is not specified, then 1 is assumed. The expression given as *increment* is evaluated only once. Changing the step during execution of the loop will have no effect.
statements	Any number of Basic Control Engine statements.

The **For...Next** statement continues executing until an **Exit For** statement is encountered when *counter* is greater than *end*.

For...Next statements can be nested. In such a case, the **Next [***counter***]** statement applies to the innermost **For...Next**.

The **Next** clause can be optimized for nested next loops by separating each counter with a comma. The ordering of the counters must be consistent with the nesting order (innermost counter appearing before outermost counter). The following example shows two equivalent **For** statements:

```
For i = 1 To 10          For i = 1 To 10
  For j = 1 To 10          For j = 1 To 10
  Next j                 Next j,i
Next i
```

A **Next** clause appearing by itself (with no *counter* variable) matches the innermost **For** loop.

The *counter* variable can be changed within the loop but will have no effect on the number of times the loop will execute.

Example

```
Sub Main()
  'This example constructs a truth table for the OR statement  'using nested
For...Next loops.
  Msg1 = "Logic table for Or:" & crlf & crlf
  For x = -1 To 0
    For y = -1 To 0
      z = x Or y
      msg1 = msg1 & CBool(x) & " Or "
      msg1 = msg1 & CBool(y) & " = "
      msg1 = msg1 & CBool(z) & Basic.Eoln$
    Next y
  Next x
  MsgBox msg1
End Sub
```

See Also **`Do...Loop`** (statement); **`While...WEnd`** (statement).

Notes: Due to errors in program logic, you can inadvertently create infinite loops in your code. You can use **Ctrl+Break** to break out of infinite loops.

Format, Format$ (functions)

.

Syntax	**`Format[$]`**(*expression* [,*Userformat$*])
Description	Returns a **`String`** formatted to user specification.
Comments	**`Format$`** returns a **`String`**, whereas **`Format`** returns a **`String`** variant.

The **`Format$/Format`** functions take the following parameters:

Parameter	**Description**
expression	String or numeric expression to be formatted.
Userformat$	Format expression that can be either one of the built-in Basic Control Engine formats or a user-defined format consisting of characters that specify how the expression should be displayed. String, numeric, and date/time formats cannot be mixed in a single *Userformat$* expression.

If *Userformat$* is omitted and the expression is numeric, then these functions perform the same function as the **`Str$`** or **`Str`** statements, except that they do not preserve a leading space for positive values.

If *expression* is **`Null`**, then a zero-length string is returned.

Built-In Formats

To format numeric expressions, you can specify one of the built-in formats. There are two categories of built-in formats: one deals with numeric expressions and the other with date/time values. The following tables list the built-in numeric and date/time format strings, followed by an explanation of what each does.

Numeric Formats

Format	**Description**
General number	Display the numeric expression as is, with no additional formatting.
Currency	Displays the numeric expression as currency, with thousands separator if necessary.
Fixed	Displays at least one digit to the left of the decimal separator and two digits to the right.
Standard	Displays the numeric expression with thousands separator if necessary. Displays at least one digit to the left of the decimal separator and two digits to the right.
Percent	Displays the numeric expression multiplied by 100. A percent sign (%) will appear at the right of the formatted output. Two digits are displayed to the right of the decimal separator.
Scientific	Displays the number using scientific notation. One digit appears before the decimal separator and two after.
Yes/No	Displays No if the numeric expression is 0. Displays Yes for all other values.
True/False	Displays False if the numeric expression is 0. Displays True for all other values.
On/Off	Displays Off if the numeric expression is 0. Displays On for all other values.

Date/Time Formats

Format	Description
General date	Displays the date and time. If there is no fractional part in the numeric expression, then only the date is displayed. If there is no integral part in the numeric expression, then only the time is displayed. Output is in the following form: **`1/1/95 01:00:00 AM.`**
Long date	Displays a long date.
Medium date	Displays a medium date—prints out only the abbreviated name of the month.
Short date	Displays a short date.
Long time	Displays the long time. The default is: h:mm:ss.
Medium time	Displays the time using a 12-hour clock. Hours and minutes are displayed, and the AM/PM designator is at the end.
Short time	Displays the time using a 24-hour clock. Hours and minutes are displayed.

User-Defined Formats

In addition to the built-in formats, you can specify a user-defined format by using characters that have special meaning when used in a format expression. The following tables list the characters you can use for numeric, string, and date/time formats and explain their functions.

Numeric Formats

Character	Meaning
Empty string	Displays the numeric expression as is, with no additional formatting.
`0`	This is a digit placeholder. Displays a number or a 0. If a number exists in the numeric expression in the position where the 0 appears, the number will be displayed. Otherwise, a 0 will be displayed. If there are more 0s in the format string than there are digits, the leading and trailing 0s are displayed without modification.
`#`	This is a digit placeholder. Displays a number or nothing. If a number exists in the numeric expression in the position where the number sign appears, the number will be displayed. Otherwise, nothing will be displayed. Leading and trailing 0s are not displayed.
`.`	This is the decimal placeholder. Designates the number of digits to the left of the decimal and the number of digits to the right. The character used in the formatted string depends on the decimal placeholder, as specified by your locale.
`%`	This is the percentage operator. The numeric expression is multiplied by 100, and the percent character is inserted in the same position as it appears in the user-defined format string.

,	This is the thousand separator.
	The common use for the thousands separator is to separate thousands from hundreds. To specify this use, the thousands separator must be surrounded by digit placeholders. Commas appearing before any digit placeholders are specified are just displayed. Adjacent commas with no digit placeholders specified between them and the decimal mean that the number should be divided by 1,000 for each adjacent comma in the format string. A comma immediately to the left of the decimal has the same function. The actual thousands separator character used depends on the character specified by your locale.
:E- E+ e- e+	These are the scientific notation operators, which display the number in scientific notation. At least one digit placeholder must exist to the left of **E-**, **E+**, **e-**, or **e+**. Any digit placeholders displayed to the left of **E-**, **E+**, **e-**, or **e+** determine the number of digits displayed in the exponent. Using **E+** or **e+** places a + in front of positive exponents and a – in front of negative exponents. Using **E-** or **e-** places a – in front of negative exponents and nothing in front of positive exponents.
:	This is the time separator.
	Separates hours, minutes, and seconds when time values are being formatted. The actual character used depends on the character specified by your locale.
/	This is the date separator.
	Separates months, days, and years when date values are being formatted. The actual character used depends on the character specified by your locale.
:- + $ ( ) space	These are the literal characters you can display.
	To display any other character, you should precede it with a backslash or enclose it in quotes.
\	This designates the next character as a displayed character.
	To display characters, precede them with a backslash. To display a backslash, use two backslashes. Double quotation marks can also be used to display characters. Numeric formatting characters, date/time formatting characters, and string formatting characters cannot be displayed without a preceding backslash.
:"ABC"	Displays the text between the quotation marks, but not the quotation marks. To designate a double quotation mark within a format string, use two adjacent double quotation marks.
*****	This will display the next character as the fill character.
	Any empty space in a field will be filled with the specified fill character.

. Numeric formats can contain one to three parts. Each part is separated by a semicolon. If you specify one format, it applies to all values. If you specify two formats, the first applies to positive values and the second to negative values. If you specify three formats, the first applies to positive values, the second to negative values, and the third to 0s. If you include semicolons with no format between them, the format for positive values is used.

String Formats

Character	Meaning
`@`	This is a character placeholder. Displays a character if one exists in the expression in the same position; otherwise, displays a space. Placeholders are filled from right to left unless the format string specifies left to right.
`&`	This is a character placeholder. Displays a character if one exists in the expression in the same position; otherwise, displays nothing. Placeholders are filled from right to left unless the format string specifies left to right.
`<`	This character forces lowercase. Displays all characters in the expression in lowercase.
`>`	This character forces uppercase. Displays all characters in the expression in uppercase.
`!`	This character forces placeholders to be filled from left to right. The default is right to left.

Date/Time Formats

Character	Meaning
`c`	Displays the date as **ddddd** and the time as **ttttt**. Only the date is displayed if no fractional part exists in the numeric expression. Only the time is displayed if no integral portion exists in the numeric expression.
`d`	Displays the day without a leading 0 (1–31).
`dd`	Displays the day with a leading 0 (01–31).
`ddd`	Displays the day of the week abbreviated (Sun–Sat).
`dddd`	Displays the day of the week (Sunday–Saturday).
`ddddd`	Displays the date as a short date.
`dddddd`	Displays the date as a long date.
`w`	Displays the number of the day of the week (1–7). Sunday is 1; Saturday is 7.
`ww`	Displays the week of the year (1–53).
`m`	Displays the month without a leading 0 (1–12). If m immediately follows h or hh, m is treated as minutes (0–59).
`mm`	Displays the month with a leading 0 (01–12). If mm immediately follows h or hh, mm is treated as minutes with a leading 0 (00–59).
`mmm`	Displays the month abbreviated (Jan–Dec).
`mmmm`	Displays the month (January–December).
`q`	Displays the quarter of the year (1–4).
`y`	Displays the day of the year (1–366).
`yy`	Displays the year, not the century (00–99).
`yyyy`	Displays the year (1000–9999).

h	Displays the hour without a leading 0 (0–24).
hh	Displays the hour with a leading 0 (00–24).
n	Displays the minute without a leading 0 (0–59).
nn	Displays the minute with a leading 0 (00–59).
s	Displays the second without a leading 0 (0–59).
ss	Displays the second with a leading 0 (00–59).
ttttt	Displays the time. A leading 0 is displayed if specified by your locale.
AM/PM	Displays the time using a 12-hour clock. Displays an uppercase **AM** for time values before 12 noon. Displays an uppercase **PM** for time values after 12 noon and before 12 midnight.
am/pm	Displays the time using a 12-hour clock. Displays a lowercase **am** or **pm** at the end.
A/P	Displays the time using a 12-hour clock. Displays an uppercase **A** or **P** at the end.
a/p	Displays the time using a 12-hour clock. Displays a lowercase **a** or **p** at the end.
AMPM	Displays the time using a 12-hour clock. Displays the string **s1159** for values before 12 noon and **s2359** for values after 12 noon and before 12 midnight.

Example

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a# = 1199.234
  msg1 = "Some general formats for '" & a# & "' are:" & crlf & crlf
  msg1 = msg1 & Format(a#,"General Number") & crlf
  msg1 = msg1 & Format(a#,"Currency") & crlf
  msg1 = msg1 & Format(a#,"Standard") & crlf
  msg1 = msg1 & Format(a#,"Fixed") & crlf
  msg1 = msg1 & Format(a#,"Percent") & crlf
  msg1 = msg1 & Format(a#,"Scientific") & crlf
  msg1 = msg1 & Format(True,"Yes/No") & crlf
  msg1 = msg1 & Format(True,"True/False") & crlf
  msg1 = msg1 & Format(True,"On/Off") & crlf
  msg1 = msg1 & Format(a#,"0,0.00") & crlf
  msg1 = msg1 & Format(a#,"##,###,###.###") & crlf
  MsgBox msg1

  da$ = Date$
  msg1 = "Some date formats for '" & da$ & "' are:" & crlf & crlf
  msg1 = msg1 & Format(da$,"General Date") & crlf
  msg1 = msg1 & Format(da$,"Long Date") & crlf
  msg1 = msg1 & Format(da$,"Medium Date") & crlf
  msg1 = msg1 & Format(da$,"Short Date") & crlf
  MsgBox msg1

  ti$ = Time$
  msg1 = "Some time formats for '" & ti$ & "' are:" & crlf & crlf
  msg1 = msg1 & Format(ti$,"Long Time") & crlf
  msg1 = msg1 & Format(ti$,"Medium Time") & crlf
  msg1 = msg1 & Format(ti$,"Short Time") & crlf
  MsgBox msg1
End Sub
```

See Also **Str, Str$** (functions); **CStr** (function).

Note: The default date/time formats are read from the **[Intl]** section of the win.ini file.

FreeFile (function)

Syntax `FreeFile[()]`

Description Returns an **`Integer`** containing the next available file number.

Comments The number returned is suitable for use in the **`Open`** statement and will always be between 1 and 255 inclusive.

Example This example assigns A to the next free file number and displays it in a dialog box.

```
Sub Main()
  a = FreeFile
  MsgBox "The next free file number is: " & a
End Sub
```

See Also **`FileAttr`** (function); **`Open`** (statement).

Function...End Function (statement)

Syntax **`[Private | Public] [Static] Function`** *name*[(*arglist*)] [As *ReturnType*]
  [*statements*]
`End Sub`

where *arglist* is a comma-separated list of the following (up to 30 arguments are allowed):

`[Optional] [ByVal | ByRef]` *parameter* [()] [As *type*]

Description Creates a user-defined function.

Comments The **`Function`** statement has the following parts:

Part	Description
`Private`	Indicates that the function being defined cannot be called from other scripts.
`Public`	Indicates that the function being defined can be called from other scripts. If both the **`Private`** and **`Public`** keywords are missing, then **`Public`** is assumed.
`Static`	Recognized by the compiler but currently has no effect.
name	Name of the function, which must follow Basic Control Engine naming conventions: 1. Must start with a letter. 2. May contain letters, digits, and the underscore character (_). Punctuation and type-declaration characters are not allowed. The exclamation point (**`!`**) can appear within the name as long as it is not the last character, in which case it is interpreted as a type-declaration character. 3. Must not exceed 80 characters in length. Additionally, the *name* parameter can end with an optional type-declaration character specifying the type of data returned by the function (that is, any of the following characters: **`%`**, **`&`**, **`!`**, **`#`**, **`@`**).

`Optional`	Keyword indicating that the parameter is optional. All optional parameters must be of type **`Variant`**. Furthermore, all parameters that follow the first optional parameter must also be optional. If this keyword is omitted, then the parameter is required. **Note** You can use the **`IsMissing`** function to determine if an optional parameter was actually passed by the caller.
`ByVal`	Keyword indicating that *parameter* is passed by value.
`ByRef`	Keyword indicating that *parameter* is passed by reference. If neither the **`ByVal`** nor the **`ByRef`** keyword is given, then **`ByRef`** is assumed.
parameter	Name of the parameter, which must follow the same naming conventions as those used by variables. This name can include a type-declaration character, appearing in place of **`As`** *type*.

type	Type of the parameter (for example, **`Integer`**, **`String`**, and so on). Arrays are indicated with parentheses. For example, an array of integers would be declared as follows:
	`Function Test(a() As Integer)`
	`End Function`

ReturnType	Type of data returned by the function. If the return type is not given, then **`Variant`** is assumed. The *ReturnType* can only be specified if the function name (i.e., the *name* parameter) does not contain an explicit type-declaration character.

A function returns to the caller when either of the following statements is encountered:

```
End Function
Exit Function
```

Functions can be recursive.

Returning Values from Functions

To assign a return value, an expression must be assigned to the name of the function, as shown below:

```
Function TimesTwo(a As Integer) As Integer
  TimesTwo = a * 2
End Function
```

If no assignment is encountered before the function exits, then one of the following values is returned:

Value	Data Type Returned by the Function
`0`	**`Integer`**, **`Long`**, **`Single`**, **`Double`**, **`Currency`**
Zero-length string	**`String`**
`Nothing`	**`Object`** (or any data object)
`Empty`	**`Variant`**
December 30, 1899	**`Date`**
`False`	**`Boolean`**

The type of the return value is determined by the **As** *ReturnType* clause on the **Function** statement itself. As an alternative, a type-declaration character can be added to the **Function** name. For example, the following two definitions of **Test** both return **String** values:

```
Function Test() As String
  Test = "Hello, world"
End Function

Function Test$()
  Test = "Hello, world"
End Function
```

Passing Parameters to Functions

Parameters are passed to a function either by value or by reference, depending on the declaration of that parameter in *arglist*. If the parameter is declared using the **ByRef** keyword, then any modifications to that passed parameter within the function change the value of that variable in the caller. If the parameter is declared using the **ByVal** keyword, then the value of that variable cannot be changed in the called function. If neither the **ByRef** or **ByVal** keywords are specified, then the parameter is passed by reference.

You can override passing a parameter by reference by enclosing that parameter within parentheses. For instance, the following example passes the variable **j** by reference, regardless of how the third parameter is declared in the *arglist* of **UserFunction**:

```
i = UserFunction(10,12,(j))
```

Optional Parameters

The Basic Control Engine allows you to skip parameters when calling functions, as shown in the following example:

```
Function Test(a%,b%,c%) As Variant
End Function

Sub Main
  a = Test(1,,4)    'Parameter 2 was skipped.
End Sub
```

You can skip any parameter with the following restrictions:

1. The call cannot end with a comma. For instance, using the above example, the following is not valid:

   ```
   a = Test(1,,)
   ```

2. The call must contain the minimum number of parameters as required by the called function. For instance, using the above example, the following are invalid:

   ```
   a = Test(,1)    'Only passes two out of three required parameters.
   a = Test(1,2)   'Only passes two out of three required parameters.
   ```

When you skip a parameter in this manner, the Basic Control Engine creates a temporary variable and passes this variable instead. The value of this temporary variable depends on the data type of the corresponding parameter in the argument list of the called function, as described in the following table:

Value	Data Type
0	**Integer**, **Long**, **Single**, **Double**, **Currency**
Zero-length string	**String**
Nothing	**Object** (or any data object)
Error	**Variant**
December 30, 1899	**Date**
False	Boolean

Within the called function, you will be unable to determine if a parameter was skipped unless the parameter was declared as a variant in the argument list of the function. In this case, you can use the **IsMissing** function to determine if the parameter was skipped:

```
Function Test(a,b,c)
  If IsMissing(a) Or IsMissing(b) Then Exit Sub
End Function
```

Example

```
Function Factorial(n%) As Integer
  'This function calculates N! (N-factorial).
  f% = 1
  For i = n To 2 Step -1
    f = f * i
  Next i
  Factorial = f
End Function

Sub Main()
  'This example calls user-defined function Factorial and displays the
  'result in a dialog box.
  a% = 0
  Do While a% < 2
    a% = Val(InputBox("Enter an integer number greater than 2.","Compute Factorial"))
  Loop
  b# = Factorial(a%)
  MsgBox "The factorial of " & a% & " is: " & b#
End Sub
```

See Also **Sub...End Sub** (statement)

Fv (function)

Syntax **`Fv`**(*Rate, Nper, Pmt,Pv,Due*)

Description Calculates the future value of an annuity based on periodic fixed payments and a constant rate of interest.

Comments An annuity is a series of fixed payments made to an insurance company or other investment company over a period of time. Examples of annuities are mortgages and monthly savings plans.

The **`Fv`** function requires the following parameters:

Parameter	Description
Rate	**`Double`** representing the interest rate per period. Make sure that annual rates are normalized for monthly periods (divided by 12).
NPer	**`Double`** representing the total number of payments (periods) in the annuity.
Pmt	**`Double`** representing the amount of each payment per period. Payments are entered as negative values, whereas receipts are entered as positive values.
Pv	**`Double`** representing the present value of your annuity. In the case of a loan, the present value would be the amount of the loan, whereas in the case of a retirement annuity, the present value would be the amount of the fund.
Due	**`Integer`** indicating when payments are due for each payment period. A **`0`** specifies payment at the end of each period, whereas a **`1`** indicates payment at the start of each period.

Rate and *NPer* values must be expressed in the same units. If *Rate* is expressed as a percentage per month, then *NPer* must also be expressed in months. If *Rate* is an annual rate, then the *NPer* must also be given in years.

Positive numbers represent cash received, whereas negative numbers represent cash paid out.

Example This example calculates the future value of 100 dollars paid periodically for a period of 10 years (120 months) at a rate of 10% per year (or .10/12 per month) with payments made on the first of the month. The value is displayed in a dialog box. Note that payments are negative values.

```
Sub Main()
  a# = Fv((.10/12),120,-100.00,0,1)
  MsgBox "Future value is: " & Format(a#,"Currency")
End Sub
```

See Also **`IRR`** (function); **`MIRR`** (function); **`Npv`** (function); **`Pv`** (function).

G

Get (statement)

Syntax **`Get`** [#] *filenumber*, [*recordnumber*], *variable*

Description Retrieves data from a random or binary file and stores that data into the specified variable.

Comments The **`Get`** statement accepts the following parameters:

Parameter	Description
filenumber	**`Integer`** used by the Basic Control Engine to identify the file. This is the same number passed to the **`Open`** statement.
recordnumber	**`Long`** specifying which record is to be read from the file. For **`binary`** files, this number represents the first byte to be read starting with the beginning of the file (the first byte is 1). For **`random`** files, this number represents the record number starting with the beginning of the file (the first record is 1). This value ranges from 1 to 2147483647. If the *recordnumber* parameter is omitted, the next record is read from the file (if no records have been read yet, then the first record in the file is read). When this parameter is omitted, the commas must still appear, as in the following example: `Get #1,,recvar` If *recordnumber* is specified, it overrides any previous change in file position specified with the **`Seek`** statement.
variable	Variable into which data will be read. The type of the variable determines how the data is read from the file, as described below.

With random files, a runtime error will occur if the length of the data being read exceeds the *reclen* parameter specified with the **`Open`** statement. If the length of the data being read is less than the record length, the file pointer is advanced to the start of the next record. With binary files, the data elements being read are contiguous—the file pointer is never advanced.

Variable Types

The type of the *variable* parameter determines how data will be read from the file. It can be any of the following types:

Variable Type	File Storage Description
`Integer`	2 bytes are read from the file.
`Long`	4 bytes are read from the file.

`String` (variable-length)	In binary files, variable-length strings are read by first determining the specified string variable's length and then reading that many bytes from the file. For example, to read a string of eight characters:
	`s$ = String(8," ")`
	`Get #1,,s$`
	In random files, variable-length strings are read by first reading a 2-byte length and then reading that many characters from the file.

`String` (fixed-length)	Fixed-length strings are read by reading a fixed number of characters from the file equal to the string's declared length.
`Double`	8 bytes are read from the file (IEEE format).
`Single`	4 bytes are read from the file (IEEE format).
`Date`	8 bytes are read from the file (IEEE double format).
`Boolean`	2 bytes are read from the file. Nonzero values are **`True,`** and zero values are **`False`**.
`Variant`	A 2-byte **`VarType`** is read from the file, which determines the format of the data that follows. Once the **`VarType`** is known, the data is read individually, as described above. With user-defined errors, after the 2-byte **`VarType`**, a 2-byte unsigned integer is read and assigned as the value of the user-defined error, followed by 2 additional bytes of information about the error. The exception is with strings, which are always preceded by a 2-byte string length.
User-defined types	Each member of a user-defined data type is read individually In binary files, variable-length strings within user-defined types are read by first reading a 2-byte length followed by the string's content. This storage is different from variable-length strings outside of user-defined types. When reading user-defined types, the record length must be greater than or equal to the combined size of each element within the data type.
Arrays	Arrays cannot be read from a file using the **`Get`** statement.
Objects	Object variables cannot be read from a file using the **`Get`** statement.

Example This example opens a file for random write, then writes ten records into the file with the values 10...50. Then the file is closed and reopened in random mode for read, and the records are read with the Get statement. The result is displayed in a message box.

```
Sub Main()
  Open "test.dat" For Random Access Write As #1
  For x = 1 to 10
    y = x * 10
    Put #1,x,y
  Next x
  Close


  Open "test.dat" For Random Access Read As #1
  msg1 = ""

  For y = 1 to 5
    Get #1,y,x
    msg1 = msg1 & "Record " & y & ": " & x & Basic.Eoln$
  Next y
  Close

  MsgBox msg1
End Sub
```

See Also **`Open`** (statement); **`Put`** (statement); **`Input#`** (statement); **`Line Input#`** (statement); **`Input, Input$`** (functions).

GetAttr (function)

Syntax **`GetAttr`**(*filename$*)

Description Returns an **`Integer`** containing the attributes of the specified file.

Comments The attribute value returned is the sum of the attributes set for the file. The value of each attribute is as follows:

Constant	Value	Includes
`ebNormal`	**0**	Read-only files, archive files, subdirectories, and files with no attributes.
`ebReadOnly`	**1**	Read-only files
`ebHidden`	**2**	Hidden files
`ebSystem`	**4**	System files
`ebVolume`	**8**	Volume label
`ebDirectory`	**16**	DOS subdirectories
`ebArchive`	**32**	Files that have changed since the last backup
`ebNone`	**64**	Files with no attributes

To determine whether a particular attribute is set, you can **`And`** the values shown above with the value returned by **`GetAttr`**. If the result is **`True`**, the attribute is set, as shown below:

```
Sub Main()
  Dim w As Integer
  w = GetAttr("sample.txt")
  If w And ebReadOnly Then MsgBox "This file is read-only."
End Sub
```

Example This example tests to see whether the file test.dat exists. If it does not, then it creates the file. The file attributes are then retrieved with the GetAttr function, and the result is displayed.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim a()
  FileList a,"*.*"
Again:
  msg1 = ""
  r = SelectBox("Attribute Checker","Select File:",a)
  If r = -1 Then
    End
  Else
    y% = GetAttr(a(r))
  End If

  If y% = 0 Then msg1 = msg1 & "This file has no special attributes." & crlf
  If y% And ebReadOnly Then msg1 = msg1 & "The read-only bit is set." & crlf
  If y% And ebHidden Then msg1 = msg1 & "The hidden bit is set." & crlf
  If y% And ebSystem Then msg1 = msg1 & "The system bit is set." & crlf
  If y% And ebVolume Then msg1 = msg1 & "The volume bit is set." & crlf
  If y% And ebDirectory Then msg1 = msg1 & "The directory bit is set." & crlf
  If y% And ebArchive Then msg1 = msg1 & "The archive bit is set."

  MsgBox msg1
  Goto Again
End Sub
```

See Also **`SetAttr`** (statement); **`FileAttr`** (function).

GetObject (function)

Syntax **`GetObject`**(*filename$* [,*class$*])

Description Returns the object specified by *filename$* or returns a previously instantiated object of the given *class$*.

Comments This function is used to retrieve an existing OLE automation object, either one that comes from a file or one that has previously been instantiated.

The *filename$* argument specifies the full pathname of the file containing the object to be activated. The application associated with the file is determined by OLE at runtime. For example, suppose that a file called **`c:\docs\resume.doc`** was created by a word processor called **`wordproc.exe`**. The following statement would invoke **`wordproc.exe`**, load the file called **`c:\docs\resume.doc`**, and assign that object to a variable:

```
  Dim doc As Object
  Set doc = GetObject("c:\docs\resume.doc")
```

To activate a part of an object, add an exclamation point to the filename followed by a string representing the part of the object that you want to activate. For example, to activate the first three pages of the document in the previous example:

```
  Dim doc As Object
  Set doc = GetObject("c:\docs\resume.doc!P1-P3")
```

The **`GetObject`** function behaves differently depending on whether the first parameter is omitted. The following table summarizes the different behaviors of **`GetObject`**:

Filename$	Class$	GetObject Returns
Omitted	Specified	Reference to an existing instance of the specified object. A runtime error results if the object is not already loaded.
`""`	Specified	Reference to a new object (as specified by *class$*). A runtime error occurs if an object of the specified class cannot be found. This is the same as **`CreateObject`**.
Specified	Omitted	Default object from *filename$*. The application to activate is determined by OLE based on the given filename.
Specified	Specified	Object given by *class$* from the file given by *filename$*. A runtime error occurs if an object of the given class cannot be found in the given file.

Examples This first example instantiates the existing copy of Excel.

```
Sub Main()
  Dim Excel As Object
  Set Excel = GetObject(,"Excel.Application")
```

This second example loads the OLE server associated with a document.

```
  Dim MyObject As Object
  Set MyObject = GetObject("c:\documents\resume.doc")
End Sub
```

See Also **`CreateObject`** (function); **`Object`** (data type).

Global (statement)

Description See **`Public`** (statement).

GoSub (statement)

Syntax **`GoSub`** *label*

Description Causes execution to continue at the specified label.

Comments Execution can later be returned to the statement following the **`GoSub`** by using the **`Return`** statement.

The *label* parameter must be a label within the current function or subroutine. **`GoSub`** outside the context of the current function or subroutine is not allowed.

Example This example gets a name from the user and then branches to a subroutine to check the input. If the user clicks Cancel or enters a blank name, the program terminates; otherwise, the name is set to MICHAEL, and a message is displayed.

```
Sub Main()
  uname$ = Ucase$(InputBox$("Enter your name:","Enter Name"))
  GoSub CheckName
  MsgBox "I'm looking for MICHAEL, not " & uname$
  Exit Sub

CheckName:
  If (uname$ = "") Then
    GoSub BlankName
  ElseIf uname$ = "MICHAEL" Then
    GoSub RightName
  Else
    GoSub OtherName
  End If
  Return

BlankName:
  MsgBox "No name? Clicked Cancel? I'm shutting down."
  Exit Sub
RightName:
  Msgbox "Hey, MIKE where have you been?"
  End
OtherName:
  Return
End Sub
```

See Also **`Goto`** (statement); **`Return`** (statement).

Goto (statement)

Syntax **`Goto`** *label*

Description Transferss execution to the line containing the specified label.

Comments The compiler will produce an error if *label* does not exist.

The *label* must appear within the same subroutine or function as the **`Goto`**.

Labels are identifiers that follow these rules:

1. Must begin with a letter.
2. May contain letters, digits, and the underscore character.
3. Must not exceed 80 characters in length.
4. Must be followed by a colon (**`:`**).

Labels are not case-sensitive.

Example This example gets a name from the user and then branches to a statement, depending on the input name. If the name is not MICHAEL, it is reset to MICHAEL unless it is null or the user clicks Cancel--in which case, the program displays a message and terminates.

```
Sub Main()
  uname$ = UCase(InputBox("Enter your name:","Enter Name"))
  If uname$ = "MICHAEL" Then
    Goto RightName
  Else
    Goto WrongName
  End If

WrongName:
  If (uname$ = "") Then
    MsgBox "No name? Clicked Cancel? I'm shutting down."
  Else
    MsgBox "I am renaming you MICHAEL!"
    uname$ = "MICHAEL"
    Goto RightName
  End If
  Exit Sub

RightName:
  MsgBox "Hello, " & uname$
End Sub
```

See Also **`GoSub`** (statement); **`Call`** (statement).

Note: To break out of an infinite loop, press Ctrl+Break.

GroupBox (statement)

Syntax `GroupBox` *X*,*Y*,*width*,*height*,*title$* [,.*Identifier*]

Description Defines a group box within a dialog box template.

Comments This statement can only appear within a dialog box template (that is., between the **`Begin Dialog`** and **`End Dialog`** statements).

The group box control is used for static display only—the user cannot interact with a group box control.

Separator lines can be created using group box controls. This is accomplished by creating a group box that is wider than the width of the dialog box and extends below the bottom of the dialog box—that is, three sides of the group box are not visible.

If *title$* is a zero-length string, then the group box is drawn as a solid rectangle with no title.

The **`GroupBox`** statement requires the following parameters:

Parameter	Description
X, *Y*	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
title$	**`String`** containing the label of the group box. If *title$* is a zero-length string, then no title will appear.
.*Identifier*	Optional parameter that specifies the name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**). If omitted, then the first two words of *title$* are used.

Example This example shows the GroupBox statement being used both for grouping and as a separator line.

```
Sub Main()
  Begin Dialog OptionsTemplate 16,32,128,84,"Options"
    GroupBox 4,4,116,40,"Window Options"
    CheckBox 12,16,60,8,"Show &Toolbar",.ShowToolbar
    CheckBox 12,28,68,8,"Show &Status Bar",.ShowStatusBar
    GroupBox -12,52,152,48," ",.SeparatorLine
    OKButton 16,64,40,14,.OK
    CancelButton 68,64,40,14,.Cancel
  End Dialog
  Dim OptionsDialog As OptionsTemplate
  Dialog OptionsDialog
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

H

Hex, Hex$ (functions)

Syntax **`Hex[$](`***number***`)`**

Description Returns a **`String`** containing the hexadecimal equivalent of *number*.

Comments **`Hex$`** returns a **`String`**, whereas **`Hex`** returns a **`String`** variant.

The returned string contains only the number of hexadecimal digits necessary to represent the number, up to a maximum of eight.

The *number* parameter can be any type but is rounded to the nearest whole number before converting to hex. If the passed number is an integer, then a maximum of four digits are returned; otherwise, up to eight digits can be returned.

The *number* parameter can be any expression convertible to a number. If *number* is **`Null`**, then **`Null`** is returned. **`Empty`** is treated as 0.

Example This example accepts a number and displays the decimal and hexadecimal equivalent until the input number is 0 or invalid.

```
Sub Main()
  Do
    xs$ = InputBox("Enter a number to convert:","Hex Convert")
    x = Val(xs$)
    If x <> 0 Then
      MsgBox "Decimal: " & x & "   Hex: " & Hex(x)
    Else
      MsgBox "Goodbye."
    End If
  Loop While x <> 0
End Sub
```

See Also **`Oct, Oct$`** (functions).

HLine (statement)

Syntax **`HLine`** *[lines]*

Description Scrolls the window with the focus left or right by the specified number of lines.

Comments The *lines* parameter is an **`Integer`** specifying the number of lines to scroll. If this parameter is omitted, then the window is scrolled right by one line.

Example This example scrolls the Notepad window to the left by three "amounts." Each "amount" is equivalent to clicking the right arrow of the horizontal scroll bar once.

```
Sub Main()
  AppActivate "Notepad"
  HLine 3       'Move 3 lines in.
End Sub
```

See Also **`HPage`** (statement); **`HScroll`** (statement).

Hour (function)

Syntax **`Hour`**(*time*)

Description Returns the hour of the day encoded in the specified *time* parameter.

Comments The value returned is as an **`Integer`** between 0 and 23 inclusive.

The *time* parameter is any expression that converts to a **`Date`**.

Example This example takes the current time; extracts the hour, minute, and second; and displays them as the current time.

```
Sub Main()
  Msgbox "It is now hour " & Hour(Time) & " of today."
End Sub
```

See Also **`Day`** (function); **`Minute`** (function); **`Second`** (function); **`Month`** (function); **`Year`** (function); **`Weekday`** (function); **`DatePart`** (function).

HPage (statement)

Syntax **`HPage`** *[pages]*

Description Scrolls the window with the focus left or right by the specified number of pages.

Comments The *pages* parameter is an **`Integer`** specifying the number of pages to scroll. If this parameter is omitted, then the window is scrolled right by one page.

Example This example scrolls the Notepad window to the left by three "amounts." Each "amount" is equivalent to clicking within the horizontal scroll bar on the right side of the thumb mark.

```
Sub Main()
  AppActivate "Notepad"
  HPage 3     'Move 3 pages down.
End Sub
```

See Also **`HLine`** (statement); **`HScroll`** (statement).

HScroll (statement)

Syntax **`HScroll`** *percentage*

Description Sets the thumb mark on the horizontal scroll bar attached to the current window.

Comments The position is given as a percentage of the total range associated with that scroll bar. For example, if the *percentage* parameter is 50, then the thumb mark is positioned in the middle of the scroll bar.

Example This example centers the thumb mark on the horizontal scroll bar of the Notepad window.

```
Sub Main()
  AppActivate "Notepad"
  HScroll 50    'Jump to the middle of the document.
End Sub
```

See Also **`HLine`** (statement); **`HPage`** (statement).

HWND (object)

Syntax **Dim** *name* **As HWND**

Description A data type used to hold window objects.

Comments This data type is used to hold references to physical windows in the operating environment. The following commands operate on **HWND** objects:

WinActivate	**WinClose**	**WinFind**	**WinList**
WinMaximize	**WinMinimize**	**WinMove**	**WinRestore**
WinSize			

The above language elements support both string and **HWND** window specifications.

Example This example activates the "Main" MDI window within Program Manager.

```
Sub Main()
  Dim ProgramManager As HWND
  Dim ProgramManagerMain As HWND
  Set ProgramManager = WinFind("Program Manager")
  If ProgramManager Is Not Nothing Then
    WinActivate ProgramManager
    WinMaximize ProgramManager
    Set ProgramManagerMain = WinFind("Program Manager|Main")
    If ProgramManagerMain Is Not Nothing Then
      WinActivate ProgramManagerMain
      WinRestore ProgramManagerMain
    Else
      MsgBox "Your Program Manager doesn't have a Main group."
    End If
  Else
    MsgBox "Program Manager is not running."
  End If
End Sub
```

See Also **HWND.Value** (property); **WinFind** (function); **WinActivate** (statement).

HWND.Value (property)

Syntax **`window`**.*Value*

Description The default property of an **`HWND`** object that returns a **`Variant`** containing a **`HANDLE`** to the physical window of an **`HWND`** object variable.

Comments The .*Value* property is used to retrieve the operating environment–specific value of a given **`HWND`** object. The size of this value depends on the operating environment in which the script is executing and thus should always be placed into a **`Variant`** variable.

This property is read-only.

Example This example displays a dialog box containing the class name of Program Manager's Main window. It does so using the .*Value* property, passing it directly to a Windows external routine.

```
Declare Sub GetClassName Lib "user" (ByVal Win%,ByVal ClsName$,
    ByVal ClsNameLen%)
Sub Main()
  Dim ProgramManager As HWND
  Set ProgramManager = WinFind("Program Manager")
  ClassName$ = Space(40)
  GetClassName ProgramManager.Value,ClassName$,Len(ClassName$)
  MsgBox "The program classname is: " & ClassName$
End Sub
```

See Also **`HWND`** (object).

Notes Under Windows, this value is an **`Integer`**.

I

If...Then...Else (statement)

Syntax 1	**`If`** *condition* **`Then`** *statements* **`[Else`** *else_statements*`]`

Syntax 2

```
If condition Then
  [statements]
[ElseIf else_condition Then
  [elseif_statements]]
[Else
  [else_statements]]
End If
```

Description Conditionally executes a statement or group of statements.

Comments The single-line conditional statement (syntax 1) has the following parameters:

Parameter	Description
condition	Any expression evaluating to a **`Boolean`** value.
statements	One or more statements separated with colons. This group of statements is executed when *condition* is **`True`**.
else_statements	One or more statements separated with colons. This group of statements is executed when *condition* is **`False`**.

The multiline conditional statement (syntax 2) has the following parameters:

Parameter	Description
condition	Any expression evaluating to a **`Boolean`** value.
statements	One or more statements to be executed when condition is **`True`**.
else_condition	Any expression evaluating to a **`Boolean`** value. The *else_condition* is evaluated if *condition* is **`False`**.
elseif_statements	One or more statements to be executed when *condition* is **`False`** and *else_condition* is **`True`**.
else_statements	One or more statements to be executed when both *condition* and *else_condition* are **`False`**.

There can be as many **`ElseIf`** conditions as required.

Example This example inputs a name from the user and checks to see whether it is MICHAEL or MIKE using three forms of the If...Then...Else statement. It then branches to a statement that displays a welcome message depending on the user's name.

```
Sub Main()
  uname$ = UCase(InputBox("Enter your name:","Enter Name"))
  If uname$ = "MICHAEL" Then GoSub MikeName
  If uname$ = "MIKE" Then
    GoSub MikeName
    Exit Sub
  End If

  If uname$ = "" Then
    MsgBox "Since you don't have a name, I'll call you MIKE!"
    uname$ = "MIKE"
    GoSub MikeName
  ElseIf uname$ = "MICHAEL" Then
    GoSub MikeName
  Else
    GoSub OtherName
  End If
  Exit Sub

MikeName:
  MsgBox "Hello, MICHAEL!"
  Return

OtherName:
  MsgBox "Hello, " & uname$ & "!"
  Return
End Sub
```

See Also `Choose` (function); `Switch` (function); `IIf` (function); `Select...Case` (statement).

IIf (function)

Syntax `IIf`(*condition*,*TrueExpression*,*FalseExpression*)

Description Returns *TrueExpression* if *condition* is `True`; otherwise, returns *FalseExpression*.

Comments Both expressions are calculated before `IIf` returns.

The `IIf` function is shorthand for the following construct:

```
If condition Then
  variable = TrueExpression
Else
  variable = FalseExpression
End If
```

Example

```
Sub Main()
  s$ = "Car"
  MsgBox "You have a " & IIf(s$ = "Car","nice car.","nice non-car.")
End Sub
```

See Also `Choose` (function); `Switch` (function); `If...Then...Else` (statement); `Select...Case` (statement).

Imp (operator)

Syntax *expression1* **Imp** *expression2*

Description Performs a logical or binary implication on two expressions.

Comments If both expressions are either **Boolean**, **Boolean** variants, or **Null** variants, then a logical implication is performed as follows:

If the first expression is	and the second expression is	then the result is
True	**True**	**True**
True	**False**	**False**
True	**Null**	**Null**
False	**True**	**True**
False	**False**	**True**
False	**Null**	**True**
Null	**True**	**True**
Null	**False**	**Null**
Null	**Null**	**Null**

Binary Implication

If the two expressions are **Integer**, then a binary implication is performed, returning an **Integer** result. All other numeric types (including **Empty** variants) are converted to **Long** and a binary implication is then performed, returning a **Long** result.

Binary implication forms a new value based on a bit-by-bit comparison of the binary representations of the two expressions, according to the following table:

1	Imp	1	=	1	Example:
0	Imp	1	=	1	5 01101001
1	Imp	0	=	0	6 10101010
0	Imp	0	=	1	Imp 10111110

Example This example compares the result of two expressions to determine whether one implies the other.

```
Sub Main()
  a = 10 : b = 20 : c = 30 : d = 40
  If (a < b) Imp (c < d) Then
    MsgBox "a is less than b implies that c is less than d."
  Else
    MsgBox "a is less than b does not imply that c is less than d."
  End If

  If (a < b) Imp (c > d) Then
    MsgBox "a is less than b implies that c is greater than d."
  Else
    MsgBox "a is less than b does not imply that c is greater than d."
  End If
End Sub
```

See Also Operator Precedence (topic); **Or** (operator); **Xor** (operator); **Eqv** (operator); **And** (operator).

Inline (statement)

Syntax **`Inline`** *name* [*parameters*]
anytext
`End Inline`

Description Allows execution or interpretation of a block of text.

Comments The **`Inline`** statement takes the following parameters:

Parameter	Description
name	Identifier specifying the type of inline statement.
parameters	Comma-separated list of parameters.
anytext	Text to be executed by the **`Inline`** statement. This text must be in a format appropriate for execution by the **`Inline`** statement. The end of the text is assumed to be the first occurrence of the words **`End Inline`** appearing on a line.

Example

```
Sub Main()
  Inline Script
    -- This is an Win32Script comment.
    Beep
    Display Dialog "Win32Script" buttons "OK" default button "OK"
    Display Dialog Current Date
  End Inline
End Sub
```

Input# (statement)

Syntax **`Input`** [#]*filenumber*%,*variable*[,*variable*]...

Description Reads data from the file referenced by *filenumber* into the given variables.

Comments Each *variable* must be type-matched to the data in the file. For example, a **`String`** variable must be matched to a string in the file.

The following parsing rules are observed while reading each variable in the variable list:

1. Leading white space is ignored (spaces and tabs).
2. When reading **`String`** variables, if the first character on the line is a quotation mark, then characters are read up to the next quotation mark or the end of the line, whichever comes first. Blank lines are read as empty strings. If the first character read is not a quotation mark, then characters are read up to the first comma or the end of the line, whichever comes first. String delimiters (quotes, comma, end-of-line) are not included in the returned string.
3. When reading numeric variables, scanning of the number stops when the first nonnumber character (such as a comma, a letter, or any other unexpected character) is encountered. Numeric errors are ignored while reading numbers from a file. The resultant number is automatically converted to the same type as the variable into which the value will be placed. If there is an error in conversion, then 0 is stored into the variable.

   octaldigits`[!|#|%|&|@]`

After reading the number, input is skipped up to the next delimiter—a comma, an end-of-line, or an end-of-file.

Numbers must adhere to any of the following syntaxes:

[-|+]***digits***[.***digits***][E[-|+]***digits***][!|#|%|&|@]

&H***hexdigits***[!|#|%|&]

&[O]

4. When reading **`Boolean`** variables, the first character must be #; otherwise, a runtime error occurs. If the first character is #, then input is scanned up to the next delimiter (a comma, an end-of-line, or an end-of-file). If the input matches #FALSE#, then **`False`** is stored in the **`Boolean`**; otherwise **`True`** is stored.

5. When reading **`Date`** variables, the first character must be #; otherwise, a runtime error occurs. If the first character is #, then the input is scanned up to the next delimiter (a comma, an end-of-line, or an end-of-file). If the input ends in a # and the text between the #'s can be correctly interpreted as a date, then the date is stored; otherwise, December 31, 1899, is stored.

   Normally, dates that follow the universal date format are input from sequential files. These dates use this syntax:

   #YYYY-MM-DD HH:MM:SS#

   where *YYYY* is a year between 100 and 9999, *MM* is a month between 1 and 12, *DD* is a day between 1 and 31, *HH* is an hour between 0 and 23, *MM* is a minute between 0 and 59, and *SS* is a second between 0 and 59.

6. When reading **`Variant`** variables, if the data begins with a quotation mark, then a string is read consisting of the characters between the opening quotation mark and the closing quotation mark, end-of-line, or end-of-file.

   If the input does not begin with a quotation mark, then input is scanned up to the next comma, end-of-line, or end-of-file and a determination is made as to what data is being represented. If the data cannot be represented as a number, **`Date`**, **`Error`**, **`Boolean`**, or **`Null`**, then it is read as a string.

   The following table describes how special data is interpreted as variants:

Blank line	Read as an Empty variant.
#NULL#	Read as a **`Null`** variant.
#TRUE#	Read as a **`Boolean`** variant.
#FALSE#	Read as a **`Boolean`** variant.
#ERROR *code***#**	Read as a user-defined error.
#*date***#**	Read as a **`Date`** variant.
"*text***"**	Read as a **`String`** variant.

   If an error occurs in interpretation of the data as a particular type, then that data is read as a **`String`** variant.

When reading numbers into variants, the optional type-declaration character determines the **`VarType`** of the resulting variant. If no type-declaration character is specified, then The Basic Control Engine will read the number according to the following rules:

Rule 1: If the number contains a decimal point or an exponent, then the number is read as **`Currency`**. If there is an error converting to **`Currency`**, then the number is treated as a **`Double`**.

Rule 2: If the number does not contain a decimal point or an exponent, then the number is stored in the smallest of the following data types that most accurately represents that value: **`Integer`**, **`Long`**, **`Currency`**, **`Double`**.

7. End-of-line is interpreted as either a single line feed, a single carriage return, or a carriage-return/line-feed pair. Thus, text files from any platform can be interpreted using this command.

The *filenumber* parameter is a number that is used by The Basic Control Engine to refer to the open file—the number passed to the **`Open`** statement.

The *filenumber* must reference a file opened in **`Input`** mode. It is good practice to use the **`Write`** statement to write date elements to files read with the **`Input`** statement to ensure that the variable list is consistent between the input and output routines.

Example This example creates a file called test.dat and writes a series of variables into it. Then the variables are read using the Input# function.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Open "test.dat" For Output As #1
  Write #1,2112,"David","McCue","123-45-6789"
  Close

  Open "test.dat" For Input As #1
  Input #1,x%,s1$,s2$,s3$
  msg1 = "Employee #" & x% & " Personal Information" & crlf & crlf
  msg1 = msg1 & "First Name: " & s1$ & crlf
  msg1 = msg1 & "Last Name: "& s2$ & crlf
  msg1 = msg1 & "Social Security Number: " & s3$
  MsgBox msg1
  Close

  Kill "test.dat"
End Sub
```

See Also **`Open`** (statement); **`Get`** (statement); **`Line Input#`** (statement); **`Input, Input$`** (functions).

Input, Input$ (functions)

Syntax	**`Input[$]`**(*numbytes*,[#]*filenumber*)
Description	Returns *numbytes* characters read from a given sequential file.

Comments

`Input$` returns a **`String`**, whereas **`Input`** returns a **`String`** variant.

The **`Input/Input$`** functions require the following parameters:

Parameter	Description
numbytes	**`Integer`** containing the number of bytes to be read from the file.
filenumber	**`Integer`** referencing a file opened in either **`Input`** or **`Binary`** mode. This is the same number passed to the **`Open`** statement.

This function reads all characters, including spaces and end-of-lines.

Example

This example opens the autoexec.bat file and displays it in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  file$ = "c:\autoexec.bat"
  x& = FileLen(file$)

  If x& > 0 Then
    Open file$ For Input As #1
  Else
    MsgBox "'" & file$ & "' not found or empty."
    Exit Sub
  End If

  'use the file length to read the file in
  If x& > 80 Then
    ins = Input(80,1)
  Else
    ins = Input(x&,1)
  End If
  Close

  MsgBox UCase(file$) & crlf & crlf & "File length: " & x& & crlf & "Contents:" &
crlf & ins
End Sub
```

See Also

`Open` (statement); **`Get`** (statement); **`Input#`** (statement); **`Line Input#`** (statement).

InputBox, InputBox$ (functions)

Syntax **InputBox[$](***prompt* **[,[***title***] [,[***default***] [,X,Y]]])**

Description Displays a dialog box with a text box into which the user can type.

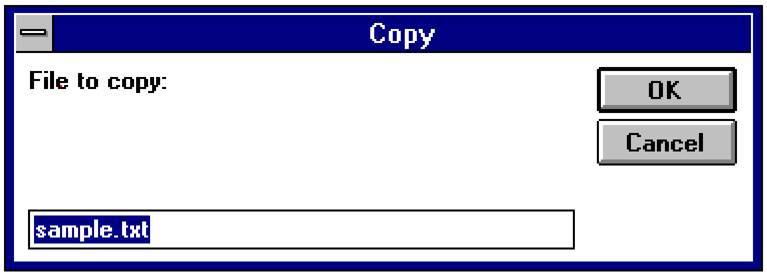
Comments The content of the text box is returned as a **String** (in the case of **InputBox$**) or as a **String** variant (in the case of **InputBox**). A zero-length string is returned if the user selects Cancel.

The **InputBox/InputBox$** functions take the following parameters:

Parameter	Description
prompt	Text to be displayed above the text box. The *prompt* parameter can contain multiple lines, each separated with an end-of-line (a carriage return, line feed, or carriage-return/line-feed pair). A runtime error is generated if *prompt* is **Null**.
title	Caption of the dialog box. If this parameter is omitted, then no title appears as the dialog box's caption. A runtime error is generated if *title* is **Null**.
default	Default response. This string is initially displayed in the text box. A runtime error is generated if *default* is **Null**.
X, Y	**Integer** coordinates, given in twips (twentieths of a point), specifying the upper left corner of the dialog box relative to the upper left corner of the screen. If the position is omitted, then the dialog box is positioned on or near the application executing the script.

Example

```
Sub Main()
  s$ = InputBox("File to copy:","Copy","sample.txt")
End Sub
```



See Also **MsgBox** (statement); **AskBox$** (function); **AskPassword$** (function); **OpenFilename$** (function); **SaveFilename$** (function); **SelectBox** (function); **AnswerBox** (function).

InStr (function)

Syntax `InStr([`*start*`,]` *search*`,` *find* `[,`*compare*`])`

Description Returns the first character position of string *find* within string *search*.

Comments The **`InStr`** function takes the following parameters:

Parameter	Description
start	**`Integer`** specifying the character position where searching begins. The *start* parameter must be between 1 and 32767. If this parameter is omitted, then the search starts at the beginning (*start* = **`1`**).
search	Text to search. This can be any expression convertible to a **`String`**.
find	Text for which to search. This can be any expression convertible to a **`String`**.
compare	**`Integer`** controlling how string comparisons are performed: **`0`** String comparisons are case-sensitive. **`1`** String comparisons are case-insensitive. Any other value A runtime error is produced. If this parameter is omitted, then string comparisons use the current **`Option Compare`** setting. If no **`Option Compare`** statement has been encountered, then **`Binary`** is used (i.e., string comparisons are case-sensitive).

If the string is found, then its character position within *search* is returned, with 1 being the character position of the first character. If *find* is not found, or *start* is greater than the length of *search*, or *search* is zero-length, then 0 is returned.

Example This example checks to see whether one string is in another and, if it is, then it copies the string to a variable and displays the result.

```
Sub Main()
  a$ = "This string contains the name Stuart and other characters."
  x% = InStr(a$,"Stuart",1)
  If x% <> 0 Then
    b$ = Mid(a$,x%,6)
    MsgBox b$ & " was found."
    Exit Sub
  Else
    MsgBox "Stuart not found."
  End If
End Sub
```

See Also **`Mid`**, **`Mid$`** **`(functions); Option Compare (statement); Item$ (function); Word$ (function); Line$ (function).`**

Int (function)

Syntax `Int`(*number*)

Description Returns the integer part of *number*.

Comments This function returns the integer part of a given value by returning the first integer less than the *number*. The sign is preserved.

The `Int` function returns the same type as *number*, with the following exceptions:

- If *number* is `Empty`, then an `Integer` variant of value 0 is returned.
- If *number* is a `String`, then a `Double` variant is returned.
- If *number* is `Null`, then a `Null` variant is returned.

Example This example extracts the integer part of a number.

```
Sub Main()
  a# = -1234.5224
  b% = Int(a#)
  MsgBox "The integer part of -1234.5224 is: " & b%
End Sub
```

See Also `Fix` (function); `CInt` (function).

Integer (data type)

Syntax `Integer`

Description A data type used to declare whole numbers with up to four digits of precision.

Comments `Integer` variables are used to hold numbers within the following range:

–32768 <= ***integer*** **<= 32767**

Internally, integers are 2-byte `short` values. Thus, when appearing within a structure, integers require 2 bytes of storage. When used with binary or random files, 2 bytes of storage are required.

When passed to external routines, `Integer` values are sign-extended to the size of an integer on that platform (either 16 or 32 bits) before pushing onto the stack.

The type-declaration character for `Integer` is `%`.

See Also `Currency` (data type); `Date` (data type); `Double` (data type); `Long` (data type), `Object` (data type), `Single` (data type), `String` (data type), `Variant` (data type), `Boolean` (data type), `Def`*Type* (statement), `CInt` (function).

IPmt (function)

Syntax `IPmt`(*Rate*, *Per*, *Nper*, *Pv*, *Fv*, *Due*)

Description Returns the interest payment for a given period of an annuity based on periodic, fixed payments and a fixed interest rate.

Comments An annuity is a series of fixed payments made to an insurance company or other investment company over a period of time. Examples of annuities are mortgages, monthly savings plans, and retirement plans.

The following table describes the different parameters:

Parameter	**Description**
Rate	**`Double`** representing the interest rate per period. If the payment periods are monthly, be sure to divide the annual interest rate by 12 to get the monthly rate.
Per	**`Double`** representing the payment period for which you are calculating the interest payment. If you want to know the interest paid or received during period 20 of an annuity, this value would be 20.
Nper	**`Double`** representing the total number of payments in the annuity. This is usually expressed in months, and you should be sure that the interest rate given above is for the same period that you enter here.
Pv	**`Double`** representing the present value of your annuity. In the case of a loan, the present value would be the amount of the loan because that is the amount of cash you have in the present. In the case of a retirement plan, this value would be the current value of the fund because you have a set amount of principal in the plan.
Fv	**`Double`** representing the future value of your annuity. In the case of a loan, the future value would be zero because you will have paid it off. In the case of a savings plan, the future value would be the balance of the account after all payments are made.
Due	**`Integer`** indicating when payments are due. If this parameter is 0, then payments are due at the end of each period (usually, the end of the month). If this value is 1, then payments are due at the start of each period (the beginning of the month).

Rate and *Nper* must be in expressed in the same units. If *Rate* is expressed in percentage paid per month, then *Nper* must also be expressed in months. If *Rate* is an annual rate, then the period given in *Nper* should also be in years or the annual *Rate* should be divided by 12 to obtain a monthly rate.

If the function returns a negative value, it represents interest you are paying out, whereas a positive value represents interest paid to you.

Example

This example calculates the amount of interest paid on a $1,000.00 loan financed over 36 months with an annual interest rate of 10%. Payments are due at the beginning of the month. The interest paid during the first 10 months is displayed in a table.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  msg1 = ""
  For x = 1 to 10
    ipm# = IPmt((.10/12),x,36,1000,0,1)
    msg1 = msg1 & Format(x,"00") & " : " & Format(ipm#," 0,0.00") & crlf
  Next x
  MsgBox msg1
End Sub
```

See Also

`NPer` (function); **`Pmt`** (function); **`PPmt`** (function); **`Rate`** (function).

IRR (function)

Syntax **IRR**(*ValueArray()*,*Guess*)

Description Returns the internal rate of return for a series of periodic payments and receipts.

Comments The internal rate of return is the equivalent rate of interest for an investment consisting of a series of positive and/or negative cash flows over a period of regular intervals. It is usually used to project the rate of return on a business investment that requires a capital investment up front and a series of investments and returns on investment over time.

The **IRR** function requires the following parameters:

Parameter	Description
ValueArray()	Array of **Double** numbers that represent payments and receipts. Positive values are payments, and negative values are receipts. There must be at least one positive and one negative value to indicate the initial investment (negative value) and the amount earned by the investment (positive value).
Guess	**Double** containing your guess as to the value that the **IRR** function will return. The most common guess is .1 (10 percent).

The value of **IRR** is found by iteration. It starts with the value of *Guess* and cycles through the calculation adjusting *Guess* until the result is accurate within 0.00001 percent. After 20 tries, if a result cannot be found, **IRR** fails, and the user must pick a better guess.

Example This example illustrates the purchase of a lemonade stand for $800 and a series of incomes from the sale of lemonade over 12 months. The projected incomes for this example are generated in two **For...Next** Loops, and then the internal rate of return is calculated and displayed. (Not a bad investment!)

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim valu#(12)
  valu(1) = -800             'Initial investment
  msg1 = valu#(1) & ", "

  'Calculate the second through fifth months' sales.
  For x = 2 To 5
    valu(x) = 100 + (x * 2)
    msg1 = msg1 & valu(x) & ", "
  Next x

  'Calculate the sixth through twelfth months' sales.
  For x = 6 To 12
    valu(x) = 100 + (x * 10)
    msg1 = msg1 & valu(x) & ", "
  Next x

  'Calculate the equivalent investment return rate.
  retrn# = IRR(valu,.1)
  msg1 = "The values: " & crlf & msg1 & crlf & crlf
  MsgBox msg1 & "Return rate: " & Format(retrn#,"Percent")
End Sub
```

See Also **Fv** (function); **MIRR** (function); **Npv** (function); **Pv** (function).

Is (operator)

Syntax *object* **`Is [`***object* **`| Nothing]`**

Description Returns **`True`** if the two operands refer to the same object; returns **`False`** otherwise.

Comments This operator is used to determine whether two object variables refer to the same object. Both operands must be object variables of the same type (i.e., the same data object type or both of type **`Object`**).

The **`Nothing`** constant can be used to determine whether an object variable is uninitialized:

```
  If MyObject Is Nothing Then MsgBox "MyObject is uninitialized."
```

Uninitialized object variables reference no object.

Example This function inserts the date into a Microsoft Word document.

```
Sub InsertDate(ByVal WinWord As Object)
  If WinWord Is Nothing Then
    MsgBox "Object variant is not set."
  Else
    WinWord.Insert Date$
  End If
End Sub

Sub Main()
  Dim WinWord As Object
  On Error Resume Next
  WinWord = CreateObject("word.basic")
  InsertDate WinWord
End Sub
```

See Also Operator Precedence (topic); **`Like`** (operator).

Platform(s) All.

Notes: When comparing OLE automation objects, the **`Is`** operator will only return **`True`** if the operands reference the same OLE automation object. This is different from data objects. For example, the following use of **`Is`** (using the object class called **`excel.application`**) returns **`True`**:

```
  Dim a As Object
  Dim b As Object
  a = CreateObject("excel.application")
  b = a
  If a Is b Then Beep
```

The following use of **`Is`** will return **`False`**, even though the actual objects may be the same:

```
  Dim a As Object
  Dim b As Object
  a = CreateObject("excel.application")
  b = GetObject(,"excel.application")
  If a Is b Then Beep
```

The **`Is`** operator may return **`False`** in the above case because, even though **`a`** and **`b`** reference the same object, they may be treated as different objects by OLE 2.0 (this is dependent on the OLE 2.0 server application).

IsDate (function)

Syntax **IsDate(***expression***)**

Description Returns **True** if *expression* can be legally converted to a date; returns **False** otherwise.

Example

```
Sub Main()
  Dim a As Variant
Retry:
  a = InputBox("Enter a date.","Enter Date")
  If IsDate(a) Then
    MsgBox Format(a,"long date")
  Else
    Msgbox "Not quite, please try again!"
    Goto Retry
  End If
End Sub
```

See Also **Variant** (data type); **IsEmpty** (function); **IsError** (function); **IsObject** (function); **VarType** (function); **IsNull** (function).

IsEmpty (function)

Syntax **IsEmpty(***expression***)**

Description Returns **True** if *expression* is a **Variant** variable that has never been initialized; returns **False** otherwise.

Comments The **IsEmpty** function is the same as the following:

(VarType(*expression*) = ebEmpty)

Example

```
Sub Main()
  Dim a As Variant
  If IsEmpty(a) Then
    a = 1.0#     'Give uninitialized data a Double value 0.0.
    MsgBox "The variable has been initialized to: " & a
  Else
    MsgBox "The variable was already initialized!"
  End If
End Sub
```

See Also **Variant** (data type); **IsDate** (function); **IsError** (function); **IsObject** (function); **VarType** (function); **IsNull** (function).

IsError (function)

Syntax **`IsError(`***expression***`)`**

Description Returns **`True`** if *expression* is a user-defined error value; returns **`False`** otherwise.

Example This example creates a function that divides two numbers. If there is an error dividing the numbers, then a variant of type "error" is returned. Otherwise, the function returns the result of the division. The IsError function is used to determine whether the function encountered an error.

```
Function Div(ByVal a,ByVal b) As Variant
  If b = 0 Then
    Div = CVErr(2112)   'Return a special error value.
  Else
    Div = a / b       'Return the division.
  End If
End Function

Sub Main()
  Dim a As Variant
  a = Div(10,12)
  If IsError(a) Then
    MsgBox "The following error occurred: " & CStr(a)
  Else
    MsgBox "The result of the division is: " & a
  End If
End Sub
```

See Also **`Variant`** (data type); **`IsEmpty`** (function); **`IsDate`** (function); **`IsObject`** (function); **`VarType`** (function); **`IsNull`** (function).

IsMissing (function)

Syntax **`IsMissing(`***variable***`)`**

Description Returns **`True`** if *variable* was passed to the current subroutine or function; returns **`False`** if omitted.

Comments The **`IsMissing`** is used with variant variables passed as optional parameters (using the **`Optional`** keyword) to the current subroutine or function. For non-variant variables or variables that were not declared with the **`Optional`** keyword, **`IsMissing`** will always return **`True`**.

Example The following function runs an application and optionally minimizes it. If the optional isMinimize parameter is not specified by the caller, then the application is not minimized.

```
Sub Test(AppName As String,Optional isMinimize As Variant)
  app = Shell(AppName)
  If Not IsMissing(isMinimize) Then
    AppMinimize app
  Else
    AppMaximize app
  End If
End Sub

Sub Main
  Test "notepad.exe"         'Maximize this application
  Test "notepad.exe",True    'Minimize this application
End Sub
```

See Also **`Declare`** (statement), **`Sub...End Sub`** (statement), **`Function...End Function`** (statement)

IsNull (function)

Syntax **`IsNull(`***expression***`)`**

Description Returns **`True`** if *expression* is a **`Variant`** variable that contains no valid data; returns **`False`** otherwise.

Comments The **`IsNull`** function is the same as the following:

`(VarType(`***expression*****`) = ebNull)`**

Example

```
Sub Main()
  Dim a As Variant    'Initialized as Empty
  If IsNull(a) Then MsgBox "The variable contains no valid data."
  a = Empty * Null
  If IsNull(a) Then MsgBox "Null propagated through the expression."
End Sub
```

See Also **`Empty`** (constant); **`Variant`** (data type); **`IsEmpty`** (function); **`IsDate`** (function); **`IsError`** (function); **`IsObject`** (function); **`VarType`** (function).

IsNumeric (function)

Syntax `IsNumeric`(*expression*)

Description Returns `True` if *expression* can be converted to a number; returns `False` otherwise.

Comments If passed a number or a variant containing a number, then `IsNumeric` always returns `True`.

If a `String` or `String` variant is passed, then `IsNumeric` will return `True` only if the string can be converted to a number. The following syntaxes are recognized as valid numbers:

&H*hexdigits*[&|%|!|#|@]

&[O]*octaldigits*[&|%|!|#|@]

[-|+]*digits*[.[*digits*]][E[-|+]*digits*][!|%|&|#|@]

If an `Object` variant is passed, then the default property of that object is retrieved and one of the above rules is applied.

`IsNumeric` returns `False` if *expression* is a `Date`.

Example

```
Sub Main()
  Dim s$ As String
  s$ = InputBox("Enter a number.","Enter Number")

  If IsNumeric(s$) Then
    MsgBox "You did good!"
  Else
    MsgBox "You didn't do so good!"
  End If
End Sub
```

See Also `Variant` (data type); `IsEmpty` (function); `IsDate` (function); `IsError` (function); `IsObject` (function); `VarType` (function); `IsNull` (function).

IsObject (function)

Syntax **`IsObject(`***expression***`)`**

Description Returns **`True`** if *expression* is a **`Variant`** variable containing an **`Object`**; returns **`False`** otherwise.

Example This example will attempt to find a running copy of Excel and create 'a Excel object that can be referenced as any other object in the Basic Control Engine.

```
Sub Main()
  Dim v As Variant
  On Error Resume Next
  Set v = GetObject(,"Excel.Application")

  If IsObject(v) Then
    MsgBox "The default object value is: " & v = v.Value     'Access value property
of the object.
  Else
    MsgBox "Excel not loaded."
  End If
End Sub
```

See Also **`Variant`** (data type); **`IsEmpty`** (function); **`IsDate`** (function); **`IsError`** (function); **`VarType`** (function); **`IsNull`** (function).

Item$ (function)

Syntax **`Item$(`*`text$`*`,`*`first`*`,`*`last`* `[,`*`delimiters$`*`])`**

Description Returns all the items between *first* and *last* within the specified formatted text list.

Comments The **`Item$`** function takes the following parameters:

Parameter	Description
text$	**`String`** containing the text from which a range of items is returned.
first	**`Integer`** containing the index of the first item to be returned. If *first* is greater than the number of items in *text$*, then a zero-length string is returned.
last	**`Integer`** containing the index of the last item to be returned. All of the items between *first* and *last* are returned. If *last* is greater than the number of items in *text$*, then all items from *first* to the end of text are returned.
delimiters$	**`String`** containing different item delimiters. By default, items are separated by commas and end-of-lines. This can be changed by specifying different delimiters in the *delimiters$* parameter.

Example This example creates two delimited lists and extracts a range from each, then displays the result in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  ilist$ = "1,2,3,4,5,6,7,8,9,10,11,12,13,14,15"
  slist$ = "1/2/3/4/5/6/7/8/9/10/11/12/13/14/15"
  list1$ = Item$(ilist$,5,12)
  list2$ = Item$(slist$,2,9,"/")
  MsgBox "The returned lists are: " & crlf & list1$ & crlf & list2$
End Sub
```

See Also **`ItemCount`** (function); **`Line$`** (function); **`LineCount`** (function); **`Word$`** (function); **`WordCount`** (function).

ItemCount (function)

Syntax `ItemCount(`*text$* `[,`*delimiters$*`])`

Description Returns an **`Integer`** containing the number of items in the specified delimited text.

Comments Items are substrings of a delimited text string. Items, by default, are separated by commas and/or end-of-lines. This can be changed by specifying different delimiters in the *delimiters$* parameter. For example, to parse items using a backslash:

```
n = ItemCount(text$,"\")
```

Example This example creates two delimited lists and then counts the number of items in each. The counts are displayed in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  ilist$ = "1,2,3,4,5,6,7,8,9,10,11,12,13,14,15"
  slist$ = "1/2/3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19"

  l1% = ItemCount(ilist$)
  l2% = ItemCount(slist$,"/")
  msg1 = "The first lists contains: " & l1% & " items." & crlf
  msg1 = msg1 & "The second list contains: " & l2% & " items."
  MsgBox msg1
End Sub
```

See Also **`Item$`** (function); **`Line$`** (function); **`LineCount`** (function); **`Word$`** (function); **`WordCount`** (function).

K

Keywords (topic)

A keyword is any word or symbol recognized by the Basic Control Engine as part of the language. All of the following are keywords:

- Built-in subroutine names, such as **`MsgBox`** and **`Print`**.
- Built-in function names, such as **`Str$`**, **`CDbl`**, and **`Mid$`**.
- Special keywords, such as **`To`**, **`Next`**, **`Case`**, and **`Binary`**.
- Names of any extended language elements.

Restrictions

All keywords are reserved by the Basic Control Engine , in that you cannot create a variable, function, constant, or subroutine with the same name as a keyword. However, you are free to use all keywords as the names of structure members.

Kill (statement)

Syntax `Kill` *filespec$*

Description Deletes all files matching *filespec$*.

Comments The *filespec$* argument can include wildcards, such as **`*`** and **`?`**. The **`*`** character matches any sequence of zero or more characters, whereas the **`?`** character matches any single character. Multiple **`*`**'s and **`?`**'s can appear within the expression to form complex searching patterns. The following table shows some examples.

This Pattern	Matches These Files	Doesn't Match These Files

`*S*.TXT`	`SAMPLE.TXT`
	`GOOSE.TXT`
	`SAMS.TXT`
		`SAMPLE`
		`SAMPLE.DAT`

`C*T.TXT`	`CAT.TXT`	`CAP.TXT` `ACATS.TXT`
`C*T`	`CAT`	`CAT.DOC` `CAP.TXT`

`C?T`	`CAT`
	`CUT`
		`CAT.TXT`
		`CAPIT`
		`CT`

`*`	(All files)	

Example This example looks to see whether file test1.dat exists. If it does not, then it creates both test1.dat and test2.dat. The existence of the files is tested again; if they exist, a message is generated, and then they are deleted. The final test looks to see whether they are still there and displays the result.

```
Sub Main()
  If Not FileExists("test1.dat") Then
    Open "test1.dat" For Output As #1
    Open "test2.dat" For Output As #2
    Close
  End If

  If FileExists ("test1.dat") Then
    MsgBox "File test1.dat exists."
    Kill "test?.dat"
  End If

  If FileExists ("test1.dat") Then
    MsgBox "File test1.dat still exists."
  Else
    MsgBox "test?.dat successfully deleted."
  End If
End Sub
```

See Also **`Name`** (statement).

L

LBound (function)

Syntax **`LBound`**(*ArrayVariable*() [,*dimension*])

Description Returns an **`Integer`** containing the lower bound of the specified dimension of the specified array variable.

Comments The *dimension* parameter is an integer specifying the desired dimension. If this parameter is not specified, then the lower bound of the first dimension is returned.

The **`LBound`** function can be used to find the lower bound of a dimension of an array returned by an OLE automation method or property:

`LBound(`*object*`.`*property* **`[,`***dimension***`])`**

`LBound(`*object*`.`*method* **`[,`***dimension***`])`**

Examples

```
Sub Main()
  'This example dimensions two arrays and displays their lower bounds.

  Dim a(5 To 12)
  Dim b(2 To 100,9 To 20)

  lba = LBound(a)
  lbb = LBound(b,2)
  MsgBox "The lower bound of a is: " & lba & " The lower bound of b is: " & lbb

  'This example uses LBound and UBound to dimension a dynamic array to
  'hold a copy of an array redimmed by the FileList statement.

  Dim fl$()
  FileList fl$,"*.*"
  count = UBound(fl$)
  If ArrayDims(a) Then
    Redim nl$(LBound(fl$) To UBound(fl$))
    For x = 1 To count
      nl$(x) = fl$(x)
    Next x
    MsgBox "The last element of the new array is: " & nl$(count)
  End If
End Sub
```

See Also **`UBound`** (function); **`ArrayDims`** (function); Arrays (topic).

LCase, LCase$ (functions)

Syntax **`LCase[$](`***text*)

Description Returns the lowercase equivalent of the specified string.

Comments **`LCase$`** returns a **`String`**, whereas **`LCase`** returns a **`String`** variant.

`Null` is returned if *text* is **`Null`**.

Example This example shows the LCase function used to change uppercase names to lowercase with an uppercase first letter.

```
Sub Main()
  lname$ = "WILLIAMS"
  fl$ = Left(lname$,1)
  rest$ = Mid(lname$,2,Len(lname$))
  lname$ = fl$ & LCase(rest$)
  MsgBox "The converted name is: " & lname$
End Sub
```

See Also **`UCase, UCase$`** (functions).

Left, Left$ (functions)

Syntax **`Left[$]`**(*text*,*NumChars*)

Description Returns the leftmost *NumChars* characters from a given string.

Comments **`Left$`** returns a **`String`**, whereas **`Left`** returns a **`String`** variant.

NumChars is an **`Integer`** value specifying the number of character to return. If *NumChars* is 0, then a zero-length string is returned. If *NumChars* is greater than or equal to the number of characters in the specified string, then the entire string is returned.

`Null` is returned if *text* is **`Null`**.

Example This example shows the Left$ function used to change uppercase names to lowercase with an uppercase first letter.

```
Sub Main()
  lname$ = "WILLIAMS"
  fl$ = Left(lname$,1)
  rest$ = Mid(lname$,2,Len(lname$))
  lname$ = fl$ & LCase(rest$)
  MsgBox "The converted name is: " & lname$
End Sub
```

See Also **`Right, Right$`** (functions).

Len (function)

Syntax **Len**(*expression*)

Description Returns the number of characters in *expression* or the number of bytes required to store the specified variable.

Comments If *expression* evaluates to a string, then **Len** returns the number of characters in a given string or 0 if the string is empty. When used with a **Variant** variable, the length of the variant when converted to a **String** is returned. If *expression* is a **Null**, then **Len** returns a **Null** variant.

If used with a non-**String** or non-**Variant** variable, the function returns the number of bytes occupied by that data element.

When used with user-defined data types, the function returns the combined size of each member within the structure. Since variable-length strings are stored elsewhere, the size of each variable-length string within a structure is 2 bytes.

The following table describes the sizes of the individual data elements:

Data Element	Size
Integer	2 bytes.
Long	4 bytes.
Float	4 bytes.
Double	8 bytes.
Currency	8 bytes.
String (variable-length)	Number of characters in the string.
String (fixed-length)	The length of the string as it appears in the string's declaration.
Objects	0 bytes. Both data object variables and variables of type **Object** are always returned as 0 size.
User-defined type	Combined size of each structure member. Variable-length strings within structures require 2 bytes of storage. Arrays within structures are fixed in their dimensions. The elements for fixed arrays are stored within the structure and therefore require the number of bytes for each array element multiplied by the size of each array dimension: **element_size * *dimension1* * *dimension2*...**

The **Len** function always returns 0 with object variables or any data object variable.

Examples

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  'This example shows the Len function used in a routine to change
  'uppercase names to lowercase with an uppercase first letter.
  lname$ = "WILLIAMS"
  fl$ = Left(lname$,1)
  ln% = Len(lname$)
  rest$ = Mid(lname$,2,ln%)
  nname$ = fl$ & LCase(rest$)
  MsgBox "The proper case for " & lname$ & " is " & nname$ & "."
  'This example returns a table of lengths for standard numeric types.
  Dim lns(4)
  a% = 100 : b& = 200 : c! = 200.22 : d# = 300.22
  lns(1) = Len(a%)
  lns(2) = Len(b&)
  lns(3) = Len(c!)
  lns(4) = Len(d#)
  msg1 = "Lengths (in bytes) of standard types:" & crlf & crlf
  msg1 = msg1 & "Integer: " & lns(1) & crlf
  msg1 = msg1 & "Long: " & lns(2) & crlf
  msg1 = msg1 & "Single: " & lns(3) & crlf
  msg1 = msg1 & "Double: " & lns(4) & crlf
  MsgBox msg1
End Sub
```

See Also `InStr` (function).

Let (statement)

Syntax `[Let]` *variable* = *expression*

Description Assigns the result of an expression to a variable.

Comments The use of the word **`Let`** is supported for compatibility with other implementations of the Basic Control Engine. Normally, this word is dropped.

When assigning expressions to variables, internal type conversions are performed automatically between any two numeric quantities. Thus, you can freely assign numeric quantities without regard to type conversions. However, it is possible for an overflow error to occur when converting from larger to smaller types. This happens when the larger type contains a numeric quantity that cannot be represented by the smaller type. For example, the following code will produce a runtime error:

```
  Dim amount As Long
  Dim quantity As Integer

  amount = 400123   'Assign a value out of range for int.
  quantity = amount   'Attempt to assign to Integer.
```

When performing an automatic data conversion, underflow is not an error.

Example

```
Sub Main()
  Let a$ = "This is a string."
  Let b% = 100
  Let c# = 1213.3443
End Sub
```

See Also **=** (keyword); Expression Evaluation (topic).

Like (operator)

Syntax *expression* **`Like`** *pattern*

Description Compares two strings and returns **`True`** if the *expression* matches the given *pattern*; returns **`False`** otherwise.

Comments Case sensitivity is controlled by the **`Option Compare`** setting.

The *pattern* expression can contain special characters that allow more flexible matching:

Character	Evaluates To
`?`	Matches a single character.
`*`	Matches one or more characters.
`#`	Matches any digit.
`[`*range***`]`**	Matches if the character in question is within the specified range.
`[!`*range***`]`**	Matches if the character in question is not within the specified range.

A *range* specifies a grouping of characters. To specify a match of any of a group of characters, use the syntax **`[ABCDE]`**. To specify a range of characters, use the syntax **`[A-Z]`**. Special characters must appear within brackets, such as **`[]*?#`**.

If *expression* or *pattern* is not a string, then both *expression* and *pattern* are converted to **`String`** variants and compared, returning a **`Boolean`** variant. If either variant is **`Null`**, then **`Null`** is returned

The following table shows some examples:

expression	True If *pattern* Is	False If *pattern* Is
`"EBW"`	`"E*W", "E*"`	`"E*B"`
`"BasicScript"`	`"B*[r-t]icScript"`	`"B[r-t]ic"`
`"Version"`	`"V[e]?s*n"`	`"V[r]?s*N"`
`"2.0"`	`"#.#", "#?#"`	`"###", "#?[!0-9]"`
`"[ABC]"`	`"[[]*]"`	`"[ABC]", "[*]"`

Example This example demonstrates various uses of the Like function.

```
Sub Main()
  a$ = "This is a string variable of 123456 characters"
  b$ = "123.45"
  If a$ Like "[A-Z][g-i]*" Then MsgBox "The first comparison is True."
  If b$ Like "##3.##" Then MsgBox "The second comparison is True."
  If a$ Like "*variable*" Then MsgBox "The third comparison is True."
End Sub
```

See Also Operator Precedence (topic); **`Is`** (operator); **`Option Compare`** (statement).

Line Input# (statement)

Syntax **`Line Input [#]`***filenumber,variable*

Description Reads an entire line into the given variable.

Comments The *filenumber* parameter is a number that is used to refer to the open file—the number passed to the **`Open`** statement. The *filenumber* must reference a file opened in **`Input`** mode.

The file is read up to the next end-of-line, but the end-of-line character(s) is (are) not returned in the string. The file pointer is positioned after the terminating end-of-line.

The *variable* parameter is any string or variant variable reference. This statement will automatically declare the variable if the specified variable has not yet been used or dimensioned.

This statement recognizes either a single line feed or a carriage-return/line-feed pair as the end-of-line delimiter.

Example This example reads five lines of the autoexec.bat file and displays them in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  file$ = "c:\autoexec.bat"
  Open file$ For Input As #1
  msg1 = ""
  For x = 1 To 5
    Line Input #1,lin$
    msg1 = msg1 & lin$ & crlf
  Next x
  MsgBox "The first 5 lines of '" & file$ & "' are:" & crlf & crlf & msg1
End Sub
```

See Also **`Open`** (statement); **`Get`** (statement); **`Input#`** (statement); **`Input, Input$`** (functions).

Line Numbers (topic)

Line numbers are not supported by the Basic Control Engine.

As an alternative to line numbers, you can use meaningful labels as targets for absolute jumps, as shown below:

```
Sub Main()
  Dim i As Integer
  On Error Goto MyErrorTrap
  i = 0
LoopTop:
  i = i + 1
  If i < 10 Then Goto LoopTop
MyErrorTrap:
  MsgBox "An error occurred."
End Sub
```

Line$ (function)

Syntax **Line$(***text$***,***first***[,***last***])**

Description Returns a **String** containing a single line or a group of lines between *first* and *last*.

Comments Lines are delimited by carriage return, line feed, or carriage-return/line-feed pairs.

The **Line$** function takes the following parameters:

Parameter	Description
text$	**String** containing the text from which the lines will be extracted.
first	**Integer** representing the index of the first line to return. If *last* is omitted, then this line will be returned. If *first* is greater than the number of lines in *text$*, then a zero-length string is returned.
last	**Integer** representing the index of the last line to return.

Example This example reads five lines of the autoexec.bat file, extracts the third and fourth lines with the Line$ function, and displays them in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)
Sub Main()
  file$ = "c:\autoexec.bat"
  Open file$ For Input As #1
  txt = ""
  For x = 1 To 5
    Line Input #1,lin$
    txt = txt & lin$ & crlf
  Next x
  lines$ = Line$(txt,3,4)
  MsgBox "The 3rd and 4th lines of '" & file$ & "' are:" & crlf_
         & crlf & lines$
End Sub
```

See Also **Item$** (function); **ItemCount** (function); **LineCount** (function); **Word$** (function); **WordCount** (function).

LineCount (function)

Syntax **`LineCount`**(*text$*)

Description Returns an **`Integer`** representing the number of lines in *text$*.

Comments Lines are delimited by carriage return, line feed, or both.

Example This example reads your autoexec.bat file into a variable and then determines how many lines it is comprised of.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  file$ = "c:\autoexec.bat"
  Open file$ For Input As #1
  txt = ""
  Do Until Eof(1)
    Line Input #1,lin$
    txt = txt & lin$ & crlf
  Loop
  lines! = LineCount(txt)
  MsgBox "'" & file$ & "' is " & lines! & " lines long!" & crlf_
        & crlf & txt
End Sub
```

See Also **`Item$`** (function); **`ItemCount`** (function); **`Line$`** (function); **`Word$`** (function); **`WordCount`** (function).

ListBox (statement)

Syntax `ListBox` *X*`,`*Y*`,`*width*`,`*height*`,`*ArrayVariable*`,.`*Identifier*

Description Creates a list box within a dialog box template.

Comments When the dialog box is invoked, the list box will be filled with the elements contained in *ArrayVariable*.

This statement can only appear within a dialog box template (that is, between the **`Begin Dialog`** and **`End Dialog`** statements).

The **`ListBox`** statement requires the following parameters:

Parameter	Description
X, Y	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, height	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
ArrayVariable	Specifies a single-dimensioned array of strings used to initialize the elements of the list box. If this array has no dimensions, then the list box will be initialized with no elements. A runtime error results if the specified array contains more than one dimension. *ArrayVariable* can specify an array of any fundamental data type (structures are not allowed). **`Null`** and **`Empty`** values are treated as zero-length strings.
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**). This parameter also creates an integer variable whose value corresponds to the index of the list box's selection (0 is the first item, 1 is the second, and so on). This variable can be accessed using the following syntax: *DialogVariable*`.`*Identifier*

Example This example creates a dialog box with two list boxes, one containing files and the other containing directories.

```
Sub Main()
  Dim files() As String
  Dim dirs() As String
  Begin Dialog ListBoxTemplate 16,32,184,96,"Sample"
    Text 8,4,24,8,"&Files:"
    ListBox 8,16,60,72,files$,.Files
    Text 76,4,21,8,"&Dirs:"
    ListBox 76,16,56,72,dirs$,.Dirs
    OKButton 140,4,40,14
    CancelButton 140,24,40,14
  End Dialog
  FileList files
  FileDirs dirs

  Dim ListBoxDialog As ListBoxTemplate
  rc% = Dialog(ListBoxDialog)
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

Literals (topic)

Literals are values of a specific type. The following table shows the different types of literals supported by the Basic Control Engine:

Literal	Description
10	**Integer** whose value is 10.
43265	**Long** whose value is 43,265.
5#	**Double** whose value is 5.0. A number's type can be explicitly set using any of the following type-declaration characters: **%** — **Integer** **&** — **Long** **#** — **Double** **!** — **Single**
5.5	**Double** whose value is 5.5. Any number with decimal point is considered a double.
5.4E100	**Double** expressed in scientific notation.
&HFF	**Integer** expressed in hexadecimal.
&O47	**Integer** expressed in octal.
&HFF#	**Double** expressed in hexadecimal.
"hello"	**String** of five characters: **hello.**
"""hello"""	**String** of seven characters: **"hello"**. Quotation marks can be embedded within strings by using two consecutive quotation marks.
#1/1/1994#	**Date** value whose internal representation is 34335.0. Any valid date can appear with **#**'s. Date literals are interpreted at execution time using the locale settings of the host environment. To ensure that date literals are correctly interpreted for all locales, use the international date format: #*YYYY-MM-DD HH*:*MM*:*SS*#

Constant Folding

The Basic Control Engine supports constant folding where constant expressions are calculated by the compiler at compile time. For example, the expression

```
i% = 10 + 12
```

is the same as:

```
i% = 22
```

Similarly, with strings, the expression

```
s$ = "Hello," + " there" + (46)
```

is the same as:

```
s$ = "Hello, there."
```

Loc (function)

Syntax **`Loc`**(*filenumber*)

Description Returns a **`Long`** representing the position of the file pointer in the given file.

Comments The *filenumber* parameter is an **`Integer`** used by the Basic Control Engine to refer to the number passed by the **`Open`** statement to the Basic Control Engine .

The **`Loc`** function returns different values depending on the mode in which the file was opened:

File Mode	Returns
`Input`	Current byte position divided by 128
`Output`	Current byte position divided by 128
`Append`	Current byte position divided by 128
`Binary`	Position of the last byte read or written
`Random`	Number of the last record read or written

Example This example reads 5 lines of the autoexec.bat file, determines the current location of the file pointer, and displays it in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  file$ = "c:\autoexec.bat"
  Open file$ For Input As #1
  For x = 1 To 5
    If Not EOF(1) Then Line Input #1,lin$
  Next x
  lc% = Loc(1)
  Close
  MsgBox "The file byte location is: " & lc%
End Sub
```

See Also **`Seek`** (function); **`Seek`** (statement); **`FileLen`** (function).

Lock (statement)

Syntax	**`Lock [#]`** *filenumber* **`[,{`***record* **`|`** **`[`***start***`]`** **`To`** *end***`}]`**
Description	Locks a section of the specified file, preventing other processes from accessing that section of the file until the **`Unlock`** statement is issued.

Comments The **`Lock`** statement requires the following parameters:

Parameter	Description
filenumber	**`Integer`** used by the Basic Control Engine to refer to the open file—the number passed to the **`Open`** statement.
record	**`Long`** specifying which record to lock.
start	**`Long`** specifying the first record within a range to be locked.
end	**`Long`** specifying the last record within a range to be locked.

For sequential files, the *record*, *start*, and *end* parameters are ignored. The entire file is locked.

The section of the file is specified using one of the following:

Syntax	Description
No parameters	Locks the entire file (no record specification is given).
record	Locks the specified record number (for **`Random`** files) or byte (for **`Binary`** files).
`to` *end*	Locks from the beginning of the file to the specified record (for **`Random`** files) or byte (for **`Binary`** files).
start **`to`** *end*	Locks the specified range of records (for **`Random`** files) or bytes (for **`Binary`** files).

The lock range must be the same as that used to subsequently unlock the file range, and all locked ranges must be unlocked before the file is closed. Ranges within files are not unlocked automatically by the Basic Control Engine when your script terminates, which can cause file access problems for other processes. It is a good idea to group the **`Lock`** and **`Unlock`** statements close together in the code, both for readability and so subsequent readers can see that the lock and unlock are performed on the same range. This practice also reduces errors in file locks.

Example This example creates test.dat and fills it with ten string variable records. These are displayed in a dialog box. The file is then reopened for read/write, and each record is locked, modified, rewritten, and unlocked. The new records are then displayed in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a$ = "This is record number: "
  b$ = "0"
  rec$ = ""

  msg1 = ""
  Open "test.dat" For Random Access Write Shared As #1
  For x = 1 To 10
    rec$ = a$ & x
    Lock #1,x
    Put #1,,rec$
    Unlock #1,x
    msg1 = msg1 & rec$ & crlf
  Next x
  Close
  MsgBox "The records are:" & crlf & msg1

  msg1 = ""
  Open "test.dat" For Random Access Read Write Shared As #1
  For x = 1 To 10
    rec$ = Mid(rec$,1,23) & (11 - x)
    Lock #1,x
    Put #1,x,rec$
    Unlock #1,x
    msg1 = msg1 & rec$ & crlf
  Next x
  MsgBox "The records are: " & crlf & msg1
  Close

  Kill "test.dat"
End Sub
```

See Also **`Unlock`** (statement); **`Open`** (statement).

Lof (function)

Syntax **Lof**(*filenumber*)

Description Returns a **Long** representing the number of bytes in the given file.

Comments The *filenumber* parameter is an **Integer** used by the Basic Control Engine to refer to the open file—the number passed to the **Open** statement.

The file must currently be open.

Example This example creates a test file, writes ten records into it, then finds the length of the file and displays it in a message box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a$ = "This is record number: "

  Open "test.dat" For Random Access Write Shared As #1
  msg1 = ""
  For x = 1 To 10
    rec$ = a$ & x
    put #1,,rec$
    msg1 = msg1 & rec$ & crlf
  Next x
  Close

  Open "test.dat" For Random Access Read Write Shared As #1
  r% = Lof(1)
  Close
  MsgBox "The length of 'test.dat' is: " & r%
End Sub
```

See Also **Loc** (function); **Open** (statement); **FileLen** (function).

Log (function)

Syntax **Log**(*number*)

Description Returns a **Double** representing the natural logarithm of a given number.

Comments The value of *number* must be a **Double** greater than 0.

The value of *e* is 2.71828.

Example This example calculates the natural log of 100 and displays it in a message box.

```
Sub Main()
  x# = Log(100)
  MsgBox "The natural logarithm of 100 is: " & x#
End Sub
```

See Also **Exp** (function).

Long (data type)

Syntax **Long**

Description **Long** variables are used to hold numbers (with up to ten digits of precision) within the following range:

–2,147,483,648 <= *Long* <= 2,147,483,647

Internally, longs are 4-byte values. Thus, when appearing within a structure, longs require 4 bytes of storage. When used with binary or random files, 4 bytes of storage are required.

The type-declaration character for **Long** is **&**.

See Also **Currency** (data type); **Date** (data type); **Double** (data type); **Integer** (data type); **Object** (data type); **Single** (data type); **String** (data type); **Variant** (data type); **Boolean** (data type); **Def***Type* (statement); **CLng** (function).

LSet (statement)

Syntax 1 **`LSet`** *dest* **`=`** *source*

Syntax 2 **`LSet`** *dest_variable* **`=`** *source_variable*

Description Left-aligns the source string in the destination string or copies one user-defined type to another.

Comments

Syntax 1

The **`LSet`** statement copies the source string *source* into the destination string *dest*. The *dest* parameter must be the name of either a **`String`** or **`Variant`** variable. The *source* parameter is any expression convertible to a string.

If *source* is shorter in length than *dest*, then the string is left-aligned within *dest*, and the remaining characters are padded with spaces. If *source$* is longer in length than *dest*, then *source* is truncated, copying only the leftmost number of characters that will fit in *dest*.

The *destvariable* parameter specifies a **`String`** or **`Variant`** variable. If *destvariable* is a **`Variant`** containing **`Empty`**, then no characters are copied. If *destvariable* is not convertible to a **`String`**, then a runtime error occurs. A runtime error results if *destvariable* is **`Null`**.

Syntax 2

The source structure is copied byte for byte into the destination structure. This is useful for copying structures of different types. Only the number of bytes of the smaller of the two structures is copied. Neither the source structure nor the destination structure can contain strings.

Example This example replaces a 40-character string of asterisks (*) with an RSet and LSet string and then displays the result.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim msg,tmpstr$
  tmpstr$ = String(40,"*")
  msg1 = "Here are two strings that have been right-" + crlf
  msg1 = msg1 & "and left-justified in a 40-character string."
  Msg1 = msg1 & crlf & crlf
  Rset tmpstr$ = "Right|"
  msg1 = msg1 & tmpstr$ & crlf
  LSet tmpstr$ = "|Left"
  msg1 = msg1 & tmpstr$ & crlf
  MsgBox msg1
End Sub
```

See Also **`RSet`** (function).

LTrim, LTrim$ (functions)

Syntax **`LTrim[$](`***text***`)`**

Description Returns *text* with the leading spaces removed.

Comments **`LTrim$`** returns a **`String`**, whereas **`LTrim`** returns a **`String`** variant.

`Null` is returned if *text* is **`Null`**.

Example This example displays a right-justified string and its LTrim result.

Const crlf = Chr$(13) + Chr$(10)

```
Sub Main()
  txt$ = "      This is text           "
  tr$ = LTrim(txt$)
  MsgBox "Original ->" & txt$ & "<-" & crlf & "Left Trimmed ->" & tr$ & "<-"
End Sub
```

See Also **`RTrim, RTrim$`** (functions); **`Trim, Trim$`** (functions).

M

Main (statement)

Syntax

```
Sub Main()
End Sub
```

Description Defines the subroutine where execution begins.

Example

```
Sub Main()
  MsgBox "This is the Main() subroutine and entry point."
End Sub
```

MCI (function)

Syntax `Mci(`*command$,result$ [,error$]*`)`

Description Executes an **`Mci`** command, returning an Integer indicating whether the command was successful.

Comments The **`Mci`** function takes the following parameters:

Parameter	**Description**
command$	String containing the command to be executed.
result$	String variable into which the result is placed. If the command doesn't return anything, then a zero-length string is returned. To ignore the returned string, pass a zero-length string, such as. `r% = Mci("open chimes.wav type waveaudio","")`
error$	Optional String variable into which an error string will be placed. A zero-length string will be returned if the function is successful.

Example 1 This first example plays a wave file. The wave file is played to completion before execution can continue.

```
Sub Main()
  Dim result As String
  Dim ErrorMessage As String
  Dim Filename As String
  Dim rc As Integer
  'Establish name of file in the Windows directory.
  Filename = FileParse$(System.WindowsDirectory$ + "\" + "chimes.wav")
  'Open the file and driver.
  rc = Mci("open " & Filename & " type waveaudio alias CoolSound","",ErrorMessage)
  If (rc) Then
    'Error occurred--display error message to user.
    MsgBox ErrorMessage
    Exit Sub
  End If
  rc = Mci("play CoolSound wait","","")    'Wait for sound to finish.
  rc = Mci("close CoolSound","","")     'Close driver and file.
End Sub
```

Example 2 This next example shows how to query an Mci device and play an MIDI file in the background.

```
Sub Main()
  Dim result As String
  Dim ErrMsg As String
  Dim Filename As String
  Dim rc As Integer
  'Check to see whether MIDI device can play for us.
  rc = Mci("capability sequencer can play",result,ErrorMessage)
  'Check for error.
  If rc Then
    MsgBox ErrorMessage
    Exit Sub
  End If
  'Can it play?
  If result <> "true" Then
    MsgBox "MIDI device is not capable of playing."
    Exit Sub
  End If
  'Assemble a filename from the Windows directory.
  Filename = FileParse$(System.WindowsDirectory$ & "\" & "canyon.mid")

  'Open the driver and file.
  rc = Mci("open " & Filename & " type sequencer alias song",result$,ErrMsg)
  If rc Then
    MsgBox ErrMsg
    Exit Sub
  End If
  rc = Mci("play song","","")     'Play in the background.
  MsgBox "Press OK to stop the music.",ebOKOnly
  rc = Mci("close song","","")
End Sub
```

See Also **`Beep`** (statement)

Notes The **`Mci`** function accepts any Mci command as defined in the Multimedia Programmers Reference in the Windows 3.1 SDK.

Mid, Mid$ (functions)

Syntax **`Mid[$](`***text***`,`***start*** `[,`*length*`])`**

Description Returns a substring of the specified string, beginning with *start,* for *length* characters.

Comments The returned substring starts at character position *start* and will be *length* characters long.

`Mid$` returns a **`String`**, whereas **`Mid`** returns a **`String`** variant.

The **`Mid/Mid$`** functions take the following parameters:

Parameter	Description
text	Any **`String`** expression containing the text from which characters are returned.
start	**`Integer`** specifying the character position where the substring begins. If *start* is greater than the length of *text$*, then a zero-length string is returned.
length	**`Integer`** specifying the number of characters to return. If this parameter is omitted, then the entire string is returned, starting at *start*.

The **`Mid`** function will return **`Null`** *text* is **`Null`**.

Example This example extracts the left and right halves of a string using the Mid functions and displays the text with a message spliced in the middle.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a$ = "DAVE is a good programmer"
  l$ = Mid(a$,1,7)
  r$ = Mid(a$,16,10)
  MsgBox l$ & " an excellent " & r$
End Sub
```

See Also **`InStr`** (function); **`Option Compare`** (statement); **`Mid, Mid$`** (statements).

Mid, Mid$ (statements)

Syntax **`Mid[$](`***variable***`,`***start***`[,`***length***`]) =`** *newvalue*

Description Replaces one part of a string with another.

Comments The **`Mid/Mid$`** statements take the following parameters:

Parameter	**Description**
variable	**`String`** or **`Variant`** variable to be changed.
start	**`Integer`** specifying the character position within *variable* where replacement begins. If *start* is greater than the length of *variable*, then *variable* remains unchanged.
length	**`Integer`** specifying the number of characters to change. If this parameter is omitted, then the entire string is changed, starting at *start*.
newvalue	Expression used as the replacement. This expression must be convertible to a **`String`**.

The resultant string is never longer than the original length of *variable*.

With **`Mid`**, *variable* must be a **`Variant`** variable convertible to a **`String`**, and *newvalue* is any expression convertible to a string. A runtime error is generated if either variant is **`Null`**.

Example This example displays a substring from the middle of a string variable using the Mid$ function, replacing the first four characters with "NEW " using the Mid$ statement.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a$ = "This is the Main string containing text."
  b$ = Mid(a$,14,Len(a$))
  Mid(b$,1) = "NEW"
  MsgBox a$ & crlf & b$
End Sub
```

See Also **`Mid, Mid$`** (functions); **`Option Compare`** (statement).

Minute (function)

Syntax **`Minute(`***time***`)`**

Description Returns the minute of the day encoded in the specified *time* parameter.

Comments The value returned is as an **`Integer`** between 0 and 59 inclusive.

The *time* parameter is any expression that converts to a **`Date`**.

Example This example takes the current time; extracts the hour, minute, and second; and displays them as the current time.

```
Sub Main()
  Msgbox "It is now minute " & Minute(Time) & " of the hour."
End Sub
```

See Also **`Day`** (function); **`Second`** (function); **`Month`** (function); **`Year`** (function); **`Hour`** (function); **`Weekday`** (function); **`DatePart`** (function).

MIRR (function)

Syntax **`MIRR(`***ValueArray*`()`,*FinanceRate*,*ReinvestRate***`)`**

Description Returns a **`Double`** representing the modified internal rate of return for a series of periodic payments and receipts.

Comments The modified internal rate of return is the equivalent rate of return on an investment in which payments and receipts are financed at different rates. The interest cost of investment and the rate of interest received on the returns on investment are both factors in the calculations.

The **`MIRR`** function requires the following parameters:

Parameter	Description
ValueArray()	Array of **`Double`** numbers representing the payments and receipts. Positive values are payments (invested capital), and negative values are receipts (returns on investment). There must be at least one positive (investment) value and one negative (return) value.
FinanceRate	**`Double`** representing the interest rate paid on invested monies (paid out).
ReinvestRate	**`Double`** representing the rate of interest received on incomes from the investment (receipts).

FinanceRate and *ReinvestRate* should be expressed as percentages. For example, 11 percent should be expressed as 0.11.

To return the correct value, be sure to order your payments and receipts in the correct sequence.

Example This example illustrates the purchase of a lemonade stand for $800 financed with money borrowed at 10%. The returns are estimated to accelerate as the stand gains popularity. The proceeds are placed in a bank at 9 percent interest. The incomes are estimated (generated) over 12 months. This program first generates the income stream array in two For...Next loops, and then the modified internal rate of return is calculated and displayed. Notice that the annual rates are normalized to monthly rates by dividing them by 12.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim valu#(12)
  valu(1) = -800                    'Initial investment
  msg1 = valu(1) & ", "
  For x = 2 To 5
    valu(x) = 100 + (x * 2)             'Incomes months 2-5
    msg1 = msg1 & valu(x) & ", "
  Next x
  For x = 6 To 12
    valu(x) = 100 + (x * 10)          'Incomes months 6-12
    msg1 = msg1 & valu(x) & ", "
  Next x
  retrn# = MIRR(valu,.1/12,.09/12)      'Note: normalized annual rates

  msg1 = "The values: " & crlf & msg1 & crlf & crlf
  MsgBox msg1 & "Modified rate: " & Format(retrn#,"Percent")
End Sub
```

See Also **Fv** (function); **IRR** (function); **Npv** (function); **Pv** (function).

MkDir (statement)

Syntax **MkDir** *dir$*

Description Creates a new directory as specified by *dir$*.

Example This example creates a new directory on the default drive. If this causes an error, then the error is displayed and the program terminates. If no error is generated, the directory is removed with the RmDir statement.

```
Sub Main()
  On Error Resume Next
  MkDir "testdir"
  If Err <> 0 Then
    MsgBox "The following error occurred: " & Error(Err)
  Else
    MsgBox "Directory 'testdir' was created and is about to be removed."
    RmDir "testdir"
  End If
End Sub
```

See Also **ChDir** (statement); **ChDrive** (statement); **CurDir, CurDir$** (functions); **Dir, Dir$** (functions); **RmDir** (statement).

Mod (operator)

Syntax *expression1* **Mod** *expression2*

Description Returns the remainder of *expression1* **/** *expression2* as a whole number.

Comments If both expressions are integers, then the result is an integer. Otherwise, each expression is converted to a **Long** before performing the operation, returning a **Long**.

A runtime error occurs if the result overflows the range of a **Long**.

If either expression is **Null**, then **Null** is returned. **Empty** is treated as 0.

Example This example uses the Mod operator to determine the value of a randomly selected card where card 1 is the ace (1) of clubs and card 52 is the king (13) of spades. Since the values recur in a sequence of 13 cards within 4 suits, we can use the Mod function to determine the value of any given card number.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  cval$ = "Ace,Two,Three,Four,Five,Six,Seven,Eight,Nine,Ten,Jack,Queen,King"
  Randomize
  card% = Random(1,52)
  value = card% Mod 13
  If value = 0 Then value = 13
  CardNum$ = Item$(cval,value)
  If card% < 53 Then suit$ = "Spades"
  If card% < 40 Then suit$ = "Hearts"
  If card% < 27 Then suit$ = "Diamonds"
  If card% < 14 Then suit$ = "Clubs"
  msg1 = "Card number " & card% & " is the "
  msg1 = msg 1& CardNum & " of " & suit$
  MsgBox msg1
End Sub
```

See Also **/** (operator); **** (operator).

Month (function)

Syntax **Month(***date***)**

Description Returns the month of the date encoded in the specified *date* parameter.

Comments The value returned is as an **Integer** between 1 and 12 inclusive.

The *date* parameter is any expression that converts to a **Date**.

Example This example returns the current month in a dialog box.

```
Sub Main()
  mons$ = "Jan.,Feb.,Mar.,Apr.,May,Jun.,Jul.,Aug.,Sep.,Oct.,Nov.,Dec."
  tdate$ = Date$
  tmonth! = Month(DateValue(tdate$))
  MsgBox "The current month is: " & Item$(mons$,tmonth!)
End Sub
```

See Also **Day** (function); **Minute** (function); **Second** (function); **Year** (function); **Hour** (function); **Weekday** (function); **DatePart** (function).

MsgBox (function)

Syntax `MsgBox(`*msg* `[,[`*type*`] [,`*title*`]])`

Description Displays a message in a dialog box with a set of predefined buttons, returning an **`Integer`** representing which button was selected.

Comments The **`MsgBox`** function takes the following parameters:

Parameter	Description
msg	Message to be displayed—any expression convertible to a **`String`**. End-of-lines can be used to separate lines (either a carriage return, line feed, or both). If a given line is too long, it will be word-wrapped. If *msg* contains character 0, then only the characters up to the character 0 will be displayed. The width and height of the dialog box are sized to hold the entire contents of *msg*. A runtime error is generated if *msg* is **`Null`**.
type	**`Integer`** specifying the type of dialog box (see below).
title	Caption of the dialog box. This parameter is any expression convertible to a **`String`**. If it is omitted, then **`the script`** is used. A runtime error is generated if *title* is **`Null`**.

The **`MsgBox`** function returns one of the following values:

Constant	Value	Description
`ebOK`	1	OK was clicked.
`ebCancel`	2	Cancel was clicked.
`ebAbort`	3	Abort was clicked.
`ebRetry`	4	Retry was clicked.
`ebIgnore`	5	Ignore was clicked.
`ebYes`	6	Yes was clicked.
`ebNo`	7	No was clicked.

The *type* parameter is the sub of any of the following values:

Constant	Value	Description
`ebOKOnly`	0	Displays OK button only.
`ebOKCancel`	1	Displays OK and Cancel buttons.
`ebAbortRetryIgnore`	2	Displays Abort, Retry, and Ignore buttons.
`ebYesNoCancel`	3	Displays Yes, No, and Cancel buttons.
`ebYesNo`	4	Displays Yes and No buttons.
`ebRetryCancel`	5	Displays Retry and Cancel buttons.
`ebCritical`	16	Displays "stop" icon.

`ebQuestion`	32	Displays "question mark" icon.	❓
`ebExclamation`	48	Displays "exclamation point" icon.	❗
`ebInformation`	64	Displays "information" icon.	ℹ
`ebDefaultButton1`	0	First button is the default button.	
`ebDefaultButton2`	256	Second button is the default button.	
`ebDefaultButton3`	512	Third button is the default button.	
`ebApplicationModal`	0	Application modal—the current application is suspended until the dialog box is closed.	

The default value for *type* is **`0`** (display only the OK button, making it the default).

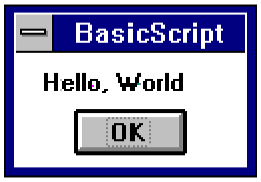
Breaking Text across Lines

The *msg* parameter can contain end-of-line characters, forcing the text that follows to start on a new line. The following example shows how to display a string on two lines:

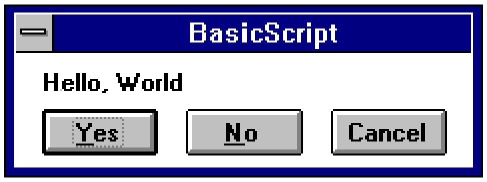
```
  MsgBox "This is on" + Chr(13) + Chr(10) + "two lines."
```

The carriage-return or line-feed characters can be used by themselves to designate an end-of-line.

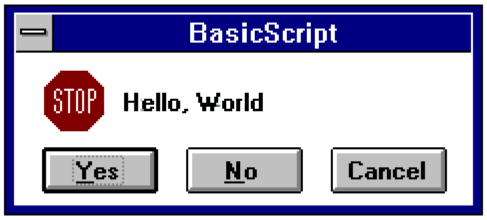
```
r = MsgBox("Hello, World")
```



```
r = MsgBox("Hello, World",ebYesNoCancel Or ebDefaultButton1)
```



```
r = MsgBox("Hello, World",ebYesNoCancel Or ebDefaultButton1 Or ebCritical)
```



Example

```
Sub Main()
  MsgBox "This is a simple message box."
  MsgBox "This is a message box with a title and an icon.",_
    ebExclamation,"Simple"
  MsgBox "This message box has OK and Cancel buttons.",_
    ebOkCancel,"MsgBox"
  MsgBox "This message box has Abort, Retry, and Ignore buttons.",_
    ebAbortRetryIgnore,"MsgBox"
  MsgBox "This message box has Yes, No, and Cancel buttons.",_
    ebYesNoCancel Or ebDefaultButton2,"MsgBox"
  MsgBox "This message box has Yes and No buttons.",ebYesNo,"MsgBox"
  MsgBox "This message box has Retry and Cancel buttons.",_
    ebRetryCancel,"MsgBox"
  MsgBox "This message box is system modal!",ebSystemModal
End Sub
```

See Also **`AskBox$`** (function); **`AskPassword$`** (function); **`InputBox, InputBox$`** (functions); **`OpenFilename$`** (function); **`SaveFilename$`** (function); **`SelectBox`** (function); **`AnswerBox`** (function).

Note: **`MsgBox`** displays all text in its dialog box in 8-point MS Sans Serif.

MsgBox (statement)

Syntax **`MsgBox`** *msg* `[,[`*type*`] [,`*title*`]]`

Description This command is the same as the **`MsgBox`** function, except that the statement form does not return a value. See **`MsgBox`** (function).

Example

```
Sub Main()
  MsgBox "This is text displayed in a message box." 'Display text.
  MsgBox "The result is: " & (10 * 45)  'Display a number.
End Sub
```

See Also **`AskBox$`** (function); **`AskPassword$`** (function); **`InputBox, InputBox$`** (functions); **`OpenFilename$`** (function); **`SaveFilename$`** (function); **`SelectBox`** (function); **`AnswerBox`** (function).

Msg.Close (method)

Syntax **`Msg.Close`**

Description Closes the modeless message dialog box.

Comments Nothing will happen if there is no open message dialog box.

Example

```
Sub Main()
  Msg.Open "Printing. Please wait...",0,True,True
  Sleep 3000
  Msg.Close
End Sub
```

See Also **`Msg.Open`** (method); **`Msg.Thermometer`** (property); **`Msg.Text`** (property).

Msg.Open (method)

Syntax `Msg.Open` *prompt,timeout,cancel,thermometer [,XPos,YPos]*

Description Displays a message in a dialog box with an optional Cancel button and thermometer.

Comments The **`Msg.Open`** method takes the following named parameters:

Parameter	Description
prompt	String containing the text to be displayed. The text can be changed using the **`Msg.Text`** property.
timeout	Integer specifying the number of seconds before the dialog box is automatically removed. The *timeout* parameter has no effect if its value is 0.
cancel	Boolean controlling whether or not a **Cancel** button appears within the dialog box beneath the displayed message. If this parameter is True, then a **Cancel** button appears. If it is not specified or False, then no **Cancel** button is created. If a user chooses the **Cancel** button at runtime, a trappable runtime error is generated (error number 18). In this manner, a message dialog box can be displayed and processing can continue as normal, aborting only when the user cancels the process by choosing the **Cancel** button.
thermometer	Boolean controlling whether the dialog box contains a thermometer. If this parameter is True, then a thermometer is created between the text and the optional **Cancel** button. The thermometer initially indicates 0% complete and can be changed using the **`Msg.Thermometer`** property.
XPos, *YPos*	Integer coordinates specifying the location of the upper left corner of the message box, in twips (twentieths of a point). If these parameters are not specified, then the window is centered on top of the application.

Unlike other dialog boxes, a message dialog box remains open until the user selects **Cancel**, the *timeout* has expired, or the **`Msg.Close`** method is executed (this is sometimes referred to as modeless).

Only a single message window can be opened at any one time. The message window is removed automatically when a script terminates.

The **Cancel** button, if present, can be selected using either the mouse or keyboard. However, these events will never reach the message dialog unless you periodically call **`DoEvents`** from within your script.

Example This example displays several types of message boxes.

```
Sub Main()
  Msg.Open "Printing. Please wait...",0,True,False
  Sleep 3000
  Msg.Close
  Msg.Open "Printing. Please wait...",0,True,True
  For x = 1 to 100
    Msg.Thermometer = x
  Next x
  Sleep 1000
  Msg.Close
End Sub
```

See Also **`Msg.Close`** (method); **`Msg.Thermometer`** (property); **`Msg.Text`** (property).

Msg.Text (property)

Syntax `Msg.Text` *[= newtext$]*

Description Changes the text within an open message dialog box (one that was previously opened with the **`Msg.Open`** method).

Comments The message dialog box is not resized to accommodate the new text.

A runtime error will result if a message dialog box is not currently open (using **`Msg.Open`**).

Example This example creates a modeless message box, leaving room in the message text for the record number. This box contains a Cancel button.

```
Sub Main()
  Msg.Open "Reading Record",0,True,False
  For i = 1 To 100
    'Read a record here.
    'Update the modeless message box.
    Sleep 100
    Msg.Text ="Reading record " & i
  Next i
  Msg.Close
End Sub
```

See Also **`Msg.Close`** (method); **`Msg.Open`** (method); **`Msg.Thermometer`** (property).

Msg.Thermometer (property)

Syntax `Msg.Thermometer` *[= percentage]*

Description Changes the percentage filled indicated within the thermometer of a message dialog box (one that was previously opened with the **`Msg.Open`** method).

Comments A runtime error will result if a message box is not currently open (using **`Msg.Open`**) or if the value of *percentage* is not between 0 and 100 inclusive.

Example This example create a modeless message box with a thermometer and a Cancel button. This example also shows how to process the clicking of the Cancel button.

```
Sub Main()
  On Error Goto ErrorTrap
  Msg.Open "Reading records from file...",0,True,True
  For i = 1 To 100    'Read a record here.
    'Update the modeless message box.
    Msg.Thermometer =i
    DoEvents
    Sleep 50
  Next i
  Msg.Close
  On Error Goto 0     'Turn error trap off.
  Exit Sub
ErrorTrap:
  If Err = 809 Then
    MsgBox "Cancel was pressed!"
    Exit Sub       'Reset error handler.
  End If
End Sub
```

See Also **`Msg.Close`** (method); **`Msg.Open`** (method); **`Msg.Text`** (property).

N

Name (statement)

Syntax **`Name`** *oldfile$* **`As`** *newfile$*

Description Renames a file.

Comments Each parameter must specify a single filename. Wildcard characters such as **`*`** and **`?`** are not allowed.

Some platforms allow naming of files to different directories on the same physical disk volume. For example, the following rename will work under Windows:

```
  Name "c:\samples\mydoc.txt" As "c:\backup\doc\mydoc.bak"
```

You cannot rename files across physical disk volumes. For example, the following will error under Windows:

```
  Name "c:\samples\mydoc.txt" As "a:\mydoc.bak"  'This will error!
```

To rename a file to a different physical disk, you must first copy the file, then erase the original:

```
  FileCopy "c:\samples\mydoc.txt","a:\mydoc.bak" 'Make a copy
  Kill "c:\samples\mydoc.txt"             'Delete the original
```

Example This example creates a file called test.dat and then renames it to test2.dat.

```
Sub Main()
  oldfile$ = "test.dat"
  newfile$ = "test2.dat"

  On Error Resume Next
  If FileExists(oldfile$) Then
    Name oldfile$ As newfile$
    If Err <> 0 Then
      msg1 = "The following error occurred: " & Error(Err)
    Else
      msg1 = "'" & oldfile$ & "' was renamed to '" & newfile$ & "'"
    End If

  Else
    Open oldfile$ For Output As #1
    Close
    Name oldfile$ As newfile$
    If Err <> 0 Then
      msg1 = "'" & oldfile$ & "' not created. The following error occurred: " &
Error(Err)
    Else
      msg1 = "'" & oldfile$ & "' was created and renamed to '" &  newfile$ & "'"
    End If
  End If
  MsgBox msg1
End Sub
```

See Also **`Kill`** (statement), **`FileCopy`** (statement).

Named Parameters (topic)

Many language elements in BasicScript support named parameters. Named parameters allow you to specify parameters to a function or subroutine by name rather than in adherence to a predetermined order. The following table contains examples showing various calls to **`MsgBox`** both using parameter by both name and position.

By Name	`MsgBox Prompt:= "Hello, world."`
By Position	`MsgBox "Hello, world."`
By Name	`MsgBox Title:="Title", Prompt:="Hello, world."`
By Position	`MsgBox "Hello, world",,"Title"`
By Name	`MsgBox HelpFile:="BASIC.HLP", _`
	`Prompt:="Hello, world.", HelpContext:=10`
By Position	`MsgBox "Hello, world.",,,"BASIC.HLP",10`

Using named parameter makes your code easier to read, while at the same time removes you from knowing the order of parameter. With function that require many parameters, most of which are optional (such as **`MsgBox`**), code becomes significantly easier to write and maintain.

When supported, the names of the named parameter appear in the description of that language element.

When using named parameter, you must observe the following rules:

- Named parameter must use the parameter name as specified in the description of that language element. Unrecognized parameter names cause compiler errors.
- All parameters, whether named or positional, are separated by commas.
- The parameter name and its associated value are separated with **:=**
- If one parameter is named, then all subsequent parameter must also be named as shown below:

```
MsgBox "Hello, world", Title:="Title"   'OK

MsgBox Prompt:="Hello, world.",,"Title" 'WRONG!!!
```

Net.AddCon (method)

Syntax **`Net.AddCon`** *NetPath,Password,LocalName [,[UserName] [,isPermanent]]*

Description Redirects a local device (a disk drive or printer queue) to the specified shared device or remote server.

The new syntax does not affect previously compiled code.

If *Password* is not specified, then the default password is used. If empty, then no password is used.

If *LocalName* is not specified, then the a connection is made to the network resource without redirecting the local device.

The *UserName* parameter specifies the name of the user making the connection. If *UserName* is not specified, then the default user for that process is used.

The *isPermanent* parameter specifies whether the connection should be restored during subsequent logon operations. Only a successful connection will persist in this manner.

Comments The **`Net.AddCon`** method takes the following parameters:

Parameter	Description
netpath$	String containing the name of the shared device or the name of a remote server. This parameter can contain the name of a shared printer queue (such as that returned by **`Net.Browse[1]`**) or the name of a network path (such as that returned by **`Net.Browse[0]`**).
password$	String containing the password for the given device or server. This parameter is mainly used to specify the password on a remote server.
localname$	String containing the name of the local device being redirected, such as "LPT1" or "D:".

A runtime error will result if no network is present.

Example This example sets N: so that it refers to the network path SYS:\PUBLIC.

```
Sub Main()
  Net.AddCon "SYS:\PUBLIC","","N:"
End Sub
```

See Also **`Net.CancelCon`** (method); **`Net.GetCon$`** (method).

Net.Browse$ (method)

Syntax **Net.Browse$***(type)*

Description Calls the currently installed network's browse dialog box, requesting a particular type of information.

Comments The *type* parameter is an **Integer** specifying the type of dialog box to display:

Type	Description
0	If *type* is 0, then this method displays a dialog box that allows the user to browse network volumes and directories. Choosing OK returns the completed pathname as a String.
1	If *type* is 1, then this function displays a dialog box that allows the user to browse the network's printer queues. Choosing OK returns the complete name of that printer queue as a String. This string is the same format as required by the Net.AddCon method.
2	Display the Disconnect dialog for disk resources
3	Display the Disconnect dialog for printer resources

This dialog box differs depending on the type of network installed.

A runtime error will result if no network is present.

Example This example retrieves a valid network path.

```
Sub Main()
  s$ = Net.Browse$(0)
  If s$ <> "" Then
    MsgBox "The following network path was selected: " & s$
  Else
    MsgBox "Dialog box was canceled."
  End If
End Sub
```

See Also **Net.Dialog** (method).

Net.CancelCon (method)

Syntax **`Net.CancelCon Connection`** *[,[isForce] [,isPermanent]]*

Description The *isForce* parameter is True if missing or omitted.

The *isPermanent* parameter indicates if the disconnection should persist to subsequent logon operations.

On all platforms, the Connection parameter specifies what is to be disconnected. If Connection specifies a local device, then only that device is disconnected. If Connection specifies a remote device, then all local devices attached to that remote device are disconnected.

Cancels a network connection.

Comments The **`Net.CancelCon`** method takes the following parameters:

Parameter	Description
connection$	String containing the name of the device to cancel, such as "LPT1" or "D:".
isForce	Boolean specifying whether to force the cancellation of the connection if there are open files or open print jobs. • If this parameter is True, then this method will close all open files and open print jobs before the connection is closed. • If this parameter is False, this the method will issue a runtime error if there are any open files or open print jobs.

A runtime error will result if no network is present.

Example This example deletes the drive mapping associated with drive N:.

```
Sub Main()
  Net.CancelCon "N:"
End Sub
```

See Also **`Net.AddCon`** (method); **`Net.GetCon$`** (method).

Net.GetCon$ (method)

Syntax **`Net.GetCon$`***(localname$)*

Description Returns the name of the network resource associated with the specified redirected local device.

Comments The *localname$* parameter specifies the name of the local device, such as "LPT1" or "D:".

The function returns a zero-length string if the specified local device is not redirected.

A runtime error will result if no network is present.

Example This example finds out where drive Z is mapped.

```
Sub Main()
  NetPath$ = Net.GetCon$("Z:")
  MsgBox "Drive Z is mapped as " & NetPath$
End Sub
```

See Also **`Net.CancelCon`** (method); **`Net.AddCon`** (method).

Net.User$ (property)

Syntax **`Net.User$`** *[([LocalName])]*

Description Returns the name of the user on the network.

Comments A runtime error is generated if the network is not installed.

The *LocalName* parameter is the name of the local device that the user has made a connection to. If this parameter is omitted, then the name of the current user of the process is used.

If *Localname* is a network name and the user is connected to that resource using different names, the network provider may not be able to resolve which user name to return. In this case, the provider may make an arbitrary choice from the possible user names.

Example

```
Sub Main()
  'This example tells the user who he or she is.
  MsgBox "You are " & Net.User$
  'This example makes sure this capability is supported.
  If Net.GetCaps(4) And 1 Then MsgBox "You are " & _
    Net.User$
End Sub
```

New (keyword)

Syntax 1	`Dim` *ObjectVariable* `As New` *ObjectType*
Syntax 2	`Set` *ObjectVariable* `= New` *ObjectType*
Description	Creates a new instance of the specified object type, assigning it to the specified object variable.
Comments	The `New` keyword is used to declare a new instance of the specified data object. This keyword can only be used with data object types. At runtime, the application or extension that defines that object type is notified that a new object is being defined. The application responds by creating a new physical object (within the appropriate context) and returning a reference to that object, which is immediately assigned to the variable being declared. When that variable goes out of scope (that is, the `Sub` or `Function` procedure in which the variable is declared ends), the application is notified. The application then performs some appropriate action, such as destroying the physical object.
See Also	`Dim` (statement); `Set` (statement).

Not (operator)

Syntax `Not` *expression*

Description Returns either a logical or binary negation of *expression*.

Comments The result is determined as shown in the following table:

If the Expression Is	Then the Result Is
`True`	`False`
`False`	`True`
`Null`	`Null`
Any numeric type	A binary negation of the number. If the number is an `Integer`, then an `Integer` is returned. Otherwise, the *expression* is first converted to a `Long`, then a binary negation is performed, returning a `Long`.
`Empty`	`T`reated as a `Long` value 0.

Example This example demonstrates the use of the Not operator in comparing logical expressions and for switching a True/False toggle variable.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a = False
  b = True
  If (Not a and b) Then msg1 = "a = False, b = True" & crlf

  toggle% = True
  msg1 = msg1 & "toggle% is now " & CBool(toggle%) & crlf
  toggle% = Not toggle%
  msg1 = msg1 & "toggle% is now " & CBool(toggle%) & crlf
  toggle% = Not toggle%
  msg1 = msg1 & "toggle% is now " & CBool(toggle%)
  MsgBox msg1
End Sub
```

See Also `Boolean` (data type); Comparison Operators (topic).

Nothing (constant)

Description A value indicating that an object variable no longer references a valid object.

Example

```
Sub Main()
  Dim a As Object
  If a Is Nothing Then
    MsgBox "The object variable references no object."
  Else
    MsgBox "The object variable references: " & a.Value
  End If
End Sub
```

See Also `Set` (statement); `Object` (data type).

Now (function)

Syntax `Now[()]`

Description Returns a `Date` variant representing the current date and time.

Example This example shows how the Now function can be used as an elapsed-time counter.

```
Sub Main()
  t1# = Now
  MsgBox "Wait a while and click OK."
  t2# = Now
  t3# = Second(t2#) - Second(t1#)
  MsgBox "Elapsed time was: " & t3# & " seconds."
End Sub
```

See Also `Date, Date$` (functions); `Time, Time$` (functions).

NPer (function)

Syntax **`NPer(`***Rate*`,`*Pmt*`,`*Pv*`,`*Fv*`,`*Due***`)`**

Description Returns the number of periods for an annuity based on periodic fixed payments and a constant rate of interest.

Comments An annuity is a series of fixed payments paid to or received from an investment over a period of time. Examples of annuities are mortgages, retirement plans, monthly savings plans, and term loans.

The **`NPer`** function requires the following parameters:

Parameter	Description
Rate	**`Double`** representing the interest rate per period. If the periods are monthly, be sure to normalize annual rates by dividing them by 12.
Pmt	**`Double`** representing the amount of each payment or income. Income is represented by positive values, whereas payments are represented by negative values.
Pv	**`Double`** representing the present value of your annuity. In the case of a loan, the present value would be the amount of the loan, and the future value (see below) would be zero.
Fv	**`Double`** representing the future value of your annuity. In the case of a loan, the future value would be zero, and the present value would be the amount of the loan.
Due	**`Integer`** indicating when payments are due for each payment period. A **`0`** specifies payment at the end of each period, whereas a **`1`** indicates payment at the start of each period.

Positive numbers represent cash received, whereas negative numbers represent cash paid out.

Example This example calculates the number of $100.00 monthly payments necessary to accumulate $10,000.00 at an annual rate of 10%. Payments are made at the beginning of the month.

```
Sub Main()
  ag# = NPer((.10/12),100,0,10000,1)
  MsgBox "The number of monthly periods is: " & Format(ag#,"Standard")
End Sub
```

See Also **`IPmt`** (function); **`Pmt`** (function); **`PPmt`** (function); **`Rate`** (function).

Npv (function)

Syntax **`Npv(`***`Rate`*`,`*`ValueArray`*`())`**

Description Returns the net present value of an annuity based on periodic payments and receipts, and a discount rate.

Comments The **`Npv`** function requires the following parameters:

Parameter	Description
Rate	**`Double`** that represents the interest rate over the length of the period. If the values are monthly, annual rates must be divided by 12 to normalize them to monthly rates.
ValueArray()	Array of **`Double`** numbers representing the payments and receipts. Positive values are payments, and negative values are receipts. There must be at least one positive and one negative value.

Positive numbers represent cash received, whereas negative numbers represent cash paid out.

For accurate results, be sure to enter your payments and receipts in the correct order because **`Npv`** uses the order of the array values to interpret the order of the payments and receipts.

If your first cash flow occurs at the beginning of the first period, that value must be added to the return value of the **`Npv`** function. It should not be included in the array of cash flows.

`Npv` differs from the **`Pv`** function in that the payments are due at the end of the period and the cash flows are variable. **`Pv`**'s cash flows are constant, and payment may be made at either the beginning or end of the period.

Example This example illustrates the purchase of a lemonade stand for $800 financed with money borrowed at 10%. The returns are estimated to accelerate as the stand gains popularity. The incomes are estimated (generated) over 12 months. This program first generates the income stream array in two For...Next loops, and then the net present value (Npv) is calculated and displayed. Note normalization of the annual 10% rate.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim valu#(12)
  valu(1) = -800                      'Initial investment
  msg1 = valu(1) & ", "
  For x = 2 To 5                      'Months 2-5
    valu(x) = 100 + (x * 2)
    msg1 = msg1 1& valu(x) & ", "
  Next x
  For x = 6 To 12                     'Months 6-12
    valu(x) = 100 + (x * 10)            'Accelerated income
    msg1 = msg1 & valu(x) & ", "
  Next x
  NetVal# = NPV((.10/12),valu)
  msg1 = "The values:" & crlf & msg1 & crlf & crlf
  MsgBox msg1 & "Net present value: " & Format(NetVal#,"Currency")
End Sub
```

See Also **`Fv`** (function); **`IRR`** (function); **`MIRR`** (function); **`Pv`** (function).

Null (constant)

Description Represents a variant of **`VarType`** 1.

Comments The **`Null`** value has special meaning indicating that a variable contains no data.

Most numeric operators return **`Null`** when either of the arguments is **`Null`**. This "propagation" of **`Null`** makes it especially useful for returning error values through a complex expression. For example, you can write functions that return **`Null`** when an error occurs, then call this function within an expression. You can then use the **`IsNull`** function to test the final result to see whether an error occurred during calculation.

Since variants are **`Empty`** by default, the only way for **`Null`** to appear within a variant is for you to explicitly place it there. Only a few functions return this value.

Example

```
Sub Main()
  Dim a As Variant
  a = Null
  If IsNull(a) Then MsgBox "The variable is Null."
  MsgBox "The VarType of a is: " & VarType(a)  'Should display 1.
End Sub
```

O

Object (data type)

Syntax `Object`

Description A data type used to declare OLE automation variables.

Comments The **`Object`** type is used to declare variables that reference objects within an application using OLE automation.

Each object is a 4-byte (32-bit) value that references the object internally. The value 0 (or **`Nothing`**) indicates that the variable does not reference a valid object, as is the case when the object has not yet been given a value. Accessing properties or methods of such **`Object`** variables generates a runtime error.

Using Objects

`Object` variables are declared using the **`Dim`**, **`Public`**, or **`Private`** statement:

```
Dim MyApp As Object
```

`Object` variables can be assigned values (thereby referencing a real physical object) using the **`Set`** statement:

```
Set MyApp = CreateObject("phantom.application")
Set MyApp = Nothing
```

Properties of an **`Object`** are accessed using the dot (.) separator:

```
MyApp.Color = 10
i% = MyApp.Color
```

Methods of an **`Object`** are also accessed using the dot (.) separator:

```
MyApp.Open "sample.txt"
isSuccess = MyApp.Save("new.txt",15)
```

Automatic Destruction

The Basic Control Engine keeps track of the number of variables that reference a given object so that the object can be destroyed when there are no longer any references to it:

```
Sub Main()              'Number of references to object
  Dim a As Object                 '0
  Dim b As Object                 '0
  Set a = CreateObject("phantom.application)  '1
  Set b = a                       '2
  Set a = Nothing                 '1
End Sub                           '0 (object destroyed)
```

Note

An OLE automation object is instructed by the Basic Control Engine to destroy itself when no variables reference that object. However, it is the responsibility of the OLE automation server to destroy it. Some servers do not destroy their objects—usually when the objects have a visual component and can be destroyed manually by the user.

See Also **`Currency`** (data type); **`Date`** (data type); **`Double`** (data type); **`Integer`** (data type); **`Long`** (data type); **`Single`** (data type); **`String`** (data type); **`Variant`** (data type); **`Boolean`** (data type); **`Def`***Type* (statement).

Objects (topic)

The Basic Control Engine defines two types of objects: data objects and OLE automation objects.

Syntactically, these are referenced in the same way.

What Is an Object

An object in the Basic Control Engine is an encapsulation of data and routines into a single unit. The use of objects in the Basic Control Engine has the effect of grouping together a set of functions and data items that apply only to a specific object type.

Objects expose data items for programmability called properties. For example, a **`sheet`** object may expose an integer called **`NumColumns`**. Usually, properties can be both retrieved (get) and modified (set).

Objects also expose internal routines for programmability called methods. In the Basic Control Engine, an object method can take the form of a function or a subroutine. For example, a OLE automation object called **`MyApp`** may contain a method subroutine called **`Open`** that takes a single argument (a filename), as shown below:

```
MyApp.Open "c:\files\sample.txt"
```

Declaring Object Variables

In order to gain access to an object, you must first declare an object variable using either **`Dim`**, **`Public`**, or **`Private`**:

```
Dim o As Object   'OLE automation object
```

Initially, objects are given the value **`0`** (or **`Nothing`**). Before an object can be accessed, it must be associated with a physical object.

Assigning a Value to an Object Variable

An object variable must reference a real physical object before accessing any properties or methods of that object. To instantiate an object, use the **`Set`** statement.

```
Dim MyApp As Object
Set MyApp = CreateObject("Server.Application")
```

Accessing Object Properties

Once an object variable has been declared and associated with a physical object, it can be modified using the Basic Control Engine code. Properties are syntactically accessible using the dot operator, which separates an object name from the property being accessed:

```
MyApp.BackgroundColor = 10
i% = MyApp.DocumentCount
```

Properties are set using the Basic Control Engine normal assignment statement:

```
MyApp.BackgroundColor = 10
```

Object properties can be retrieved and used within expressions:

```
i% = MyApp.DocumentCount + 10
MsgBox "Number of documents = " & MyApp.DocumentCount
```

Accessing Object Methods

Like properties, methods are accessed via the dot operator. Object methods that do not return values behave like subroutines in the Basic Control Engine (that is, the arguments are not enclosed within parentheses):

```
MyApp.Open "c:\files\sample.txt",True,15
```

Object methods that return a value behave like function calls in the Basic Control Engine. Any arguments must be enclosed in parentheses:

```
If MyApp.DocumentCount = 0 Then MsgBox "No open documents."
NumDocs = app.count(4,5)
```

There is no syntactic difference between calling a method function and retrieving a property value, as shown below:

variable = *object*.*property*(*arg1*,*arg2*)
variable = *object*.*method*(*arg1*,*arg2*)

Comparing Object Variables

The values used to represent objects are meaningless to the script in which they are used, with the following exceptions:

- Objects can be compared to each other to determine whether they refer to the same object.
- Objects can be compared with **`Nothing`** to determine whether the object variable refers to a valid object.

Object comparisons are accomplished using the **`Is`** operator:

```
If a Is b Then MsgBox "a and b are the same object."
If a Is Nothing Then MsgBox "a is not initialized."
If b Is Not Nothing Then MsgBox "b is in use."
```

Collections

A collection is a set of related object variables. Each element in the set is called a member and is accessed via an index, either numeric or text, as shown below:

```
MyApp.Toolbar.Buttons(0)
MyApp.Toolbar.Buttons("Tuesday")
```

It is typical for collection indexes to begin with **0**.

Each element of a collection is itself an object, as shown in the following examples:

```
Dim MyToolbarButton As Object

Set MyToolbarButton = MyApp.Toolbar.Buttons("Save")
MyAppp.Toolbar.Buttons(1).Caption = "Open"
```

The collection itself contains properties that provide you with information about the collection and methods that allow navigation within that collection:

```
Dim MyToolbarButton As Object

NumButtons% = MyApp.Toolbar.Buttons.Count
MyApp.Toolbar.Buttons.MoveNext
MyApp.Toolbar.Buttons.FindNext "Save"

For i = 1 To MyApp.Toolbar.Buttons.Count
  Set MyToolbarButton = MyApp.Toolbar.Buttons(i)
  MyToolbarButton.Caption = "Copy"
Next i
```

Predefined Objects

The Basic Control Engine predefines a few objects for use in all scripts. These are:

```
Clipboard  System    HWND
Net        Basic     Screen
```

Oct, Oct$ (functions)

Syntax **`Oct[$](`***number***`)`**

Description Returns a **`String`** containing the octal equivalent of the specified number.

Comments **`Oct$`** returns a **`String`**, whereas **`Oct`** returns a **`String`** variant.

The returned string contains only the number of octal digits necessary to represent the number.

The *number* parameter is any numeric expression. If this parameter is **`Null`**, then **`Null`** is returned. **`Empty`** is treated as 0. The *number* parameter is rounded to the nearest whole number before converting to the octal equivalent.

Example This example accepts a number and displays the decimal and octal 'equivalent until the input number is 0 or invalid.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Do
    xs$ = InputBox("Enter a number to convert:","Octal Convert")
    x = Val(xs$)
    If x <> 0 Then
      MsgBox "Decimal: " & x & "   Octal: " & Oct(x)
    Else
      MsgBox "Goodbye."
    End If
  Loop While x <> 0
End Sub
```

See Also **`Hex, Hex$`** (functions).

OKButton (statement)

Syntax **`OKButton`** *X*, *Y*, *width*, *height* [, .*Identifier*]

Description Creates an OK button within a dialog box template.

Comments This statement can only appear within a dialog box template (that is, between the **`Begin Dialog`** and **`End Dialog`** statements).

The **`OKButton`** statement accepts the following parameters:

Parameter	Description
X, *Y*	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**).

If the *DefaultButton* parameter is not specified in the **`Dialog`** statement, the OK button will be used as the default button. In this case, the OK button can be selected by pressing Enter on a nonbutton control.

A dialog box template must contain at least one **`OKButton`**, **`CancelButton`**, or **`PushButton`** statement (otherwise, the dialog box cannot be dismissed).

Example This example shows how to use the OK and Cancel buttons within a dialog box template and how to detect which one closed the dialog box.

```
Sub Main()
  Begin Dialog QuitDialogTemplate 16,32,116,64,"Quit"
    Text 4,8,108,8,"Are you sure you want to exit?"
    CheckBox 32,24,63,8,"Save Changes",.SaveChanges
    OKButton 12,40,40,14
    CancelButton 60,40,40,14
  End Dialog
  Dim QuitDialog As QuitDialogTemplate
  rc% = Dialog(QuitDialog)
  Select Case rc%
    Case -1
      MsgBox "OK was pressed!"
    Case 1
      MsgBox "Cancel was pressed!"
  End Select
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

On Error (statement)

Syntax **`On Error {Goto`** *label* **`| Resume Next | Goto 0}`**

Description Defines the action taken when a trappable runtime error occurs.

Comments The form **`On Error Goto`** *label* causes execution to transfer to the specified label when a runtime error occurs.

The form **`On Error Resume Next`** causes execution to continue on the line following the line that caused the error.

The form **`On Error Goto 0`** causes any existing error trap to be removed.

If an error trap is in effect when the script ends, then an error will be generated.

An error trap is only active within the subroutine or function in which it appears.

Once an error trap has gained control, appropriate action should be taken, and then control should be resumed using the **`Resume`** statement. The **`Resume`** statement resets the error handler and continues execution. If a procedure ends while an error is pending, then an error will be generated. (The **`Exit Sub`** or E**`xit Function`** statement also resets the error handler, allowing a procedure to end without displaying an error message.)

Errors within an Error Handler

If an error occurs within the error handler, then the error handler of the caller (or any procedure in the call stack) will be invoked. If there is no such error handler, then the error is fatal, causing the script to stop executing. The following statements reset the error state (that is, these statements turn off the fact that an error occurred):

```
Resume
Err=-1
```

The **`Resume`** statement forces execution to continue either on the same line or on the line following the line that generated the error. The **`Err=-1`** statement allows explicit resetting of the error state so that the script can continue normal execution without resuming at the statement that caused the error condition.

The **`On Error`** statement will not reset the error. Thus, if an **`On Error`** statement occurs within an error handler, it has the effect of changing the location of a new error handler for any new errors that may occur once the error has been reset.

Example This example will demonstrate three types of error handling. The first case simply by-passes an expected error and continues with program operation. The second case creates an error branch that jumps to a common error handling routine that processes incoming errors, clears the error (with the Resume statement) and resumes program execution. The third case clears all internal error handling so that execution will stop when the next error is encountered.

```
Sub Main()
  Dim x%
  a = 10000
  b = 10000

  On Error Goto Pass       'Branch to this label on error.
  Do
    x% = a * b
  Loop

Pass:
  Err = -1            'Clear error status.
  MsgBox "Cleared error status and continued."

  On Error Goto Overflow   'Branch to new error routine on any
  x% = 1000              'subsequent errors.
  x% = a * b
  x% = a / 0

  On Error Resume Next   'Pass by any following errors until
  x% = 1000              'another On Error statement is
  x% = a * b           'encountered.

  On Error Goto 0        'Clear error branching.
  x% = a * b           'Program will stop here.
  Exit Sub             'Exit before common error routine.

Overflow:              'Beginning of common error routine.
  If Err = 6 then
    MsgBox "Overflow Branch."
  Else
    MsgBox Error(Err)
  End If

  Resume Next
End Sub
```

See Also Error Handling (topic); **`Error`** (statement); **`Resume`** (statement).

Open (statement)

Syntax **`Open`** *filename$* [**`For`** *mode*] [**`Access`** *accessmode*] [*lock*] **`As [#]`** *filenumber* _
[**`Len =`** *reclen*]

Description Opens a file for a given mode, assigning the open file to the supplied *filenumber*.

Comments The *filename$* parameter is a string expression that contains a valid filename.

The *filenumber* parameter is a number between 1 and 255. The **`FreeFile`** function can be used to determine an available file number.

The *mode* parameter determines the type of operations that can be performed on that file:

File Mode	Description
`Input`	Opens an existing file for sequential input (*filename$* must exist). The value of *accessmode*, if specified, must be **`Read`**.
`Output`	Opens an existing file for sequential output, truncating its length to zero, or creates a new file. The value of *accessmode*, if specified, must be **`Write`**.
`Append`	Opens an existing file for sequential output, positioning the file pointer at the end of the file, or creates a new file. The value of *accessmode*, if specified, must be **`Read Write`**.
`Random`	Opens an existing file for record I/O or creates a new file. Existing random files are truncated only if *accessmode* is **`Write`**. The *reclen* parameter determines the record length for I/O operations.

If the *mode* parameter is missing, then **`Random`** is used.

The *accessmode* parameter determines what type of I/O operations can be performed on the file:

Access	Description
`Read`	Opens the file for reading only. This value is valid only for files opened in **`Binary`**, **`Random`**, or **`Input`** mode.
`Write`	Opens the file for writing only. This value is valid only for files opened in **`Binary`**, **`Random`**, or **`Output`** mode.
`Read Write`	Opens the file for both reading and writing. This value is valid only for files opened in **`Binary`**, **`Random`**, or **`Append`** mode.

If the *accessmode* parameter is not specified, the following defaults are used:

File Mode	Default Value for *accessmode*
`Input`	**`Read`**
`Output`	**`Write`**
`Append`	**`Read Write`**
`Binary`	When the file is initially opened, access is attempted three times in the following order: 1. **`Read Write`** 2. **`Write`** 3. **`Read`**

`Random`	Same as **`Binary`** files

The *lock* parameter determines what access rights are granted to other processes that attempt to open the same file. The following table describes the values for *lock:*

***lock* Value**	**Description**
`Shared`	Another process can both read this file and write to it. (Deny none.)
`Lock Read`	Another process can write to this file but not read it. (Deny read.)
`Lock Write`	Another process can read this file but not write to it. (Deny write.)
`Lock Read Write`	Another process is prevented both from reading this file and from writing to it. (Exclusive.)

If *lock* is not specified, then the file is opened in **`Shared`** mode.

If the file does not exist and the *lock* parameter is specified, the file is opened twice—once to create the file and again to establish the correct sharing mode.

Files opened in **`Random`** mode are divided up into a sequence of records, each of the length specified by the *reclen* parameter. If this parameter is missing, then 128 is used. For files opened for sequential I/O, the *reclen* parameter specifies the size of the internal buffer used by the Basic Control Engine when performing I/O. Larger buffers mean faster file access. For **`Binary`** files, the *reclen* parameter is ignored.

Example This example opens several files in various configurations.

```
Sub Main()
  Open "test.dat" For Output Access Write Lock Write As #2
  Close
  Open "test.dat" For Input Access Read Shared As #1
  Close
  Open "test.dat" For Append Access Write Lock Read Write As #3
  Close
  Open "test.dat" For Binary Access Read Write Shared As #4
  Close
  Open "test.dat" For Random Access Read Write Lock Read As #5
  Close
  Open "test.dat" For Input Access Read Shared As #6
  Close
  Kill "test.dat"
End Sub
```

See Also **`Close`** (statement); **`Reset`** (statement); **`FreeFile`** (function).

OpenFilename$ (function)

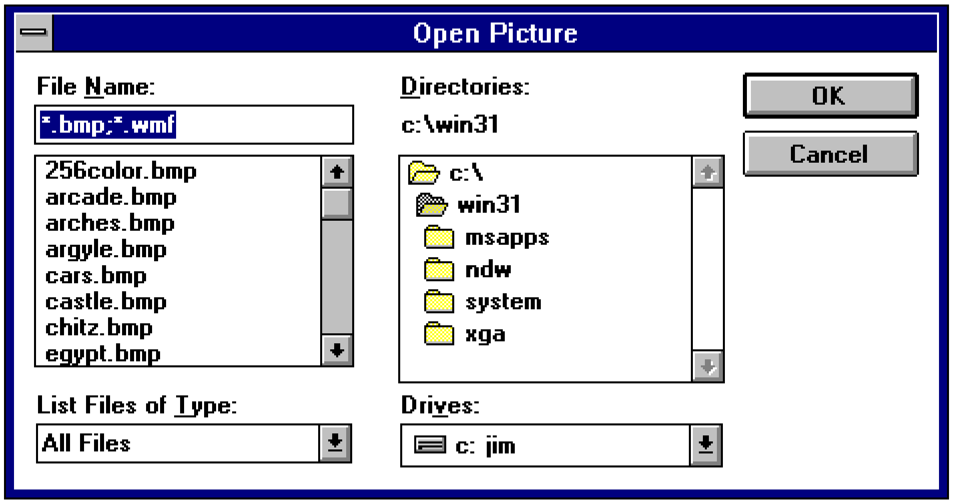
Syntax `OpenFilename$[([`*title$* `[,`*extensions$*`]])]`

Description Displays a dialog box that prompts the user to select from a list of files, returning the full pathname of the file the user selects or a zero-length string if the user selects Cancel.

Comments This function displays the standard file open dialog box, which allows the user to select a file. It takes the following parameters:

Parameter	Description
title$	**`String`** specifying the title that appears in the dialog box's title bar. If this parameter is omitted, then **`"Open"`** is used.
extension$	**`String`** specifying the available file types. If this parameter is omitted, then all files are displayed.

```
e$ = "All Files:*.BMP,*.WMF;Bitmaps:*.BMP;Metafiles:*.WMF"
f$ = OpenFilename$("Open Picture",e$)
```



Example This example asks the user for the name of a file, then proceeds to read the first line from that file.

```
Sub Main
  Dim f As String,s As String
  f$ = OpenFilename$("Open Picture","Text Files:*.TXT")
  If f$ <> "" Then
    Open f$ For Input As #1
    Line Input #1,s$
    Close #1
    MsgBox "First line from " & f$ & " is " & s$
  End If
End Sub
```

See Also **`MsgBox`** (statement); **`AskBox$`** (function); **`AskPassword$`** (function); **`InputBox, InputBox$`** (functions); **`SaveFilename$`** (function); **`SelectBox`** (function); **`AnswerBox`** (function).

Notes: The *extensions$* parameter must be in the following format:

***type*:*ext*[,*ext*][;*type*:*ext*[,*ext*]]...**

Placeholder	**Description**
type	Specifies the name of the grouping of files, such as **`All Files`**.
ext	Specifies a valid file extension, such as **`*.BAT`** or **`*.?F?`**.

For example, the following are valid *extensions$* specifications:

```
"All Files:*.*"
"Documents:*.TXT,*.DOC"
"All Files:*.*;Documents:*.TXT,*.DOC"
```

Operator Precedence (topic)

The following table shows the precedence of the operators supported by the Basic Control Engine. Operations involving operators of higher precedence occur before operations involving operators of lower precedence. When operators of equal precedence occur together, they are evaluated from left to right.

Operator	**Description**	**Precedence Order**
`()`	Parentheses	Highest
`^`	Exponentiation	
`-`	Unary minus	
`/, *`	Division and multiplication	
`\`	Integer division	
`Mod`	Modulo	
`+, -`	Addition and subtraction	
`&`	String concatenation	
`=, <>, >, <, <=, >=`	Relational	
`Like, Is`	String and object comparison	
`Not`	Logical negation	
`And`	Logical or binary conjunction	
`Or`	Logical or binary disjunction	
`Xor, Eqv, Imp`	Logical or binary operators	Lowest

The precedence order can be controlled using parentheses, as shown below:

```
a = 4 + 3 * 2     'a becomes 10.
a = (4 + 3) * 2   'a becomes 14.
```

Operator Precision (topic)

When numeric, binary, logical or comparison operators are used, the data type of the result is generally the same as the data type of the more precise operand. For example, adding an **`Integer`** and a **`Long`** first converts the **`Integer`** operand to a **`Long`**, then performs a long addition, overflowing only if the result cannot be contained with a **`Long`**. The order of precision is shown in the following table:

`Empty`	Least precise
`Boolean`	
`Integer`	
`Long`	
`Single`	
`Date`	
`Double`	
`Currency`	Most precise

There are exceptions noted in the descriptions of each operator.

The rules for operand conversion are further complicated when an operator is used with variant data. In many cases, an overflow causes automatic promotion of the result to the next highest precise data type. For example, adding two **`Integer`** variants results in an **`Integer`** variant unless it overflows, in which case the result is automatically promoted to a **`Long`** variant.

Option Base (statement)

Syntax **`Option Base {0 | 1}`**

Description Sets the lower bound for array declarations.

Comments By default, the lower bound used for all array declarations is 0.

This statement must appear outside of any functions or subroutines.

Example

```
Option Base 1

Sub Main()
  Dim a(10)           'Contains 10 elements (not 11).
  a(1) = "Hello"
  MsgBox "The first element of the array is: " & a(1)
End Sub
```

See Also **`Dim`** (statement); **`Public`** (statement); **`Private`** (statement).

Option Compare (statement)

Syntax `Option Compare [Binary | Text]`

Description Controls how strings are compared.

Comments When **`Option Compare`** is set to **`Binary`**, then string comparisons are case-sensitive (for example, "**`A`**" does not equal "**`a`**"). When it is set to **`Text`**, string comparisons are case-insensitive (for example, "**`A`**" is equal to "**`a`**").

The default value for **`Option Compare`** is **`Binary`**.

The **`Option Compare`** statement affects all string comparisons in any statements that follow the **`Option Compare`** statement. Additionally, the setting affects the default behavior of **`Instr`**, **`StrComp`**, and the **`Like`** operator. The following table shows the types of string comparisons affected by this setting:

`>`	`<`	`<>`
`<=`	`>=`	`Instr`
`StrComp`	`Like`	

The **`Option Compare`** statement must appear outside the scope of all subroutines and functions. In other words, it cannot appear within a **`Sub`** or **`Function`** block.

Example This example shows the use of Option Compare.

```
Option Compare Binary
Sub CompareBinary
  a$ = "This String Contains UPPERCASE."
  b$ = "this string contains uppercase."
  If a$ = b$ Then
    MsgBox "The two strings were compared case-insensitive."
  Else
    MsgBox "The two strings were compared case-sensitive."
  End If
End Sub

Option Compare Text
Sub CompareText
  a$ = "This String Contains UPPERCASE."
  b$ = "this string contains uppercase."
  If a$ = b$ Then
    MsgBox "The two strings were compared case-insensitive."
  Else
    MsgBox "The two strings were compared case-sensitive."
  End If
End Sub

Sub Main()
  CompareBinary        'Calls subroutine above.
  CompareText          'Calls subroutine above.
End Sub
```

See Also **`Like`** (operator); **`InStr`** (function); **`StrComp`** (function); Comparison Operators (topic).

Option CStrings (statement)

Syntax `Option CStrings {On | Off}`

Description Turns on or off the ability to use C-style escape sequences within strings.

Comments When `Option CStrings On` is in effect, the compiler treats the backslash character as an escape character when it appears within strings. An escape character is simply a special character that cannot otherwise be ordinarily typed by the computer keyboard.

Escape	Description	Equivalent Expression
\r	Carriage return	**Chr$(13)**
\n	Line feed	**Chr$(10)**
\a	**Be**ll	**Chr$(7)**
\b	Backspace	**Chr$(8)**
\f	Form feed	**Chr$(12)**
\t	Tab	**Chr$(9)**
\v	Vertical tab	**Chr$(11)**
\0	Null	**Chr$(0)**
\"	Double quotation mark	**""** or **Chr$(34)**
\\	Backslash	**Chr$(92)**
\?	Question mark	**?**
\'	Single quotation mark	**'**
\x*hh*	Hexadecimal number	**Chr$(Val("&H***hh***))**
\ooo	Octal number	**Chr$(Val("&O***ooo*"**))**
\*anycharacter*	Any character	*anycharacter*

With hexadecimal values, the Basic Control Engine stops scanning for digits when it encounters a nonhexadecimal digit or two digits, whichever comes first. Similarly, with octal values, the Basic Control Engine stops scanning when it encounters a nonoctal digit or three digits, whichever comes first.

When `Option CStrings Off` is in effect, then the backslash character has no special meaning. This is the default.

Example

```
Option CStrings On

Sub Main()
  MsgBox "They said, \"Watch out for that clump of grass!\""
  MsgBox "First line.\r\nSecond line."
  MsgBox "Char A: \x41 \r\n Char B: \x42"
End Sub
```

OptionButton (statement)

Syntax **`OptionButton`** *X,Y,width,height,title$* [,*.Identifier*]

Description Defines an option button within a dialog box template.

Comments This statement can only appear within a dialog box template (that is, between the **`Begin Dialog`** and **`End Dialog`** statements).

The **`OptionButton`** statement accepts the following parameters:

Parameter	Description
X, *Y*	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
title$	**`String`** containing text that appears within the option button. This text may contain an ampersand character to denote an accelerator letter, such as **`"&Portrait"`** for **`Portrait`**, which can be selected by pressing the P accelerator.
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**).

Example This example creates a group of option buttons.

```
Sub Main()
  Begin Dialog PowerTemplate 16,31,128,65,"Print"
    GroupBox 8,8,64,52,"Amplifier Output",.Junk
    OptionGroup .Orientation
      OptionButton 16,20,51,8,"10 Watts",.Ten
      OptionButton 16,32,51,8,"50 Watts",.Fifty
      OptionButton 16,44,51,8,"100 Watts",.Hundred
    OKButton 80,8,40,14
  End Dialog
  Dim PowerDialog As PowerTemplate
  Dialog PowerDialog
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

Note: Accelerators are underlined, and the accelerator combination Alt+*letter* is used.

OptionGroup (statement)

Syntax **`OptionGroup`** `.`*Identifier*

Description Specifies the start of a group of option buttons within a dialog box template.

Comments The *.Identifier* parameter specifies the name by which the group of option buttons can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**). This parameter also creates an integer variable whose value corresponds to the index of the selected option button within the group (0 is the first option button, 1 is the second option button, and so on). This variable can be accessed using the following syntax: *DialogVariable.Identifier*.

This statement can only appear within a dialog box template (that is, between the **`Begin Dialog`** and **`End Dialog`** statements).

When the dialog box is created, the option button specified by *.Identifier* will be on; all other option buttons in the group will be off. When the dialog box is dismissed, the *.Identifier* will contain the selected option button.

Example This example creates a group of option buttons.

```
Sub Main()
  Begin Dialog PowerTemplate 16,31,128,65,"Print"
    GroupBox 8,8,64,52,"Amplifier Output",.Junk
    OptionGroup .Orientation
      OptionButton 16,20,51,8,"10 Watts",.Ten
      OptionButton 16,32,51,8,"50 Watts",.Fifty
      OptionButton 16,44,51,8,"100 Watts",.Hundred
    OKButton 80,8,40,14
  End Dialog
  Dim PowerDialog As PowerTemplate
  Dialog PowerDialog
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

Or (operator)

Syntax

expression1 **Or** *expression2*

Description

Performs a logical or binary disjunction on two expressions.

Comments

If both expressions are either **Boolean**, **Boolean** variants, or **Null** variants, then a logical

If the first expression is	and the second expression is	then the result is
True	True	True
True	False	True
True	Null	True
False	True	True
False	False	False
False	Null	Null
Null	True	True
Null	False	Null
Null	Null	Null

Binary Disjunction

If the two expressions are **Integer**, then a binary disjunction is performed, returning an **Integer** result. All other numeric types (including **Empty** variants) are converted to **Long** and a binary disjunction is then performed, returning a **Long** result.

Binary disjunction forms a new value based on a bit-by-bit comparison of the binary representations of the two expressions according to the following table:

1	Or	1	=	1	Example:	
0	Or	1	=	1	5	10101001
1	Or	0	=	1	6	01101010
0	Or	0	=	0	Or	11101011

Examples

This first example shows the use of logical Or.

```
Sub Main()
  temperature_alert = True
  pressure_alert = False
  If temperature_alert Or pressure_alert Then
    MsgBox "You had better run!",ebExclamation,"Nuclear Disaster Imminent"
  End If
End Sub
```

This second example shows the use of binary Or.

```
Sub Main()
  Dim w As Integer

TryAgain:
  s$ = InputBox("Enter a hex number (four digits max).","Binary Or Example")
  If Mid(s$,1,1) <> "&" Then
    s$ = "&H" & s$
  End If
  If Not IsNumeric(s$) Then Goto TryAgain

  w = Cint(s$)
  MsgBox "Your number is &H" & Hex(w)
  w = w Or &H8000
  MsgBox "Your number with the high bit set is &H" & Hex(w)
End Sub
```

See Also

Operator Precedence (topic); **Xor** (operator); **Eqv** (operator); **Imp** (operator); **And** (operator).

P

Pi (constant)

Syntax `Pi`

Description The `Double` value `3.141592653589793238462643383279`.

Comments `Pi` can also be determined using the following formula:

```
4 * Atn(1)
```

Example This example illustrates the use of the Pi constant.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  dia = InputBox("Enter a circle diameter to compute.","Compute Circle")
  circ# = Pi * dia
  area# = Pi * ((dia / 2) ^ 2)
  msg1 = "Diameter: " & dia & crlf
  msg1 = msg1 & "Circumference: " & Format(circ#,"Standard") & crlf
  msg1 = msg1 & "Area: " & Format(area#,"Standard")
  MsgBox msg1
End Sub
```

See Also `Tan` (function); `Atn` (function); `Cos` (function); `Sin` (function).

Picture (statement)

Syntax `Picture` *X*`,`*Y*`,`*width*`,`*height*`,`*PictureName$*`,`*PictureType* `[,[.`*Identifier*`] [,`*style*`]]`

Description Creates a picture control in a dialog box template.

Comments Picture controls are used for the display of graphics images only. The user cannot interact with these controls.

The **`Picture`** statement accepts the following parameters:

Parameter	Description
X, Y	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, height	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
PictureName$	**`String`** containing the name of the picture. If *PictureType* is 0, then this name specifies the name of the file containing the image. If *PictureType* is 10, then *PictureName$* specifies the name of the image within the resource of the picture library. If *PictureName$* is empty, then no picture will be associated with the control. A picture can later be placed into the picture control using the **`DlgSetPicture`** statement.
PictureType	**`Integer`** specifying the source for the image. The following sources are supported: 0 The image is contained in a file on disk. 10 The image is contained in a picture library as specified by the PicName$ parameter on the Begin Dialog statement.
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**). If omitted, then the first two words of *PictureName$* are used
style	Specifies whether the picture is drawn within a 3D frame. It can be any of the following values: 0 Draw the picture control with a normal frame. 1 Draw the picture control with a 3D frame. If omitted, then the picture control is drawn with a normal frame..

The picture control extracts the actual image from either a disk file or a picture library. In the case of bitmaps, both 2- and 16-color bitmaps are supported. In the case of WMFs, the Basic Control Engine supports the Placeable Windows Metafile.

If *PictureName$* is a zero-length string, then the picture is removed from the picture control, freeing any memory associated with that picture.

Examples This first example shows how to use a picture from a file.

```
Sub Main()
  Begin Dialog LogoDialogTemplate 16,32,288,76,"Introduction"
    OKButton 240,8,40,14
    Picture 8,8,224,64,"c:\bitmaps\logo.bmp",0,.Logo
  End Dialog
  Dim LogoDialog As LogoDialogTemplate
  Dialog LogoDialog
End Sub
```

This second example shows how to use a picture from a picture library with a 3D frame.

```
Sub Main()
  Begin Dialog LogoDialogTemplate 16,31,288,76,"Introduction",,"pictures.dll"
    OKButton 240,8,40,14
    Picture 8,8,224,64,"CompanyLogo",10,.Logo,1
  End Dialog
  Dim LogoDialog As LogoDialogTemplate
  Dialog LogoDialog
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement) , **`DlgSetPicture`** (statement).

Notes: Picture controls can contain either a bitmap or a WMF (Windows metafile). When extracting images from a picture library, the Basic Control Engine assumes that the resource type for metafiles is 256.

Picture libraries are implemented as DLLs on the Windows and Win32 platforms.

PictureButton (statement)

Syntax **`PictureButton`** *X*, *Y*, *width*, *height*, *PictureName$*, *PictureType* [, .*Identifier*]

Description Creates a picture button control in a dialog box template.

Comments Picture button controls behave very much like a push button controls. Visually, picture buttons are different than push buttons in that they contain a graphic image imported either from a file or from a picture library.

The **`PictureButton`** statement accepts the following parameters:

Parameter	Description
X, *Y*	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
PictureName$	**`String`** containing the name of the picture. If *PictureType* is 0, then this name specifies the name of the file containing the image. If *PictureType* is 10, then *PictureName$* specifies the name of the image within the resource of the picture library. If *PictureName$* is empty, then no picture will be associated with the control. A picture can later be placed into the picture control using the **`DlgSetPicture`** statement.
PictureType	**`Integer`** specifying the source for the image. The following sources are supported: **`0`** The image is contained in a file on disk. **`10`** The image is contained in a picture library as specified by the *PicName$* parameter on the **`Begin Dialog`** statement.
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**).

The picture button control extracts the actual image from either a disk file or a picture library, depending on the value of *PictureType*. The supported picture formats vary from platform to platform.

If *PictureName$* is a zero-length string, then the picture is removed from the picture button control, freeing any memory associated with that picture.

Examples This first example shows how to use a picture from a file.

```
Sub Main()
  Begin Dialog LogoDialogTemplate 16,32,288,76,"Introduction"
    OKButton 240,8,40,14
    PictureButton 8,4,224,64,"c:\bitmaps\logo.bmp",0,.Logo
  End Dialog
  Dim LogoDialog As LogoDialogTemplate
  Dialog LogoDialog
End Sub
```

This second example shows how to use a picture from a picture library.

```
Sub Main()
  Begin Dialog LogoDialogTemplate 16,31,288,76,"Introduction",,"pictures.dll"
    OKButton 240,8,40,14
    PictureButton 8,4,224,64,"CompanyLogo",10,.Logo
  End Dialog
  Dim LogoDialog As LogoDialogTemplate
  Dialog LogoDialog
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`Picture`** (statement), **`DlgSetPicture`** (statement).

Notes: Picture controls can contain either a bitmap or a WMF (Windows metafile). When extracting images from a picture library, the Basic Control Engine assumes that the resource type for metafiles is 256.

Picture libraries are implemented as DLLs on the Win32 platforms.

Picture controls can contain either bitmaps or Windows metafiles.

Picture libraries under OS/2 are implemented as resources within DLLs. The *PictureName$* parameter corresponds to the name of one of these resources as it appears within the DLL.

Picture controls on the Macintosh can contain only PICT images. These are contained in files of type PICT.

Picture libraries on the Macintosh are files with collections of named PICT resources. The *PictureName$* parameter corresponds to the name of one the resources as it appears within the file.

Under DOS, **`PictureButton`** statements within dialog box templates are ignored at runtime.

Pmt (function)

Syntax **`Pmt(`***Rate***`,`***NPer***`,`***Pv***`,`***Fv***`,`***Due***`)`**

Description Returns the payment for an annuity based on periodic fixed payments and a constant rate of interest.

Comments An annuity is a series of fixed payments made to an insurance company or other investment company over a period of time. Examples of annuities are mortgages and monthly savings plans.

The **`Pmt`** function requires the following parameters:

Parameter	Description
Rate	**`Double`** representing the interest rate per period. If the periods are given in months, be sure to normalize annual rates by dividing them by 12.
NPer	**`Double`** representing the total number of payments in the annuity.
Pv	**`Double`** representing the present value of your annuity. In the case of a loan, the present value would be the amount of the loan.
Fv	**`Double`** representing the future value of your annuity. In the case of a loan, the future value would be 0.
Due	**`Integer`** indicating when payments are due for each payment period. A **`0`** specifies payment at the end of each period, whereas a **`1`** specifies payment at the start of each period.

Rate and *NPer* must be expressed in the same units. If *Rate* is expressed in months, then *NPer* must also be expressed in months.

Positive numbers represent cash received, whereas negative numbers represent cash paid out.

Example This example calculates the payment necessary to repay a $1,000.00 loan over 36 months at an annual rate of 10%. Payments are due at the beginning of the period.

```
Sub Main()
  x = Pmt((.1/12),36,1000.00,0,1)
  msg1 = "The payment to amortize $1,000 over 36 months @ 10% is: "
  MsgBox msg1 & Format(x,"Currency")
End Sub
```

See Also **`IPmt`** (function); **`NPer`** (function); **`PPmt`** (function); **`Rate`** (function).

PopupMenu (function)

Syntax **`PopupMenu`**(*MenuItems$*())

Description Displays a pop-up menu containing the specified items, returning an **`Integer`** representing the index of the selected item.

Comments If no item is selected (that is, the pop-up menu is canceled), then a value of 1 less than the lower bound is returned (normally, –1).

This function creates a pop-up menu using the string elements in the given array. Each array element is used as a menu item. A zero-length string results in a separator bar in the menu.

The pop-up menu is created with the upper left corner at the current mouse position.

A runtime error results if *MenuItems$* is not a single-dimension array.

Only one pop-up menu can be displayed at a time. An error will result if another script executes this function while a pop-up menu is visible.

Example

```
Sub Main()
  Dim a$()
  AppList a$
  w% = PopupMenu(a$)
End Sub
```

See Also **`SelectBox`** (function).

PPmt (function)

Syntax `PPmt(`*Rate*`,`*Per*`,`*NPer*`,`*Pv*`,`*Fv*`,`*Due*`)`

Description Calculates the principal payment for a given period of an annuity based on periodic, fixed payments and a fixed interest rate.

Comments An annuity is a series of fixed payments made to an insurance company or other investment company over a period of time. Examples of annuities are mortgages and monthly savings plans.

The **`PPmt`** function requires the following parameters:

Parameter	Description
Rate	**`Double`** representing the interest rate per period.
Per	**`Double`** representing the number of payment periods. *Per* can be no less than **`1`** and no greater than *NPer*.
NPer	**`Double`** representing the total number of payments in your annuity.
Pv	**`Double`** representing the present value of your annuity. In the case of a loan, the present value would be the amount of the loan.
Fv	**`Double`** representing the future value of your annuity. In the case of a loan, the future value would be **`0`**.
Due	**`Integer`** indicating when payments are due. If this parameter is **`0`**, then payments are due at the end of each period; if it is **`1`**, then payments are due at the start of each period.

Rate and *NPer* must be in the same units to calculate correctly. If *Rate* is expressed in months, then *NPer* must also be expressed in months.

Negative values represent payments paid out, whereas positive values represent payments received.

Example This example calculates the principal paid during each year on a loan of $1,000.00 with an annual rate of 10% for a period of 10 years. The result is displayed as a table containing the following information: payment, principal payment, principal balance.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  pay = Pmt(.1,10,1000.00,0,1)
  msg1 = "Amortization table for 1,000" & crlf & "at 10% annually for"
  msg1 = msg1 & " 10 years: " & crlf & crlf
  bal = 1000.00
  For per = 1 to 10
    prn = PPmt(.1,per,10,1000,0,0)
    bal = bal + prn
    msg1 = msg1 & Format(pay,"Currency") & "  " & Format$(Prn,"Currency")
    msg1 = msg1 & "  " & Format(bal,"Currency") & crlf
  Next per
  MsgBox msg1
End Sub
```

See Also **`IPmt`** (function); **`NPer`** (function); **`Pmt`** (function); **`Rate`** (function).

Print (statement)

Syntax	**`Print [[{Spc(`*`n`*`) | Tab(`*`n`*`)}][`*`expressionlist`*`][{; | ,}]]`**
Description	Prints data to an output device.

Comments The actual output device depends on the platform on which the Basic Control Engine is running.

The following table describes how data of different types is written:

Data Type	Description
`String`	Printed in its literal form, with no enclosing quotes.
Any numeric type	Printed with an initial space reserved for the sign (space = positive). Additionally, there is a space following each number.
`Boolean`	Printed as "True" or "False".
`Date`	Printed using the short date format. If either the date or time component is missing, only the provided portion is printed (this is consistent with the "general date" format understood by the **`Format/Format$`** functions).
`Empty`	Nothing is printed.
`Null`	Prints "Null".
User-defined errors	Printed as "Error *code*", where *code* is the value of the user-defined error. The word "Error" is not translated.

Each expression in *expressionlist* is separated with either a comma (,) or a semicolon (;). A comma means that the next expression is output in the next print zone. A semicolon means that the next expression is output immediately after the current expression. Print zones are defined every 14 spaces.

If the last expression in the list is not followed by a comma or a semicolon, then a carriage return is printed to the file. If the last expression ends with a semicolon, no carriage return is printed—the next **`Print`** statement will output information immediately following the expression. If the last expression in the list ends with a comma, the file pointer is positioned at the start of the next print zone on the current line.

The **`Tab`** and **`Spc`** functions provide additional control over the column position. The **`Tab`** function moves the file position to the specified column, whereas the **`Spc`** function outputs the specified number of spaces.

Examples

```
Sub Main()
  i% = 10
  s$ = "This is a test."
  Print "The value of i=";i%,"the value of s=";s$
  'This example prints the value of i% in print zone 1 and s$ in print
  'zone 3.
  Print i%,,s$
  'This example prints the value of i% and s$ separated by 10 spaces.
  Print i%;Spc(10);s$
  'This example prints the value of i in column 1 and s$ in column 30.
  Print i%;Tab(30);s$
  'This example prints the value of i% and s$.
  Print i%;s$,
  Print 67
End Sub
```

Note: On Win32, the **`Print`** statement prints data to **`stdout`**.

Print# (statement)

Syntax `Print [#]`*filenumber*`, [[{Spc(`*n*`) | Tab(`*n*`)}][`*expressionlist*`][{;|,}]]`

Description Writes data to a sequential disk file.

Comments The *filenumber* parameter is a number that is used by the Basic Control Engine to refer to the open file—the number passed to the **Open** statement.

The following table describes how data of different types is written:

Data Type	Description
String	Printed in its literal form, with no enclosing quotes.
Any numeric type	Printed with an initial space reserved for the sign (space = positive). Additionally, there is a space following each number.
Boolean	Printed as "True" or "False".
Date	Printed using the short date format. If either the date or time component is missing, only the provided portion is printed (this is consistent with the "general date" format understood by the **Format/Format$** functions).
Empty	Nothing is printed.
Null	Prints "Null".
User-defined errors	Printed to files as "Error *code*", where *code* is the value of the user-defined error. The word "Error" is not translated.

Each expression in *expressionlist* is separated with either a comma (,) or a semicolon (;). A comma means that the next expression is output in the next print zone. A semicolon means that the next expression is output immediately after the current expression. Print zones are defined every 14 spaces.

If the last expression in the list is not followed by a comma or a semicolon, then an end-of-line is printed to the file. If the last expression ends with a semicolon, no end-of-line is printed—the next **Print** statement will output information immediately following the expression. If the last expression in the list ends with a comma, the file pointer is positioned at the start of the next print zone on the current line.

The **Write** statement always outputs information ending with an end-of-line. Thus, if a **Print** statement is followed by a **Write** statement, the file pointer is positioned on a new line.

The **Print** statement can only be used with files that are opened in **Output** or **Append** mode.

The **Tab** and **Spc** functions provide additional control over the file position. The **Tab** function moves the file position to the specified column, whereas the **Spc** function outputs the specified number of spaces.

In order to correctly read the data using the **Input#** statement, you should write the data using the **Write** statement.

Examples

```
Sub Main()
  'This example opens a file and prints some data.
  Open "test.dat" For Output As #1
  i% = 10
  s$ = "This is a test."
  Print #1,"The value of i=";i%,"the value of s=";s$

  'This example prints the value of i% in print zone 1 and s$ in
  'print zone 3.
  Print #1,i%,,s$

  'This example prints the value of i% and s$ separated by ten spaces.
  Print #1,i%;Spc(10);s$

  'This example prints the value of i in column 1 and s$ in column 30.
  Print #1,i%;Tab(30);s$

  'This example prints the value of i% and s$.
  Print #1,i%;s$,
  Print #1,67

  Close #1
  Kill "test.dat"
End Sub
```

See Also `Open` (statement); `Put` (statement); `Write#` (statement).

Note: The end-of-line character can be either the carriage-return/line-feed pair, or the line-feed character.

Private (statement)

Syntax **`Private`** *name* **`[(`***subscripts***`)] [As`** *type***`] [,`***name* **`[(`***subscripts***`)] [As`** *type***`]]...`**

Description Declares a list of private variables and their corresponding types and sizes.

Comments Private variables are global to every **`Sub`** and **`Function`** within the currently executing script.

If a type-declaration character is used when specifying *name* (such as **`%`**, **`@`**, **`&`**, **`$`**, or **`!`**), the optional **`[As`** *type***`]`** expression is not allowed. For example, the following are allowed:

```
Private foo As Integer
Private foo%
```

The *subscripts* parameter allows the declaration of arrays. This parameter uses the following syntax:

[*lower* **`To`**] *upper* [,[*lower* **`To`**] *upper*]...

The *lower* and *upper* parameters are integers specifying the lower and upper bounds of the array. If *lower* is not specified, then the lower bound as specified by **`Option Base`** is used (or 1 if no **`Option Base`** statement has been encountered). Up to 60 array dimensions are allowed.

The total size of an array (not counting space for strings) is limited to 64K.

Dynamic arrays are declared by not specifying any bounds:

```
Private a()
```

The *type* parameter specifies the type of the data item being declared. It can be any of the following data types: **`String`**, **`Integer`**, **`Long`**, **`Single`**, **`Double`**, **`Currency`**, **`Object`**, data object, built-in data type, or any user-defined data type.

If a variable is seen that has not been explicitly declared with either **`Dim`**, **`Public`**, or **`Private`**, then it will be implicitly declared local to the routine in which it is used.

Fixed-Length Strings

Fixed-length strings are declared by adding a length to the **`String`** type-declaration character:

`Private` *name* **`As String *`** *length*

where *length* is a literal number specifying the string's length.

Initial Values

All declared variables are given initial values, as described in the following table:

Data Type	Initial Value
`Integer`	**`0`**
`Long`	**`0`**
`Double`	**`0.0`**
`Single`	**`0.0`**
`Currency`	**`0.0`**
`Object`	**`Nothing`**
`Date`	**`December 31, 1899 00:00:00`**
`Boolean`	**`False`**

`Variant`	**`Empty`**
`String`	**`""`** (zero-length string)
User-defined type	Each element of the structure is given a default value, as described above.
Arrays	Each element of the array is given a default value, as described above.

Example This example sets the value of variable x# in two separate routines to show the behavior of private variables.

```
Private x#

Sub Area()
  x# = 10    'Set this copy of x# to 10 and display
  MsgBox x#
End Sub

Sub Main()
  x# = 100   'Set this copy of x# to 100 and display after calling the Area
subroutine
  Area
  MsgBox x#
End Sub
```

See Also **`Dim`** (statement); **`Redim`** (statement); **`Public`** (statement); **`Option Base`** (statement).

Public (statement)

Syntax **Public** *name* **[(***subscripts***)] [As** *type***] [,***name* **[(***subscripts***)] [As** *type***]]...**

Description Declares a list of public variables and their corresponding types and sizes.

Comments Public variables are global to all **Sub**s and **Function**s in all scripts.

If a type-declaration character is used when specifying *name* (such as **%**, **@**, **&**, **$**, or **!**), the optional **[As** *type***]** expression is not allowed. For example, the following are allowed:

```
Public foo As Integer
Public foo%
```

The *subscripts* parameter allows the declaration of arrays. This parameter uses the following syntax:

[*lower* **To]** *upper* **[,[***lower* **To]** *upper***]...**

The *lower* and *upper* parameters are integers specifying the lower and upper bounds of the array. If *lower* is not specified, then the lower bound as specified by **Option Base** is used (or 1 if no **Option Base** statement has been encountered). Up to 60 array dimensions are allowed.

The total size of an array (not counting space for strings) is limited to 64K.

Dynamic arrays are declared by not specifying any bounds:

```
Public a()
```

The *type* parameter specifies the type of the data item being declared. It can be any of the following data types: **String**, **Integer**, **Long**, **Single**, **Double**, **Currency**, **Object**, data object, built-in data type, or any user-defined data type.

If a variable is seen that has not been explicitly declared with either **Dim**, **Public**, or **Private**, then it will be implicitly declared local to the routine in which it is used.

For compatibility, the keyword **Global** is also supported. It has the same meaning as **Public**.

Fixed-Length Strings

Fixed-length strings are declared by adding a length to the **String** type-declaration character:

Public *name* **As String *** *length*

where *length* is a literal number specifying the string's length.

Initial Values

All declared variables are given initial values, as described in the following table:

Data Type	Initial Value
Integer	**0**
Long	**0**
Double	**0.0**
Single	**0.0**
Currency	**0.0**
Date	**December 31, 1899 00:00:00**
Object	**Nothing**

`Boolean`	**`False`**
`Variant`	**`Empty`**
`String`	**`""`** (zero-length string)
User-defined type	Each element of the structure is given a default value, as described above.
Arrays	Each element of the array is given a default value, as described above.

Sharing Variables

When sharing variables, you must ensure that the declarations of the shared variables are the same in each script that uses those variables. If the public variable being shared is a user-defined structure, then the structure definitions must be exactly the same.

Example This example uses a subroutine to calculate the area of ten circles and displays the result in a dialog box. The variables R and Ar are declared as Public variables so that they can be used in both Main and Area.

```
Const crlf = Chr$(13) + Chr$(10)

Public x#,ar#

Sub Area()
  ar# = (x# ^ 2) * Pi
End Sub

Sub Main()
  msg1 = "The area of the ten circles are:" & crlf & crlf
  For x# = 1 To 10
    Area
    msg1 = msg1 & x# & ": " & Format(ar#,"fixed") & Basic.Eoln$
  Next x#
  MsgBox msg1
End Sub
```

See Also **`Dim`** (statement); **`Redim`** (statement); **`Private`** (statement); **`Option Base`** (statement).

PushButton (statement)

Syntax **`PushButton`** *X*, *Y*, *width*, *height*, *title$* [, .*Identifier*]

Description Defines a push button within a dialog box template.

Comments Choosing a push button causes the dialog box to close (unless the dialog function redefines this behavior).

This statement can only appear within a dialog box template (that is, between the **`Begin Dialog`** and **`End Dialog`** statements).

The **`PushButton`** statement accepts the following parameters:

Parameter	Description
X, *Y*	**`Integer`** coordinates specifying the position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**`Integer`** coordinates specifying the dimensions of the control in dialog units.
title$	**`String`** containing the text that appears within the push button. This text may contain an ampersand character to denote an accelerator letter, such as "**`&Save`**" for **`Save`**.
.Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**).

If a push button is the default button, it can be selected by pressing Enter on a nonbutton control.

A dialog box template must contain at least one **`OKButton`**, **`CancelButton`**, or **`PushButton`** statement (otherwise, the dialog box cannot be dismissed).

Example This example creates a bunch of push buttons and displays which button was pushed.

```
Sub Main()
  Begin Dialog ButtonTemplate 17,33,104,84,"Buttons"
    OKButton 8,4,40,14,.OK
    CancelButton 8,24,40,14,.Cancel
    PushButton 8,44,40,14,"1",.Button1
    PushButton 8,64,40,14,"2",.Button2
    PushButton 56,4,40,14,"3",.Button3
    PushButton 56,24,40,14,"4",.Button4
    PushButton 56,44,40,14,"5",.Button5
    PushButton 56,64,40,14,"6",.Button6
  End Dialog
  Dim ButtonDialog As ButtonTemplate
  WhichButton% = Dialog(ButtonDialog)
  MsgBox "You pushed button " & WhichButton%
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`Text`** (statement); **`TextBox`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

Note: Accelerators are underlined, and the accelerator combination **Alt+*letter*** is used.

Put (statement)

Syntax	**`Put [#]`***filenumber*, [*recordnumber*], *variable*
Description	Writes data from the specified variable to a **`Random`** or **`Binary`** file.
Comments	The **`Put`** statement accepts the following parameters:

Parameter	Description
filenumber	**`Integer`** representing the file to be written to. This is the same value as returned by the **`Open`** statement.
recordnumber	**`Long`** specifying which record is to be written to the file. For **`Binary`** files, this number represents the first byte to be written starting with the beginning of the file (the first byte is 1). For **`Random`** files, this number represents the record number starting with the beginning of the file (the first record is 1). This value ranges from 1 to 2147483647. If the *recordnumber* parameter is omitted, the next record is written to the file (if no records have been written yet, then the first record in the file is written). When *recordnumber* is omitted, the commas must still appear, as in the following example: **`Put #1,,recvar`** If *recordlength* is specified, it overrides any previous change in file position specified with the **`Seek`** statement.

The *variable* parameter is the name of any variable of any of the following types:

Variable Type	File Storage Description
`Integer`	2 bytes are written to the file.
`Long`	4 bytes are written to the file.
`String` (variable-length)	In **`Binary`** files, variable-length strings are written by first determining the specified string variable's length, then writing that many bytes to the file. In **`Random`** files, variable-length strings are written by first writing a 2-byte length, then writing that many characters to the file.
`String` (fixed-length)	Fixed-length strings are written to **`Random`** and **`Binary`** files in the same way: the number of characters equal to the string's declared length are written.
`Double`	8 bytes are written to the file (IEEE format).
`Single`	4 bytes are written to the file (IEEE format).
`Date`	8 bytes are written to the file (IEEE double format).
`Boolean`	2 bytes are written to the file (either –1 for **`True`** or 0 for **`False`**).

`Variant`	A 2-byte **`VarType`** is written to the file followed by the data as described above. With variants of type 10 (user-defined errors), the 2-byte **`VarType`** is followed by a 2-byte unsigned integer (the error value), which is then followed by 2 additional bytes of information. The exception is with strings, which are always preceded by a 2-byte string length.
User-defined types	Each member of a user-defined data type is written individually. In **`Binary`** files, variable-length strings within user-defined types are written by first writing a 2-byte length followed by the string's content. This storage is different than variable-length strings outside of user-defined types. When writing user-defined types, the record length must be greater than or equal to the combined size of each element within the data type.
Arrays	Arrays cannot be written to a file using the **`Put`** statement.
Objects	Object variables cannot be written to a file using the **`Put`** statement.

With **`Random`** files, a runtime error will occur if the length of the data being written exceeds the record length (specified as the *reclen* parameter with the **`Open`** statement). If the length of the data being written is less than the record length, the entire record is written along with padding (whatever data happens to be in the I/O buffer at that time). With **`Binary`** files, the data elements are written contiguously: they are never separated with padding.

Example

This example opens a file for random write, then writes ten records into the file with the values 10-50. Then the file is closed and reopened in random mode for read, and the records are read with the Get statement. The result is displayed in a dialog box.

```
Sub Main()
  Open "test.dat" For Random Access Write As #1
  For x = 1 To 10
    r% = x * 10
    Put #1,x,r%
  Next x
  Close

  Open "test.dat" For Random Access Read As #1
  For x = 1 To 10
    Get #1,x,r%
    msg1 = "Record " & x & " is: " & r% & Basic.Eoln$
  Next x

  MsgBox msg1
  Close
  Kill "test.dat"
End Sub
```

See Also

`Open` (statement); **`Put`** (statement); **`Write#`** (statement); **`Print#`** (statement).

Pv (function)

Syntax **`Pv(`***Rate***`,`***NPer***`,`***Pmt***`,`***Fv***`,`***Due***`)`**

Description Calculates the present value of an annuity based on future periodic fixed payments and a constant rate of interest.

Comments The **`Pv`** function requires the following parameters:

Parameter	Description
Rate	**`Double`** representing the interest rate per period. When used with monthly payments, be sure to normalize annual percentage rates by dividing them by 12.
NPer	**`Double`** representing the total number of payments in the annuity.
Pmt	**`Double`** representing the amount of each payment per period.
Fv	**`Double`** representing the future value of the annuity after the last payment has been made. In the case of a loan, the future value would be 0.
Due	**`Integer`** indicating when the payments are due for each payment period. A **`0`** specifies payment at the end of each period, whereas a **`1`** specifies payment at the start of each period.

Rate and *NPer* must be expressed in the same units. If *Rate* is expressed in months, then *NPer* must also be expressed in months.

Positive numbers represent cash received, whereas negative numbers represent cash paid out.

Example This example demonstrates the present value (the amount you'd have to pay now) for a $100,000 annuity that pays an annual income of $5,000 over 20 years at an annual interest rate of 10%.

```
Sub Main()
  pval = Pv(.1,20,-5000,100000,1)
  MsgBox "The present value is: " & Format(pval,"Currency")
End Sub
```

See Also **`Fv`** (function); **`IRR`** (function); **`MIRR`** (function); **`Npv`** (function).

R

Random (function)

Syntax **Random(***min*,*max***)**

Description Returns a **Long** value greater than or equal to *min* and less than or equal to *max*.

Comments Both the *min* and *max* parameters are rounded to **Long**. A runtime error is generated if *min* is greater than *max*.

Example This example sets the randomize seed then generates six random numbers between 1 and 54 for the lottery.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim a%(5)
  Randomize

  For x = 0 To 5
    temp = Random(1,54)

    'Elimininate duplicate numbers.
    For y = 0 To 5
      If a(y) = temp Then found = true
    Next

    If found = false Then a(x) = temp Else   x = x - 1
    found = false
  Next

  ArraySort a
  msg1 = ""
  For x = 0 To 5
    msg1 = msg1 & a(x) & crlf
  Next x

  MsgBox "Today's winning lottery numbers are: " & crlf & crlf & msg1
End Sub
```

See Also **Randomize** (statement); **Random** (function).

Randomize (statement)

Syntax **`Randomize`** [*seed*]

Description Initializes the random number generator with a new seed.

Comments If *seed* is not specified, then the current value of the system clock is used.

Example This example sets the randomize seed then generates six random numbers between 1 and 54 for the lottery.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim a%(5)
  Randomize  'This sets the random seed.
        'Omitting this line will cause the random numbers to be
        'identical each time the sample is run.

  For x = 0 To 5
    temp = Rnd(1) * 54 + 1

    'Elimininate duplicate numbers.
    For y = 0 To 5
      If a(y) = temp Then found = true
    Next

    If found = false Then a(x) = temp Else  x = x - 1

    found = false
  Next

  ArraySort a
  msg1 = ""
  For x = 0 To 5
    msg1 = msg1 & a(x) & crlf
  Next x

  MsgBox "Today's winning lottery numbers are: " & crlf & crlf & msg1
End Sub
```

See Also **Random** (function); **Rnd** (function).

Rate (function)

Syntax **`Rate`**(*NPer*,*Pmt*,*Pv*,*Fv*,*Due*,*Guess*)

Description Returns the rate of interest for each period of an annuity.

Comments An annuity is a series of fixed payments made to an insurance company or other investment company over a period of time. Examples of annuities are mortgages and monthly savings plans.

The **`Rate`** function requires the following parameters:

Parameter	Description
NPer	**`Double`** representing the total number of payments in the annuity.
Pmt	**`Double`** representing the amount of each payment per period.
Pv	**`Double`** representing the present value of your annuity. In a loan situation, the present value would be the amount of the loan.
Fv	**`Double`** representing the future value of the annuity after the last payment has been made. In the case of a loan, the future value would be zero.
Due	**`Integer`** specifying when the payments are due for each payment period. A **`0`** indicates payment at the end of each period, whereas a **`1`** indicates payment at the start of each period.
Guess	**`Double`** specifying a guess as to the value the **`Rate`** function will return. The most common guess is .1 (10 percent).

Positive numbers represent cash received, whereas negative values represent cash paid out.

The value of *Rate* is found by iteration. It starts with the value of *Guess* and cycles through the calculation adjusting *Guess* until the result is accurate within 0.00001 percent. After 20 tries, if a result cannot be found, *Rate* fails, and the user must pick a better guess.

Example This example calculates the rate of interest necessary to save $8,000 by paying $200 each year for 48 years. The guess rate is 10%.

```
Sub Main()
  r# = Rate(48,-200,8000,0,1,.1)
  MsgBox "The rate required is: " & Format(r#,"Percent")
End Sub
```

See Also **`IPmt`** (function); **`NPer`** (function); **`Pmt`** (function); **`PPmt`** (function).

ReadIni$ (function)

Syntax **`ReadIni$`**(*section$*,*item$*[,*filename$*])

Description Returns a **`String`** containing the specified item from an ini file.

Comments The **`ReadIni$`** function takes the following parameters:

Parameter	Description
section$	**`String`** specifying the section that contains the desired variable, such as "windows". Section names are specified without the enclosing brackets.
item$	**`String`** specifying the item whose value is to be retrieved.
filename$	**`String`** containing the name of the ini file to read.

See Also **`WriteIni`** (statement); **`ReadIniSection`** (statement).

Notes: If the name of the ini file is not specified, then win.ini is assumed.

If the *filename$* parameter does not include a path, then this statement looks for ini files in the Windows directory.

ReadIniSection (statement)

Syntax **`ReadIniSection`** *section$*,*ArrayOfItems()*[,*filename$*]

Description Fills an array with the item names from a given section of the specified ini file.

Comments The **`ReadIniSection`** statement takes the following parameters:

Parameter	**Description**
section$	**`String`** specifying the section that contains the desired variables, such as "windows". Section names are specified without the enclosing brackets.
ArrayOfItems()	Specifies either a zero- or a one-dimensioned array of strings or variants. The array can be either dynamic or fixed. If *ArrayOfItems()* is dynamic, then it will be redimensioned to exactly hold the new number of elements. If there are no elements, then the array will be redimensioned to contain no dimensions. You can use the **`LBound`**, **`UBound`**, and **`ArrayDims`** functions to determine the number and size of the new array's dimensions. If the array is fixed, each array element is first erased, then the new elements are placed into the array. If there are fewer elements than will fit in the array, then the remaining elements are initialized to zero-length strings (for **`String`** arrays) or **`Empty`** (for **`Variant`** arrays). A runtime error results if the array is too small to hold the new elements.
filename$	**`String`** containing the name of an ini file.

On return, the *ArrayOfItems()* parameter will contain one array element for each variable in the specified ini section.

Example

```
Sub Main()
  Dim items() As String
  ReadIniSection "Windows",items$
  r% = SelectBox("INI Items",,items$)
End Sub
```

See Also **`ReadIni$`** (function); **`WriteIni`** (statement).

Notes: If the name of the ini file is not specified, then win.ini is assumed.

If the *filename$* parameter does not include a path, then this statement looks for ini files in the Windows directory.

Redim (statement)

Syntax **`Redim [Preserve]`** *variablename* **(***subscriptRange***) [As** *type***],...**

Description Redimensions an array, specifying a new upper and lower bound for each dimension of the array.

Comments The *variablename* parameter specifies the name of an existing array (previously declared using the **`Dim`** statement) or the name of a new array variable. If the array variable already exists, then it must previously have been declared with the **`Dim`** statement with no dimensions, as shown in the following example:

```
Dim a$() 'Dynamic array of strings (no dimensions yet)
```

Dynamic arrays can be redimensioned any number of times.

The *subscriptRange* parameter specifies the new upper and lower bounds for each dimension of the array using the following syntax:

[*lower* **To]** *upper* **[,[***lower* **To]** *upper***]...**

If *lower* is not specified, then **`0`** is used (or the value set using the **`Option Base`** statement). A runtime error is generated if *lower* is less than *upper*. Array dimensions must be within the following range:

–32768 <= *lower* **<=** *upper* **<= 32767**

The *type* parameter can be used to specify the array element type. Arrays can be declared using any fundamental data type, user-defined data types, and objects.

Redimensioning an array erases all elements of that array unless the **`Preserve`** keyword is specified. When this keyword is specified, existing data in the array is preserved where possible. If the number of elements in an array dimension is increased, the new elements are initialized to **`0`** (or empty string). If the number of elements in an array dimension is decreased, then the extra elements will be deleted. If the **`Preserve`** keyword is specified, then the number of dimensions of the array being redimensioned must either be zero or the same as the new number of dimensions.

Example This example uses the FileList statement to redim an array and fill it with filename strings. A new array is then redimmed to hold the number of elements found by FileList, and the FileList array is copied into it and partially displayed.

```
Sub Main()
  Dim fl$()
  FileList fl$,"*.*"
  count = Ubound(fl$)
  Redim nl$(Lbound(fl$) To Ubound(fl$))
  For x = 1 to count
    nl$(x) = fl(x)
  Next x
  MsgBox "The last element of the new array is: " & nl$(count)
End Sub
```

See Also **`Dim`** (statement); **`Public`** (statement); **`Private`** (statement); **`ArrayDims`** (function); **`LBound`** (function); **`UBound`** (function).

Rem (statement)

Syntax `Rem` *text*

Description Causes the compiler to skip all characters on that line.

Example

```
Sub Main()
  Rem This is a line of comments that serves to illustrate the
  Rem workings of the code. You can insert comments to make it more
  Rem readable and maintainable in the future.
End Sub
```

See Also `'` (keyword); Comments (topic).

Reset (statement)

Syntax `Reset`

Description Closes all open files, writing out all I/O buffers.

Example This example opens a file for output, closes it with the Reset statement, then deletes it with the Kill statement.

```
Sub Main()
  Open "test.dat" for Output Access Write as # 1
  Reset
  Kill "test.dat"

  If FileExists("test.dat") Then
    MsgBox "The file was not deleted."
  Else
    MsgBox "The file was deleted."
  End If
End Sub
```

See Also **`Close`** (statement); **`Open`** (statement).

Resume (statement)

Syntax **Resume {[0] | Next |** *label***}**

Description Ends an error handler and continues execution.

Comments The form **Resume 0** (or simply **Resume** by itself) causes execution to continue with the statement that caused the error.

The form **Resume Next** causes execution to continue with the statement following the statement that caused the error.

The form **Resume** *label* causes execution to continue at the specified label.

The **Resume** statement resets the error state. This means that, after executing this statement, new errors can be generated and trapped as normal.

Example This example accepts two integers from the user and attempts to multiply the numbers together. If either number is larger than an integer, the program processes an error routine and then continues program execution at a specific section using 'Resume <label>'. Another error trap is then set using 'Resume Next'. The new error trap will clear any previous error branching and also 'tell' the program to continue execution of the program even if an error is encountered.

```
Sub Main()
  Dim a%,b%,x%

Again:
  On Error Goto Overflow
  a% = InputBox("Enter 1st integer to multiply","Enter Number")
  b% = InputBox("Enter 2nd integer to multiply","Enter Number")

  On Error Resume Next   'Continue program execution at next line
  x% = a% * b%           'if an error (integer overflow) occurs.

  If err = 0 Then
    MsgBox a% & " * " & b% & " = " & x%
  Else
    Msgbox a% & " * " & b% & " cause an integer overflow!"
  End If

  Exit Sub

Overflow:                'Error handler.
  MsgBox "You've entered a non-integer value, try again!"
  Resume Again
End Sub
```

See Also Error Handling (topic); **On Error** (statement).

Return (statement)

Syntax `Return`

Description Transfers execution control to the statement following the most recent **GoSub**.

Comments A runtime error results if a **Return** statement is encountered without a corresponding **GoSub** statement.

Example This example calls a subroutine and then returns execution to the Main routine by the Return statement.

```
Sub Main()
  GoSub SubTrue
  MsgBox "The Main routine continues here."
  Exit Sub

SubTrue:
  MsgBox "This message is generated in the subroutine."
  Return
  Exit Sub
End Sub
```

See Also **GoSub** (statement).

Right, Right$ (functions)

Syntax **Right[$](***text***,** *NumChars***)**

Description Returns the rightmost *NumChars* characters from a specified string.

Comments **Right$** returns a **String**, whereas **Right** returns a **String** variant.

The **Right** function takes the following parameters:

Parameter	Description
text	**String** from which characters are returned. A runtime error is generated if *text* is **Null**.
NumChars	**Integer** specifying the number of characters to return. If *NumChars* is greater than or equal to the length of the string, then the entire string is returned. If *NumChars* is 0, then a zero-length string is returned.

Example This example shows the Right$ function used in a routine to change uppercase names to lowercase with an uppercase first letter.

```
Sub Main()
  lname$ = "WILLIAMS"
  x = Len(lname$)
  rest$ = Right(lname$,x - 1)
  fl$ =  Left(lname$,1)
  lname$ = fl$ & LCase(rest$)
  MsgBox "The converted name is: " & lname$
End Sub
```

See Also **Left, Left$** (functions).

RmDir (statement)

Syntax **`RmDir`** *dir$*

Comments Removes the directory specified by the **`String`** contained in *dir$*.

Example This routine creates a directory and then deletes it with RmDir.

```
Sub Main()
  On Error Goto ErrMake
  MkDir("test01")
  On Error Goto ErrRemove
  RmDir("test01")

ErrMake:
  MsgBox "The directory could not be created."
  Exit Sub

ErrRemove:
  MsgBox "The directory could not be removed."
  Exit Sub
End Sub
```

See Also **`ChDir`** (statement); **`ChDrive`** (statement); **`CurDir, CurDir$`** (functions); **`Dir, Dir$`** (functions); **`MkDir`** (statement).

Rnd (function)

Syntax **`Rnd[(`***number***`)]`**

Description Returns a random **`Single`** number between 0 and 1.

Comments If *number* is omitted, the next random number is returned. Otherwise, the *number* parameter has the following meaning:

If	Then
number **`< 0`**	Always returns the same number.
number **`= 0`**	Returns the last number generated.
number **`> 0`**	Returns the next random number.

Example This example sets the randomize seed then generates six random numbers between 1 and 54 for the lottery.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim a%(5)
  Randomize

  For x = 0 To 5
    temp = Rnd(1) * 54 + 1

    'Elimininate duplicate numbers.
    For y = 0 To 5
      If a(y) = temp Then found = true
    Next

    If found = false Then a(x) = temp Else   x = x - 1

    found = false
  Next

  ArraySort a
  msg1 = ""
  For x = 0 To 5
    msg1 = msg1 & a(x) & crlf
  Next x

  MsgBox "Today's winning lottery numbers are: " & crlf & crlf & msg1
End Sub
```

See Also **`Randomize`** (statement); **`Random`** (function).

RSet (statement)

Syntax **`RSet`** *destvariable* = *source*

Description Copies the source string *source* into the destination string *destvariable*.

Comments If *source* is shorter in length than *destvariable*, then the string is right-aligned within *destvariable* and the remaining characters are padded with spaces. If *source* is longer in length than *destvariable*, then *source* is truncated, copying only the leftmost number of characters that will fit in *destvariable*. A runtime error is generated if *source* is **`Null`**.

The *destvariable* parameter specifies a **`String`** or **`Variant`** variable. If *destvariable* is a **`Variant`** containing **`Empty`**, then no characters are copied. If *destvariable* is not convertible to a **`String`**, then a runtime error occurs. A runtime error results if *destvariable* is **`Null`**.

Example This example replaces a 40-character string of asterisks (*) with an RSet and LSet string and then displays the result.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim msg1,tmpstr$
  tmpstr$ = String(40,"*")
  msg1 = "Here are two strings that have been right-" + crlf
  msg1 = msg1 & "and left-justified in a 40-character string."
  msg1 = msg1 & crlf & crlf
  RSet tmpstr$ = "Right|"
  msg1 = msg1 & tmpstr$ & crlf
  LSet tmpstr$ = "|Left"
  msg1 = msg1 & tmpstr$ & crlf
  MsgBox msg1
End Sub
```

See Also **`LSet`** (statement).

RTrim, RTrim$ (functions)

Syntax **`RTrim[$](`***text***`)`**

Description Returns a string with the trailing spaces removed.

Comments **`RTrim$`** returns a **`String`**, whereas **`RTrim`** returns a **`String`** variant.

`Null` is returned if *text* is **`Null`**.

Example This example displays a left-justified string and its RTrim result.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  txt$ = "      This is text           "
  tr$ = RTrim(txt$)
  MsgBox "Original ->" & txt$ & "<-" & crlf & "Right Trimmed ->" & tr$ & "<-"
End Sub
```

See Also **`LTrim, LTrim$`** (functions); **`Trim, Trim$`** (functions).

S

SaveFilename$ (function)

Syntax **`SaveFilename$[([`***title$*** `[,`***extensions$***`]])]`**

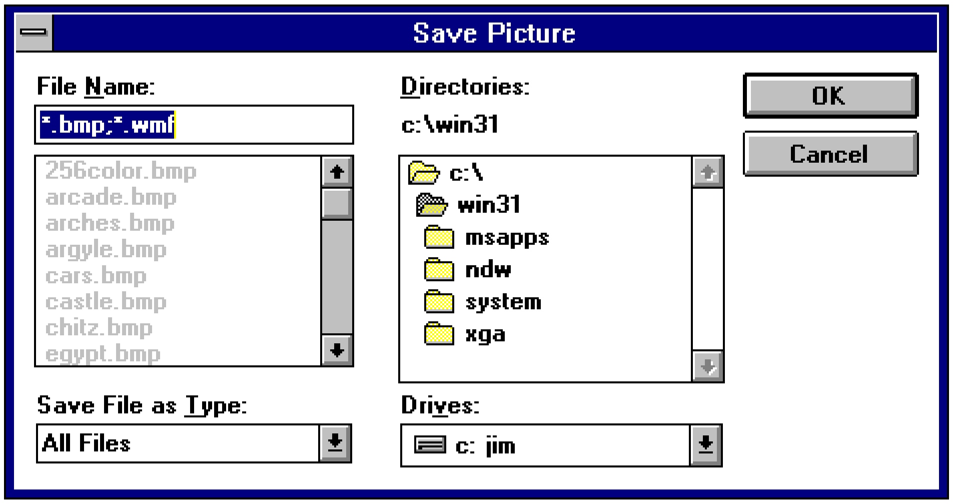
Description Displays a dialog box that prompts the user to select from a list of files and returns a **`String`** containing the full path of the selected file.

Comments The **`SaveFilename$`** function accepts the following parameters:

Parameter	Description
title$	**`String`** containing the title that appears on the dialog box's caption. If this string is omitted, then **`"Save As"`** is used.
extensions$	**`String`** containing the available file types. Its format depends on the platform on which the Basic Control Engine is running. If this string is omitted, then all files are used.

The **`SaveFilename$`** function returns a full pathname of the file that the user selects. A zero-length string is returned if the user selects Cancel. If the file already exists, then the user is prompted to overwrite it.

```
e$ = "All Files:*.BMP,*.WMF;Bitmaps:*.BMP;Metafiles:*.WMF"
f$ = SaveFilename$("Save Picture",e$)
```



Example

This example creates a save dialog box, giving the user the ability to save to several different file types.

```
Sub Main()
  e$ = "All Files:*.BMP,*.WMF;Bitmaps:*.BMP;Metafiles:*.WMF"
  f$ = SaveFilename$("Save Picture",e$)
  If Not f$ = "" Then
    Msgbox "User choose to save file as: " + f$
  Else
    Msgbox "User canceled."
  End IF
End Sub
```

See Also

`MsgBox` (statement); **`AskBox$`** (function); **`AskPassword$`** (function); **`InputBox, InputBox$`** (functions); **`OpenFilename$`** (function); **`SelectBox`** (function); **`AnswerBox`** (function).

Note:

The *extensions$* parameter must be in the following format:

***description*`:`*ext*`[,`*ext*`][;`*description*`:`*ext*`[,`*ext*`]]...`**

Placeholder	Description
description	Specifies the grouping of files for the user, such as **`All Files`**.
ext	Specifies a valid file extension, such as **`*.BAT`** or **`*.?F?`**.

For example, the following are valid *extensions$* specifications:

```
  "All Files:*"
  "Documents:*.TXT,*.DOC"
  "All Files:*;Documents:*.TXT,*.DOC"
```

Screen.DlgBaseUnitsX (property)

Syntax `Screen.DlgBaseUnitsX`

Description Returns an **`Integer`** used to convert horizontal pixels to and from dialog units.

Comments The number returned depends on the name and size of the font used to display dialog boxes.

To convert from pixels to dialog units in the horizontal direction:

```
((XPixels * 4) + (Screen.DlgBaseUnitsX - 1)) / Screen.DlgBaseUnitsX
```

To convert from dialog units to pixels in the horizontal direction:

```
(XDlgUnits * Screen.DlgBaseUnitsX) / 4
```

Example This example converts the screen width from pixels to dialog units.

```
Sub Main()
  XPixels = Screen.Width
  conv% = Screen.DlgBaseUnitsX
  XDlgUnits = (XPixels * 4) + (conv% -1) / conv%
  MsgBox "The screen width is " & XDlgUnits & " dialog units."
End Sub
```

See Also **`Screen.DlgBaseUnitsY`** (property).

Screen.DlgBaseUnitsY (property)

Syntax `Screen.DlgBaseUnitsY`

Description Returns an **`Integer`** used to convert vertical pixels to and from dialog units.

Comments The number returned depends on the name and size of the font used to display dialog boxes.

To convert from pixels to dialog units in the vertical direction:

```
(YPixels * 8) + (Screen.DlgBaseUnitsY - 1) / Screen.DlgBaseUnitsY
```

To convert from dialog units to pixels in the vertical direction:

```
(YDlgUnits * Screen.DlgBaseUnitsY) / 8
```

Example This example converts the screen width from pixels to dialog units.

```
Sub Main()
  YPixels = Screen.Height
  conv% = Screen.DlgBaseUnitsY
  YDlgUnits = (YPixels * 8) + (conv% -1) / conv%
  MsgBox "The screen width is " & YDlgUnits & " dialog units."
End Sub
```

See Also **`Screen.DlgBaseUnitsX`** (property).

Screen.Height (property)

Syntax `Screen.Height`

Description Returns the height of the screen in pixels as an `Integer`.

Comments This property is used to retrieve the height of the screen in pixels. This value will differ depending on the display resolution.

This property is read-only.

Example This example displays the screen height in pixels.

```
Sub Main()
  MsgBox "The Screen height is " & Screen.Height & " pixels."
End Sub
```

See Also `Screen.Width` (property).

Screen.TwipsPerPixelX (property)

Syntax `Screen.TwipsPerPixelX`

Description Returns an `Integer` representing the number of twips per pixel in the horizontal direction of the installed display driver.

Comments This property is read-only.

Example This example displays the number of twips across the screen horizontally.

```
Sub Main()
  XScreenTwips = Screen.Width * Screen.TwipsPerPixelX
  MsgBox "Total horizontal screen twips = " & XScreenTwips
End Sub
```

See Also `Screen.TwipsPerPixelY` (property).

Screen.TwipsPerPixelY (property)

Syntax `Screen.TwipsPerPixelY`

Description Returns an **`Integer`** representing the number of twips per pixel in the vertical direction of the installed display driver.

Comments This property is read-only.

Example This example displays the number of twips across the screen vertically.

```
Sub Main()
  YScreenTwips = Screen.Height * Screen.TwipsPerPixelY
  MsgBox "Total vertical screen twips = " & YScreenTwips
End Sub
```

See Also **`Screen.TwipsPerPixelX`** (property).

Screen.Width (property)

Syntax `Screen.Width`

Description Returns the width of the screen in pixels as an **`Integer`**.

Comments This property is used to retrieve the width of the screen in pixels. This value will differ depending on the display resolution.

This property is read-only.

Example This example displays the screen width in pixels.

```
Sub Main()
  MsgBox "The screen width is " & Screen.Width & " pixels."
End Sub
```

See Also **`Screen.Height`** (property).

Second (function)

Syntax **`Second(`***time***`)`**

Description Returns the second of the day encoded in the specified *time* parameter.

Comments The value returned is an **`Integer`** between 0 and 59 inclusive.

The *time* parameter is any expression that converts to a **`Date`**.

Example This example fires and event every 10 seconds based on the system clock.

```
Sub Main()
  trigger = 10
  Do
    xs% = Second(Now)
    If (xs% Mod trigger = 0) Then
      Beep
      End    'Remove this line to trigger the loop continuously.
      Sleep 1000
    End If
    DoEvents
  Loop
End Sub
```

See Also **`Day`** (function); **`Minute`** (function); **`Month`** (function); **`Year`** (function); **`Hour`** (function); **`Weekday`** (function); **`DatePart`** (function).

Seek (function)

Syntax	`Seek(`*filenumber*`)`

Description Returns the position of the file pointer in a file relative to the beginning of the file.

Comments The *filenumber* parameter is a number that the Basic Control Engine uses to refer to the open file—the number passed to the **`Open`** statement.

The value returned depends on the mode in which the file was opened:

File Mode	Returns
`Input`	Byte position for the next read
`Output`	Byte position for the next write
`Append`	Byte position for the next write
`Random`	Number of the next record to be written or read
`Binary`	Byte position for the next read or write

The value returned is a **`Long`** between 1 and 2147483647, where the first byte (or first record) in the file is 1.

Example This example opens a file for random write, then writes ten records into the file using the PUT statement. The file position is displayed using the Seek Function, and the file is closed.

```
Sub Main()
  Open "test.dat" For Random Access Write As #1
  For x = 1 To 10
    r% = x * 10
    Put #1,x,r%
  Next x
  y = Seek(1)
  MsgBox "The current file position is: " & y
  Close
End Sub
```

See Also **`Seek`** (statement); **`Loc`** (function).

Seek (statement)

Syntax **`Seek [#]`** *filenumber,position*

Description Sets the position of the file pointer within a given file such that the next read or write operation will occur at the specified position.

Comments The **`Seek`** statement accepts the following parameters:

Parameter	Description
filenumber	**`Integer`** used by the Basic Control Engine to refer to the open file—the number passed to the **`Open`** statement.
position	**`Long`** that specifies the location within the file at which to position the file pointer. The value must be between 1 and 2147483647, where the first byte (or record number) in the file is 1. For files opened in either **`Binary`**, **`Output`**, **`Input`**, or **`Append`** mode, *position* is the byte position within the file. For **`Random`** files, *position* is the record number.

A file can be extended by seeking beyond the end of the file and writing data there.

Example This example opens a file for random write, then writes ten records into the file using the PUT statement. The file is then reopened for read, and the ninth record is read using the Seek and Get functions.

```
Sub Main()
  Open "test.dat" For Random Access Write As #1
  For x = 1 To 10
    rec$ = "Record#: " & x
    Put #1,x,rec$
  Next x
  Close

  Open "test.dat" For Random Access Read As #1
  Seek #1,9
  Get #1,,rec$
  MsgBox "The ninth record = " & x
  Close
  Kill "test.dat"
End Sub
```

See Also **`Seek`** (function); **`Loc`** (function).

Select...Case (statement)

Syntax

```
Select Case testexpression
[Case expressionlist
  [statement_block]]
[Case expressionlist
  [statement_block]]
  .
  .
[Case Else
  [statement_block]]
End Select
```

Description Used to execute a block of the Basic Control Engine statements depending on the value of a given expression.

Comments The **`Select Case`** statement has the following parts:

Part	Description
testexpression	Any numeric or string expression.
statement_block	Any group of the Basic Control Engine statements. If the *testexpression* matches any of the expressions contained in *expressionlist*, then this statement block will be executed.
expressionlist	A comma separated list of expressions to be compared against *testexpression* using any of the following syntaxes: *expression* **`[,`***expression***`]...`** / *expression* **`to`** *expression* / **`is`** *relational_operator expression*. The resultant type of *expression* in *expressionlist* must be the same as that of *testexpression*.

Multiple expression ranges can be used within a single **`Case`** clause. For example:

```
Case 1 to 10,12,15 Is > 40
```

Only the *statement_block* associated with the first matching expression will be executed. If no matching *statement_block* is found, then the statements following the **`Case Else`** will be executed.

A **`Select...End Select`** expression can also be represented with the **`If...Then`** expression. The use of the **`Select`** statement, however, may be more readable.

Example This example uses the **`Select...Case`** statement to output the current operating system.

```
Sub Main()
  OpSystem% = Basic.OS
  Select Case OpSystem%
    Case 0,2
      s = "Microsoft Windows"
    Case 1
      s = "DOS"
    Case 3 to 8,12
      s = "UNIX"
    Case 10
      s = "IBM OS/2"
    Case Else
      s = "Other"
  End Select
  MsgBox "This version of the Basic Control Engine is running on: " & s
End Sub
```

See Also **`Choose`** (function); **`Switch`** (function); **`IIf`** (function); **`If...Then...Else`** (statement).

SelectBox (function)

Syntax `SelectBox(`*title*`,`*prompt*`,`*ArrayOfItems*`)`

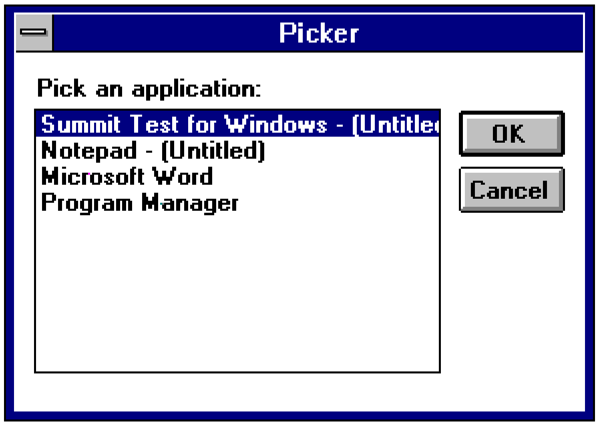
Description Displays a dialog box that allows the user to select from a list of choices and returns an **`Integer`** containing the index of the item that was selected.

Comments The **`SelectBox`** statement accepts the following parameters:

Parameter	Description
title	Title of the dialog box. This can be an expression convertible to a **`String`**. A runtime error is generated if *title* is **`Null`**.
prompt	Text to appear immediately above the list box containing the items. This can be an expression convertible to a **`String`**. A runtime error is generated if *prompt* is **`Null`**.
ArrayOfItems	Single-dimensioned array. Each item from the array will occupy a single entry in the list box. A runtime error is generated if *ArrayOfItems* is not a single-dimensioned array. *ArrayOfItems* can specify an array of any fundamental data type (structures are not allowed). **`Null`** and **`Empty`** values are treated as zero-length strings.

The value returned is an **`Integer`** representing the index of the item in the list box that was selected, with 0 being the first item. If the user selects Cancel, –1 is returned.

```
result% = SelectBox("Picker","Pick an application:",a$)
```



Example This example gets the current apps running, puts them in to an array and then asks the user to select one from a list.

```
Sub Main()
  Dim a$()
  AppList a$
  result% = SelectBox("Picker","Pick an application:",a$)
  If Not result% = -1 then
    Msgbox "User selected: " & a$(result%)
  Else
    Msgbox "User canceled"
  End If
End Sub
```

See Also **MsgBox** (statement); **AskBox$** (function); **AskPassword$** (function); **InputBox, InputBox$** (functions); **OpenFilename$** (function); **SaveFilename$** (function); **AnswerBox** (function).

Note: The **SelectBox** displays all text in its dialog box in 8-point MS Sans Serif.

SendKeys (statement)

Syntax **SendKeys** *KeyString$* **[,[***isWait***] [,***time***]]**

Description Sends the specified keys to the active application, optionally waiting for the keys to be processed before continuing.

Comments The **SendKeys** statement accepts the following parameters:

Parameter	Description
KeyString$	**String** containing the keys to be sent. The format for *KeyString$* is described below.
isWait	**Boolean** value. If **True**, then the Basic Control Engine waits for the keys to be completely processed before continuing. If you are using **SendKeys** in a **CimEdit**/**CimView** script, you ***must*** set this flag to **True**. If you do not, when a user tries to execute the **SendKeys** statement, the **CimView** screen freezes and processing will not continue. If **False** (or not specified), then the BasicScript continues script execution before the active application receives all keys from the **SendKeys** statement.
time	**Integer** specifying the number of milliseconds devoted for the output of the entire *KeyString$* parameter. It must be within the following range: **0 <=** *time* **<= 32767** For example, if *time* is 5000 (5 seconds) and the *KeyString$* parameter contains ten keys, then a key will be output every 1/2 second. If unspecified (or 0), the keys will play back at full speed.

Specifying Keys

To specify any key on the keyboard, simply use that key, such as "**a**" for lowercase **a**, or "**A**" for uppercase **a**.

Sequences of keys are specified by appending them together: "**abc**" or "**dir /w**".

Some keys have special meaning and are therefore specified in a special way—by enclosing them within braces. For example, to specify the percent sign, use **"{%}"**. The following table shows the special keys:

Key	Special Meaning	Example	
+	Shift	**"+{F1}"**	**'Shift+F1**
^	Ctrl	**"^a"**	**'Ctrl+A**
~	Shortcut for Enter	**"~"**	**'Enter**
%	Alt	**"%F"**	**'Alt+F**

`[]`	No special meaning	`"{[}"`	`'Open bracket`
`{}`	Used to enclose special keys	`"{Up}"`	`'Up Arrow`
`()`	Used to specify grouping	`"^(ab)"`	`'Ctrl+A, Ctrl+B`

Keys that are not displayed when you press them are also specified within braces, such as **`{Enter}`** or **`{Up}`**. A list of these keys follows:

`{BkSp}`	`{BS}`	`{Break}`	`{CapsLock}`	`{Clear}`
`{Delete}`	`{Del}`	`{Down}`	`{End}`	`{Enter}`
`{Escape}`	`{Esc}`	`{Help}`	`{Home}`	`{Insert}`
`{Left}`	`{NumLock}`	`{NumPad0}`	`{NumPad1}`	`{NumPad2}`
`{NumPad3}`	`{NumPad4}`	`{NumPad5}`	`{NumPad6}`	`{NumPad7}`
`{NumPad8}`	`{NumPad9}`	`{NumPad/}`	`{NumPad*}`	`{NumPad-}`
`{NumPad+}`	`{NumPad.}`	`{PgDn}`	`{PgUp}`	`{PrtSc}`
`{Right}`	`{Tab}`	`{Up}`	`{F1`	`{Scroll Lock}`
`{F2}`	`{F3}`	`{F4}`	`{F5}`	`{F6}`
`{F7}`	`{F8}`	`{F9}`	`{F10}`	`{F11}`
`{F12}`	`{F13}`	`{F14}`	`{F15}`	`{F16}`

Keys can be combined with **Shift**, **Ctrl**, and **Alt** using the reserved keys "**+**", "**^**", and "**%**" respectively:

<u>**For Key Combination**</u>	<u>**Use**</u>
Shift+Enter	`"+{Enter}"`
Ctrl+C	`"^c"`
Alt+F2	`"%{F2}"`

To specify a modifier key combined with a sequence of consecutive keys, group the key sequence within parentheses, as in the following example:

<u>**For Key Combination**</u>	<u>**Use**</u>
Shift+A, **Shift+B**	`"+(abc)"`
Ctrl+F1, **Ctrl+F2**	`"^({F1}{F2})"`

Use "**~**" as a shortcut for embedding Enter within a key sequence:

<u>**For Key Combination**</u>	<u>**Use**</u>
a, b, **Enter**, d, e	`"ab~de"`
Enter, **Enter**	`"~~"`

To embed quotation marks, use two quotation marks in a row:

<u>**For Key Combination**</u>	<u>**Use**</u>
"Hello"	`""Hello""`
a"b"c	`"a""b""c"`

Key sequences can be repeated using a repeat count within braces:

<u>**For Key Combination**</u>	<u>**Use**</u>
Ten "a" keys	`"{a 10}"`
Two **Enter** keys	`"{Enter 2}"`

Example This example runs Notepad, writes to Notepad, and saves the new file using the SendKeys statement.

```
Sub Main()
   Dim id As Variant
   id = Shell ("notepad.exe")    'Run Notepad minimized
   AppActivate id                'Now activate Notepad
   AppMaximize                   'Open and maximize the Notepad window
   SendKeys "Hello Notepad", 1   'Write text with time to avoid burst
   Sleep 2000
   SendKeys "%fs", 1             'Save file (Simulate Alt+F,S keys)
   Sleep 2000
   SendKeys "name.txt{ENTER}", 1 'Enter name of file to save
   AppClose
End Sub
```

Set (statement)

Syntax 1 **`Set`** *object_var* **`=`** *object_expression*

Syntax 2 **`Set`** *object_var* **`= New`** *object_type*

Syntax 3 **`Set`** *object_var* **`= Nothing`**

Description Assigns a value to an object variable.

Comments

Syntax 1

The first syntax assigns the result of an expression to an object variable. This statement does not duplicate the object being assigned but rather copies a reference of an existing object to an object variable.

The *object_expression* is any expression that evaluates to an object of the same type as the *object_var*.

With data objects, **`Set`** performs additional processing. When the **`Set`** is performed, the object is notified that a reference to it is being made and destroyed. For example, the following statement deletes a reference to object **`A`**, then adds a new reference to **`B`**.

```
Set a = b
```

In this way, an object that is no longer being referenced can be destroyed.

Syntax 2

In the second syntax, the object variable is being assigned to a new instance of an existing object type. This syntax is valid only for data objects.

When an object created using the **`New`** keyword goes out of scope (that is, the **`Sub`** or **`Function`** in which the variable is declared ends), the object is destroyed.

Syntax 3

The reserved keyword **`Nothing`** is used to make an object variable reference no object. At a later time, the object variable can be compared to **`Nothing`** to test whether the object variable has been instantiated:

```
Set a = Nothing
  :
If a Is Nothing Then Beep
```

Example This example creates two objects and sets their values.

```
Sub Main()
  Dim document As Object
  Dim page As Object
  Set document = GetObject("c:\resume.doc")
  Set page = Document.ActivePage
  MsgBox page.name
End Sub
```

See Also **`=`** (statement); **`Let`** (statement); **`CreateObject`** (function); **`GetObject`** (function); **`Nothing`** (constant).

SetAttr (statement)

Syntax

`SetAttr` *filename$*, *attribute*

Description

Changes the attribute *filename$* to the given attribute. A runtime error results if the file cannot be found.

Comments

The **`SetAttr`** statement accepts the following parameters:

Parameter	Description
filename$	**`String`** containing the name of the file.
attribute	**`Integer`** specifying the new attribute of the file.

The *attribute* parameter can contain any combination of the following values:

Constant	Value	Description
`ebNormal`	**0**	Turns off all attributes
`ebReadOnly`	**1**	Read-only files
`ebHidden`	**2**	Hidden files
`ebSystem`	**4**	System files
`ebVolume`	**8**	Volume label
`ebArchive`	**32**	Files that have changed since the last backup
`ebNone`	**64**	Turns off all attributes

The attributes can be combined using the + operator or the binary **`Or`** operator.

Example

This example creates a file and sets its attributes to Read-Only and System.

```
Sub Main()
  Open "test.dat" For Output As #1
  Close #1
  MsgBox "The current file attribute is: " & GetAttr("test.dat")
  SetAttr "test.dat",ebReadOnly + ebSystem
  MsgBox "The file attribute was set to: " & GetAttr("test.dat")
  SetAttr "test.dat",ebNormal
  Kill "test.dat"
End Sub
```

See Also

`GetAttr` (function); **`FileAttr`** (function).

Sgn (function)

Syntax **`Sgn(`***number***`)`**

Description Returns an **`Integer`** indicating whether a number is less than, greater than, or equal to 0.

Comments Returns 1 if *number* is greater than 0.

Returns 0 if *number* is equal to 0.

Returns –1 if *number* is less than 0.

The *number* parameter is a numeric expression of any type. If *number* is **`Null`**, then a runtime error is generated. **`Empty`** is treated as 0.

Example This example tests the product of two numbers and displays a message based on the sign of the result.

```
Sub Main()
  a% = -100
  b% = 100
  c% = a% * b%
  Select Case Sgn(c%)
    Case -1
      MsgBox "The product is negative " & Sgn(c%)
    Case 0
      MsgBox "The product is 0 " & Sgn(c%)
    Case 1
      MsgBox "The product is positive " & Sgn(c%)
  End Select
End Sub
```

See Also **`Abs`** (function).

Shell (function)

Syntax `Shell(`*command$* `[,`*WindowStyle*`])`

Description Executes another application, returning the task ID if successful.

Comments The **`Shell`** statement accepts the following parameters:

Parameter	Description
command$	**`String`** containing the name of the application and any parameters.
WindowStyle	Optional **`Integer`** specifying the state of the application window after execution. It can be any of the following values:

1	Normal window with focus
2	Minimized with focus (default)
3	Maximized with focus
4	Normal window without focus
7	Minimized without focus

An error is generated if unsuccessful running *command$*.

The **`Shell`** command runs programs asynchronously: the statement following the **`Shell`** statement will execute before the child application has exited. On some platforms, the next statement will run before the child application has finished loading.

The **`Shell`** function returns a value suitable for activating the application using the **`AppActivate`** statement. It is important that this value be placed into a **`Variant`**, as its type depends on the platform.

Example This example displays the Windows Clock, delays awhile, then closes it.

```
Sub Main()
  id = Shell("clock.exe",1)
  AppActivate "Clock"
  Sleep(2000)
  AppClose "Clock"
End Sub
```

See Also **`SendKeys`** (statement); **`AppActivate`** (statement).

Note: This function returns a global process ID that can be used to identify the new process.

Important: On Windows NT, CIMPLICITY runs as a service. Programs started from the Event Manager run as part of the service. Services, by default, do not interact with the desktop. Therefore, shelling of a program such as CimView, will cause the program to run, but with no interface.

Sin (function)

Syntax **`Sin(`***angle***`)`**

Description Returns a **`Double`** value specifying the sine of *angle*.

Comments The *angle* parameter is a **`Double`** specifying an angle in radians.

Example This example displays the sine of pi/4 radians (45 degrees).

```
Sub Main()
  c# = Sin(Pi / 4)
  MsgBox "The sine of 45 degrees is: " & c#
End Sub
```

See Also **`Tan`** (function); **`Cos`** (function); **`Atn`** (function).

Single (data type)

Syntax **`Single`**

Description A data type used to declare variables capable of holding real numbers with up to seven digits of precision.

Comments **`Single`** variables are used to hold numbers within the following ranges:

Sign	Range
Negative	**`-3.402823E38 <=`** *single* **`<= -1.401298E-45`**
Positive	**`1.401298E-45 <=`** *single* **`<= 3.402823E38`**

The type-declaration character for **`Single`** is **`!`**.

Storage

Internally, singles are stored as 4-byte (32-bit) IEEE values. Thus, when appearing within a structure, singles require 4 bytes of storage. When used with binary or random files, 4 bytes of storage is required.

Each single consists of the following

- A 1-bit sign
- An 8-bit exponent
- A 24-bit mantissa

See Also **`Currency`** (data type); **`Date`** (data type); **`Double`** (data type); **`Integer`** (data type); **`Long`** (data type); **`Object`** (data type); **`String`** (data type); **`Variant`** (data type); **`Boolean`** (data type); **`Def`***Type* (statement); **`CSng`** (function).

Sleep (statement)

Syntax `Sleep` *milliseconds*

Description Causes the script to pause for a specified number of milliseconds.

Comments The *milliseconds* parameter is a **`Long`** in the following range:

`0 <=` *milliseconds* **`<= 2,147,483,647`**

Example This example displays a message for 2 seconds.

```
Sub Main()
  MsgOpen "Waiting 2 seconds",0,False,False
  Sleep 2000
  MsgClose
End Sub
```

Sln (function)

Syntax **`Sln(`***Cost***`,`***Salvage***`,`***Life***`)`**

Description Returns the straight-line depreciation of an asset assuming constant benefit from the asset.

Comments The **`Sln`** of an asset is found by taking an estimate of its useful life in years, assigning values to each year, and adding up all the numbers.

The formula used to find the **`Sln`** of an asset is as follows:

`(Cost - Salvage Value) / Useful Life`

The **`Sln`** function requires the following parameters:

Parameter	Description
Cost	**`Double`** representing the initial cost of the asset.
Salvage	**`Double`** representing the estimated value of the asset at the end of its useful life.
Life	**`Double`** representing the length of the asset's useful life.

The unit of time used to express the useful life of the asset is the same as the unit of time used to express the period for which the depreciation is returned.

Example This example calculates the straight-line depreciation of an asset that cost $10,000.00 and has a salvage value of $500.00 as scrap after 10 years of service life.

```
Sub Main()
  dep# = Sln(10000.00,500.00,10)
  MsgBox "The annual depreciation is: " & Format(dep#,"Currency")
End Sub
```

See Also **`SYD`** (function); **`DDB`** (function).

Space, Space$ (functions)

Syntax **`Space[$](`***NumSpaces***`)`**

Description Returns a string containing the specified number of spaces.

Comments **`Space$`** returns a **`String`**, whereas **`Space`** returns a **`String`** variant.

NumSpaces is an **`Integer`** between 0 and 32767.

Example This example returns a string of ten spaces and displays it.

```
Sub Main()
  ln$ = Space(10)
  MsgBox "Hello" & ln$ & "over there."
End Sub
```

See Also **`String, String$`** (functions); **`Spc`** (function).

Spc (function)

Syntax **`Spc(`***numspaces***`)`**

Description Prints out the specified number of spaces. This function can only be used with the **`Print`** and **`Print#`** statements.

Comments The *numspaces* parameter is an **`Integer`** specifying the number of spaces to be printed. It can be any value between 0 and 32767.

If a line width has been specified (using the **`Width`** statement), then the number of spaces is adjusted as follows:

```
  numspaces = numspaces Mod width
```

If the resultant number of spaces is greater than **`width - print_position`**, then the number of spaces is recalculated as follows:

```
  numspaces = numspaces – (width – print_position)
```

These calculations have the effect of never allowing the spaces to overflow the line length. Furthermore, with a large value for **`column`** and a small line width, the file pointer will never advance more than one line.

Example This example displays 20 spaces between the arrows.

```
Sub Main()
  Print "I am"; Spc(20); "20 spaces apart!"
  Sleep (10000) 'Wait 10 seconds.
End Sub
```

See Also **`Tab`** (function); **`Print`** (statement); **`Print#`** (statement).

SQLBind (function)

Syntax **`SQLBind(`***ID***`,`***array***`,`***column***`)`**

Description Specifies which fields are returned when results are requested using the **`SQLRetrieve`** or **`SQLRetrieveToFile`** function.

Comments The following table describes the parameters to the **`SQLBind`** function:

Parameter	Description
ID	**`Long`** parameter specifying a valid connection.
array	Any array of variants. Each call to **`SQLBind`** adds a new column number (an **`Integer`**) in the appropriate slot in the array. Thus, as you bind additional columns, the *array* parameter grows, accumulating a sorted list (in ascending order) of bound columns. If *array* is fixed, then it must be a one-dimensional variant array with sufficient space to hold all the bound column numbers. A runtime error is generated if *array* is too small. If *array* is dynamic, then it will be resized to exactly hold all the bound column numbers.
column	Optional **`Long`** parameter that specifies the column to which to bind data. If this parameter is omitted, all bindings for the connection are dropped.

This function returns the number of bound columns on the connection. If no columns are bound, then 0 is returned. If there are no pending queries, then calling **`SQLBind`** will cause an error (queries are initiated using the **`SQLExecQuery`** function).

If supported by the driver, row numbers can be returned by binding column 0.

The Basic Control Engine generates a trappable runtime error if **`SQLBind`** fails. Additional error information can then be retrieved using the **`SQLError`** function.

Example This example binds columns to data.

```
Sub Main()
  Dim columns() As Variant
  id& = SQLOpen("dsn=SAMPLE",,3)
  t& = SQLExecQuery(id&,"Select * From c:\sample.dbf")
  i% = SQLBind(id&,columns,3)
  i% = SQLBind(id&,columns,1)
  i% = SQLBind(id&,columns,2)
  i% = SQLBind(id&,columns,6)
  For x = 0 To (i% - 1)
    MsgBox columns(x)
  Next x
  id& = SQLClose(id&)
End Sub
```

See Also **`SQLRetrieve`** (function); **`SQLRetrieveToFile`** (function).

SQLClose (function)

Syntax **`SQLClose(`***connectionID***`)`**

Description Closes the connection to the specified data source.

Comments The unique connection ID (*connectionID*) is a **`Long`** value representing a valid connection as returned by **`SQLOpen`**. After **`SQLClose`** is called, any subsequent calls made with the *connectionID* will generate runtime errors.

The **`SQLClose`** function returns 0 if successful; otherwise, it returns the passed connection ID and generates a trappable runtime error. Additional error information can then be retrieved using the **`SQLError`** function.

The Basic Control Engine automatically closes all open SQL connections when either the script or the application terminates. You should use the **`SQLClose`** function rather than relying on the application to automatically close connections in order to ensure that your connections are closed at the proper time.

Example This example disconnects the data source sample.

```
Sub Main()
  Dim s As String
  Dim qry As Long
  id& = SQLOpen("dsn=SAMPLE",s$,3)
  qry = LExecQuery(id&,"Select * From c:\sample.dbf")
  MsgBox "There are " & qry & " records in the result set."
  id& = SQLClose(id&)
End Sub
```

See Also **`SQLOpen`** (function).

SQLError (function)

Syntax	**`SQLError(`***ErrArray* [, *ID*]**`)`**
Description	Retrieves driver-specific error information for the most recent SQL functions that failed.
Comments	This function is called after any other SQL function fails. Error information is returned in a two-dimensional array (*ErrArray*). The following table describes the parameters to the **`SQLError`** function:

Parameter	Description
ErrArray	Two-dimensional **`Variant`** array, which can be dynamic or fixed. If the array is fixed, it must be (*x*,3), where *x* is the number of errors you want returned. If *x* is too small to hold all the errors, then the extra error information is discarded. If *x* is greater than the number of errors available, all errors are returned, and the empty array elements are set to **`Empty`**. If the array is dynamic, it will be resized to hold the exact number of errors.
ID	Optional **`Long`** parameter specifying a connection ID. If this parameter is omitted, error information is returned for the most recent SQL function call.

Each array entry in the *ErrArray* parameter describes one error. The three elements in each array entry contain the following information:

Element	Value
`(`*entry***`,0)`**	The ODBC error state, indicated by a **`Long`** containing the error class and subclass.
`(`*entry***`,1)`**	The ODBC native error code, indicated by a **`Long`**.
`(`*entry***`,2)`**	The text error message returned by the driver. This field is **`String`** type.

For example, to retrieve the ODBC text error message of the first returned error, the array is referenced as:

ErrArray**`(0,2)`**

The **`SQLError`** function returns the number of errors found.

The Basic Control Engine generates a runtime error if **`SQLError`** fails. (You cannot use the SQLError function to gather additional error information in this case.)

Example This example forces a connection error and traps it for use with the SQLError function.

```
Sub Main()
  Dim a() As Variant
  On Error Goto Trap
  id& = SQLOpen("",,4)
  id& = SQLClose(id&)
  Exit Sub

Trap:
  rc% = SQLError(a)
  If (rc%) Then
    For x = 0 To (rc% - 1)
      MsgBox "The SQL state returned was: " & a(x,0)
      MsgBox "The native error code returned was: " & a(x,1)
      MsgBox a(x,2)
    Next x
  End If
End Sub
```

SQLExecQuery (function)

Syntax **`SQLExecQuery(`***ID*, *query$***`)`**

Description Executes an SQL statement query on a data source.

Comments This function is called after a connection to a data source is established using the **`SQLOpen`** function. The **`SQLExecQuery`** function may be called multiple times with the same connection ID, each time replacing all results.

The following table describes the parameters to the **`SQLExecQuery`** function:

Parameter	Description
ID	**`Long`** identifying a valid connected data source. This parameter is returned by the **`SQLOpen`** function.
query$	**`String`** specifying an SQL query statement. The SQL syntax of the string must strictly follow that of the driver.

The return value of this function depends on the result returned by the SQL statement:

SQL Statement	Value
`SELECT...FROM`	The value returned is the number of columns returned by the SQL statement.
`DELETE,INSERT,UPDATE`	The value returned is the number of rows affected by the SQL statement.

The Basic Control Engine generates a runtime error if **`SQLExecQuery`** fails. Additional error information can then be retrieved using the **`SQLError`** function.

Example This example executes a query on the connected data source.

```
Sub Main()
  Dim s As String
  Dim qry As Long
  id& = SQLOpen("dsn=SAMPLE",s$,3)
  qry = SQLExecQuery(id&,"Select * From c:\sample.dbf")
  MsgBox "There are " & qry & " columns in the result set."
  id& = SQLClose(id&)
End Sub
```

See Also **`SQLOpen`** (function); **`SQLClose`** (function); **`SQLRetrieve`** (function); **`SQLRetrieveToFile`** (function).

SQLGetSchema (function)

Syntax **`SQLGetSchema(`***ID, action,* `[,[`*array*`] [,`*qualifier$*`]]`**`)`**

Description Returns information about the data source associated with the specified connection.

Comments The following table describes the parameters to the **`SQLGetSchema`** function:

Parameter	Description
ID	**`Long`** parameter identifying a valid connected data source. This parameter is returned by the **`SQLOpen`** function.
action	**`Integer`** parameter specifying the results to be returned. The following table lists values for this parameter:

Value	Meaning
`1`	Returns a one-dimensional array of available data sources. The array is returned in the *array* parameter.
`2`	Returns a one-dimensional array of databases (either directory names or database names, depending on the driver) associated with the current connection. The array is returned in the *array* parameter.
`3`	Returns a one-dimensional array of owners (user IDs) of the database associated with the current connection. The array is returned in the *array* parameter.
`4`	Returns a one-dimensional array of table names for a specified owner and database associated with the current connection. The array is returned in the *array* parameter.
`5`	Returns a two-dimensional array (*n* by 2) containing information about a specified table. The array is configured as follows: **`(0,0)`** Zeroth column name **`(0,1)`** ODBC SQL data type (**`Integer`**) **`(1,0)`** First column name **`(1,1)`** ODBC SQL data type (**`Integer`**) : : **`(n,0)`** *N*th column name **`(n,1)`** ODBC SQL data type (**`Integer`**)
`6`	Returns a string containing the ID of the current user.
`7`	Returns a string containing the name (either the directory name or the database name, depending on the driver) of the current database.
`8`	Returns a string containing the name of the data source on the current connection.
`9`	Returns a string containing the name of the DBMS of the data source on the current connection (for example, "FoxPro 2.5" or "Excel Files").

10	Returns a string containing the name of the server for the data source.
11	Returns a string containing the owner qualifier used by the data source (for example, "owner," "Authorization ID," "Schema").
12	Returns a string containing the table qualifier used by the data source (for example, "table," "file").
13	Returns a string containing the database qualifier used by the data source (for example, "database," "directory").
14	Returns a string containing the procedure qualifier used by the data source (for example, "database procedure," "stored procedure," "procedure").

array Optional **`Variant`** array parameter. This parameter is only required for action values 1, 2, 3, 4, and 5. The returned information is put into this array.

If *array* is fixed and it is not the correct size necessary to hold the requested information, then **`SQLGetSchema`** will fail. If the array is larger than required, then any additional elements are erased.

If *array* is dynamic, then it will be redimensioned to hold the exact number of elements requested.

qualifier Optional **`String`** parameter required for actions 3, 4, or 5. The values are listed in the following table:

Action	**Qualifier**
3	The *qualifier* parameter must be the name of the database represented by *ID.*
4	The *qualifier* parameter specifies a database name and an owner name. The syntax for this string is: *DatabaseName.OwnerName*
5	The *qualifier* parameter specifies the name of a table on the current connection.

The Basic Control Engine generates a runtime error if **`SQLGetSchema`** fails. Additional error information can then be retrieved using the **`SQLError`** function.

If you want to retrieve the available data sources (where *action* = 1) before establishing a connection, you can pass 0 as the *ID* parameter. This is the only action that will execute successfully without a valid connection.

This function calls the ODBC functions **`SQLGetInfo`** and **`SQLTables`** in order to retrieve the requested information. Some database drivers do not support these calls and will therefore cause the **`SQLGetSchema`** function to fail.

Example This example gets all available data sources.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim dsn() As Variant
  numdims% = SQLGetSchema(0,1,dsn)
  If (numdims%) Then
    msg1 = "Valid ODBC data sources:" & crlf & crlf
    For x = 0 To numdims% - 1
      msg1 = msg1 & dsn(x) & crlf
    Next x
  Else
    msg1 = "There are no available data sources."
  End If
  MsgBox msg1
End Sub
```

See Also `SQLOpen` (function).

SQLOpen (function)

Syntax **`SQLOpen(`***login$* `[,[`*completed$*`] [,`*prompt*`]]`**`)`**

Description Establishes a connection to the specified data source, returning a **`Long`** representing the unique connection ID.

Comments This function connects to a data source using a login string (*login$*) and optionally sets the completed login string (*completed$*) that was used by the driver. The following table describes the parameters to the **`SQLOpen`** function:

Parameter	Description
login$	**`String`** expression containing information required by the driver to connect to the requested data source. The syntax must strictly follow the driver's SQL syntax.
completed$	Optional **`String`** variable that will receive a completed connection string returned by the driver. If this parameter is missing, then no connection string will be returned.
prompt	**`Integer`** expression specifying any of the following values:

Value	Meaning
1	The driver's login dialog box is always displayed.
2	The driver's dialog box is only displayed if the connection string does not contain enough information to make the connection. This is the default behavior.
3	The driver's dialog box is only displayed if the connection string does not contain enough information to make the connection. Dialog box options that were passed as valid parameters are dimmed and unavailable.
4	The driver's login dialog box is never displayed.

The **`SQLOpen`** function will never return an invalid connection ID. The following example establishes a connection using the driver's login dialog box:

```
  id& = SQLOpen("",,1)
```

The Basic Control Engine returns 0 and generates a trappable runtime error if **`SQLOpen`** fails. Additional error information can then be retrieved using the **`SQLError`** function.

Before you can use any SQL statements, you must set up a data source and relate an existing database to it. This is accomplished using the odbcadm.exe program.

Example This example connects the data source called "sample," returning the completed connection string, and then displays it.

```
Sub Main()
  Dim s As String
  id& = SQLOpen("dsn=SAMPLE",s$,3)
  MsgBox "The completed connection string is: " & s$
  id& = SQLClose(id&)
End Sub
```

See Also **`SQLClose`** (function).

SQLQueryTimeout (statement)

Syntax **`SQLQueryTimeout`** *time*

Description Specifies the timeout, in seconds, for ODBC queries.

If you do not set **`SQLQueryTimeout`** , the default timeout is 60 seconds (1 minute).

Comments The **`SQLQueryTimeout`** statement accepts the following parameter:

Parameter	Description
time	**`Integer`** specifying the timeout for ODBC queries in seconds.

Example The following example sets the timeout for ODBC queries to 120 seconds (2 minutes).

```
Sub Main()
  SQLQueryTimeout 120
End Sub
```

SQLRequest (function)

Syntax **`SQLRequest(`***connection$*`,`*query$*`,`*array* `[,[`*output$*`] [,[`*prompt*`][,`*isColumnNames*`]]]`**`)`**

Description Opens a connection, runs a query, and returns the results as an array.

Comments The **`SQLRequest`** function takes the following parameters:

Parameter	Description
connection	**`String`** specifying the connection information required to connect to the data source.
query	**`String`** specifying the query to execute. The syntax of this string must strictly follow the syntax of the ODBC driver.
array	Array of variants to be filled with the results of the query.
	The *array* parameter must be dynamic: it will be resized to hold the exact number of records and fields.
output	Optional **`String`** to receive the completed connection string as returned by the driver.
prompt	Optional **`Integer`** specifying the behavior of the driver's dialog box.
isColumnNames	Optional **`Boolean`** specifying whether the column names are returned as the first row of results. The default is **`False`**.

The Basic Control Engine generates a runtime error if **`SQLRequest`** fails. Additional error information can then be retrieved using the **`SQLError`** function.

The **`SQLRequest`** function performs one of the following actions, depending on the type of query being performed:

Type of Query	Action
`SELECT`	The **`SQLRequest`** function fills *array* with the results of the query, returning a **`Long`** containing the number of results placed in the array. The array is filled as follows (assuming an *x* by *y* query): (record 1,field 1) (record 1,field 2) : (record 1,field *y*) (record 2,field 1) (record 2,field 2) : (record 2,field *y*) : : (record *x*,field 1) (record *x*,field 2) : (record *x*,field *y*)
`INSERT, DELETE, UPDATE`	The **`SQLRequest`** function erases *array* and returns a **`Long`** containing the number of affected rows.

Example

This example opens a data source, runs a select query on it, and then displays all the data found in the result set.

```
Sub Main()
  Dim a() As Variant
  l& = SQLRequest("dsn=SAMPLE;","Select * From c:\sample.dbf",a,,3,True)
  For x = 0 To Ubound(a)
    For y = 0 To l - 1
      MsgBox a(x,y)
    Next y
  Next x
End Sub
```

SQLRetrieve (function)

Syntax **`SQLRetrieve(`***ID*`,`*array*`[,`[*maxcolumns*] `[,`[*maxrows*] `[,`[*isColumnNames*] `[,` *isFetchFirst*`]]]])`

Description Retrieves the results of a query.

Comments This function is called after a connection to a data source is established, a query is executed, and the desired columns are bound. The following table describes the parameters to the **`SQLRetrieve`** function:

Parameter	Description
ID	**`Long`** identifying a valid connected data source with pending query results.
array	Two-dimensional array of variants to receive the results. The array has *x* rows by *y* columns. The number of columns is determined by the number of bindings on the connection.
maxcolumns	Optional **`Integer`** expression specifying the maximum number of columns to be returned. If *maxcolumns* is greater than the number of columns bound, the additional columns are set to empty. If *maxcolumns* is less than the number of bound results, the rightmost result columns are discarded until the result fits.
maxrows	Optional **`Integer`** specifying the maximum number of rows to be returned. If *maxrows* is greater than the number of rows available, all results are returned, and additional rows are set to empty. If *maxrows* is less than the number of rows available, the array is filled, and additional results are placed in memory for subsequent calls to **`SQLRetrieve.`**
isColumnNames	Optional **`Boolean`** specifying whether column names should be returned as the first row of results. The default is **`False`**.
isFetchFirst	Optional **`Boolean`** expression specifying whether results are retrieved from the beginning of the result set. The default is **`False`**.

Before you can retrieve the results from a query, you must (1) initiate a query by calling the **`SQLExecQuery`** function and (2) specify the fields to retrieve by calling the **`SQLBind`** function.

This function returns a **`Long`** specifying the number of rows available in the array.

The Basic Control Engine generates a runtime error if **`SQLRetrieve`** fails. Additional error information is placed in memory.

Example This example executes a query on the connected data source, binds columns, and retrieves them.

```
Sub Main()
  Dim b() As Variant
  Dim c() As Variant
  id& = SQLOpen("DSN=SAMPLE",,3)
  qry& = SQLExecQuery(id&,"Select * From c:\sample.dbf")
  i% = SQLBind(id&,b,3)
  i% = SQLBind(id&,b,1)
  i% = SQLBind(id&,b,2)
  i% = SQLBind(id&,b,6)
  l& = SQLRetrieve(id&,c)
  For x = 0 To Ubound(c)
    For y = 0 To Ubound(b)
      MsgBox c(x,y)
    Next y
  Next x
  id& = SQLClose(id&)
End Sub
```

See Also **`SQLOpen`** (function); **`SQLExecQuery`** (function); **`SQLClose`** (function); **`SQLBind`** (function); **`SQLRetrieveToFile`** (function).

SQLRetrieveToFile (function)

Syntax **`SQLRetrieveToFile(`***ID*`,`*destination$* `[,[`*isColumnNames*`] [,`*delimiter$*`]]`**`)`**

Description Retrieves the results of a query and writes them to the specified file.

Comments The following table describes the parameters to the **`SQLRetrieveToFile`** function:

Parameter	Description
ID	**`Long`** specifying a valid connection ID.
destination	**`String`** specifying the file where the results are written.
isColumnNames	Optional **`Boolean`** specifying whether the first row of results returned are the bound column names. By default, the column names are not returned.
delimiter	Optional **`String`** specifying the column separator. A tab (**`Chr$(9)`**) is used as the default.

Before you can retrieve the results from a query, you must (1) initiate a query by calling the **`SQLExecQuery`** function and (2) specify the fields to retrieve by calling the **`SQLBind`** function.

This function returns the number of rows written to the file. A runtime error is generated if there are no pending results or if the Basic Control Engine is unable to open the specified file.

The Basic Control Engine generates a runtime error if **`SQLRetrieveToFile`** fails. Additional error information may be placed in memory for later use with the **`SQLError`** function.

Example This example opens a connection, runs a query, binds columns, and writes the results to a file.

```
Sub Main()
  Dim b() As Variant
  id& = SQLOpen("DSN=SAMPLE;UID=RICH",,4)
  t& = SQLExecQuery(id&,"Select * From c:\sample.dbf")
  i% = SQLBind(id&,b,3)
  i% = SQLBind(id&,b,1)
  i% = SQLBind(id&,b,2)
  i% = SQLBind(id&,b,6)
  l& = SQLRetrieveToFile(id&,"c:\results.txt",True,",")
  id& = SQLClose(id&)
End Sub
```

See Also **`SQLOpen`** (function); **`SQLExecQuery`** (function); **`SQLClose`** (function); **`SQLBind`** (function); **`SQLRetrieve`** (function).

Sqr (function)

Syntax `Sqr(`*number*`)`

Description Returns a **`Double`** representing the square root of *number*.

Comments The *number* parameter is a **`Double`** greater than or equal to 0.

Example This example calculates the square root of the numbers from 1 to 10 and displays them.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  msg1 = ""
  For x = 1 To 10
    sx# = Sqr(x)
    msg1 = msg1 & "The square root of " & x & " is " &_
           Format(sx#,"Fixed") & crlf
  Next x
  MsgBox msg1
End Sub
```

Stop (statement)

Syntax **`Stop`**

Description Suspends execution of the current script, returning control to a debugger if one is present. If a debugger is not present, this command will have the same effect as **End**.

Example The Stop statement can be used for debugging. In this example, it is used to stop execution when Z is randomly set to 0.

```
Sub Main()
  For x = 1 To 10
    z = Random(0,10)
    If z = 0 Then Stop
    y = x / z
  Next x
End Sub
```

See Also **`Exit For`** (statement); **`Exit Do`** (statement); **`Exit Function`** (statement); **`Exit Sub`** (statement); **End** (statement).

Str, Str$ (functions)

Syntax **`Str[$](`***number***`)`**

Description Returns a string representation of the given number.

Comments The *number* parameter is any numeric expression or expression convertible to a number. If *number* is negative, then the returned string will contain a leading minus sign. If *number* is positive, then the returned string will contain a leading space.

Singles are printed using only 7 significant digits. Doubles are printed using 15–16 significant digits.

These functions recognize the decimal separator and thousands separators as specified in the Regional Settings in the Control Panel. If the regional settings are changed, these functions will recognize it and act accordingly. The **`CStr`**, **`Format`**, and **`Format$`** functions also determine their separators based on the regional settings.

Example In this example, the **`Str$`** function is used to display the value of a numeric variable.

```
Sub Main()
  x# = 100.22
  MsgBox "The string value is: " + Str(x#)
End Sub
```

See Also **`Format, Format$`** (functions); **`CStr`** (function).

StrComp (function)

Syntax **`StrComp(`***string1***`,`***string2* `[,`*compare*`]`**`)`**

Description Returns an **`Integer`** indicating the result of comparing the two string arguments.

Comments Any of the following values are returned:

`0`	*string1* **`=`** *string2*
`1`	*string1* **`>`** *string2*
`-1`	*string1* **`<`** *string2*
`Null`	*string1* or *string2* is **`Null`**

The **`StrComp`** function accepts the following parameters:

Parameter	Description
string1	First string to be compared, which can be any expression convertible to a **`String`**.
string2	Second string to be compared, which can be any expression convertible to a **`String`**.
compare	Optional **`Integer`** specifying how the comparison is to be performed. It can be either of the following values:

`0`	Case-sensitive comparison
`1`	Case-insensitive comparison

If *compare* is not specified, then the current **`Option Compare`** setting is used. If no **`Option Compare`** statement has been encountered, then **`Binary`** is used (that is, string comparison is case-sensitive).

Example

This example compares two strings and displays the results. It illustrates that the function compares two strings to the length of the shorter string in determining equivalency.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  dim abc as boolean
  dim abi as boolean
  dim cdc as boolean
  dim cdi as boolean

  a$ = "This string is UPPERCASE and lowercase"
  b$ = "This string is uppercase and lowercase"
  c$ = "This string"
  d$ = "This string is uppercase and lowercase characters"
  msg1 = "a = " & a & crlf
  msg1 = msg1 & "b = " & b & crlf
  msg1 = msg1 & "c = " & c & crlf
  msg1 = msg1 & "d = " & d & crlf & crlf

  abc = StrComp(a$,b$,0)
  msg1 = msg1 & "a and c (insensitive)  : " & abc & crlf
  abi = StrComp(a$,b$,1)
  msg1 = msg1 & "a and c (sensitive): " & abi & crlf
  cdc = StrComp(c$,d$,1)
  msg1 = msg1 & "c and d (insensitive): " & cdc & crlf
  cdi = StrComp(c$,d$,1)
  msg1 = msg1 & "c and d (sensitive)  : " & cdi & crlf

  MsgBox msg1
End Sub
```

See Also

Comparison Operators (topic); **`Like`** (operator); **`Option Compare`** (statement).

String (data type)

Syntax	**`String`**
Description	A data type capable of holding a number of characters.

Comments

Strings are used to hold sequences of characters, each character having a value between 0 and 255. Strings can be any length up to a maximum length of 32767 characters.

Strings can contain embedded nulls, as shown in the following example:

```
s$ = "Hello" + Chr$(0) + "there"    'String with embedded null
```

The length of a string can be determined using the **`Len`** function. This function returns the number of characters that have been stored in the string, including unprintable characters.

The type-declaration character for **`String`** is **`$`**.

`String` variables that have not yet been assigned are set to zero-length by default.

Strings are normally declared as variable-length, meaning that the memory required for storage of the string depends on the size of its content. The following script statements declare a variable-length string and assign it a value of length 5:

```
Dim s As String
s = "Hello"       'String has length 5.
```

Fixed-length strings are given a length in their declaration:

```
Dim s As String * 20
s = "Hello"       'String has length 20 (internally pads with spaces).
```

When a string expression is assigned to a fixed-length string, the following rules apply:

- If the string expression is less than the length of the fixed-length string, then the fixed-length string is padded with spaces up to its declared length.
- If the string expression is greater than the length of the fixed-length string, then the string expression is truncated to the length of the fixed-length string.

Fixed-length strings are useful within structures when a fixed size is required, such as when passing structures to external routines.

The storage for a fixed-length string depends on where the string is declared, as described in the following table:

Strings Declared	**Are Stored**
In structures	In the same data area as that of the structure. Local structures are on the stack; public structures are stored in the public data space; and private structures are stored in the private data space. Local structures should be used sparingly as stack space is limited.
In arrays	In the global string space along with all the other array elements.
Local routines	On the stack. The stack is limited in size, so local fixed-length strings should be used sparingly.

See Also

`Currency` (data type); **`Date`** (data type); **`Double`** (data type); **`Integer`** (data type); **`Long`** (data type); **`Object`** (data type); **`Single`** (data type); **`Variant`** (data type); **`Boolean`** (data type); **`Def`***Type* (statement); **`CStr`** (function).

String, String$ (functions)

Syntax `String[$](`*number*`,[`*CharCode* `|` *text$*`])`

Description Returns a string of length *number* consisting of a repetition of the specified filler character.

Comments **`String$`** returns a **`String`**, whereas **`String`** returns a **`String`** variant.

These functions take the following parameters:

Parameter	**Description**
number	**`Integer`** specifying the number of repetitions.
CharCode	**`Integer`** specifying the character code to be used as the filler character. If *CharCode* is greater than 255 (the largest character value), then the Basic Control Engine converts it to a valid character using the following formula: *CharCode* **`Mod 256`**
text$	Any **`String`** expression, the first character of which is used as the filler character.

Example This example uses the String function to create a line of "=" signs the length of another string and then displays the character string underlined with the generated string.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a$ = "This string will appear underlined."
  b$ = String(Len(a$),"_")
  MsgBox a$ & crlf & b$
End Sub
```

See Also **`Space, Space$`** (functions).

Sub...End Sub (statement)

Syntax

[Private | Public] [Static] Sub *name***[(***arglist***)]**
  [*statements***]**
End Sub

Where *arglist* is a comma-separated list of the following (up to 30 arguments are allowed):

[Optional] [ByVal | ByRef] *parameter***[()] [As** *type***]**

Description

Declares a subroutine.

Comments

The **Sub** statement has the following parts:

Part	Description
Private	Indicates that the subroutine being defined cannot be called from other scripts.
Public	Indicates that the subroutine being defined can be called from other scripts. If the **Private** and **Public** keywords are both missing, then **Public** is assumed.
Static	Recognized by the compiler but currently has no effect.
name	Name of the subroutine, which must follow the Basic Control Engine naming conventions: 1. Must start with a letter. 2. May contain letters, digits, and the underscore character (_). Punctuation and type-declaration characters are not allowed. The exclamation point (**!**) can appear within the name as long as it is not the last character. 3. Must not exceed 80 characters in length.
Optional	Keyword indicating that the parameter is optional. All optional parameters must be of type **Variant**. Furthermore, all parameters that follow the first optional parameter must also be optional. If this keyword is omitted, then the parameter is required. **Note** You can use the **IsMissing** function to determine if an optional parameter was actually passed by the caller.
ByVal	Keyword indicating that the parameter is passed by value.
ByRef	Keyword indicating that the parameter is passed by reference. If neither the **ByVal** nor the **ByRef** keyword is given, then **ByRef** is assumed.
parameter	Name of the parameter, which must follow the same naming conventions as those used by variables. This name can include a type-declaration character, appearing in place of **As** *type*.

type	Type of the parameter (i.e., **Integer**, **String**, and so on). Arrays are indicated with parentheses. For example, an array of integers would be declared as follows:
	`Sub Test(a() As Integer)`
	`End Sub`

A subroutine terminates when one of the following statements is encountered:

```
End Sub
Exit Sub
```

Subroutines can be recursive.

Passing Parameters to Subroutines

Parameters are passed to a subroutine either by value or by reference, depending on the declaration of that parameter in *arglist*. If the parameter is declared using the **`ByRef`** keyword, then any modifications to that passed parameter within the subroutine change the value of that variable in the caller. If the parameter is declared using the **`ByVal`** keyword, then the value of that variable cannot be changed in the called subroutine. If neither the **`ByRef`** or **`ByVal`** keywords are specified, then the parameter is passed by reference.

You can override passing a parameter by reference by enclosing that parameter within parentheses. For instance, the following example passes the variable **`j`** by reference, regardless of how the third parameter is declared in the *arglist* of **`UserSub`**:

```
UserSub 10,12,(j)
```

Optional Parameters

The Basic Control Engine allows you to skip parameters when calling subroutines, as shown in the following example:

```
Sub Test(a%,b%,c%)
  End Sub

  Sub Main
    Test 1,,4     'Parameter 2 was skipped.
  End Sub
```

You can skip any parameter with the following restrictions:

1. The call cannot end with a comma. For instance, using the above example, the following is not valid:

   ```
   Test 1,,
   ```

2. The call must contain the minimum number of parameters as required by the called subroutine. For instance, using the above example, the following are invalid:

   ```
   Test ,1      'Only passes two out of three required parameters.
   Test 1,2   'Only passes two out of three required parameters.
   ```

When you skip a parameter in this manner, the Basic Control Engine creates a temporary variable and passes this variable instead. The value of this temporary variable depends on the data type of the corresponding parameter in the argument list of the called subroutine, as described in the following table:

Value	Data type
`0`	**`Integer`**, **`Long`**, **`Single`**, **`Double`**, **`Currency`**
Zero-length string	**`String`**
`Nothing`	**`Object`** (or any data object)
`Error`	**`Variant`**
December 30, 1899	**`Date`**
`False`	Boolean

Within the called subroutine, you will be unable to determine if a parameter was skipped unless the parameter was declared as a variant in the argument list of the subroutine. In this case, you can use the **`IsMissing`** function to determine if the parameter was skipped:

```
Sub Test(a,b,c)
  If IsMissing(a) Or IsMissing(b) Then Exit Sub
End Sub
```

Example This example uses a subroutine to calculate the area of a circle.

```
Sub Main()
  r = inputbox("Enter a circle radius to be converted to area","Radius -> Area")
  PrintArea r
End Sub

Sub PrintArea(r)
  area! = (r ^ 2) * Pi
  MsgBox "The area of a circle with radius " & r & " = " & area!
End Sub
```

See Also **`Main`** (keyword); **`Function...End Function`** (statement).

Switch (function)

Syntax **`Switch(`***condition1*`,`*expression1* `[,`*condition2*`,`*expression2* `...` `[,`*condition7*`,`*expression7*`]]`**`)`**

Description Returns the expression corresponding to the first **`True`** condition.

Comments The **`Switch`** function evaluates each condition and expression, returning the expression that corresponds to the first condition (starting from the left) that evaluates to **`True`**. Up to seven condition/expression pairs can be specified.

A runtime error is generated it there is an odd number of parameters (that is, there is a condition without a corresponding expression).

The **`Switch`** function returns **`Null`** if no condition evaluates to **`True`**.

Example The following code fragment displays the current operating platform. If the platform is unknown, then the word "Unknown" is displayed.

```
Sub Main()
  Dim a As Variant
  a = Switch(Basic.OS = 0,"Windows 3.1",Basic.OS = 2,"Win32",Basic.OS = 11,"OS/2")
  MsgBox "The current platform is: " & IIf(IsNull(a),"Unknown",a)
End Sub
```

See Also **`Choose`** (function); **`IIf`** (function); **`If...Then...Else`** (statement); **`Select...Case`** (statement).

SYD (function)

Syntax **SYD(***Cost***,***Salvage***,***Life***,***Period***)**

Description Returns the sum of years' digits depreciation of an asset over a specific period of time.

Comments The **SYD** of an asset is found by taking an estimate of its useful life in years, assigning values to each year, and adding up all the numbers.

The formula used to find the **SYD** of an asset is as follows:

```
(Cost – Salvage_Value) * Remaining_Useful_Life / SYD
```

The **SYD** function requires the following parameters:

Parameter	Description
Cost	**Double** representing the initial cost of the asset.
Salvage	**Double** representing the estimated value of the asset at the end of its useful life.
Life	**Double** representing the length of the asset's useful life.
Period	**Double** representing the period for which the depreciation is to be calculated. It cannot exceed the life of the asset.

To receive accurate results, the parameters *Life* and *Period* must be expressed in the same units. If *Life* is expressed in terms of months, for example, then *Period* must also be expressed in terms of months.

Example In this example, an asset that cost $1,000.00 is depreciated over ten years. The salvage value is $100.00, and the sum of the years' digits depreciation is shown for each year.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  msg1 = ""
  For x = 1 To 10
    dep# = SYD(1000,100,10,x)
    msg1 = msg1 & "Year: " & x & "  Dep: " & Format(dep#,"Currency") & crlf
  Next x
  MsgBox msg1
End Sub
```

See Also **Sln** (function); **DDB** (function).

System.Exit (method)

Syntax `System.Exit`

Description Exits the operating environment.

Example This example asks whether the user would like to restart Windows after exiting.

```
Sub Main
  message$="Restart Windows on exit?",ebYesNo,"Exit Windows"
  button = MsgBox message$
  If button = ebYes Then System.Restart    'Yes button selected.
  If button = ebNo Then System.Exit      'No button selected.
End Sub
```

See Also **System.Restart** (method).

System.FreeMemory (property)

Syntax `System.FreeMemory`

Description Returns a **Long** indicating the number of bytes of free memory.

Example The following example gets the free memory and converts it to kilobytes.

```
Sub Main()
  FreeMem& = System.FreeMemory
  FreeKBytes$ = Format(FreeMem& / 1000,"##,###")
  MsgBox FreeKbytes$ & " Kbytes of free memory"
End Sub
```

See Also **System.TotalMemory** (property); **System.FreeResources** (property); **Basic.FreeMemory** (property).

System.FreeResources (property)

Syntax `System.FreeResources`

Description Returns an `Integer` representing the percentage of free system resources.

Comments The returned value is between 0 and 100.

Example This example gets the percentage of free resources.

```
Sub Main()
  FreeRes% = System.FreeResources
  MsgBox FreeRes% & "% of memory resources available."
End Sub
```

See Also `System.TotalMemory` (property); `System.FreeMemory` (property); `Basic.FreeMemory` (property).

System.MouseTrails (method)

Syntax `System.MouseTrails` *isOn*

Description Toggles mouse trails on or off.

Comments If *isOn* is `True`, then mouse trails are turned on; otherwise, mouse trails are turned off.

A runtime error is generated if mouse trails is not supported on your system.

Example This example turns on mouse trails.

```
Sub Main
  System.MouseTrails 1
End Sub
```

See Also

System.Restart (method)

Syntax `System.Restart`

Description Restarts the operating environment.

Example This example asks whether the user would like to restart Windows after exiting.

```
Sub Main
  button = MsgBox ("Restart Windows on exit?",ebYesNo, _
    "Exit Windows")
  If button = ebYes Then System.Restart  'Yes button selected.
  If button = ebNo Then System.Exit 'No button selected.
End Sub
```

See Also `System.Exit` (method).

System.TotalMemory (property)

Syntax `System.TotalMemory`

Description Returns a **Long** representing the number of bytes of available free memory in Windows.

Example This example displays the total system memory.

```
Sub Main()
  TotMem& = System.TotalMemory
  TotKBytes$ = Format(TotMem& / 1000,"##,###")
  MsgBox TotKbytes$ & " Kbytes of total system memory exist"
End Sub
```

See Also **System.FreeMemory** (property); **System.FreeResources** (property); **Basic.FreeMemory** (property).

System.WindowsDirectory$ (property)

Syntax `System.WindowsDirectory$`

Description Returns the home directory of the operating environment.

Example This example displays the Windows directory.

```
Sub Main
  MsgBox "Windows directory = " & System.WindowsDirectory$
End Sub
```

See Also **Basic.HomeDir$** (property).

System.WindowsVersion$ (property)

Syntax `System.WindowsVersion$`

Description Returns the version of the operating environment, such as "3.0" or "3.1."

Comments

Example This example sets the UseWin31 variable to True if the Windows version is greater than or equal to 3.1; otherwise, it sets the UseWin31 variable to False.

```
Sub Main()
  If Val(System.WindowsVersion$) > 3.1 Then
    MsgBox "You are running a Windows version later than 3.1"
  Else
    MsgBox "You are running Windows version 3.1 or earlier"
  End If
End Sub
```

See Also **Basic.Version$** (property).

T

Tab (function)

Syntax `Tab(`*column*`)`

Description Prints the number of spaces necessary to reach a given column position.

Comments This function can only be used with the **`Print`** and **`Print#`** statements.

The *column* parameter is an **`Integer`** specifying the desired column position to which to advance. It can be any value between 0 and 32767 inclusive.

Rule 1: If the current print position is less than or equal to *column*, then the number of spaces is calculated as:

```
column – print_position
```

Rule 2: If the current print position is greater than *column*, then *column* **`– 1`** spaces are printed on the next line.

If a line width is specified (using the **`Width`** statement), then the column position is adjusted as follows before applying the above two rules:

```
column = column Mod width
```

The **`Tab`** function is useful for making sure that output begins at a given column position, regardless of the length of the data already printed on that line.

Example This example prints three column headers and three numbers aligned below the column headers.

```
Sub Main()
  Print "Column1";Tab(10);"Column2";Tab(20);"Column3"
  Print Tab(3);"1";Tab(14);"2";Tab(24);"3"
  Sleep(10000)    'Wait 10 seconds.
End Sub
```

See Also **`Spc`** (function); **`Print`** (statement); **`Print#`** (statement).

Tan (function)

Syntax	**`Tan(`***angle***`)`**
Description	Returns a **`Double`** representing the tangent of *angle*.
Comments	The *angle* parameter is a **`Double`** value given in radians.
Example	This example computes the tangent of pi/4 radians (45 degrees).

```
Sub Main()
  c# = Tan(Pi / 4)
  MsgBox "The tangent of 45 degrees is: " & c#
End Sub
```

See Also **`Sin`** (function); **`Cos`** (function); **`Atn`** (function).

Text (statement)

Syntax **`Text`** *x*, *y*, *width*, *height*, *title$* [,[.*Identifier*] [,[*FontName$*] [,[*size*] [,*style*]]]]

Description Defines a text control within a dialog box template. The text control only displays text; the user cannot set the focus to a text control or otherwise interact with it.

Comments The text within a text control word-wraps. Text controls can be used to display up to 32K of text.

The **`Text`** statement accepts the following parameters:

Parameter	Description
x, *y*	**`Integer`** positions of the control (in dialog units) relative to the upper left corner of the dialog box.
width, *height*	**`Integer`** dimensions of the control in dialog units.
title$	**`String`** containing the text that appears within the text control. This text may contain an ampersand character to denote an accelerator letter, such as **`"&Save"`** for **`Save`**. Pressing this accelerator letter sets the focus to the control following the **`Text`** statement in the dialog box template.
Identifier	Name by which this control can be referenced by statements in a dialog function (such as **`DlgFocus`** and **`DlgEnable`**). If omitted, then the first two words from *title$* are used.
FontName$	Name of the font used for display of the text within the text control. If omitted, then the default font for the dialog is used.
size	Size of the font used for display of the text within the text control. If omitted, then the default size for the default font of the dialog is used.
style	Style of the font used for display of the text within the text control. This can be any of the following values:

`ebRegular`	Normal font (that is, neither bold nor italic)
`ebBold`	Bold font
`ebItalic`	Italic font
`ebBoldItalic`	Bold-italic font

If omitted, then **`ebRegular`** is used.

Example

```
Sub Main()
  Begin Dialog UserDialog 81,64,128,60,"Untitled"
    CancelButton 80,32,40,14
    OKButton 80,8,40,14
    Text 4,8,68,44,"This text is displayed in the dialog box."
  End Dialog
  Dim d As UserDialog
  Dialog d
End Sub
```

See Also `CancelButton` (statement); `CheckBox` (statement); `ComboBox` (statement); `Dialog` (function); `Dialog` (statement); `DropListBox` (statement); `GroupBox` (statement); `ListBox` (statement); `OKButton` (statement); `OptionButton` (statement); `OptionGroup` (statement); `Picture` (statement); `PushButton` (statement); `TextBox` (statement); `Begin Dialog` (statement), `PictureButton` (statement).

Note: Accelerators are underlined, and the Alt+*letter* accelerator combination is used.

8-point MS Sans Serif is the default font used within user dialogs.

TextBox (statement)

Syntax `TextBox` *x*, *y*, *width*, *height*, .*Identifier* [, [*isMultiline*] [, [*FontName$*] [, [*size*] [, *style*]]]]

Description Defines a single or multiline text-entry field within a dialog box template.

Comments If *isMultiline* is 1, the `TextBox` statement creates a multiline text-entry field. When the user types into a multiline field, pressing the Enter key creates a new line rather than selecting the default button.

This statement can only appear within a dialog box template (that is, between the `Begin Dialog` and `End Dialog` statements).

The `TextBox` statement requires the following parameters:

Parameter	Description
x, *y*	`Integer` position of the control (in dialog units) relative to the upper left corner of the dialog box.
width, height	`Integer` dimensions of the control in dialog units.
Identifier	Name by which this control can be referenced by statements in a dialog function (such as `DlgFocus` and `DlgEnable`). This parameter also creates a string variable whose value corresponds to the content of the text box. This variable can be accessed using the syntax: *DialogVariable*.*Identifier*
isMultiline	Specifies whether the text box can contain more than a single line (0 = single-line; 1 = multiline).
FontName$	Name of the font used for display of the text within the text box control. If omitted, then the default font for the dialog is used.
size	Size of the font used for display of the text within the text box control. If omitted, then the default size for the default font of the dialog is used.

style	Style of the font used for display of the text within the text box control. This can be any of the following values:

`ebRegular`	Normal font (i.e., neither bold nor italic)
`ebBold`	Bold font
`ebItalic`	Italic font
`ebBoldItalic`	Bold-italic font

If omitted, then **`ebRegular`** is used.

When the dialog box is created, the *Identifier* variable is used to set the initial content of the text box. When the dialog box is dismissed, the variable will contain the new content of the text box.

A single-line text box can contain up to 256 characters. The length of text in a multiline text box is not limited by the Basic Control Engine; the default memory limit specified by the given platform is used instead.

Example

```
Sub Main()
  Begin Dialog UserDialog 81,64,128,60,"Untitled"
    CancelButton 80,32,40,14
    OKButton 80,8,40,14
    TextBox 4,8,68,44,.TextBox1,1
  End Dialog
  Dim d As UserDialog
  d.TextBox1 = "Enter text before invoking"  'Display text in the Textbox by
setting the default value of the TextBox before showing it.
  Dialog d
End Sub
```

See Also **`CancelButton`** (statement); **`CheckBox`** (statement); **`ComboBox`** (statement); **`Dialog`** (function); **`Dialog`** (statement); **`DropListBox`** (statement); **`GroupBox`** (statement); **`ListBox`** (statement); **`OKButton`** (statement); **`OptionButton`** (statement); **`OptionGroup`** (statement); **`Picture`** (statement); **`PushButton`** (statement); **`Text`** (statement); **`Begin Dialog`** (statement), **`PictureButton`** (statement).

Note: 8-point MS Sans Serif is the default font used within user dialogs.

Time, Time$ (functions)

Syntax **`Time[$]`**[**`()`**]

Description Returns the system time as a **`String`** or as a **`Date`** variant.

Comments The **`Time$`** function returns a **`String`** contains the time in 24-hour time format, whereas **`Time`** returns a **`Date`** variant.

To set the time, use the **`Time/Time$`** statements.

Example This example returns the system time and displays it in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  oldtime$ = Time
  msg1 = "Time was: " & oldtime$ & crlf
  Time = "10:30:54"
  msg1 = msg1 & "Time set to: " & Time & crlf
  Time = oldtime$
  msg1 = msg1 & "Time restored to: " & Time
  MsgBox msg1
End Sub
```

See Also **`Time, Time$`** (statements); **`Date, Date$`** (functions); **`Date, Date$`** (statements); **`Now`** (function).

Time, Time$ (statements)

Syntax **`Time[$] =`** *newtime*

Description Sets the system time to the time contained in the specified string.

Comments The **`Time$`** statement requires a string variable in one of the following formats:

HH
HH:*MM*
HH:*MM*:*SS*

where *HH* is between 0 and 23, *MM* is between 0 and 59, and *SS* is between 0 and 59.

The **`Time`** statement converts any valid expression to a time, including string and numeric values. Unlike the **`Time$`** statement, **`Time`** recognizes many different time formats, including 12-hour times.

Example This example returns the system time and displays it in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  oldtime$ = Time
  msg1 = "Time was: " & oldtime$ & crlf
  Time = "10:30:54"
  msg1 = msg1 & "Time set to: " & Time & crlf
  Time = oldtime$
  msg1 = msg1 & "Time restored to: " & Time
  MsgBox msg1
End Sub
```

See Also **`Time, Time$`** (functions); **`Date, Date$`** (functions); **`Date, Date$`** (statements).

Note: If you do not have permission to change the time, a runtime error 70 will be generated.

Timer (function)

Syntax **`Timer`**

Description Returns a **`Single`** representing the number of seconds that have elapsed since midnight.

Example This example displays the elapsed time between execution start and the time you clicked the OK button on the first message.

```
Sub Main()
  start& = Timer
  MsgBox "Click the OK button, please."
  total& = Timer - start&
  MsgBox "The elapsed time was: " & total& & " seconds."
End Sub
```

See Also **`Time, Time$`** (functions); **`Now`** (function).

TimeSerial (function)

Syntax **`TimeSerial(`***hour***`,`** *minute***`,`** *second***`)`**

Description Returns a **`Date`** variant representing the given time with a date of zero.

Comments The **`TimeSerial`** function requires the following parameters:

Parameter	Description
hur	**`Integer`** between 0 and 23.
minute	**`Integer`** between 0 and 59.
second	**`Integer`** between 0 and 59.

Example

```
Sub Main()
  start# = TimeSerial(10,22,30)
  finish# = TimeSerial(10,35,27)
  dif# = Abs(start# - finish#)
  MsgBox "The time difference is: " & Format(dif#,"hh:mm:ss")
End Sub
```

See Also **`DateValue`** (function); **`TimeValue`** (function); **`DateSerial`** (function).

TimeValue (function)

Syntax **`TimeValue(`***time_string$***`)`**

Description Returns a **`Date`** variant representing the time contained in the specified string argument.

Comments This function interprets the passed *time_string$* parameter looking for a valid time specification.

The *time_string$* parameter can contain valid time items separated by time separators such as colon (:) or period (.).

Time strings can contain an optional date specification, but this is not used in the formation of the returned value.

If a particular time item is missing, then it is set to 0. For example, the string "10 pm" would be interpreted as "22:00:00."

Example This example calculates the TimeValue of the current time and displays it in a dialog box.

```
Sub Main()
  t1$ = "10:15"
  t2# = TimeValue(t1$)
  MsgBox "The TimeValue of " & t1$ & " is: " & t2#
End Sub
```

See Also **`DateValue`** (function); **`TimeSerial`** (function); **`DateSerial`** (function).

Trim, Trim$ (functions)

Syntax **`Trim[$](`***text***`)`**

Description Returns a copy of the passed string expression (*text*) with leading and trailing spaces removed.

Comments **`Trim$`** returns a **`String`**, whereas **`Trim`** returns a **`String`** variant.

`Null` is returned if *text* is **`Null`**.

Example This example uses the Trim$ function to extract the nonblank part of a string and display it.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  txt$ = "      This is text           "
  tr$ = Trim(txt$)
  MsgBox "Original ->" & txt$ & "<-" & crlf & "Trimmed ->" & tr$ & "<-"
End Sub
```

See Also **`LTrim, LTrim$`** (functions); **`RTrim, RTrim$`** (functions).

True (constant)

Description **`Boolean`** constant whose value is **`True`**.

Comments Used in conditionals and **`Boolean`** expressions.

Example This example sets variable a to True and then tests to see whether (1) A is True; (2) the True constant = -1; and (3) A is equal to -1 (True).

```
Sub Main()
  a = True
  If ((a = True) and (True = -1) and (a = -1)) then
    MsgBox "a is True."
  Else
    MsgBox "a is False."
  End If
End Sub
```

See Also **`False`** (constant); Constants (topic); **`Boolean`** (data type).

Type (statement)

Syntax

Type *username*
  variable **As** *type*
  variable **As** *type*
  variable **As** *type*
  :
End Type

Description

The **Type** statement creates a structure definition that can then be used with the **Dim** statement to declare variables of that type. The *username* field specifies the name of the structure that is used later with the **Dim** statement.

Comments

Within a structure definition appear field descriptions in the format:

variable **As** *type*

where *variable* is the name of a field of the structure, and *type* is the data type for that variable. Any fundamental data type or previously declared user-defined data type can be used within the structure definition (structures within structures are allowed). Only fixed arrays can appear within structure definitions.

The **Type** statement can only appear outside of subroutine and function declarations.

When declaring strings within fixed-size types, it is useful to declare the strings as fixed-length. Fixed-length strings are stored within the structure itself rather than in the string space. For example, the following structure will always require 62 bytes of storage:

```
Type Person
  FirstName As String * 20
  LastName As String * 40
  Age As Integer
End Type
```

Note

Fixed-length strings within structures are size-adjusted upward to an even byte boundary. Thus, a fixed-length string of length 5 will occupy 6 bytes of storage within the structure.

Example

This example displays the use of the Type statement to create a structure representing the parts of a circle and assign values to them.

```
Type Circ
  msg As String
  rad As Integer
  dia As Integer
  are As Double
  cir As Double
End Type

Sub Main()
  Dim circle As Circ
  circle.rad = 5
  circle.dia = circle.rad * 2
  circle.are = (circle.rad ^ 2) * Pi
  circle.cir = circle.dia * Pi
  circle.msg = "The area of this circle is: " & circle.are
  MsgBox circle.msg
End Sub
```

See Also

Dim (statement); **Public** (statement); **Private** (statement).

U

UBound (function)

Syntax **UBound(***ArrayVariable*`()` `[,`*dimension*`]`**)**

Description Returns an **Integer** containing the upper bound of the specified dimension of the specified array variable.

Comments The *dimension* parameter is an integer that specifies the desired dimension. If not specified, then the upper bound of the first dimension is returned.

The **UBound** function can be used to find the upper bound of a dimension of an array returned by an OLE automation method or property:

UBound(*object*`.`*property* `[,`*dimension*`]`**)**

UBound(*object*`.`*method* `[,`*dimension*`]`**)**

Example This example dimensions two arrays and displays their upper bounds.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  Dim a(5 To 12)
  Dim b(2 To 100,9 To 20)
  uba = UBound(a)
  ubb = UBound(b,2)
  MsgBox "The upper bound of a is: " & uba & crlf & " The upper bound of b is: " &
ubb
```

This example uses Lbound and Ubound to dimension a dynamic array to hold a copy of an array redimmed by the FileList statement.

```
  Dim fl$()
  FileList fl$,"*"
  count = Ubound(fl$)
  If ArrayDims(a) Then
    Redim nl$(Lbound(fl$) To Ubound(fl$))
    For x = 1 To count
      nl$(x) = fl$(x)
    Next x
    MsgBox "The last element of the new array is: " & nl$(count)
  End If
End Sub
```

See Also **LBound** (function); **ArrayDims** (function); Arrays (topic).

UCase, UCase$ (functions)

Syntax	**`UCase[$](`***text***`)`**
Description	Returns the uppercase equivalent of the specified string.
Comments	**`UCase$`** returns a **`String`**, whereas **`UCase`** returns a **`String`** variant.
	`Null` is returned if *text* is **`Null`**.
Example	This example uses the UCase$ function to change a string from lowercase to uppercase.

```
Sub Main()
  a1$ = "this string was lowercase, but was converted."
  a2$ = UCase(a1$)
  MsgBox a2$
End Sub
```

See Also **`LCase, LCase$`** (functions).

Unlock (statement)

Syntax **`Unlock [#]`** *filenumber* **`[,`**{*record* **`|`** [*start*] **`To`** *end*}**`]`**

Description Unlocks a section of the specified file, allowing other processes access to that section of the file.

Comments The **`Unlock`** statement requires the following parameters:

Parameter	Description
filenumber	**`Integer`** used by the Basic Control Script to refer to the open file—the number passed to the **`Open`** statement.
record	**`Long`** specifying which record to unlock.
start	**`Long`** specifying the first record within a range to be unlocked.
end	**`Long`** specifying the last record within a range to be unlocked.

For sequential files, the *record*, *start*, and *end* parameters are ignored: the entire file is unlocked.

The section of the file is specified using one of the following:

Syntax	Description
No record specification	Unlock the entire file.
record	Unlock the specified record number (for **`Random`** files) or byte (for **`Binary`** files).
`to` *end*	Unlock from the beginning of the file to the specified record (for **`Random`** files) or byte (for **`Binary`** files).
start **`to`** *end*	Unlock the specified range of records (for **`Random`** files) or bytes (for **`Binary`** files).

The unlock range must be the same as that used by the **`Lock`** statement.

Example

This example creates a file named test.dat and fills it with ten string variable records. These are displayed in a dialog box. The file is then reopened for read/write, and each record is locked, modified, rewritten, and unlocked. The new records are then displayed in a dialog box.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  a$ = "This is record number: "
  b$ = "0"
  rec$ = ""

  msg1 = ""
  Open "test.dat" For Random Access Write Shared As #1
  For x = 1 To 10
    rec$ = a$ & x
    Lock #1,x
    Put #1,,rec$
    Unlock #1,x
    msg1 = msg1 & rec$ & crlf
  Next x
  Close
  MsgBox "The records are: " & crlf & msg1

  msg1 = ""
  Open "test.dat" For Random Access Read Write Shared As #1
  For x = 1 to 10
    rec$ = Mid(rec$,1,23) & (11 - x)
    Lock #1,x       'Lock it for our use.
    Put #1,x,rec$   'Nobody's changed it.
    UnLock #1,x
    msg1 = msg1 & rec$ & crlf
  Next x
  MsgBox "The records are: " & crlf & msg1
  Close

  Kill "test.dat"
End Sub
```

See Also

`Lock` (statement); **`Open`** (statement).

User-Defined Types (topic)

User-defined types (UDTs) are structure definitions created using the **`Type`** statement. UDTs are equivalent to C language structures.

Declaring Structures

The **`Type`** statement is used to create a structure definition. Type declarations must appear outside the body of all subroutines and functions within a script and are therefore global to an entire script.

Once defined, a UDT can be used to declare variables of that type using the **`Dim`**, **`Public`**, or **`Private`** statement. The following example defines a rectangle structure:

```
Type Rect
  left As Integer
  top As Integer
  right As Integer
  bottom As Integer
End Type
  :
Sub Main()
  Dim r As Rect
    :
  r.left = 10
End Sub
```

Any fundamental data type can be used as a structure member, including other user-defined types. Only fixed arrays can be used within structures.

Copying Structures

UDTs of the same type can be assigned to each other, copying the contents. No other standard operators can be applied to UDTs.

```
Dim r1 As Rect
Dim r2 As Rect
  :
r1 = r2
```

When copying structures of the same type, all strings in the source UDT are duplicated and references are placed into the target UDT.

The **`LSet`** statement can be used to copy a UDT variable of one type to another:

```
LSet variable1 = variable2
```

`LSet` cannot be used with UDTs containing variable-length strings. The smaller of the two structures determines how many bytes get copied.

Passing Structures

UDTs can be passed both to user-defined routines and to external routines, and they can be assigned. UDTs are always passed by reference.

Since structures are always passed by reference, the **`ByVal`** keyword cannot be used when defining structure arguments passed to external routines (using **`Declare`**). The **`ByVal`** keyword can only be used with fundamental data types such as **`Integer`** and **`String`**.

Passing structures to external routines actually passes a far pointer to the data structure.

Size of Structures

The **`Len`** function can be used to determine the number of bytes occupied by a UDT:

`Len(`*udt_variable_name***`)`**

Since strings are stored in the Basic Control Engine's data space, only a reference (currently, 2 bytes) is stored within a structure. Thus, the **`Len`** function may seem to return incorrect information for structures containing strings.

V

Val (function)

Syntax **`Val`**(*string_expression*)

Description Converts a given string expression to a number.

Comments The *number* parameter can contain any of the following:

- Leading minus sign (for nonhex or octal numbers only)
- Hexadecimal number in the format &H*hexdigits*
- Octal number in the format &O*octaldigits*
- Floating-point number, which can contain a decimal point and an optional exponent

Spaces, tabs, and line feeds are ignored.

If *number* does not contain a number, then 0 is returned.

The **`Val`** function continues to read characters from the string up to the first nonnumeric character.

The **`Val`** function always returns a double-precision floating-point value. This value is forced to the data type of the assigned variable.

Example This example inputs a number string from an InputBox and converts it to a number variable.

```
Sub Main()
  a$ = InputBox("Enter anything containing a number","Enter Number")
  b# = Val(a$)
  MsgBox "The value is: " & b#
End Sub
```

```
'The following table shows valid strings and their numeric equivalents:
' "1  2       3"    123
' "12.3"         12.3
' "&HFFFF"       -1
' "&O77"         63
' "12.345E-02"      .12345
```

See Also **`CDbl`** (function); **`Str, Str$`** (functions).

Variant (data type)

Syntax **`Variant`**

Description A data type used to declare variables that can hold one of many different types of data.

Comments During a variant's existence, the type of data contained within it can change. Variants can contain any of the following types of data:

Type of Data	The Basic Control Engine Data Types
Numeric	**`Integer, Long, Single, Double, Boolean, Date, Currency`**
Logical	**`Boolean`**
Dates and times	**`Date`**
String	**`String`**
Object	**`Object`**
No valid data	A variant with no valid data is considered **`Null`**
Uninitialized	An uninitialized variant is considered **`Empty`**

There is no type-declaration character for variants.

The number of significant digits representable by a variant depends on the type of data contained within the variant.

`Variant` is the default data type for the Basic Control Engine. If a variable is not explicitly declared with **`Dim`**, **`Public`**, or **`Private`**, and there is no type-declaration character (i.e., **`#`**, **`@`**, **`!`**, **`%`**, or **`&`**), then the variable is assumed to be **`Variant`**.

Determining the Subtype of a Variant

The following functions are used to query the type of data contained within a variant:

Function	Description
`VarType`	Returns a number representing the type of data contained within the variant.
`IsNumeric`	Returns **`True`** if a variant contains numeric data. The following are considered numeric: **`Integer`**, **`Long`**, **`Single`**, **`Double`**, **`Date`**, **`Boolean`**, **`Currency`** If a variant contains a string, this function returns **`True`** if the string can be converted to a number. If a variant contains an **`Object`** whose default property is numeric, then **`IsNumeric`** returns **`True`**.
`IsObject`	Returns **`True`** if a variant contains an object.
`IsNull`	Returns **`True`** if a variant contains no valid data.
`IsEmpty`	Returns **`True`** if a variant is uninitialized.

`IsDate`	Returns **`True`** if a variant contains a date. If the variant contains a string, then this function returns **`True`** if the string can be converted to a date. If the variant contains an **`Object`**, then this function returns **`True`** if the default property of that object can be converted to a date.

Assigning to Variants

Before a **`Variant`** has been assigned a value, it is considered empty. Thus, immediately after declaration, the **`VarType`** function will return **`ebEmpty`**. An uninitialized variant is **`0`** when used in numeric expressions and is a zero-length string when used within string expressions.

A **`Variant`** is **`Empty`** only after declaration and before assigning it a value. The only way for a **`Variant`** to become **`Empty`** after having received a value is for that variant to be assigned to another **`Variant`** containing **`Empty`**, for it to be assigned explicitly to the constant **`Empty`**, or for it to be erased using the **`Erase`** statement.

When a variant is assigned a value, it is also assigned that value's type. Thus, in all subsequent operations involving that variant, the variant will behave like the type of data it contains.

Operations on Variants

Normally, a **`Variant`** behaves just like the data it contains. One exception to this rule is that, in arithmetic operations, variants are automatically promoted when an overflow occurs. Consider the following statements:

```
Dim a As Integer,b As Integer,c As Integer
Dim x As Variant,y As Variant,z As Variant

a% = 32767
b% = 1
c% = a% + b%      'This will overflow.

x = 32767
y = 1
z = x + y         'z becomes a Long because of Integer overflow.
```

In the above example, the addition involving **`Integer`** variables overflows because the result (32768) overflows the legal range for integers. With **`Variant`** variables, on the other hand, the addition operator recognizes the overflow and automatically promotes the result to a **`Long`**.

Adding Variants

The + operator is defined as performing two functions: when passed strings, it concatenates them; when passed numbers, it adds the numbers.

With variants, the rules are complicated because the types of the variants are not known until execution time. If you use +, you may unintentionally perform the wrong operation.

It is recommended that you use the **`&`** operator if you intend to concatenate two **`String`** variants. This guarantees that string concatenation will be performed and not addition.

Variants That Contain No Data

A **`Variant`** can be set to a special value indicating that it contains no valid data by assigning the **`Variant`** to **`Null`**:

```
Dim a As Variant
a = Null
```

The only way that a **`Variant`** becomes **`Null`** is if you assign it as shown above.

The **`Null`** value can be useful for catching errors since its value propagates through an expression.

Variant Storage

Variants require 16 bytes of storage internally:

- A 2-byte type
- A 2-byte extended type for data objects
- bytes of padding for alignment
- An 8-byte value

Unlike other data types, writing variants to **`Binary`** or **`Random`** files does not write 16 bytes. With variants, a 2-byte type is written, followed by the data (2 bytes for **`Integer`** and so on).

Disadvantages of Variants

The following list describes some disadvantages of variants:

1. Using variants is slower than using the other fundamental data types (that is, **`Integer`**, **`Long`**, **`Single`**, **`Double`**, **`Date`**, **`Object`**, String, Currency, and **`Boolean`**). Each operation involving a **`Variant`** requires examination of the variant's type.
2. Variants require more storage than other data types (16 bytes as opposed to 8 bytes for a **`Double`**, 2 bytes for an **`Integer`**, and so on).
3. Unpredictable behavior. You may write code to expect an **`Integer`** variant. At runtime, the variant may be automatically promoted to a **`Long`** variant, causing your code to break.

Passing Nonvariant Data to Routines Taking Variants

Passing nonvariant data to a routine that is declared to receive a variant by reference prevents that variant from changing type within that routine. For example:

```
Sub Foo(v As Variant)
  v = 50            'OK.
  v = "Hello, world."   'Get a type-mismatch error here!
End Sub

Sub Main()
  Dim i As Integer
  Foo i             'Pass an integer by reference.
End Sub
```

In the above example, since an **`Integer`** is passed by reference (meaning that the caller can change the original value of the **`Integer`**), the caller must ensure that no attempt is made to change the variant's type.

Passing Variants to Routines Taking Nonvariants

Variant variables cannot be passed to routines that accept nonvariant data by reference, as demonstrated in the following example:

```
Sub Foo(i As Integer)
End Sub

Sub Main()
  Dim a As Variant
  Foo a    'Compiler gives type-mismatch error here.
End Sub
```

See Also

`Currency` (data type); **`Date`** (data type); **`Double`** (data type); **`Integer`** (data type); **`Long`** (data type); **`Object`** (data type); **`Single`** (data type); **`String`** (data type); **`Boolean`** (data type); **`Def`***Type* (statement); **`CVar`** (function); **`Empty`** (constant); **`Null`** (constant); **`VarType`** (function).

VarType (function)

Syntax **VarType**(*variable*)

Description Returns an **Integer** representing the type of data in *variable*.

Comments The *variable* parameter is the name of any **Variant**.

The following table shows the different values that can be returned by **VarType**:

Value	Constant	Data Type
0	**ebEmpty**	Uninitialized
1	**ebNull**	No valid data
2	**ebInteger**	**Integer**
3	**ebLong**	**Long**
4	**ebSingle**	**Single**
5	**ebDouble**	**Double**
6	**ebCurrency**	**Currency**
7	**ebDate**	**Date**
8	**ebString**	**String**
9	**ebObject**	**Object** (OLE automation object)
10	**ebError**	User-defined error
11	**ebBoolean**	**Boolean**
12	**ebVariant**	**Variant** (not returned by this function)
13	**ebDataObject**	Non-OLE automation object

Comments When passed an object, the **VarType** function returns the type of the default property of that object. If the object has no default property, then either **ebObject** or **ebDataObject** is returned, depending on the type of *variable*.

Example

```
Sub Main()
  Dim v As Variant
  v = 5&         'Set v to a Long.

  If VarType(v) = ebInteger Then
    Msgbox "v is an Integer."
  ElseIf VarType(v) = ebLong Then
    Msgbox "v is a Long."
  End If
End Sub
```

See Also **Empty** (constant); **Null** (constant); **Variant** (data type).

VLine (statement)

Syntax **`VLine`** *[lines]*

Description Scrolls the window with the focus up or down by the specified number of lines.

Comments The *lines* parameter is an **`Integer`** specifying the number of lines to scroll. If this parameter is omitted, then the window is scrolled down by one line.

Example This example prints a series of lines to the viewport, then scrolls back up the lines to the top using VLine.

```
Sub Main()
  "BasicScript Viewport",100,100,500,200
  For i = 1 to 50
    Print "This will be displayed on line#: " & i
  Next i
  MsgBox "We will now go back 40 lines..."
  VLine -40
  MsgBox "...and here we are!"
End Sub
```

See Also **`VPage`** (statement); **`VScroll`** (statement).

VPage (statement)

Syntax **`VPage`** *[pages]*

Description Scrolls the window with the focus up or down by the specified number of pages.

Comments The *pages* parameter is an **`Integer`** specifying the number of lines to scroll. If this parameter is omitted, then the window is scrolled down by one page.

Example This example scrolls the viewport window up five pages.

```
Sub Main()
  "BasicScript Viewport",100,100,500,200
  For i = 1 to 500
    Print "This will be displayed on line#: " & i
  Next i
  MsgBox "We will now go back 5 pages..."
  VLine -5
  MsgBox "...and here we are!"
End Sub
```

See Also **`VLine`** (statement); **`VScroll`** (statement).

VScroll (statement)

Syntax **`VScroll`** *percentage*

Description Sets the thumb mark on the vertical scroll bar attached to the current window.

Comments The position is given as a percentage of the total range associated with that scroll bar. For example, if the percentage parameter is 50, then the thumb mark is positioned in the middle of the scroll bar.

Example This example prints a bunch of lines to the viewport, then scrolls back to the top using **`VScroll`**.

```
Sub Main()
  "BasicScript Viewport",100,100,500,200
  For i = 1 to 50
    Print "This will be displayed on line#: " & i
  Next i
  Message$="We will now go to the the top..."
  MsgBox Message$
  VScroll 0
  VScroll 0
  MsgBox "...and here we are!"
End Sub
```

See Also **`VLine`** (statement); **`VPage`** (statement).

W

Weekday (function)

Syntax **`Weekday`**(*date*)

Description Returns an **`Integer`** value representing the day of the week given by date. Sunday is 1, Monday is 2, and so on.

The *date* parameter is any expression representing a valid date.

Example This example gets a date in an input box and displays the day of the week and its name for the date entered.

```
Sub Main()
  Dim a$(7)
  a$(1) = "Sunday"
  a$(2) = "Monday"
  a$(3) = "Tuesday"
  a$(4) = "Wednesday"
  a$(5) = "Thursday"
  a$(6) = "Friday"
  a$(7) = "Saturday"

Reprompt:
  bd = InputBox("Please enter your birthday.","Enter Birthday")
  If Not(IsDate(bd)) Then Goto Reprompt

  dt = DateValue(bd)
  dw = WeekDay(dt)
  Msgbox "You were born on day " & dw & ", which was a " & a$(dw)
End Sub
```

See Also **`Day`** (function); **`Minute`** (function); **`Second`** (function); **`Month`** (function); **`Year`** (function); **`Hour`** (function); **`DatePart`** (function).

While...Wend (statement)

Syntax **`While`** *condition*
  [*statements*]
`Wend`

Description Repeats a statement or group of statements while a condition is **`True`**.

Comments The condition is initially and then checked at the top of each iteration through the loop.

Example This example executes a While loop until the random number generator returns a value of 1.

```
Sub Main()
  x% = 0
  count% = 0
  While x% <> 1 And count% < 500
    x% = Rnd(1)
    If count% > 1000 Then
      Exit Sub
    Else
      count% = count% + 1
    End If
  Wend
  MsgBox "The loop executed " & count% & " times."
End Sub
```

See Also **`Do...Loop`** (statement); **`For...Next`** (statement).

Note: Due to errors in program logic, you can inadvertently create infinite loops in your code. You can break out of infinite loops using **Ctrl+Break**.

Width# (statement)

Syntax **`Width#`** *filenumber*, *newwidth*

Description Specifies the line width for sequential files opened in either **`Output`** or **`Append`** mode.

Comments The **`Width#`** statement requires the following parameters:

Parameter	Description
filenumber	**`Integer`** used by the Basic Control Engine to refer to the open file—the number passed to the **`Open`** statement.
newwidth	**`Integer`** between 0 to 255 inclusive specifying the new width. If *newwidth* is 0, then no maximum line length is used.

When a file is initially opened, there is no limit to line length. This command forces all subsequent output to the specified file to use the specified value as the maximum line length.

The **`Width`** statement affects output in the following manner: if the column position is greater than 1 and the length of the text to be written to the file causes the column position to exceed the current line width, then the data is written on the next line.

The **`Width`** statement also affects output of the **`Print`** command when used with the **`Tab`** and **`Spc`** functions.

Example This statement sets the maximum line width for file number 1 to 80 columns.

```
Const crlf$ = Chr$(13) + Chr$(10)

Sub Main()
  Dim i,msg1,newline$

  Open "test.dat" For Output As #1  'Create data file.
  For i = 0 To 9
    Print #1,Chr(48 + i);  'Print 0-9 to test file all on same line.
  Next i
  Print #1,crlf   'New line.
  Width #1,5 'Change line width to 5.

  For i = 0 To 9  'Print 0-9 again. This time, five characters print before line
wraps.
    Print #1,Chr(48 + i);
  Next I
  Close #1

  msg1 = "The effect of the Width statement is as shown below: " & crlf
  Open "test.dat" For Input As #1 'Read new file.
  Do While Not Eof(1)
    Input #1,newline$
    msg1 = msg1 & crlf$ & newline$
  Loop
  Close #1
  msg1 = msg1 & crlf$ & crlf$ & "Choose OK to remove the test file."

  MsgBox msg1'Display effects of Width.
  Kill "test.dat"
End Sub
```

See Also **`Print`** (statement); **`Print#`** (statement); **`Tab`** (function); **`Spc`** (function).

WinActivate (statement)

Syntax `WinActivate` [*window_name$* | *window_object*] [,*timeout*]

Description Activates the window with the given name or object value.

Comments The `WinActivate` statement requires the following parameters:

Parameter	Description
window_name$	String containing the name that appears on the desired application's title bar. Optionally, a partial name can be used, such as "Word" for "Microsoft Word." A hierarchy of windows can be specified by separating each window name with a vertical bar (|), as in the following example: `WinActivate "Notepad|Find"` In this example, the top-level windows are searched for a window whose title contains the word `"Notepad"`. If found, the windows owned by the top level window are searched for one whose title contains the string `"Find"`.
window_object	HWND object specifying the exact window to activate. This can be used in place of the *window_name$* parameter to indicate a specific window to activate.
timeout	Integer specifying the number of milliseconds for which to attempt activation of the specified window. If not specified (or 0), then only one attempt will be made to activate the window. This value is handy when you are not certain that the window you are attempting to activate has been created.

If *window_name$* and *window_object* are omitted, then no action is performed.

Example This example runs the `clock.exe` program by activating the *Run File* dialog box from within Program Manager.

```
Sub Main()
  WinActivate "Program Manager"
  Menu "File.Run"
  WinActivate "Program Manager|Run"
  SendKeys "clock.exe{ENTER}"
End Sub
```

See Also `AppActivate` (statement).

WinClose (statement)

Syntax **`WinClose`** [*window_name$* | *window_object*]

Description Closes the given window.

Comments The **`WinClose`** statement requires the following parameters:

Parameter	Description
window_name$	String containing the name that appears on the desired application's title bar. Optionally, a partial name can be used, such as "Word" for "Microsoft Word." A hierarchy of windows can be specified by separating each window name with a vertical bar (|), as in the following example: **`WinActivate "Notepad|Find"`** In this example, the top-level windows are searched for a window whose title contains the word **`"Notepad"`**. If found, the windows owned by the top level window are searched for one whose title contains the string **`"Find"`**.
window_object	HWND object specifying the exact window to activate. This can be used in place of the *window_name$* parameter to indicate a specific window to activate.

If *window_name$* and *window_object* are omitted, then the window with the focus is closed.

This command differs from the **`AppClose`** command in that this command operates on the current window rather than the current top-level window (or application).

Example This example closes Microsoft Word if its object reference is found.

```
Sub Main()
  Dim WordHandle As HWND
  Set WordHandle = WinFind("Word")
  If (WordHandle Is Not Nothing) Then WinClose WordHandle
End Sub
```

See Also **`WinFind`** (function).

Notes Under Windows, the current window can be an MDI child window, a pop-up window, or a top-level window.

WinFind (function)

Syntax **`WinFind`***(name$)* **`As HWND`**

Description Returns an object variable referencing the window having the given name.

Comments The *name$* parameter is specified using the same format as that used by the **`WinActivate`** statement.

Example This example closes Microsoft Word if its object reference is found.

```
Sub Main()
  Dim WordHandle As HWND
  Set WordHandle = WinFind("Word")
  If (WordHandle Is Not Nothing) Then WinClose WordHandle
End Sub
```

See Also **`WinActivate`** (statement).

WinList (statement)

Syntax **`WinList`** *ArrayOfWindows()*

Description Fills the passed array with references to all the top-level windows.

Comments The passed array must be declared as an array of **`HWND`** objects.

The *ArrayOfWindows* parameter must specify either a zero- or one-dimensioned dynamic array or a single-dimensioned fixed array. If the array is dynamic, then it will be redimensioned to exactly hold the new number of elements. For fixed arrays, each array element is first erased, then the new elements are placed into the array. If there are fewer elements than will fit in the array, then the remaining elements are unused. A runtime error results if the array is too small to hold the new elements.

After calling this function, use the **`LBound`** and **`UBound`** functions to determine the new size of the array.

Example This example minimizes all top-level windows.

```
Sub Main()
  Dim a() As HWND
  WinList a
  For i = 1 To UBound(a)
    WinMinimize a(i)
  Next i
End Sub
```

See Also **`WinFind`** (function).

WinMaximize (statement)

Syntax **`WinMaximize`** [*window_name$* | *window_object*]

Description Maximizes the given window.

Comments The **`WinMaximize`** statement requires the following parameters:

Parameter	Description
window_name$	String containing the name that appears on the desired application's title bar. Optionally, a partial name can be used, such as "Word" for "Microsoft Word." A hierarchy of windows can be specified by separating each window name with a vertical bar (|), as in the following example: `WinActivate "Notepad|Find"` In this example, the top-level windows are searched for a window whose title contains the word **`"Notepad"`**. If found, the windows owned by the top level window are searched for one whose title contains the string **`"Find"`**.
window_object	HWND object specifying the exact window to activate. This can be used in place of the *window_name$* parameter to indicate a specific window to activate.

If *window_name$* and *window_object* are omitted, then the window with the focus is maximized.

This command differs from the **`AppMaximize`** command in that this command operates on the current window rather than the current top-level window.

Example This example maximizes all top-level windows.

```
Sub Main()
  Dim a() As HWND
  WinList a
  For i = 1 To UBound(a)
    WinMaximize a(i)
  Next i
End Sub
```

See Also **`WinMinimize`** (statement); **`WinRestore`** (statement).

Notes Under Windows, the current window can be an MDI child window, a pop-up window, or a top-level window.

WinMinimize (statement)

Syntax **`WinMinimize`** [*window_name$* | *window_object*]

Description Minimizes the given window.

Comments The **`WinMinimize`** statement requires the following parameters:

Parameter	Description
window_name$	String containing the name that appears on the desired application's title bar. Optionally, a partial name can be used, such as "Word" for "Microsoft Word." A hierarchy of windows can be specified by separating each window name with a vertical bar (|), as in the following example: `WinActivate "Notepad|Find"` In this example, the top-level windows are searched for a window whose title contains the word **`"Notepad"`**. If found, the windows owned by the top level window are searched for one whose title contains the string **`"Find"`**.
window_object	HWND object specifying the exact window to activate. This can be used in place of the *window_name$* parameter to indicate a specific window to activate.

If *window_name$* and *window_object* are omitted, then the window with the focus is minimized.

This command differs from the **`AppMinimize`** command in that this command operates on the current window rather than the current top-level window.

Example See example for **`WinList`** (statement).

See Also **`WinMaximize`** (statement); **`WinRestore`** (statement).

Notes Under Windows, the current window can be an MDI child window, a pop-up window, or a top-level window.

WinMove (statement)

Syntax **`WinMove`** *x,y* [*window_name$* | *window_object*]

Description Moves the given window to the given *x,y* position.

Comments The **`WinMove`** statement requires the following parameters:

Parameter	Description
x,y	Integer coordinates given in twips that specify the new location for the window.
window_name$	String containing the name that appears on the desired application's title bar. Optionally, a partial name can be used, such as "Word" for "Microsoft Word." A hierarchy of windows can be specified by separating each window name with a vertical bar (|), as in the following example: **`WinActivate "Notepad|Find"`** In this example, the top-level windows are searched for a window whose title contains the word **`"Notepad"`**. If found, the windows owned by the top level window are searched for one whose title contains the string **`"Find"`**.
window_object	HWND object specifying the exact window to activate. This can be used in place of the *window_name$* parameter to indicate a specific window to activate.

If *window_name$* and *window_object* are omitted, then the window with the focus is moved.

This command differs from the **`AppMove`** command in that this command operates on the current window rather than the current top-level window. When moving child windows, remember that the ***x*** and ***y*** coordinates are relative to the client area of the parent window.

Example This example moves Program Manager to upper left corner of the screen.

```
WinMove 0,0,"Program Manager"
```

See Also **`WinSize`** (statement).

Notes Under Windows, the current window can be an MDI child window, a pop-up window, or a top-level window.

WinRestore (statement)

Syntax **`WinRestore`** [*window_name$* | *window_object*]

Description Restores the specified window to its restore state.

Comments Restoring a minimized window restores that window to its screen position before it was minimized. Restoring a maximized window resizes the window to its size previous to maximizing.

The **`WinRestore`** statement requires the following parameters:

Parameter	Description
window_name$	String containing the name that appears on the desired application's title bar. Optionally, a partial name can be used, such as "Word" for "Microsoft Word." A hierarchy of windows can be specified by separating each window name with a vertical bar (|), as in the following example: **`WinActivate "Notepad|Find"`** In this example, the top-level windows are searched for a window whose title contains the word **`"Notepad"`**. If found, the windows owned by the top level window are searched for one whose title contains the string **`"Find"`**.
window_object	HWND object specifying the exact window to activate. This can be used in place of the *window_name$* parameter to indicate a specific window to activate.

If *window_name$* and *window_object* are omitted, then the window with the focus is restored.

This command differs from the **`AppRestore`** command in that this command operates on the current window rather than the current top-level window.

Example This example minimizes all top-level windows except for Program Manager.

```
Sub Main()
  Dim a() As HWND
  WinList a
  For i = 0 To UBound(a)
    WinMinimize a(i)
  Next I
  WinRestore "Program Manager"
End Sub
```

See Also **`WinMaximize`** (statement); **`WinMinimize`** (statement).

Notes Under Windows, the current window can be an MDI child window, a pop-up window, or a top-level window.

WinSize (statement)

Syntax `WinSize` *width,height* [,*window_name$* | *window_object*]

Description Resizes the given window to the specified width and height.

Comments The **WinSize** statement requires the following parameters:

Parameter	**Description**
width,height	Integer coordinates given in twips that specify the new size of the window.
window_name$	String containing the name that appears on the desired application's title bar. Optionally, a partial name can be used, such as "Word" for "Microsoft Word." A hierarchy of windows can be specified by separating each window name with a vertical bar (|), as in the following example: `WinActivate "Notepad|Find"` In this example, the top-level windows are searched for a window whose title contains the word `"Notepad"`. If found, the windows owned by the top level window are searched for one whose title contains the string `"Find"`.
window_object	HWND object specifying the exact window to activate. This can be used in place of the *window_name$* parameter to indicate a specific window to activate.

If *window_name$* and *window_object* are omitted, then the window with the focus is resized.

This command differs from the **`AppSize`** command in that this command operates on the current window rather than the current top-level window.

Example This example runs and resizes Notepad.

```
Sub Main()
  Dim NotepadApp As HWND
  id = Shell("Notepad.exe")
  set NotepadApp = WinFind("Notepad")
  WinSize 4400,8500,NotepadApp
End Sub
```

See Also **`WinMove`** (statement).

Note Under Windows, the current window can be an MDI child window, a pop-up window, or a top-level window.

Word$ (function)

Syntax `Word$(`*text$*`,`*first*`[,`*last*`])`

Description Returns a **`String`** containing a single word or sequence of words between *first* and *last*.

Comments The **`Word$`** function requires the following parameters:

Parameter	Description
text$	**`String`** from which the sequence of words will be extracted.
first	**`Integer`** specifying the index of the first word in the sequence to return. If *last* is not specified, then only that word is returned.
last	**`Integer`** specifying the index of the last word in the sequence to return. If *last* is specified, then all words between *first* and *last* will be returned, including all spaces, tabs, and end-of-lines that occur between those words.

Words are separated by any nonalphanumeric characters such as spaces, tabs, end-of-lines, and punctuation.

If *first* is greater than the number of words in *text$*, then a zero-length string is returned.

If *last* is greater than the number of words in *text$*, then all words from *first* to the end of the text are returned.

Example This example finds the name "Stuart" in a string and then extracts two words from the string.

```
Sub Main()
  s$ = "My last name is Williams; Stuart is my surname."
  c$ = Word$(s$,5,6)
  MsgBox "The extracted name is: " & c$
End Sub
```

See Also **`Item$`** (function); **`ItemCount`** (function); **`Line$`** (function); **`LineCount`** (function); **`WordCount`** (function).

WordCount (function)

Syntax `WordCount(`*text$*`)`

Description Returns an **`Integer`** representing the number of words in the specified text.

Comments Words are separated by spaces, tabs, and end-of-lines.

Example This example counts the number of words in a particular string.

```
Sub Main()
  s$ = "My last name is Williams; Stuart is my surname."
  i% = WordCount(s$)
  MsgBox "'" & s$ & "' has " & i% & " words."
End Sub
```

See Also **`Item$`** (function); **`ItemCount`** (function); **`Line$`** (function); **`LineCount`** (function); **`Word$`** (function).

Write# (statement)

Syntax `Write [#]`*filenumber* `[,`*expressionlist*`]`

Description Writes a list of expressions to a given sequential file.

Comments The file referenced by *filenumber* must be opened in either **`Output`** or **`Append`** mode.

The *filenumber* parameter is an **`Integer`** used by the Basic Control Engine to refer to the open file—the number passed to the **`Open`** statement.

The following table summarizes how variables of different types are written:

Data Type	Description
Any numeric type	Written as text. There is no leading space, and the period is always used as the decimal separator.
`String`	Written as text, enclosed within quotes.
`Empty`	No data is written.
`Null`	Written as **`#NULL#`**.
`Boolean`	Written as **`#TRUE#`** or **`#FALSE#`**.
`Date`	Written using the universal date format: ***#YYYY-MM-DD HH:MM:SS#***
user-defined errors	Written as **`#ERROR`** *ErrorNumber***#**, where *ErrorNumber* is the value of the user-defined error. The word **`ERROR`** is not translated.

The **`Write`** statement outputs variables separated with commas. After writing each expression in the list, **`Write`** outputs an end-of-line.

The **`Write`** statement can only be used with files opened in **`Output`** or **`Append`** mode.

Example This example opens a file for sequential write, then writes ten records into the file with the values 10...50. Then the file is closed and reopened for read, and the records are read with the Input statement. The results are displayed in a dialog box.

```
Sub Main()
  Open "test.dat" For Output Access Write As #1
  For x = 1 To 10
    r% = x * 10
    Write #1,x,r%
  Next x
  Close
  msg1 = ""

  Open "test.dat" For Input Access Read As #1
  For x = 1 To 10
    Input #1,a%,b%
    msg1 = msg1 & "Record " & a% & ": " & b% & Basic.Eoln$
  Next x

  MsgBox msg1
  Close
End Sub
```

See Also **`Open`** (statement); **`Put`** (statement); **`Print#`** (statement).

WriteIni (statement)

Syntax **`WriteIni`** *section$*`,`*ItemName$*`,`*value$*`[,`*filename$*`]`

Description Writes a new value into an ini file.

Comments The **`WriteIni`** statement requires the following parameters:

Parameter	Description
section$	**`String`** specifying the section that contains the desired variables, such as "windows." Section names are specified without the enclosing brackets.
ItemName$	**`String`** specifying which item from within the given section you want to change. If *ItemName$* is a zero-length string (""), then the entire section specified by *section$* is deleted.
value$	**`String`** specifying the new value for the given item. If *value$* is a zero-length string (""), then the item specified by *ItemName$* is deleted from the ini file.
filename$	**`String`** specifying the name of the ini file.

Example This example sets the txt extension to be associated with Notepad.

```
Sub Main()
  WriteIni "Extensions","txt","c:\windows\notepad.exe ^.txt","win.ini"
End Sub
```

See Also **`ReadIni$`** (function); **`ReadIniSection`** (statement).

Note: If *filename$* is not specified, the win.ini file is used.

If the *filename$* parameter does not include a path, then this statement looks for ini files in the Windows directory.

X

X or (operator)

Syntax *expression1* **`Xor`** *expression2*

Description Performs a logical or binary exclusion on two expressions.

Comments If both expressions are either **`Boolean`**, **`Boolean`** variants, or **`Null`** variants, then a logical exclusion is performed as follows:

If the first expression is	and the second expression is	then the result is
`True`	**`True`**	**`False`**
`True`	**`False`**	**`True`**
`False`	**`True`**	**`True`**
`False`	**`False`**	**`False`**

If either expression is **`Null`**, then **`Null`** is returned.

Binary Exclusion

If the two expressions are **`Integer`**, then a binary exclusion is performed, returning an **`Integer`** result. All other numeric types (including **`Empty`** variants) are converted to **`Long,`** and a binary exclusion is then performed, returning a **`Long`** result.

Binary exclusion forms a new value based on a bit-by-bit comparison of the binary representations of the two expressions according to the following table:

1	Xor	1	=	0	Example:	
0	Xor	1	=	1	5	01101001
1	Xor	0	=	1	6	10101010
0	Xor	0	=	0	Xor	11000011

Example This example builds a logic table for the XOR function and displays it.

```
Const crlf = Chr$(13) + Chr$(10)

Sub Main()
  msg1 = "Logic table for Xor:" & crlf & crlf
  For x = -1 To 0
    For y = -1 To 0
      z = x Xor y
      msg1 = msg1 & CBool(x) & " Xor "
      msg1 = msg1 & CBool(y) & " = "
      msg1 = msg1 & CBool(z) & crlf
    Next y
  Next x
  MsgBox msg1
End Sub
```

See Also Operator Precedence (topic); **`Or`** (operator); **`Eqv`** (operator); **`Imp`** (operator); **And** (operator).

Y

Year (function)

Syntax **`Year`**`(`*date*`)`

Description Returns the year of the date encoded in the specified *date* parameter. The value returned is between 100 and 9999 inclusive.

The *date* parameter is any expression representing a valid date.

Example This example returns the current year in a dialog box.

```
Sub Main()
  tdate$ = Date$
  tyear! = Year(DateValue(tdate$))
  MsgBox "The current year is " & tyear!
End Sub
```

See Also **`Day`** (function); **`Minute`** (function); **`Second`** (function); **`Month`** (function); **`Hour`** (function); **`Weekday`** (function); **`DatePart`** (function).

CIMPLICITY Extensions to Basic

Acquire (Function)

Syntax **`bool = Acquire(`***Region$*, *TimeOut&***`)`**

Description Acquire a Critical Section with a timeout. If the section is not acquired within the specified timeout, a value of **`False`** is returned.

Critical Sections are used in multithreaded application to control reentrancy, protect access global data structures, and provide synchronization. Only one thread of an application can be within a critical section at a time. Since the Basic Control Engine is a multithreaded application, you may need to use critical sections to prevent race type conditions.

`Acquire` and **`Release`** only work with the same process. In other words, two standalone executables cannot protect against each other using this mechanism.

Note

In the Basic Control Engine, when an event occurs, the script is started in parallel with any other currently executing scripts. If two scripts compete for the same resource in your factory (e.g. controlling a pump) you may need to use critical sections to control access.

Unlike a C application, access to public and private variables is controlled automatically by BASIC. That is, if two threads are trying to set and get the value of a variable access to the variable is synchronous. In other words, the thread, which is reading the value, won't get a value, which is half-written by the other thread. However, if you are accessing more than one element of a global data structure and expect another thread to be accessing the data, then you must protect the access with a critical section.

The Basic Control Engine automatically releases any critical sections held by the script when it terminates. While the script is running, you can use the **`Acquire`** and **`Release`** commands to control when a critical section is released. You must make a call to **`Release`** for each call you make to **`Acquire`** for a critical section.

Comments

Parameter	Description
Region$	String. A unique identifier of the region to be operated on.
TimeOut&	Long. The time in milliseconds to wait.

Example

Prevent reentry into the routine if the script is already in progress. If the script can't acquire the region immediately, it will exit.

```
sub main()
private LastDate as String
Sub Main()
    if Acquire("DATETIME",0) = FALSE then
       exit sub
    end if
    if Date$ <> LastDate then
       LastDate = Date$
       PointSet "DATE",LastDate
    end if
    PointSet "TIME",Time$
    Release "DATETIME"
End Sub
```

Acquire, Release (Statements)

Syntax

`Acquire` *Region$*
`Release` *Region$*

Description

Acquire a Critical Section. The script will wait until the region is available. Use this to provide synchronous access to data.

Release an acquired critical section.

A region can be acquired multiple times and must be released as many times as it is acquired.

`Acquire` and **`Release`** only work with the same process. In other words, two standalone executables cannot protect against each other using this mechanism.

Note

In the Basic Control Engine, when an event occurs, the script is started in parallel. If another event triggers the same script before the script ends, two scripts will be running in parallel. The **`Acquire`** and **`Release`** routines can be used to modify this behavior. Two options are available.

1. Serialize the processing. In this case, the second instance of the script waits until the first is complete and then begins execution. This is accomplished by placing an acquire statement at the start of the script.
2. Skip processing. In this case, the second instance of the script exits without performing any processing. The example in Acquire (FUNCTION) illustrated this.

Important

Be careful when acquiring more than one section (nesting), as deadlock can occur if two threads acquire the sections in different order. Consider the following:

```
Thread1
   Acquire "Section1"
   Acquire "Section2"
   ..

Thread2
   Acquire "Section2"
   Acquire "Section1"
```

In the above example, if Thread1 acquires Section1 and then Thread2 acquires Section2, both Thread1 and Thread2 will be blocked indefinitely.

Comments

Parameter	Description
Region$	String. A unique identifier of the region to be operated on.

Example

Consider the following example. Trigger is a point which caused the make decision to execute. The function may be called in response to two separate events with a different Point ID. The function will make a decision only if the timestamp of the point is more recent than the time the last decision was made.

```
Dim lastTime as Date

sub MakeDecision(trigger as Point, decision as Point)
   ' Only one thread may be within this loop.
   Acquire "MakeDecision"
   ' Make sure we release the "MakeDecision" section prior to leaving.
   ON ERROR GOTO RELEASEIT
   ' If we made a decision after this point changed then return
   if lastTime < trigger.TimeStamp then
      goto RELEASEIT
   end if
   lastTime = trigger.TimeStamp
   decision.Value = trigger.Value
   decision.Write
RELEASEIT:
    Release "MakeDecision"
    exit sub
end sub
```

AlarmGenerate (Method)

Syntax `AlarmGenerate` *Project$*`,` *AlarmId$*`,` *ResourceId$*`,` *Message$* `[,` *UserId$* `[,` *RefId$* `[,` *Master*`]]]`

Description To generate an alarm on a local or remote CIMPLICITY project.

Note

The Alarm ID must have an Alarm Type of *$CIMBASIC* otherwise the alarm message may not be displayed correctly.

A unique alarm in CIMPLICITY is defined by the Alarm ID, Resource ID and Reference ID combination. Each unique alarm can be displayed as a distinct entry in the Alarm Viewer. Non-unique alarms are stacked, so that the user only sees the most recent occurrence. In general, the Resource ID is used to control the routing of alarms to users. The Reference ID is used by an application to distinguish between different instances of the same alarm.

Comments

Parameter	Description
Project$	String. The project to generate the alarm on, an empty string "" indicates the current project
AlarmId$	String. The ID of the Alarm. Must be a valid alarm of type *$CIMBASIC*
ResourceId$	String. The Resource ID to generate the alarm against. Used to control routing of the alarm.
Message$	String. The update alarm message to display. **Note** This string is substituted into the first variable field of the Alarm's message. For a user-defined alarm message, this will be the first **`%s`** field in the message. For a point alarm message, it will be the first variable field (%VAL, %ID, etc.) in the alarm message. For this reason, it is *not* recommended that you use the *AlarmMessage$* field when updating point alarms.
UserId$	String (optional). The User ID which generated the alarm.
RefId$	String (optional). A Reference ID used to distinguish to identical alarms.
Master	Boolean (optional). By default on a computer with Server Redundancy, alarms sent by the slave computer's Event Manager are ignored. To allow an alarm to be generated from a script on a slave computer, set this parameter to **`True`**.

Example

```
sub main()
   ' Generate a single alarm with no reference Id.
   AlarmGenerate "BCEDEMO","MY_ALARM_1","$SYSTEM",_
                 "Electrical Bus 1 Failure"
   ' Generate three of the same alarm for different resources.
   AlarmGenerate "BCEDEMO","MY_ALARM_2","RESOURCE_1",_
                 "Multiple Instance for each resource"
   AlarmGenerate "BCEDEMO","MY_ALARM_2","RESOURCE_2",_
                  "Multiple Instance for each resource"
   AlarmGenerate "BCEDEMO","MY_ALARM_2","RESOURCE_3",_
                  "Multiple Instance for each resource"
   ' Generate three of the same alarm for the same resource
   ' but use a different reference id.
   AlarmGenerate "BCEDEMO","MY_ALARM_3","RESOURCE_1",_
                  "Multiple Instances for RefId","","1"
   AlarmGenerate "BCEDEMO","MY_ALARM_3","RESOURCE_1",_
                   "Multiple Instances for RefId","","2"
   AlarmGenerate "BCEDEMO","MY_ALARM_3","RESOURCE_1",_
                   "Multiple Instances for RefId","","3"
end sub
```

See Also

`AlarmUpdate`

AlarmUpdate (Method)

Syntax **`AlarmUpdate`** *Project$*`,` *AlarmId$*`,` *ResourceId$*`,` *Action%* *`[,` AlarmMessage$ `[,` UserId$ `[,`RefId$`]]]`*

Description To update a currently generated alarm. The alarm being updated may be of any alarm type. However, if the *AlarmMessage$* is specified, it must be an alarm with an alarm type of *$CIMBASIC*.

Note

When updating an alarm, the *AlarmId$*, *ResourceId$* and *RefId$* must match exactly to the alarm to be updated, if they don't match the alarm will not be updated.

When updating a point alarm, the *RefId$* is always the Point ID (which is also the Alarm ID)

Comments

Parameter	Description
Project$	String. The project to generate the alarm on, an empty string "" indicates the current project
AlarmId$	String. The ID of the Alarm. Must be a valid alarm.
ResourceId$	String. The Resource ID to generate the alarm against. Used to control routing of the alarm.
Action%	Integer. Indicates whether to acknowledge or reset the alarm. Use the manifest constants **`AM_ACKNOWLEDGED`**, **`AM_RESET or AM_ACKNOWLEDGED + AM_RESET`** to perform and acknowledgment and a reset. By default on a computer with Server Redundancy, alarm updates from the slave computer's Event Manager are ignored. To acknowledge or reset an alarm on the master computer from the slave computer, use **`AM_ACKNOWLEDGED_M`** or **`AM_RESET_M`** to override the default behavior.
AlarmMessage$	String (optional). The update alarm message to display. **Note** This string is substituted into the first variable field of the Alarm's message. For a user-defined alarm message, this will be the first **`%s`** field in the message. For a point alarm message, it will be the first variable field (%VAL, %ID, etc.) in the alarm message. For this reason, it is *not* recommended that you use the *AlarmMessage$* field when updating point alarms.
UserId$	String (optional). The User ID which generated the alarm.
RefId$	String (optional). A Reference ID used to distinguish between identical alarms. The Reference ID needs to match the Reference ID of the generated alarm. If the alarm was generated without a Reference ID, then this field can be omitted from the call.

Example

```
sub main()
      a$ = time$
      AlarmUpdate "BCEDEMO","MY_ALARM_1","$SYSTEM",x,_
            "Electrical Bus 1 " & a$
      AlarmUpdate "BCEDEMO","MY_ALARM_2","RESOURCE_1",x,_
            "Multiple Instance for each resource " & a$
      AlarmUpdate "BCEDEMO","MY_ALARM_2","RESOURCE_2",x,_
            "Multiple Instance for each resource " & a$
      AlarmUpdate "BCEDEMO","MY_ALARM_2","RESOURCE_3",x,_
"Multiple Instance for each resource " & a$
      AlarmUpdate "BCEDEMO","MY_ALARM_3","RESOURCE_1",x,_
"Multiple Instances for RefIf " & a$,"","1"
      AlarmUpdate "BCEDEMO","MY_ALARM_3","RESOURCE_1",x,_
"Multiple Instances for RefIf " & a$,"","2"
      AlarmUpdate "BCEDEMO","MY_ALARM_3","RESOURCE_1",x,_
 "Multiple Instances for RefIf " & a$,"","3"
end sub
```

See Also `AlarmGenerate`

ChangePassword (Method)

Syntax **`ChangePassword`** *Project$*, *OldPassword$*, *NewPassword$*

Description To change a password for a currently logged in user on a specified project.

Note: The user must be logged into the specified project or the function will fail.

Comments

Parameter	Description
Project$	String. The project to change the password on. An empty string indicates the current default project.
OldPassword$	String. The old password of the user
NewPassword$	String. The new password of the user

Example

```
sub main()
   ChangePassword "CIMPDEMO", "OLDPASS", "NEWPASS"
end sub
```

CimEMAlarmEvent (Object)

Overview The CimEMAlarmEvent object provides information for scripts invoked from an alarm event.

Example

```
Dim alarmEvent As CimEmAlarmEvent
Set alarmEvent = CimGetEMEvent().AlarmEvent()
PointSet "ALARM_MESSAGE", alarmEvent.Message
```

Note: CimEMAlarmEvent can only be used from the Event Manager. It is not valid in CimView/CimEdit.

CimEMAlarmEvent.AlarmID (Property, Read)

Syntax `AlarmEvent.AlarmId`

Description String. Returns the Alarm ID of the Alarm that triggered the event.

Example

```
Sub Main()
   Dim AlarmEvent as CimEmAlarmEvent
   Set AlarmEvent = CimGetEMEvent().AlarmEvent()
   PointSet “LAST_ALARM_ID”, AlarmEvent.AlarmID
   End if
end sub
```

CimEMAlarmEvent.FinalState (Property, Read)

Syntax `AlarmEvent.FinalState`

Description Integer. Returns the final state of the alarm after the requested action. For example, if the user acknowledged the alarm and the deletion requirements for the alarm only require acknowledgement then the final state would be AM_DELETED.

Valid States are :

- **AM_GENERATED**
- **AM_ACKNOWLEDGED**
- **AM_RESET**
- **AM_DELETED**

Example

```
Sub Main()
   Dim AlarmEvent as CimEmAlarmEvent
   Set AlarmEvent = CimGetEMEvent().AlarmEvent()
   If AlarmEvent.FinalState = AM_ACKNOWLEDGED then
       PointSet “ALARM_MESSAGE”, “Alarm is Acknowledged”
   End if
end sub
```

See Also

CimEMAlarmEvent.GenTime (Property, Read)

Syntax `AlarmEvent.GenTime`

Description Date. Returns the day and time the alarm was generated.

Example

```
Sub Main()
   Dim AlarmEvent as CimEmAlarmEvent
   Set AlarmEvent = CimGetEMEvent().AlarmEvent()
   PointSet “TEXT_ALARM_GEN_TIME”, cstr(AlarmEvent.GenTime)
   End if
end sub
```

CimEMAlarmEvent.Message (Property, Read)

Syntax `AlarmEvent.Message`

Description String. Returns the text of the Alarm Message of the alarm that triggered the event.

Example

```
Sub Main()
   Dim AlarmEvent as CimEmAlarmEvent
   Set AlarmEvent = CimGetEMEvent().AlarmEvent()
   PointSet “LAST_ALARM_MESSAGE”, AlarmEvent.Message
   End if
end sub
```

CimEMAlarmEvent.PrevState (Property, Read)

Syntax `AlarmEvent.PrevState`

Description Integer. Returns the previous state of the alarm. Valid States are :

- **AM_GENERATED**
- **AM_ACKNOWLEDGED**
- **AM_RESET**
- **AM_DELETED**

Example

```
Sub Main()
   Dim AlarmEvent as CimEmAlarmEvent
   Set AlarmEvent = CimGetEMEvent().AlarmEvent()
   If AlarmEvent.PrevState = AM_ACKNOWLEDGED then
       PointSet “ALARM_PREVSTATE”, “ACKNOWLEDGED”
   End if
end sub
```

CimEMAlarmEvent.RefID (Property, Read)

Syntax `AlarmEvent.RefID`

Description String. Returns the Reference ID of the alarm that triggered the event.

Example

```
Sub Main()
   Dim AlarmEvent as CimEmAlarmEvent
   Set AlarmEvent = CimGetEMEvent().AlarmEvent()
   PointSet “LAST_ALARM_REF_ID”, AlarmEvent.RefID
   End if
end sub
```

CimEMAlarmEvent.ReqAction (Property, Read)

Syntax `AlarmEvent.ReqAction`

Description Integer. Returns the action requested on the alarm. For example, if the user had acknowledged the alarm in the Alarm Viewer the requested action would be AM_ACKNOWLEDGED.

Example

```
Sub Main()
   Dim AlarmEvent as CimEmAlarmEvent
   Set AlarmEvent = CimGetEMEvent().AlarmEvent()
   If AlarmEvent.ReqAction = AM_ACKNOWLEDGED then
       PointSet “ALARM_MESSAGE”, “Alarm has been Acknowledged”
   End if
end sub
```

CimEMAlarmEvent.ResourceID (Property, Read)

Syntax `AlarmEvent.ResourceID`

Description String. Returns the Resource ID of the alarm that triggered the event.

Example

```
Sub Main()
   Dim AlarmEvent as CimEmAlarmEvent
   Set AlarmEvent = CimGetEMEvent().AlarmEvent()
   PointSet “LAST_ALARM_RESOURCE_ID”, AlarmEvent.ResourceID
   End if
end sub
```

CimEMEvent (Object)

Overview

An object used by the Event Manager to hold information about the event that triggered the action.

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   PointSet “LAST_EVENT_ID”, event.EventId
End Sub
```

Note: CimEMEvent can only be used from the Event Manager. It is not valid in CimView/CimEdit.

CimEMEvent.ActionID (Property, Read)

Syntax `Event.ActionID`

Description String. Returns the Action ID that is a running the script.

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   PointSet “LAST_ACTION_ID”, event.ActionID
End Sub
```

CimEMEvent.AlarmEvent (Function)

Syntax `Event.AlarmEvent`

Description Returns CimEMAlarmEvent. Returns the Alarm Event object that triggered the action, or empty if action was not triggered by an alarm.

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   If event.Type = EM_ALARM_GEN then
       Dim alarmEvent as CimEMAlarmEvent
       Set AlarmEvent = event.AlarmEvent()
       ‘ Process the alarm
   End If

End Sub
```

CimEMEvent.EventID (Property, Read)

Syntax `Event.EventID`

Description String. Returns the EventID that triggered the event.

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   PointSet “LAST_EVENT_ID”, event.EventId
End Sub
```

CimEMEvent.ObjectID (Property, Read)

Syntax `Event.ObjectID`

Description String. If the script is invoked from an object event, the Object ID invoking the action is returned. If the script is invoked from a non-object event, an empty string is returned

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   PointSet “LAST_OBJECT_ID”, event.ObjectID
End Sub
```

CimEMEvent.PointEvent

Syntax `Event.PointEvent`

Description Returns CimEMPointEvent. Returns the Point Event object that triggered the action, or empty if action was not triggered by point event.

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   Dim pointEvent as CimEMPointEvent
   Set pointEvent = event.PointEvent()
End Sub
```

CimEMEvent.TimeStamp (Property, Read)

Syntax `Event.TimeStamp`

Description Date. Returns the Time Stamp at which the event occurred.

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   PointSet “LAST_EVENT_TIME”, cstr(event.TimeStamp)
End Sub
```

CimEMEvent.Type (Property, Read)

Syntax `Event.Type`

Description Integer. Returns the type of event that triggered the action. Valid values are:

- **EM_ALARM_GEN –** Alarm Generated
- **EM_ALARM_ACK –** Alarm Acknowledged
- **EM_ALARM_RST –** Alarm Reset
- **EM_ALARM_DEL –** Alarm Deleted
- **EM_POINT_CHANGE –** Point Changed
- **EM_POINT_UNAVAIL –** Point Unavailable
- **EM_POINT_EQUALS –** Point Equals
- **EM_POINT_UPDATE –** Point Updated
- **EM_POINT_TRANS_HIGH –** Point Transition to High
- **EM_POINT_TRANS_LOW –** Point Transition to Low
- **EM_TIMED –** Timed Event
- **EM_RUN_ONCE –** Run Once
- **EM_TRIGGERED –** Externally trigged by BCEUI or Action Calendar

Consult the Event Editor documentation for more details**.**

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   If event.Type = EM_ALARM_GEN then
       Dim alarmEvent as CimEMAlarmEvent
       Set AlarmEvent = event.AlarmEvent()
       ‘ Process the alarm
   End If

End Sub
```

CimEMPointEvent (Object)

Overview

An Event Manager Object used to contain information about a Point Event

Example

```
Sub Main()
   Dim PointEvent as CimEmPointEvent
   Set PointEvent = CimGetEMEvent().PointEvent()
   ‘ perform processing
   ‘ reset the event point to 0
   PointSet PointEvent.Id, 0
end sub
```

Related Function

CimEMPointEvent.Id

Syntax `PointEvent.Id`

Description String. Returns the Point ID of the point that triggered the event.

Example

```
Sub Main()
   Dim PointEvent as CimEmPointEvent
   Set PointEvent = CimGetEMEvent().PointEvent()
   ‘ perform processing
   ‘ reset the event point to 0
   PointSet PointEvent.Id, 0
end sub
```

Note: CimEMPointEvent can only be used from the Event Manager. It is not valid in CimView/CimEdit

CimEmPointEvent.Quality (Property, Read)

Syntax `CimEMPointEvent.Quality`

Description Long. Returns the 16-bit quality mask for the point that triggered the event.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   X = p.Quality
End Sub
```

CimEmPointEvent.QualityAlarmed (Property, Read)

Syntax `CimEMPointEvent.QualityAlarmed`

Description Boolean. Returns TRUE if the point that triggered the event is in alarm, FALSE otherwise.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   if p.QualityAlarmed then
      DoSomething
   End If
End Sub
```

CimEmPointEvent.QualityAlarms_Enabled (Property, Read)

Syntax `CimEMPointEvent.QualityAlarms_Enabled`

Description Boolean. Returns TRUE if alarming for the point that triggered the event is enabled, FALSE otherwise.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   if p.QualityAlarms_Enabled then
      DoSomething
   End If
End Sub
```

CimEmPointEvent.QualityDisable_Write (Property, Read)

Syntax `CimEMPointEvent.QualityDisable_Write`

Description Boolean. Returns TRUE if setpoints have been disabled for the point that triggered the event, FALSE otherwise.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   if p.QualityDisable_Write Then
      DoSomething
   End If
End Sub
```

CimEmPointEvent.QualityIs_Available (Property, Read)

Syntax `CimEMPointEvent.QualityIs_Available`

Description Boolean. Returns TRUE if the value of the point that triggered the event is available, FALSE if the value is unavailable.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   if p.QualityIs_Available = FALSE then
      DoSomething
   End If
End Sub
```

CimEmPointEvent.QualityIs_In_Range (Property, Read)

Syntax `CimEMPointEvent.QualityIs_In_Range`

Description Boolean. Returns TRUE if the value of the point that triggered the event is in range, FALSE if the point is out of range. When a point is out of range its value is unavailable.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   if p.QualityIs_In_Range = FALSE then
      DoSomething
   End If
End Sub
```

CimEmPointEvent.QualityLast_Upd_Man (Property, Read)

Syntax `CimEMPointEvent.QualityLast_Upd_Man`

Description Boolean. Returns TRUE if the value of the point that triggered the event came from a manual update rather than a device read.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   If p.QualityLast_Upd_Man then
      DoSomething
   End If
End Sub
```

CimEmPointEvent.QualityManual_Mode (Property, Read)

Syntax `CimEMPointEvent.QualityManual_Mode`

Description Boolean. Returns TRUE if the point that triggers the event was in Manual Mode, otherwise FALSE.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   if p.QualityManual_Mode then
     ProcessManualMode
   End if
End Sub
```

CimEmPointEvent.QualityStale_Data (Property, Read)

Syntax `CimEMPointEvent.QualityStale_Data`

Description Boolean. Returns TRUE if the value of the point that triggered the event is stale, otherwise FALSE.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   if p.QualityStale_Data = TRUE
      DoSomething
   End If
End Sub
```

CimEMPointEvent.State (Property, Read)

Syntax `PointEvent.State`

Description Integer. Returns the state of the point. Can be used to determine if the point is available. See Point.State for a complete description of states.

Example

```
Sub Main()
   Dim PointEvent as CimEmPointEvent
   Set PointEvent = CimGetEMEvent().PointEvent()
   If PointEvent.State = CP_UNAVAILABLE THEN
            LogStatus CIM_FAILURE,"Main()", _
                "Point " & Point.Id & "is unavailable"
      end
   End if
end sub
```

CimEMPointEvent.TimeStamp (Property, Read

Syntax `PointEvent.TimeStamp`

Description Date. Returns the date and time of the point change that triggered the event.)

Example

```
Sub Main()
   Dim PointEvent as CimEmPointEvent
   Set PointEvent = CimGetEMEvent().PointEvent()
   PointSet "LAST_EVENT_TIME", cstr(PointEvent.TimeStamp)
end sub
```

CimEmPointEvent.UserFlags (Property, Read}

Syntax `CimEMPointEvent.UserFlags`

Description Long. Returns the value of the 16-bit user defined flags for the point that triggered the event.

Example

```
Sub Main()
   Dim p as new CimEMPointEvent
   Set p = CimGetEmEvent().PointEvent()
   X = p.UserFlags
End Sub
```

CimEMPointEvent.Value (Property, Read)

Syntax `PointEvent.Value`

Description Variant. Returns the value of the point that triggered the event.

Example

```
Sub Main()
   Dim PointEvent as CimEmPointEvent
   Set PointEvent = CimGetEMEvent().PointEvent()
   PointSet “OUTPUT_POINT”, PointEvent.Value + 100
end sub
```

CimGetEMEvent (Function)

Syntax `CimGetEMEvent()`

Description Returns a CimEMEvent object. A function to return the event object that causes the action to run. Only valid from Event Manager.

Example

```
Sub Main()
   Dim event as CimEMEvent
   Set event = CimGetEMEvent()
   PointSet “LAST_EVENT_TIME”, cstr(event.TimeStamp)
End Sub
```

Note: CimGetEMEvent can only be used from the Event Manager. It is not valid in CimView/CimEdit. *See the "CIMPLICITY HMI Basic Control Engine Program Editor Operation Manual" (GFK-1305) for information about fabricating an event.*

CimIsMaster (Function)

Syntax `CimIsMaster`

Description In a computer with Server Redundancy, to determine if the computer is operating in Master or Slave mode.

This function returns **`True`** if the computer is currently the active master.

This function returns **`False`** if the computer is currently the slave.

Example

```
Sub Main()
   If CimIsMaster then
      MoveCrane
   End if
End Sub
```

CimLogin (Procedure)

Syntax **`CimLogin`** *`project$`*

Description Initiates a login for the specified project. Similar in effect to selecting login from the Login Panel. Only valid when the user is actively using points or viewing alarms from the project, otherwise it has no effect. Initiating a login will cause the CIMPLICITY login box to be displayed.

Comments

Parameter	Description
project$	String. The project to login to.

Example

```
Sub Main()
   CimLogin “CIMPDEMO”
End Sub
```

CimLogout (Procedure)

Syntax **`CimLogout`** *`project$`*

Description Logs the user out of the specified project. Similar in effect to selecting logout from the Login Panel. When the user is logged out of the project, all points from the project will be unavailable and no alarm information will be available. If the user is not logged into the project, the call has no effect.

Comments

Parameter	Description
project$	String. The project to logout of.

Example

```
Sub Main()
   CimLogout “CIMPDEMO”
End Sub
```

CimProjectData (Object)

Overview The CimProjectData object provides the ability to search and return specific pieces of a project's configuration. The underlying APIs used by the CimProjectData object are the same as those used to browse point configuration on a remote project. In general, this object provides a convenient way to retrieve a set of attributes based on specified filter criteria. This object provides a read-only capability.

To write configuration, please see the help file for the CIMPLICITY Configuration Object Model.

Example

```
Sub Main()
   ' This example retrieves all points beginning with A for Device MY_PLC
   ' in project MY_PROJECT and displays the point id and resource id of
   ' each matching item.
   Dim d as new CimProjectData
   d.Project = "MY_PROJECT"
   d.Entity = "POINT"
   d.Filters = "POINT_ID=A*,DEVICE_ID=MY_PLC"
   d.Attributes = "POINT_ID,RESOURCE_ID"
   Dim p as string
   Dim r as String
 top:
   if d.GetNext(p,r) = TRUE then
      MsgBox "Point Id = " & p & " Resource Id = " & r
      goto top
   End if
end sub
```

CimProjectData.Project (Property, Read/Write)

Syntax `CimProjectData.Project`

Description String. Get/set the project to browse data from.

Must be specified when used from CimView.

For use in the Event Manager, the project name should be empty to browse the local project.

Example

```
Dim d as new CimProjectData
d.project = "MY_PROJECT"
```

CimProjectData.Entity (Property, Read/Write)

Syntax `CimProjectData.Entity`

Description String. The entity to obtain data for. Below is a list of the available entities and their attributes.

Entity	Description		
ACTION	Contains Action information		
	Attribute ID	**Filter**	**Description**
	ACTION_ID	Yes	Action ID
	ACTION_TYPE	No	Action Type
	POINT_ID	No	Point ID targeted by the action
	PT_VAL	No	Point value
	PROC_OF_SRCPT	No	Source point,
ALARM_CLASS	Contains Alarm Class information		
	Attribute ID	**Filter**	**Description**
	CLASS_ID	Yes	Class ID
	CLASS_TITLE	Yes	Class title
	CLASS_ORDER	No	Class order
	CLASS_ALARM_FG	No	The foreground color to use for points of this class that are in alarm state
	CLASS_ALARM_BG	No	The background color to use for points of this class that are in alarm state
	CLASS_NORMAL_FG	No	The foreground color to use for points of this class that are in normal state
	CLASS_NORMAL_BG	No	The background color to use for points of this class that are in normal state
	CLASS_ACK_FG	No	The foreground color to use for points of this class that are in acknowledged state
	CLASS_ACK_BG	No	The background color to use for points of this class that are in acknowledged state
	CLASS_WAVE_FILE	No	The WAV file to play from the Alarm Sound Manager
	CLASS_BEEP_FREQ	No	Frequency of beeps from the Alarm Sound Manager
	CLASS_BEEP_DURATION	No	Duration of beeps from the Alarm Sound Manager
	CLASS_BEEP_DELAY	No	Delay between beeps from the Alarm Sound Manager

ALARM_DEF Contains Alarm information

Attribute ID	**Filter**	**Description**
ALARM_ID	Yes	Alarm ID
CLASS_ID	Yes	Alarm Class of the alarm
ALARM_TYPE_ID	Yes	Alarm Type ID of the alarm
DESCRIPTION	Yes	Description of the alarm

AMLP Contains Alarm Printer information

Attribute ID	**Filter**	**Description**
AMLP_NAME	Yes	Alarm printer name
AMLP_PORT	No	Alarm printer port
PAGE_WIDTH	No	Page width
PAGE_LENGTH	No	Page length
DATE_FORMAT	No	Date format
TIME_FORMAT	No	Time format

CLASS Contains Class information

Attribute ID	**Filter**	**Description**
CLASS_ID	Yes	Class ID
DESCRIPTION	Yes	Description of the class

CLIENT Contains Client information

Attribute ID	**Filter**	**Description**
NODE_ID	Yes	Computer name
USER_ID	No	Default User ID
TRUSTED	No	Trusted computer

DEVICE Contains Device information

Attribute ID	**Filter**	**Description**
DEVICE_ID	Yes	Device ID
RESOURCE_ID	Yes	Resource ID for the device
DESCRIPTION	Yes	Device description
PORT_ID	Yes	Port ID for the device

EVENT Contains Event information

Attribute ID	**Filter**	**Description**
EVENT_ID	Yes	Event ID
EVENT_TYPE	No	Event type
EM_ENABLED	No	Event enabled flag
ID	No	Event source identifier
RESOURCE_ID	No	Resource ID of the event
PT_VAL	No	For Point Equal event, the value of the point

EVENT_ACTION Contains Event-Action information

Attribute ID	**Filter**	**Description**
EVENT_ID	Yes	Event ID
ACTION_ID	Yes	Action ID for the event
LOG_FLAG	No	Flag indicating if the event-action is to be logged

GLB_PARMS Contains Global Parameter information for the project

Attribute ID	**Filter**	**Description**
PARM_ID	Yes	Global Parameter ID
PARM_VALUE	No	Value of the global parameter

OBJECT

Contains object information

Attribute ID	Filter	Description
OBJECT_ID	Yes	Object ID
CLASS_ID	Yes	Class ID for the object
DESCRIPTION	Yes	Object description

OBJECT_INF

This is a specialized entity used to extract information from a specified object. The filter for this entity is OBJECT_ID=MY_OBJECT, where MY_OBJECT is replaced with the object name you wish to read. Since the function returns specialized attribute information, only one of the attributes may be used at a time.

This entity may not be used from the Event Manager or without a specified running project.

Attribute ID	Filter	Description
DATA_ITEM	No	Returns all data items for the object. Each data item returns by a GetNext call.
ATTRIBUTE, VALUE	No	Returns the attribute for the object. If VALUE is specified, it must be the second attribute, and the value of the attribute will be returned
CLASS_ID	No	The Class ID of the object
DEFAULT_GRAPHIC	No	Returns the name of the default graphic for the object's class. Must be specified with GRAPHICS_FILE **Example** **`obj.Attributes= "GRAPHICS_FILE,DEFAULT_GRAPHIC"`**
GRAPHICS_FILE	No	The Graphics File specified for the object’s class
HELP_FILE	No	The Help File specified for the object’s class

POINT Contains Point information

Attribute ID	**Filter**	**Description**
POINT_ID	Yes	Point ID
DEVICE_ID	Yes	The Device ID for the point. If the point is a global point, the device is “$GLOBAL”. If the point is an equation point, the device is “$DERIVED
RESOURCE_ID	Yes	The Resource ID of the point
POINT_TYPE_ID	Yes	The Point Type ID of the point (UINT, REAL, etc.)
DESCRIPTION	Yes	The description of the point
DISPLAY_LIMITS_HI	No	The high display limit of the point
DISPLAY_LIMITS_LO	No	The low display limit of the point
DISPLAY_LIMITS	No	The low and high display limits of the point separated by a hyphen
DISPLAY_FORMAT	No	The display format for the point
ELEMENTS	No	The number of array elements
ADDRESS	No	The device address of the point
ADDRESS_OFFSET	No	The address offset for the point
HAS_EU	No	Set to 1 if the point has EU Conversion, otherwise set to 0
ALARM_HI	No	The high alarm limit for the point
ALARM_LO		The low alarm limit for the point
WARNING_HI		The high warning limit for the point
WARNING_LO		The low warning limit for the point
ACCESS_FILTER	Yes	If the point is an enterprise point, this field is set to “E”
READ_WRITE	No	Indicates if point is read/write
MODIFIED	No	The data and time in string format that the point was last edited

POINT_ALSTR Contains Alarm String information

Attribute ID	**Filter**	**Description**
ALARM_STR_ID	No	Alarm String ID
ALARM_HI_STR	No	String for Alarm High state
ALARM_LOW_STR	No	String for Alarm Low state
WARNING_HI_STR	No	String for Warning High state
WARNING_LO_STR	No	String for Warning Low state

POINT_DISP Contains Point Display information

Attribute ID	**Filter**	**Description**
POINT_ID	Yes	Point ID
SCREEN_ID	No	The screen associated with the point
DISPLAY_LIM_LOW	No	The low limit for the point value display. Values below this limit will display as asterisks (***)
DISPLAY_LIM_HIGH	No	The high limit for the point value display. Values above this limit will display as asterisks (***)

POINT_TYPE Contains Point Type information

Attribute ID	Filter	Description
POINT_TYPE_ID	Yes	The Point Type ID
DATA_TYPE	No	The numeric data type code for the point type
DATA_LENGTH	No	The numeric data length for the point type

PORT Contains Port information

Attribute ID	Filter	Description
PORT_ID	Yes	The Port ID
PROTOCOL_ID	No	The protocol used by the port
DESCRIPTION	No	Port description

PROJECTS Contains information on Remote Projects

Attribute ID	Filter	Description
PROJECT_NAME	Yes	Project Name
USER_ID	No	The User ID to log into the project
PASSWORD	No	Encrypted password for project login
ENABLE	No	Indicates if the project is enabled
EXCLUSIVE	No	Indicates if the project is exclusive
CONCPOINTS	No	For an Enterprise Server, indicates if points are collected
CONCALARMS	No	For an Enterprise Server, indicates if alarms are collected

PROTOCOL Contains Protocol information

Attribute ID	Filter	Description
PROTOCOL_ID	Yes	Protocol ID

RESOURCE Contains Resource information

Attribute ID	Filter	Description
RESOURCE_ID	Yes	The Resource ID
DESCRIPTION	No	Description of the resource

ROLE Contains Role information

Attribute ID	Filter	Description
ROLE_ID	Yes	The Role ID

SYS_PARMS Contains global parameter information for the system

Attribute ID	Filter	Description
PARM_ID	Yes	System Parameter ID
PARM_VALUE	No	Value of the system parameter

USER Contains User Information

Attribute ID	Filter	Description
USER_ID	Yes	The User ID
ROLE_ID	Yes	The user’s Role ID
PASSWORD	No	The user’s encrypted password
USER_NAME	No	The user’s name
ENABLE	No	Indicates if the user account is enabled or disabled.

Example

```
Dim d as New CimProjectData
d.Entity = “POINT”
```

CimProjectData.Attributes (Property, Read/Write)

Syntax `CimProjectData.Attributes`

Description String. The list of attributes, separated by commas, of the entity to return for each item matching the filter criteria.

The Attribute IDs are case sensitive and must be entered in the case documented in **`CimProjectData.Entity`**.

Example

```
Dim d as new CimProjectData
d. Attributes = “POINT_ID,RESOURCE_ID,DESCRIPTION”
```

CimProjectData.Filters (Property, Read/Write)

Syntax `CimProjectData.Filters`

Description String. The filter set to be used to determine which items to return. Each filter contains an Attribute ID and Value pair. You can use “*” and “?”as wildcard characters.

The filters are documented in **`CimProjectData.Entity`**.

Filters must be in uppercase even when matching against lowercase data.

Example

```
Dim d as new CimProjectData
d.Filters = “POINT_ID=P*”,DEVICE_ID=TESTP?C”
```

CimProjectData.GetNext (Function)

Syntax **`CimProjectData.GetNext(p1$ [,p2$ [,p3$…) as Boolean`**

Description This function returns the specified attributes for the next item that matches the filter criteria. If a record is found, a value of TRUE is returned, otherwise a value of FALSE is returned.

The function takes a variable number (20 maximum) of string parameters.

The values returned into the parameters are defined by the attributes specified for the object.

Comments

Parameter	**Description**
p1$	String. First attribute for the object
:	:
p20$	String. Twentieth attribute for the object

Example The following sample script returns all the data items for the PID1 object.

```
Sub main()
   Dim browse as new CimProjectData
   Browse.Project = “MY_PROJ”
   Browse.Entity = “OBJECT_INF”
   Browse.Attributes = DATA_ITEM”
   Browse.Filters = “OBJECT_ID=PID1”
   Dim dataItem as String
Top:
   If Browse.GetNext(dataItem) = False then end
   Msgbox dataitem
   Goto top
End Sub
```

The following sample script returns all points for a device:

```
Sub main()
   Dim browse as new CimProjectData
   Browse.Project = “MY_PROJ”
   Browse.Entity = “POINT”
   Browse.Attributes = “POINT_ID,RESOURCE_ID”
   Browse.Filters = “DEVICE_ID=PLC1”
Top:
   If Browse.GetNext(p$,r$) = False then end
   Msgbox “Point Id “ & p$ & “ Resource id “ & r$
   Goto top
End Sub
```

CimProjectData.Reset (Method)

Syntax `CimProjectData.Reset`

Description Resets the list so that a new set of search criteria, attributes, or project may be specified.

Example

```
d.reset
```

GetKey (Function)

Syntax **a$ = GetKey(***key$*, *string$***)**

Description To search for a keyword and returns its value. This is of use particularly from the Basic Control Engine to extract the EVENT and ACTION, which caused the script to run. An empty string is returned if the key is not found.

Comments

Parameter	Description
key$	String. The keyword to search for.
string$	String. The string to search for the keyword. The format of this string is keyword followed by an equal sign and the value. A comma separates multiple keyword value combinations.

Example

```
sub main()
   event_id$= GetKey("EVENT", command$)
   action_id$ = GetKey("ACTION", command$)
   ' Name$ will contain PETE after this statement.
   name$ = GetKey("NAME","NAME=PETE,LOCATION=ALBANY")
end sub
```

GetSystemWindowsDirectory (Function)

Syntax `d$ = GetSystemWindowsDirectory`

Description Returns the true Windows directory and not the per user Windows directory when running under Terminal Services.

Example

```
Sub Main()
  direct$ = GetSystemWindowsDirectory
  MsgBox "GetSystemWindowsDirectory = " & direct$
End Sub
```

GetTSSessionId (Function)

Syntax `id& = GetTSSessionId`

Description The Session ID of the Terminal Services client. This is 0 if running on the console or if Terminal Services is not running.

Example

```
Sub Main()
  myid& = GetTSSessionId
  MsgBox "Terminal Services Session Id = " & myid&
End Sub
```

IsTerminalServices (Function)

Syntax `IsTerminalServices`

Description Returns True if this computer is running Terminal Services.

Example

```
Sub Main()
  MsgBox "Terminal Services = " & IsTerminalServices
End Sub
```

LogStatus (Property, Read/Write)

Syntax `LogStatus` *Severity*, *Procedure$*, *Message$* [, *error_code* [, *error_reference*]]

Description To provide the programmer with the ability to log errors to the CIMPLICITY Status Log. To view the errors, use the CIMPLICITY Status Log Viewer.

Comments

Parameter	Description
Severity	Integer. The severity of the error. • CIM_SUCCESS - An Informational Error • CIM_WARNING - A warning message • CIM_FAILURE - A failure message
Procedure$	String. The name of the Basic Procedure which logged the error.
Message$	String. The error message to log.
error_code	Long (optional). A user-defined error code.
error_reference	Long (optional). A user-defined error reference. Used to distinguish the difference between two errors with the same *error_code*.

Example

```
sub main()
   on error goto error_handler
      ....
      ..
   exit sub
error_handler :
   ' error$, err, and erl are BASIC variables which contain the
   ' error text, error code and error line respectively.
   LogStatus CIM_FAILURE, "main()", error$, err, erl
   exit sub
end sub
```

Point (Subject)

Overview

The values of CIMPLICITY HMI points can be used in a variety of ways by a script. You can use scripts that act on point values to define reactions to changing conditions in your process.

Points are manipulated by the **`PointSet`** statement and **`PointGet`** function or the point object. In general, **`PointSet`** and **`PointGet`** are useful if you require the value of the point or wish to set the point. The point object extends your capabilities by allowing you to receive point values as they change, access array points, provide more information about the point’s configuration; and improve performance when repeatedly setting a point.

Security

The CIMPLICITY extensions to Basic provide the same security which all your CIMPLICITY HMI applications use; Set Point Security, Set Point Privilege, Download Password and Set Point Audit trail. Consult your *CIMPLICITY HMI for Windows NT and Windows 95 Base System User's Manual* (GFK-1180) for a detailed description of these features.

In order to discuss security, first we will need to understand when security is imposed on your access to points. There are two categories of processes running on your CIMPLICITY HMI Server; User Applications and Resident Processes.

User Applications are applications run by the user, that usually provide a user interface. Examples of such programs are CimView, CimEdit, Alarm Viewer and Program Editor. In order for the application to access a point on the local CIMPLICITY HMI project or a remote CIMPLICITY HMI project, a user login is required. The CIMPLICITY HMI privileges defined for your User ID define your capabilities.

Resident Processes are processes that are started as part of your CIMPLICITY HMI project. Examples of resident processes are the Database Logger, Point Manager and scripts automatically run by the Basic Control Engine. Since a resident process is a trusted part of your system, a resident process is not required to obtain a login in order to access points in their project. If the resident process wishes to access a point on a remote system, a remote project must be configured to supply the resident process with the User ID and Password with which to log in to the remote system.

Performance

The CIMPLICITY extensions to Basic provide a high performance mechanism to interact with your Point Database. However, there are several considerations to keep in mind when designing your application to obtain the highest performance possible.

First, is the Set Point Audit Trail. For each CIMPLICITY HMI role, you may configure whether or not the user will generate an audit trail for each setpoint. The audit trail is composed of a $DOWNLOAD event containing information on who set the point. This information is sent to your event log and can provide a detailed audit trail of who and what was set. However, the audit trail imposes significant overhead (20 times slower), since the record is logged to the database for each setpoint. This is particularly noticeable when running setpoints in a loop in the Program Editor. However, when the script is run from the Basic Control Engine, a $DOWNLOAD event will not be generated since a resident process is trusted. If you do not require an audit trail is it recommended that you disable it through role configuration (this is the default).

Second, is the difference between a **`PointSet`** statement and using the Point Object. With a Point Object, you create the object once and initialize its point information once (data type, elements, etc.). Subsequent operations on the Point are very fast, since the point characteristics are contained in the object. Conversely, **`PointSet`** and **`PointRead`** must fetch the point information on each execution (in benchmark testing this is 2 times slower.)

Consider the following example :

```
' Example One
sub slow_set()
    for I = 0 to 100
       PointSet "MY_POINT", I
    next I
end sub
' Example two
sub fast_set
   Dim MyPoint as new Point
   MyPoint.Id = "MY_POINT"
   for I = 0 to 100
      MyPoint.SetValue = I
   next I
end sub
```

The subroutine **`fast_set`** ramps the point ten times faster than the **`slow_set`** routine. While the second example at first may appear more complex, you will find that the object interface provides much more flexibility. As a rule, use **`PointGet`** and **`PointSet`** when you need to read or set the point's value once within your script.

Polling

CIMPLICITY HMI provides a high performance Point Interface. As a result, improperly written applications can degrade the overall performance of a system. One common issue is polling a point to wait for it to change. Consider the following example.

Incorrect Code

```
Poll:
  If PointGet("POLL_POINT") = 0 then
     Sleep 100
     Goto poll
  Endif
```

The sleep statement causes a 100ms delay between polls. However many extra polls are still being performed.

Correct and Most Efficient Code

```
Dim p as new point
p.Id = "POLL_POINT"
p.Onchange
Poll:
  Wait_for
     p.GetNext
     if p.Value=0 then goto wait for
```

In this example, the script requests the value of the point as it changes. When the point changes, the **`GetNext`** statement returns. When the point is not changing the script is waiting and using no system resources.

Error Handling

Basic provides a flexible error handling capability with the On Error command. The CIMPLICITY extensions to Basic are designed to use the built in error handling capability. When an error occurs while executing your CIMPLICITY command, a Basic Run Time error is generated. There are many ways you can implement error handling. Among these are :

- No error handling. When an error occurs, the script's execution halts and the error is reported (in the Program Editor, this is via a Message Box, and in the control engine by logging an error message to the status log).
- Error Handler. When an error occurs, the script's execution moves to the defined error handler. Within the error handler, the user can report the error or try to recover.
- In line error checking. When an error occurs, the script's execution continues on the next program statement. The user can check the err variable to determine if an error occurred.

In the **`fast_set`** example above a run time error could be generated on the setting of the ID or the setting of the value. Since the routine provides no error handling, when an error occurs, the routine exits and returns to the calling routine. If no error handler is found as the program returns up the call stack, a default error handler reports the run-time error. If you run the script from the Program Editor, a dialog box opens, and if it is run from the Basic Control Engine, a Status Log message is created.

Consider the two examples below:

```
sub inline_errorcheck()
   ' When an error occurs continue execution at the next statement
   on error resume next
   PointSet "BAD_POINT", 10
   ' Did an error occur?
   If err <> 0 then
      ' clear the error
      err = 0
      exit sub
   End if
   PointSet "BAD_POINT1", 10
   if err <> 0 then
       err = 0
       exit sub
   end if
end sub
```

```
sub outline_errorcheck()
   ' When an error occurs goto the error handler
   on error goto error_handler
   PointSet "BAD_POINT", 10
   PointSet "BAD_POINT1", 10
   exit sub
error_handler:
   MsgBox "Error"
   exit sub
end sub
```

You can choose how to handle or not handle error conditions.

Point (Object)

Overview

The Point object provides an object-oriented interface to CIMPLICITY HMI real-time point data. Through the object, you may set and read point values. Methods are supplied to receive the point value as it changes, periodically, or when the alarm state changes.

Example

```
Dim MyPoint as new Point  ' Creates a new empty point object
Dim ThisPoint as Point    ' Creates a pointer to a point object
Set ThisPoint = MyPoint   ' Now the two object are equal
```

Notes

In the above example, we create a point object in two different ways. The first example using the new keyword, is typically the method you will use. This constructs a point object, at which time you can set the ID of the point and use it. The second example creates a reference to a point and sets it to empty. A run-time error will occur if you attempt to access methods of the object, since it is currently unassigned. You can assign the reference to a particular object by using the set command. In general, you will use this with the **`PointGetNext`** function, which takes a list of point objects and returns the first one that changes.

Point.AlarmAck (Property, Read)

Syntax

`Point.AlarmAck`

Description

Boolean. When used in combination with the **`Point.OnAlarmAck`** method, a Boolean is returned indicating if the point's alarm is in an Acknowledged state.

Example

```
Sub Main()
   Dim x as new Point
   x.ID = "Some_point"
   x.OnAlarmAck
top:
   x.GetNext
   Trace "Alarm Ack state is " & x.AlarmAck
end sub
```

Point.Cancel (Method)

Syntax `Point.Cancel`

Description To cancel the currently active **OnChange**, **OnAlarm**, **OnTimed** or **OnAlarmAck** request.

Example

```
Sub Main()
   Dim t as new Point
   t.Id = "TIME"
   ' Read the next two values of the point
   t.OnChange
   for i = 1 to 2
      t.GetNext
   next I
   ' Cancel the onchange request.
   t.Cancel
   ' Get the point value every three seconds
   t.OnTimed 3
   for i = 1 to 2
      t.GetNext
   next I
End Sub
```

See Also **Point.OnChange, Point.OnTimed, Point.OnAlarm, Point.OnAlarmAck**

Point.DataType (Property, Read)

Syntax `Point.DataType`

Description Integer. To return the numeric data type of the point.

Comments The following are the possible return values.

Return Value	Description
CP_DIGITAL	A digital or Boolean value. Range **True** or **False**
CP_STRING	A character string.
CP_USHORT	An unsigned short (8-Bit) integer.
CP_UINT	An unsigned (16-Bit) integer.
CP_UDINT	An unsigned long (32-Bit) integer, returned as a double precision floating point number
CP_SHORT	A signed short (8-bit) integer.
CP_INT	A signed (16-bit) integer.
CP_DINT	A signed long (32-bit) integer.
CP_REAL	A double precision floating point.
CP_BITSTRING	A bitstring. Can only be returned as a character string.
CP_STRUCT	A structure point. Structure points are not currently supported.

Example

```
if MyPoint.DataType = CP_STRING then
  a$ = MyPoint.Value
else
  a% = MyPoint.Value
end if
```

See Also `Point.PointTypeId`

Point.DisplayFormat (Property, Read)

Syntax `Point.DisplayFormat`

Description String. To return a string containing the configured display format for the point.

Point.DownloadPassword (Property, Read)

Syntax `Point.DownLoadPassword`

Description Boolean. To determine if a download password is required to set the point.

Example

```
' Prompt the user for the download password if required to set
' the point.
Sub Main()
   Dim p as new Point
   p.Id = "CP_UINT"
   p.Value = 10
   if p.DownLoadPassword then
      pass$ = AskPassword("DownLoad Password:")
      p.Set pass$
   else
      p.Set
   end if
End Sub
```

Related Function `Point.SetPointPriv, Point.InUserView`

Point.Elements (Property, Read)

Syntax `Point.Elements`

Description Integer. To return the number of elements configured for the point. For array points this will be greater than 1, for non-array points the value will be 1.

Example

```
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "ARRAY_POINT"
   for x = 0 to MyPoint.Elements - 1
     MyPoint.Value(x) = x
   next x
   MyPoint.Set
end sub
```

Point.EnableAlarm (Method)

Syntax `Point.EnableAlarm` *enable*

Description To enable or disable alarming on the point. Can be used to temporarily disable alarming on a point.

Comments **Parameter**

Enable – Boolean – a value of TRUE enables alarming for the point and value of FALSE disables alarming for the point.

Example

```
Sub Main()
   Dim myPoint As New point
   myPoint.Id = "ALARM_POINT"
   ' Disable alarm for point.
   myPoint.EnableAlarm FALSE
End Sub
```

Point.Enabled (Property, Read)

Syntax `Point.Enabled`

Description Boolean. To determine if the point is enabled to be collected from the PLC.

```
' Return if the point is disabled.
If MyPoint.Enabled = FALSE then
   exit sub
end if
```

Point.EuLabel (Property, Read)

Syntax `Point.EuLabel`

Description String. To retrieve the Engineering Units Label for a point.

Example

```
a$ = MyPoint.EuLabel
```

or

```
if MyPoint.EuLabel = "Litres" then
   ...
end if
```

Point.Get (Method)

Syntax `Point.Get`

Description To get the current value of the point from the CIMPLICITY Point Manager and store it in the object. You may inspect the value through the **`Value`** and **`RawValue`** properties.

Example

```
Sub Main()
   Dim MyPoint as new Point
   MyPoint.Id = "\\PROJECT1\POINT1"
   MyPoint.Get
   MsgBox "The value is " & MyPoint.Value
End Sub
```

Related Routines `Point.Value, Point.OnChange, Point.OnTimed`

Point.GetArray (Method)

Syntax **`Point.GetArray`** *array* [**,** *startElement* [**,** *endElement* [**,** *fromElement*]]]

Description To retrieve an array point's values directly into a Basic array using Engineering Units Conversion if applicable. There are several rules to keep in mind:

- If the array is undimensioned, the array will be redimensioned to the same size as the point.
- If the array is dimensioned smaller than the point, only that many elements will be copied into the array.
- If the array is larger than the point, all elements of the point are copied, and the rest of the array is left as is.

If the *startElement* is specified, the function will start copying data into the array at this element and will continue until the end of the point is reached or the array is full whichever occurs first.

If the *endElement* is specified, the function will stop copying data into the array after populating this element or when the end of the point is reached.

If the *fromElement* is specified, the values copied into the array start at this element in the point array and continue as described above.

Note

You must get the point value using the **`Get`** or **`GetNext`** method prior to using the **`GetArray`** method. The **`GetArray`** method does not retrieve the current value from the Point Manager. Instead, it retrieves the current value in the Point Object, which was generated during the last **`Get`** or **`GetNext`**. See the example below.

Comments

Parameter	Description
array	Array. A dimensioned or undimensioned Basic Array to which the point data will be copied.
startElement	(optional) Integer. The first array element to which data will be copied.
endElement	(optional) Integer. The last array element to which data will be copied.
fromElement	(optional) Integer. The first point element from which data is to be copied.

Example

```
sub main()
   Dim values() as integer
   Dim p as new Point          ' Declare the point object
   p.Id = "ARRAY_POINT"        ' Set the Id
   p.Get                       ' Get value from CIMPLICITY
   p.GetArray values           ' Copy the object into values
end sub
```

Related Function **`Point.SetArray, Point.GetRawArray, Point.HasEuConv, Point.Value, Point.RawValue`**

Point.GetNext (Function)

Syntax `Point.GetNext`*[*`(`*timeout*`)`*]*

Description Boolean. A function, to read the next value of a point with a specified timeout in milliseconds. Returns `True` if the point was read, `False` if it timed out.

Example

```
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "TIME"    ' Set the Id
   MyPoint.OnChange       ' Request the value on change
   MyPoint.GetNext        ' The current value is returned immediately.
   if MyPoint.GetNext(1000) then  ' Wait 1 second for the next value.
      MsgBox MyPoint.Value        ' Display the value.
   Else
      MsgBox "Timeout"            ' Point didn't change in one second.
   end if
end sub
```

Related Routines `Point.OnChange, Point.OnTimed, Point.OnAlarm, Point.OnAlarmAck, Point.Cancel`

Point.GetNext (Method)

Syntax `Point.GetNext`

Description To wait for and get the next value of the point. This method returns when a point update is received for the point, based on a previously submitted `OnChange`, `OnAlarm`, `OnTimed` or `OnAlarmAck` call. If the point never changes, the call never returns. To wait with a timeout, see the `GetNext`(function.)

Example

```
' Calculate the average of the next two point values.
Sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "TANK_TEMPERATURE"   ' Set the Id
   MyPoint.OnChange                  ' Request point onchange
   MyPoint.GetNext                   ' Retrieve the first value.
   x = MyPoint.Value                 ' Record the value.
   MyPoint.GetNext                   ' Wait for the next value.
   x1 = MyPoint.Value                ' Record the value
   ave# = (x + x1 )/ 2               ' Calculate the average
   MsgBox "The average was " & str$(ave)
end sub
```

See Also `Point.OnChange, Point.OnAlarm, Point.OnTimed, Point.OnAlarmAck`

Point.GetRawArray (Method)

Syntax **`Point.GetRawArray`** *array* [, *startElement* [, *endElement* [, *fromElement*]]]

Description To retrieve an array points value directly into a Basic array bypassing Engineering Units Conversion. There are several rules to keep in mind

- If the array is undimensioned, the array will be redimensioned to the same size as the point.
- If the array is dimensioned smaller than the point, only that many elements will be copied into the array.
- If the array is larger than the point, all elements of the point are copied, and the rest of the array is left as is.

If the *startElement* is specified, the function will start copying data into the array at this element and will continue until the end of the point is reached or the array is full whichever occurs first.

If the *endElement* is specified, the function will stop copying data into the array after populating this element or when the end of the point is reached.

If the *fromElement* is specified, the values copied into the array start at this element in the point array and continue as described above.

Comments

Parameter	Description
array	Array. A dimensioned or undimensioned Basic Array to which the point data will be copied.
startElement	(optional) Integer. The first array element to which data will be copied.
endElement	(optional) Integer. The last array element to which data will be copied.
fromElement	(optional) Integer. The first point element from which data is to be copied.

Example

```
sub main()
   Dim rawValues() as integer
   Dim p as new Point          ' Declare the point object
   p.Id = "ARRAY_POINT"        ' Set the Id
   p.Get                       ' Get value from CIMPLICITY
   p.GetRawArray rawValues     ' Copy the object into values
end sub
```

See Also **`Point.GetArray, Point.SetRawArray, Point.HasEuConv, Point.Value, Point.RawValue`**

Point.GetValue (Property, Read)

Syntax `Point.GetValue`

Description To get a snapshot of the point value from the Point Manager and return it. This operation combines the Get Method and Value Property into a single command.

Note

If the point is unavailable (due to the device being down, remote server unavailable, etc.) an error will be generated if you attempt to access the value (since the value is unavailable.) See the **`Point.State`** property if you need to determine if the point is available or not.

Example

```
sub main()
   Dim MyPoint as new Point      ' Declare the point object
   MyPoint.Id = "TANK_LEVEL"     ' Set the point id
   x = MyPoint.GetValue            ' Read and return the value.
end sub
```

Point.HasEuConv (Property, Read)

Syntax `Point.HasEuConv`

Description Boolean. To determine if the point has Engineering Units conversion configured.

Example

```
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "DEVICE_POINT_1"
   if MyPoint.HasEuConv then
      MsgBox "Has Eu Conversion"
   else
      MsgBox "No Eu Conversion"
   end if
end sub
```

Related Function **`Point.SetRawArray, Point.SetArray, Point.GetArray, Point.GetRawArray, Point.Value, Point.RawValue`**

Point.Id (Property, Read/Write)

Syntax `Point.Id`

Description String. To get or set the object's CIMPLICITY Point ID. The function generates an error if the point is not configured or the remote server is not available.

Comments If an error is generated, one of the following error codes may be reported.

Err	Description
`CP_POINT_NOTFOUND`	The Point ID specified is invalid and was not found.

Example

```
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "\\PROJECT1\POINT1"   ' Set the id
end sub


sub processPoint(MyPoint as Point)
   if MyPoint.Id = "GEF_DEMO_COS" then  ' Compare the Id
      ...
   end if
end sub
```

Point.InUserView (Property, Read)

Syntax `Point.InUserView`

Description Boolean. To determine if the point is in the user's view. If setpoint security is enabled on the point's project and the point's resource is not in the user's view, then **`FALSE`** is returned; otherwise, **`TRUE`** is returned.

Note

If the point is not in the user's view, a run time error will be generated if you try to set it.

Example

```
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "TEST_POINT"
   if MyPoint.InUserView = TRUE
      MyPoint.SetValue = 10
   else
      MsgBox "Point not in user view, setpoint not allowed"
   end if
end sub
```

Related Routines **`Point.SetPointPriv, Point.DownLoadPassword`**

Point.Length (Property, Read)

Syntax	`Point.Length`
Description	Integer. To return the length in Bytes of the point value. This is valid only for character strings.
Related Routines	`Point.Elements`

Point.OnAlarm (Method)

Syntax `Point.OnAlarm` *[cond1 [*`,` *cond2 [*`,` *cond3 [*`,` *cond4]]]]*

Description To request the point's value when its alarm state changes. If no parameters are specified, the value will be returned whenever the alarm state changes. The four optional parameters can be used to restrict which alarm conditions will be reported to the application.

Call **`GetNext`** to obtain the next value of the point.

Only one of the **`OnChange`**, **`OnAlarm`**, **`OnTimed`** or **`OnAlarmAck`** requests may be active at a time.

Comments Optional Parameters

Value	Description
`CP_ALARM`	Send the value whenever the point changes into an Alarm (Hi or Low) State
`CP_WARNING`	Send the value whenever the point changes into a Warning (Hi or Low) State
`CP_ALARM_HIGH`	Send the value whenever the point changes into an Alarm High State.
`CP_ALARM_LOW`	Send the value whenever the point changes into an Alarm Low State.
`CP_WARNING_HIGH`	Send the value whenever the point changes into a Warning High State.
`CP_WARNING_LOW`	Send the value whenever the point changes into a Warning Low State.

Note

Due to a current limitation, selecting **`ALARM_HIGH`** and **`WARNING_LOW`**, for example, will return the point for all alarm and warning states. In other words, the High and Low end up applying to both the Alarm and Warning.

Example

```
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "TANK_LEVEL"
   MyPoint.OnAlarm
top:
   MyPoint.GetNext
   if MyPoint.State = CP_ALARM_HIGH then
      MsgBox "Alarm High"
   elseif MyPoint.State = CP_ALARM_LOW then
      MsgBox "Alarm Low"
   elseif MyPoint.State = CP_WARNING_HIGH then
      MsgBox "Warning High"
   elseif MyPoint.State = CP_WARNING_LOW then
      MsgBox "Warning Low"
   elseif MyPoint.State = CP_UNAVAILABLE then
      MsgBox "Unavailable"
   else
      MsgBox "Normal"
   end if
   goto top
end sub
```

Related Routines `Point.GetNext, Point.Cancel, Point.OnAlarmAck`

Point.OnAlarmAck (Method)

Syntax `Point.OnAlarmAck`

Description To receive the point's value when the alarm acknowledgment state changes.

Only one of the **`OnChange`**, **`OnAlarm`**, **`OnTimed`** or **`OnAlarmAck`** requests may be active at a time.

Related Routines `Point.GetNext, Point.Cancel, Point.OnAlarm`

Point.OnChange (Method)

Syntax `Point.OnChange`

Description To request the point's value on change. The next value of the point may be received by calling the **`GetNext`** method or function. The current value of the point is returned immediately. Any subsequent **`GetNext`** call will block until the point's value changes.

Only one of the **`OnChange`**, **`OnAlarm`**, **`OnTimed`** or **`OnAlarmAck`** requests may be activate at a time.

Example Read the point value on change forever.

```
Sub main()
   Dim MyPoint as new Point    ' Declare the point object
   MyPoint.Id = "TANK_LEVEL"   ' Set the Id
   MyPoint.OnChange            ' Request the value on change

top :
   MyPoint. GetNext             ' Get the value
   Trace MyPoint.Value         ' trace it to the output window
   goto top                    ' repeat forever
end sub
```

Related Routines **`Point.GetNext, Point.OnTimed, Point.Cancel`**

Point.OnTimed (Method)

Syntax **`Point.OnTimed`** *time_period*

Description To poll the points value periodically. A new value will be sent to the application every *time_period* seconds. The application should call **`GetNext`** to retrieve the next value.

Note

Unlike the **`OnChange`** method, you may miss values of the point if it changes in between your polls. Use the **`OnChange`** method to receive the point whenever it changes. **`OnTimed`** is useful if the point is rapidly changing and you are only interested in its value in a periodic manner.

Only one of the **`OnChange`**, **`OnAlarm`**, **`OnTimed`** or **`OnAlarmAck`** requests may be active at a time.

Comments

Parameter	Description
time_period	Integer. Time period in seconds to read the point

Example

```
Sub main()
   Dim MyPoint as new Point   ' Declare the point object
   MyPoint.Id = "TANK_LEVEL"  ' Set the point Id
   MyPoint.OnTimed 60         ' Request value every minute
top :
    MyPoint.GetNext           ' Read the value
    Trace MyPoint.Value        ' Put it out to the trace buffer
    goto top                   ' Repeat forever
end sub
```

See Also **`Point.GetNext, Point.OnChange, Point.Cancel.`**

Point.PointTypeId (Property, Read)

Syntax **`Point.PointTypeId`**

Description String. To retrieve the character based Point Type ID.

Example

```
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "CP_DIGITAL"
   if MyPoint.PointTypeId = "DIGITAL" then
      MsgBox "It is a digital point"
   else
      MsgBox "Point Type ID is : " & MyPoint.PointTypeId
   endif
end sub
```

See Also **`Point.DataType`**

Point.Quality (Property, Read)

Syntax `Point.Quality`

Description Long. Return the 16-bit quality mask for the point.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   MsgBox cstr(p.Quality)
End Sub
```

Point.QualityAlarmed (Property, Read)

Syntax `Point.QualityAlarmed`

Description Boolean. Returns TRUE if the point is in alarm, FALSE otherwise.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   if p.QualityAlarmed then
      MsgBox “Point is in alarm”
   End If
End Sub
```

Point.QualityAlarms_Enabled (Property, Read)

Syntax `Point.QualityAlarms_Enabled`

Description Boolean. Returns TRUE if alarming for the point is enabled, FALSE otherwise.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   if p.QualityAlarms_Enabled then
      MsgBox “Alarming is enabled”
   End If
End Sub
```

Point.QualityDisable_Write (Property, Read)

Syntax `Point.QualityDisable_Write`

Description Boolean. Returns TRUE if setpoints have been disabled for the point, FALSE otherwise.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   if p.QualityDisable_Write Then
      MsgBox “Writing disabled for point”
   End If
End Sub
```

Point.QualityIs_Available (Property, Read)

Syntax `Point.QualityIs_Available`

Description Boolean. Returns TRUE if the points value is available, FALSE if the value is unavailable.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   if p.QualityIs_Available = FALSE then
      MsgBox “Point is not available”
   End If
End Sub
```

Point.QualityIs_In_Range (Property, Read)

Syntax `Point.QualityIs_In_Range`

Description Boolean. Returns TRUE if the current value of the point is in range, FALSE if the point is out of range. When a point is out of range its value is unavailable.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   if p.QualityIs_In_Range = FALSE then
      MsgBox “Point is out of range”
   End If
End Sub
```

Point.QualityLast_Upd_Man (Property, Read)

Syntax `Point.QualityLast_Upd_Man`

Description Boolean. Returns TRUE if the current value of the point came from a manual update rather than a device read.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   if p.QualityLast_Upd_Man then
      MsgBox “Last Update Manual”
   End If
End Sub
```

Point.QualityManual_Mode (Property, Read)

Syntax `Point.QualityManual_Mode`

Description Boolean. Returns TRUE if the point has been placed into Manual Mode, otherwise FALSE.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   if p.QualityManual_Mode then
      PointSet “VALVE_1_STATE”, “In Manual”
   Else
      PointSet “VALVE_1_STATE”, “”
   End If
End Sub
```

Point.QualityStale_Data (Property, Read)

Syntax **`Point.QualityStale_Data`**

Description Boolean. Returns TRUE if the value of the point is stale, otherwise FALSE.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   if p.QualityStale_Data = TRUE
      MsgBox “Value is stale”
   End If
End Sub
```

Point.RawValue (Property, Read/Write)

Syntax **`Point.RawValue`***[***(***index***)***]*

Description Same as **`Point.Value`** except bypasses Engineering Units conversion if configured for the point. Will return into any type subject to some restrictions. All numeric types may be returned into any other numeric type and into string types. String and BitString types can only be returned into string types. If the variable being returned into does not have a type, the variable will be changed to the appropriate type, based on the point type.

Note

The **`option base`** (see language reference), determines if the first element of an array point will be zero or one. If you do not explicitly set the **`option base`**, all arrays in Basic start at 0. If you set it to 1, all arrays in Basic start at 1. See the example below.

Comments

Parameter	Description
index	(Optional) Integer. The array element to access. Range depends on the **`option base`** setting.

Example

```
' Increment the points raw value by one.
sub main()
   Dim MyPoint as new Point         ' Declare the point object
   MyPoint.Id = "TANK_LEVEL"        ' Set the Id
   MyPoint.Get                      ' Read the point
   x = MyPoint.RawValue             ' Return the raw value
   MyPoint.RawValue = x + 1         ' Set the raw value
   MyPoint.Set                      ' Write the value.
end sub
' Find the maximum raw value in the array.
option base 1                  ' Arrays start at one.
sub main()
   Dim MyPoint as new Point    ' Declare point object
   MyPoint.Id = "ARRAY_POINT"  ' Set the Point Id
   MyPoint.Get                 ' Get the value of the point
   max = MyPoint.RawValue(1)   ' Get first value (option base = 1)
   for I = 2 to MyPoint.Elements ' Loop through all elements
      if MyPoint.RawValue(I) > max then max = MyPoint.RawValue(I)
   next I
end sub
' Set all elements of the array to 10
option base 0                  ' Arrays start at 0 (default)
sub main()
   Dim MyPoint as new Point    ' Declare the object
   MyPoint.Id = "ARRAY_POINT"  ' Set the Id
   ' Loop through all elements.  Since arrays are set to start
   ' at 0, the index of the last element is one less than the
   ' count of the elements.
   for I = 0 to MyPoint.Elements - 1
      MyPoint.RawValue(I) = 10   ' Set the raw value
   next I
   ' Values are not written to CIMPLICITY until this
   ' set is executed.
   MyPoint.Set                  ' Write the point
end sub
```

Related Routines `Point.Value`

Point.ReadOnly (Property, Read)

Syntax `Point.ReadOnly`

Description Boolean. To determine if the point is read only.

Example

```
sub main()
   Dim MyPoint as new Point   ' Declare the point object
   MyPoint.Id = "TANK_LEVEL"  ' Set the Id
   if MyPoint.ReadOnly then   ' Is the point read-only?
      MsgBox "Point cannot be set, point is read-only"
   else
      MyPoint.SetValue = 10   ' Set the value and write to CIMPLICITY.
   end if
end sub
```

Point.Set (Method)

Syntax **`Point.Set`** *[downloadPassword]*

Description To write the point's value out to the CIMPLICITY HMI project. An optional download password can be supplied.

Note

The values set into the Point using the Value, **`RawValue`**, **`SetArray`** and **`SetRawArray`** methods are not written out to the CIMPLICITY HMI project until they are committed with a **`Set`** statement.

Parameter	Description
downloadPassword	(Optional) String. The download password for the project.

Example

```
sub main()
   Dim MyPoint as new Point    ' Declare the point object
   MyPoint.Id = "TANK_LEVEL"   ' Set the Id
   MyPoint.Value = 10          ' Set the value
   MyPoint.Set                 ' Write the value out to CIMPLICITY
end sub
```

See Also **`Point.SetValue, PointSet`**

Point.SetArray (Method)

Syntax **`Point.SetArray`** *array* [**,** *startElement* [**,** *endElement* [**,** *fromElement*]]]

Description To set an array point's values directly from a Basic array. There are several rules to keep in mind:

- If the array is dimensioned smaller than the point, only that many elements will be copied into the point.
- If the array is larger than the point, all elements of the array are copied, and the rest of the array is ignored.

If the *startElement* is specified, the function will start copying data from the array at this element and will continue until the end of the array is reached or the point is full whichever occurs first.

If the *endElement* is specified, the function will stop copying data from the array after copying this element or when the point is full.

If the *fromElement* is specified, the values copied from the array start at this element in the point array and continue as described above.

Note

The **`SetArray`** method only updates the internal value of the point object. The **`Set`** method must be executed to write the value out to the CIMPLICITY HMI project.

Comments

Parameter	Description
array	Array. A dimensioned or undimensioned Basic Array from which the point data will be copied.
startElement	(optional) Integer. The first array element from which data will be copied.
endElement	(optional) Integer. The last array element from which data will be copied.
fromElement	(optional) Integer. The first point element to which data is to be copied.

Example

```
' Read an array point, sort the elements by value and write them
' out to CIMPLICITY sorted.
sub main()
   Dim x() as integer         'Declare the value array
   Dim MyPoint as new Point   'Declare the point object
   Point.Get                  'Get the point value
   Point.GetArray x           'Transfer point element into array
   ArraySort x                'Sort the array
   Point.SetArray x           'Transfer to array into the point
   Point.Set                  'Transfer the sorted data to CIMPLICITY.
end sub
```

Related Routines **`Point.SetRawArray, Point.Value, Point.GetArray, Point.Set`**

Point.SetElement (Method)

Syntax **`Point.SetElement`** *index, [download password]*

Description To write a single element of the point to the Point Manager

Comments

Parameter	Description
Index	Integer. The index of the element to write.
download password	(optional) String. Optional download password

Example

```
‘ Read an array point, sort the elements by value and write them
‘ out to CIMPLICITY sorted
sub main()
   Dim x() as integer                 ‘Declare the value array
   Dim MyPoint as new Point           ‘Declare the point object
   MyPoint.Value(3) = 10              ‘Assign the value of the third element
   MyPoint.SetElement 3               ‘Write only the third element
end sub
```

Point.SetpointPriv (Property, Read)

Syntax **`Point.SetpointPriv`**

Description Boolean. To determine if the user accessing the point has Setpoint privilege.

Example

```
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "TANK_LEVEL"
   if MyPoint.SetpointPriv = FALSE then
      MsgBox "You do not have the setpoint privilege"
   else
      MyPoint.SetValue = InputBox$("Setpoint Value:")
   end if
end sub
```

Related Routines **`Point.DownloadPassword,  Point.InUserView`**

Point.SetRawArray (Method)

Syntax **`Point.SetRawArray`** *array* [, *startElement* [, *endElement* [, *fromElement*]]]

Description To set an array point's values directly from a Basic array, bypassing Engineering Units Conversion. There are several rules to keep in mind:

- If the array is dimensioned smaller than the point, only that many elements will be copied into the point.
- If the array is larger than the point, all elements of the point are set.

If the *startElement* is specified, the function will start copying data from the array at this element and will continue until the end of the array is reached or the point is full whichever occurs first.

If the *endElement* is specified, the function will stop copying data from the array after copying this element or when the point is full.

If the *fromElement* is specified, the values copied from the array start at this element in the point array and continue as described above.

Note

The **`SetRawArray`** method only updates the internal value of the point object. The **`Set`** method must be executed to write the value out to the CIMPLICITY HMI project.

Comments

Parameter	Description
array	Array. A dimensioned or undimensioned Basic Array from which the point data will be copied.
startElement	(optional) Integer. The first array element from which data will be copied.
endElement	(optional) Integer. The last array element from which data will be copied.
fromElement	(optional) Integer. The first point element to which data is to be copied.

Example

```
' Copy the log value of one array point to another array point.
sub main()
   Dim source as new Point   ' Declare source point
   Dim dest as new Point     ' Declare destination point
   Dim x() as double         ' Declare array
   source.Id = "INPUT"       ' Set the ID of the source point
   source.Get                ' Get the value of the source point
   dest.Id = "OUTPUT"        ' Set the ID of the destination point
   source.GetRawArray x      ' Transfer value to array
   ' Loop through array point, taking logarithm.
   for I = 0 to source.Elements - 1
      x(I) = log(x(I))
   next I
   dest.SetRawArray x        ' Transfer value into destination object
   dest.Set                  ' Set the value to CIMPLICITY
end sub
```

Related Routines **`Point.SetArray, Point.RawValue, Point.GetRawArray`**

Point.SetValue (Property, Write)

Syntax `Point.SetValue = a`

Description To set the point's value in a CIMPLICITY HMI project. This operation combines the **`Value`** and **`Set`** operations into one command. The **`SetValue`** method uses Engineering Units Conversion and cannot be used to set elements of an array point.

Example

```
' Ramp tank level from 0 to 100 in steps of five, with a delay
' on 100ms between each set.
sub main()
   Dim MyPoint as new Point       'Declare the point object
   MyPoint.Id = "TANK_LEVEL"      'Set the Id
   for I = 0 to 100 step 5        'Loop in steps of 5
      MyPoint.SetValue = I          'Set and write value to CIMPLICITY
      Sleep 100                   'Sleep 100ms
   next I                         'Loop
end sub
```

Point.State (Property, Read)

Syntax `Point.State`

Description Integer. To return the state of the point's value.

Comments Any of the following states may be returned.

State	Description
CP_NORMAL	Point is in Normal State
CP_ALARM_HIGH	Point is in Alarm High State.
CP_ALARM_LOW	Point is in Alarm Low State.
CP_WARNING_HIGH	Point is in Warning High State.
CP_WARNING_LOW	Point is in Warning Low State.
CP_ALARM	Point is in Alarm State.
CP_WARNING	Point is in Warning State.
CP_AVAILABLE	Point has gone from Unavailable to Available.
CP_UNAVAILABLE	Point is Unavailable

Example

```
' Increment the point value by one, if the point is unavailable,
' set it to 0.
sub main()
   Dim MyPoint as new Point
   MyPoint.Id = "TANK_LEVEL"
   MyPoint.Get
   if MyPoint.State = CP_UNAVAILABLE then
      MyPoint.SetValue = 0
   else
      MyPoint.SetValue = MyPoint.Value + 1
   end if
end sub
```

Related Routines `Point.Get, Point.GetNext`

Point.TimeStamp (Property, Read)

Syntax **`Point.TimeStamp`**

Description Date. To retrieve the timestamp into a Basic Date Object. The timestamp indicates the time at which the point's value was read from the PLC.

Example

```
Sub Main()
   Dim x as new Point
   a$ = InputBox$("Enter a point id")
   x.Id = a$
   x.OnChange
top :
   x.GetNext
   Trace str$(x.TimeStamp) & "  " & x.Value
   goto top
End Sub
```

Related Routines **`Point.Get, Point.GetNext`**

Point.UserFlags (Property, Read)

Syntax **`Point.UserFlags`**

Description Long. Returns the value of the 16-bit user defined flags for the point.

Example

```
Sub Main()
   Dim p as new Point
   p.Id = “VALVE_1”
   p.Get
   MsgBox cstr(p.UserFlags)
End Sub
```

Point.Value (Property, Read/Write)

Syntax **`Point.Value`***[***(***index***)***]*

Description To retrieve or set the value in the point object. The optional index may be supplied to access values of an array point. The first element of the array is at the zero index. The value property uses Engineering Units conversion if supplied by the point. To bypass Engineering Units conversion, use the **`RawValue`** property.

Automatic conversion will be performed between data types as needed. The only exceptions are String and BitString points, which can only be assigned from Strings.

Note

To retrieve the point value, the **`Point.Get`** method must be invoked first. Once the value has been read, it can be accessed many times without having to retrieve it from the Point Manager on each reference. If the point hasn't been read, an exception is generated.

Note

When setting a value, the value is not written to the device until the **`Set`** method is invoked.

Example

```
' This subroutine show automatic type conversion
sub main()
   Dim MyPoint as new Point        'Declare the point object
   MyPoint.Id = "INTEGER_POINT"    'Set the Id, Point Type is INTEGER
   ' The string value of "10" is automatically converted to a integer
   ' value of 10 and place in point object.
   MyPoint.Value = "10"
   MyPoint.Set                     ' Write the point
   ' The floating point value of 10.01 is truncated to 10 and place
   ' in the point
   MyPoint.Value = 10.01
   MyPoint.Set                     ' Write the point
end sub
```

Related Routines **`Point.RawValue, Point.GetArray, Point.GetRawArray`**

PointGet (Function)

Syntax **`PointGet(`***pointId$***`)`**

Description To read a particular point and return the value.

Comments

Parameter	Description
pointId$	String. The Point ID to get the value from.

Example

```
' Prompt user for point id, get the point value and display
' it into a message box.
sub main()
   MsgBox "Value is " & PointGet(InputBox$("Enter Point Id") )
end sub
```

Related Routines `PointGetMultiple`

PointGetMultiple (Function)

Syntax **`PointGetMultiple`** *point1[,point2[,point3…]]*

Description Request data from up to 30 points in a single snapshot request.

If the function fails, an error is generated.

If you need to get data from several points, use this function rather than issuing a single **`PointGet`** command for each point. For the example below, it is six times more efficient to use **`PointGetMultiple`**, since the data is retrieved from the Point Manager in a single request, rather than six separate **`PointGet`** requests.

Comments

Parameter	Description
pointn	String. Point objects for which data is going to be requested. Up to 30 may be specified as function parameters.

Example

```
sub main()
   Dim x As New Point: x.Id = “R1”
   Dim x1 As New Point: x1.Id = “R2”
   Dim x2 As New Point: x2.Id = “R3”
   Dim x3 As New Point: x3.Id = “R4”
   Dim x4 As New Point: x4.Id = “R5”
   Dim x5 As New Point: x5.Id = “R6”

   PointGetMultiple x,x1,x2,x3,x4,x5
End Sub
```

Related Routines `PointGet`

PointGetNext (Function)

Syntax

`PointGetNext(`*timeOutMs***`,`** *point1* **[`,`**... **[`,`** *point16]***`)`**

or

`PointGetNext(`*timeOutMs***`,`** *PointArray***`)`**

Description

To return the next point value from a list of points with a timeout.

The timeout value is in milliseconds, a timeout of -1 indicates to wait forever, a timeout of 0 indicates to not wait and a positive integer indicates the timeout period in milliseconds.

Point1 is a Point object with an outstanding request. Up to 16 points can be specified on the function call.

Alternatively, the user may pass an array of point objects.

The function returns the object whose value changed or empty.

Comments

Parameter	Description
timeOutMs	Integer. Maximum time to wait in milliseconds. -1 = INFINITE, 0 = Do not wait, > 0 wait. Current resolution is 10ms, all values will be rounded up to the next 10ms increment.
pointn	Point object with an OnChange, etc. Up to 16 may be specified as function parameters.
PointArray	An array of Point object with OnChange, etc.

Example

```
' Trace the values of 2 point as they change or trace timeout if neither
' point change in 1 second.
sub main()
   Dim Point1 as new Point        ' Declare Point Object
   Dim Point2 as new Point        ' Declare Point Object
   Point1.Id = "TANK_LEVEL"       ' Set the Id
   Point2.Id = "TANK_TEMP"        ' Set the Id
   Point1.OnChange                ' Register OnChange request
   Point2.OnChange                ' Register OnChange request
   Dim Result as Point            ' Declare result pointer
top :
   ' Set result equal to result of waiting on Point1 and Point2
   ' to change for 1 second
   Set Result = PointGetNext(1000, Point1, Point2)
   if Result is empty then      ' Empty is returned if timeout
      Trace "TimeOut"
   else
     ' Otherwise Result is Point1 or Point2 depending on which one
     ' changed last.
      Trace Result.Id & " " & str$(Result.TimeStamp) & Result.Value
   end if
   goto top
end sub
```

See Also

`Point.OnChange, Point.GetNext, Point.OnAlarm, Point.OnTimed, Point.OnAlarmAck`

PointSet (Statement)

Syntax **`PointSet`** *pointId$*, *value*

Description To set a point's value.

Comments

Parameter	Description
pointId$	String. The point ID to set.
value	Value to set it to.

Example

```
sub main()
   PointSet InputBox$("Point Id:"), InputBox$("Value:")
end sub
```

Trace (Command)

Syntax **`Trace`** *a$*

Description Traces (prints) a string to the trace output. By default, when running in the Program Editor, tracing will be output to the trace window. When running from the Event Manager, tracing must be specifically enabled (**`TraceEnable`**) in order for tracing to occur.

Example

```
Sub Main()
   Dim x as new Point
   a$ = InputBox$("Enter a point id")
   x.Id = a$
   x.OnChange
top :
   x.GetNext
   Trace str$(x.TimeStamp) & "  " & x.Value
   goto top
End Sub
```

TraceEnable/TraceDisable (Command)

Syntax **`TraceEnable`** *file$*
`TraceDisable`

Description **`TraceEnable`** enables tracing to a file. The file will be located in your project's log directory. Tracing to a file is only supported from the event manager. The trace output will be written to the log directory. Tracing has a performance impact since the file is opened and closed for each write. Tracing is intended for debug use only and should be removed from production code.

`TraceDisable` disables tracing to a file

Example

```
sub main()
   if PointSet("TRACE_TRIGGER") = TRUE then
      TraceEnable "MY_LOG"
   end if
   Trace "Trace Message 1"
   Trace "Trace Message 2"
   TraceDisable
end sub
```

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