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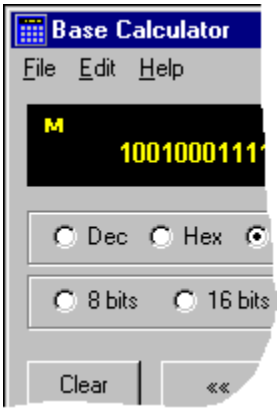
Introduction



Welcome to the **Base Calculator!**

This application was specifically written for computer programmers. It provides an integer calculator with not only the usual operations such as addition and subtraction, but also the most common logical operations. In addition, **Base Calculator** understands that computers represent integers using different bit sizes, and hence provides 8 bit, 16 bit and 32 bit numbers, both signed and unsigned. It can display these numbers in decimal, hexadecimal, binary or octal.

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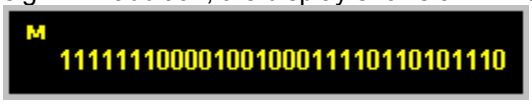
The user interface

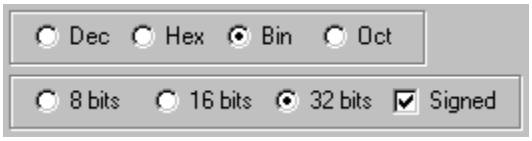
Base Calculator has been designed to mimic a standard calculator as closely as possible. As a result, the calculator is quite intuitive to use. As with a standard calculator, it consists of a display screen, various mode buttons and the actual calculator keys.

The **display screen** simply shows the current number you have entered in the appropriate base, size and sign. In addition, the display shows an **M** if a number is stored in the calculator's memory.



The Base Calculator display.

The **mode radio buttons** (and check-box) allow you to specify the base and word size of any numbers you enter, as well as if they are to be treated as signed or unsigned. For more information, click on one of the radio buttons or the check-box in the diagram below:



Select a mode button for more information.

The rest of the buttons in Base Calculator mimic **calculator keys**. These buttons allow you to enter in the required numbers, as well as to actually perform operations on them. For more details on any button, click that button in the diagram below:

Select a button for more information.

{button ,AL(`ButtonHints;BaseSizeSigned;SimpleCalc')} Related Topics

List of keyboard equivalents

Base Calculator allows you to use the keyboard instead of the mouse, as the following table shows.

Button	Key	Button	Key	Button	Key
Dec	**CTRL+D**	Clear	**ESC**	x	***** (asterisk)
Hex	**CTRL+H**	««	**BACKSPACE**	/	**/**
Bin	**CTRL+B**			-	–
Oct	**CTRL+O**	M in	**I** (letter i)	%	**%** or ****
8-bit	**CTRL+8**	MR	**R**	+	**+**
16-bit	**CTRL+1**	M+	**M**		
32-bit	**CTRL+3**			=	=
Signed	**CTRL+S**	NOT	**!** or **~** (tilde)		
		AND	**&**	0–9	**0**–**9**
(Copy)	**CTRL+C**	OR	**|** (bar)	A–F	**A**–**F**
(Paste)	**CTRL+V**	NEG	**_** (underscore)		
(Help)	**F1**	XOR	**^**		

{button ,AL(`ButtonHints')} Related Topics

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Alternatively, you can send electronic mail via the Internet to:

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To select the number base

- Click **Dec** to select decimal (base 10). In this base, the **0** to **9** keys and buttons may be used.
- Click **Hex** to select hexadecimal (base 16). In this base, the **0** to **9** keys and buttons may be used, as well as the letters **A** to **F**.
- Click **Bin** to select binary (base 2). In this base, only the **0** and **1** keys and buttons may be used.
- Click **Oct** to select octal (base 8). In this base, the **0** to **7** keys and buttons may be used.

Base Calculator will display the current number in the new number base.

{button ,AL(`BaseSizeSigned')} Related Topics

To select the word size

- Click **8 bits** to select byte-sized numbers.
- Click **16 bits** to select double-byte-sized numbers.
- Click **32 bits** to select quadruple-byte-sized numbers.

Base Calculator will truncate or extend all numbers you have entered so far to reflect the new word size.

Tips

- Changing the word size downwards (to have less bits) will **truncate** numbers. For example, 57007 as a signed 16-bit or 32-bit decimal becomes -81 in 8-bit signed decimal (in hex: DEAF becomes AF). This truncation takes place with **all** numbers entered so far, including any number in memory.
- Changing the word size upwards (to have more bits) will **extend** numbers, depending on whether they are signed or unsigned. For example, AF as an 8-bit unsigned hexadecimal will still be AF under 16-bit or 32-bit word sizes. AF as an 8-bit signed hexadecimal will become either FFAF or FFFFFFAF.

{button ,AL(`BaseSizeSigned')} Related Topics

8-bit words (bytes) are able to represent numbers in the range of -128 to 127 (signed, in decimal) or 0 to 255 (unsigned, in decimal).

16-bit words are able to represent numbers in the range of -32768 to 32767 (signed, in decimal) or 0 to 65535 (unsigned, in decimal).

32-bit words are able to represent numbers in the range of -2147483648 to 2147483647 (signed, in decimal) or 0 to 4294967295 (unsigned, in decimal).

To select signed or unsigned numbers

1 Click the **Signed** check-box to use either signed or unsigned numbers. Base Calculator will convert all of the numbers you have entered so far into the selected sign.

Tips

- Certain operations, namely, **/** (division) and **%** (modulus), differ depending on whether the numbers are signed or unsigned. For example, using 8-bit hexadecimals, AF/10= gives FB when signed numbers are used, and A when unsigned numbers are used.

{button ,AL(`BaseSizeSigned')} Related Topics

AF/10 in signed 8-bit hexadecimal is **-81/16** in decimal, which gives **FB**, ie, **-5**. As unsigned numbers, however, **AF/10** is **175/16**, which gives **A**, ie, **10**.

To perform simple calculations

1 Select the number base and word size that you wish to use.

2 Enter the first number in the calculation.

3 Click one of the basic operators or one of the logic operators.

4 Enter in the next number in the calculation.

5 Enter any remaining operators and numbers. Base Calculator makes sure that operator precedence is observed.

6 Click = to finish the calculation.

Tips

- To use your numeric keypad to enter numbers and simple operators, make sure NUM LOCK is selected.

{button ,AL(`ButtonHints;BaseSizeSigned')} Related Topics

Base Calculator supports the decimal (base 10), hexadecimal (base 16), binary (base 2) and octal (base 8) number systems, as these are the bases used by computers and programmers.

- To select a base, click the appropriate radio button (Dec, Hex, Bin, Oct).

Base Calculator supports numbers that can be stored in 8, 16 or 32 bits (binary digits).

- To select a word size, click the appropriate radio button.

The basic operators are:

+ (addition)
– (subtraction)
* (multiplication)
/ (division)
% (modulus: returns the remainder of a division)

The logic operators are:

AND (bitwise conjunction)
OR (bitwise disjunction)
XOR (bitwise exclusive OR)
EQV (bitwise equivalence or inverse XOR)
NOT (bitwise inverse)
NEG (two's complement negation)

Note that NOT and NEG operate on the current number only (ie, they are unary operators).

Operator precedence means that some operators are evaluated before others. For example, entering 5+6*7= gives 47, not 77, since the multiplication (6*7) is evaluated first, followed by the addition (5+42).

To convert a number between bases

1 Select the number base and word size that you wish to use.

2 Enter in the desired number.

3 Select the new number base. The calculator will convert the number into the new base.

or

3 Click Edit on the menu bar, then click Value (keyboard: **ALT+E** then **V**). This will show the number in all of the different bases.

Tips

- To use your numeric keypad to enter numbers, make sure NUM LOCK is selected.

{button ,AL(`ButtonHints;BaseSizeSigned')} Related Topics

To find out what a Base Calculator button does

1 Using your right mouse button, click a Base Calculator button, radio button or check-box.

2 Click the "What's This?" command.

To find out keyboard equivalents

1 Use your right mouse button to click any Base Calculator button, radio button or check-box.

2 Click the "What's This?" command.

The information that appears will list the keyboard equivalent.

Tips

- To see a complete list of keyboard equivalents, click "Related Topics" below.

{button ,AL(`ListOfKeys')} Related Topics

Working with numbers in memory

- Click **M in** to store a number. When you store a number in memory, an **M** appears in the calculator display.
- To recall the stored number, click **MR**.
- If you store another number into memory, it replaces whatever was already present.
- To clear the memory, store a zero into it.
- To add the result of the current calculation to the number already in memory, click **M+**. Note that this completes the current calculation as if = was clicked first.

To use the Clipboard

You can use the Clipboard to exchange numbers between Base Calculator and other applications, such as a programmer's editor.

- To copy the current number from Base Calculator into the Clipboard, click Edit on the menu bar, then click Copy (keyboard: **CTRL+C**). Whatever is on the calculator's display will be copied.
- To paste whatever is in the Clipboard into Base Calculator, click Edit, then click Paste (keyboard: **CTRL+V**). This has the same effect as if you typed the digits in the Clipboard yourself.

Tips

- Only currently-allowed digits may be pasted into the calculator (ie, **0**–**9** and **A**–**F**, as determined by the current base).
- Clicking **Edit**, then **Value** shows the current number in all of the different bases. These numbers may be selected with a mouse and copied into the Clipboard. Use the right mouse button for this. For more details, click "Related Topics" below.

{button ,AL(`MultValues')} Related Topics

To display a number in different bases simultaneously

1 Select your desired number base and word size.

2 Enter in the required number.

3 Click on **Edit** on the menu bar, then **Value**. This will display the current number in all of the different number bases.

Tips

- You can copy any of the numbers displayed in the Value box to the Clipboard. To do this:
  1 Select the number by dragging the mouse over it (as you would select text in any application). You can also use the right mouse button to **Select All**.
  2 Click the right mouse button on the text.
  3 Select **Copy** from the menu.

Enters this key into the calculator (if the current mode allows it).

Keyboard equivalent: **0**–**9**, **A**–**F**.

Multiplies the current number with the next number.

Keyboard equivalent: ***** (asterisk)

Divides the current number by the next number.

Keyboard equivalent: **/**

Subtracts the next number from the current number.

Keyboard equivalent: – (minus)

Calculates the **modulus** (the remainder of the current number divided by the next number).

Keyboard equivalent: **%** or ****

Adds the next number to the current number.

Keyboard equivalent: **+**

Adds the current number to any number stored in memory.

Keyboard equivalent: **M** or **m**.

Performs any operations on the previous numbers.

Keyboard equivalent: **=**

Calculates bitwise **inverse** (NOT) on the current number.

Keyboard equivalent: **~** or **!**

Calculates bitwise **conjunction** (AND) of the current number and the next number.

Keyboard equivalent: **&**

Calculates bitwise **disjunction** (OR) of the current number and the next number.

Keyboard equivalent: **|** (vertical bar)

Negates the current number (two's compliment).

Keyboard equivalent: _ (underscore)

Calculates the bitwise **exclusive OR** (XOR) of the current number and the next number.

Keyboard equivalent: ^

Calculates the bitwise **equivalence** (inverse XOR) of the current number and the next number.

Keyboard equivalent: **#**

Clears the current calculation.

Keyboard equivalent: **ESC**.

Deletes the last entered digit of the current number, if possible.

Keyboard equivalent: **BACKSPACE**.

Stores the current number in memory, overwriting any value previously there.

Keyboard equivalent: **I** or **i**.

Retrieves the number stored in memory.

Keyboard equivalent: **R** or **r**.

Displays the current number in **decimal** (base 10).

Keyboard equivalent: **CTRL**+**D**.

Displays the current number in **hexadecimal** (base 16).

Keyboard equivalent: **CTRL**+**H**.

Displays the current number in **binary** (base 2).

Keyboard equivalent: **CTRL**+**B**.

Displays the current number in **octal** (base 8).

Keyboard equivalent: **CTRL**+**O** (letter "O").

Converts all numbers entered so far (including that stored in memory) into an **8**-bit number, either signed or unsigned. The range of numbers is -128 to 127 (signed, in decimal) or 0 to 255 (unsigned, in decimal).

Keyboard equivalent: **CTRL**+**8**.

Converts all numbers entered so far (including that stored in memory) into a **16**-bit number, either signed or unsigned. The range of numbers is -32768 to 32767 (signed, in decimal) or 0 to 65535 (unsigned, in decimal).

Keyboard equivalent: **CTRL**+**1** or **CTRL**+**6**.

Converts all numbers entered so far (including that stored in memory) into a **32**-bit number, either signed or unsigned. The range of numbers is -2147483648 to 2147483647 (signed, in decimal) or 0 to 4294967295 (unsigned, in decimal).

Keyboard equivalent: **CTRL**+**3** or **CTRL**+**2**.

Converts all numbers entered so far (including that stored in memory) to be either **signed** or **unsigned**.

Keyboard equivalent: **CTRL**+**S**.

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