

The KCalc Handbook

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The KCalc Handbook

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Abstract

KCalc is a scientific calculator for KDE

Chapter 1

Introduction

This document describes KCalc version 1.8.

KCalc offers many more mathematical functions than meet the eye on a first glance. Please study the section on keyboard accelerators and modes in this handbook to learn more about the many functions available.

In addition to the usual functionality offered by most scientific calculators, KCalc offers a number of features, which I think are worthwhile pointing out:

- KCalc provides trigonometric functions, logic operations, and it is able to do statistical calculations.
- KCalc allows you to cut and paste numbers from/into its display.
- KCalc features a *results-stack* which lets you conveniently recall previous results.
- You can configure KCalc's display colors and font.
- You can configure KCalc's precision and the number of digits after the period.
- KCalc offers a great number of useful [key-bindings](#), which make using KCalc without using a pointing device easy.

Hint: pressing (and holding) the **Ctrl**-key, displays on every button, the corresponding key-binding.

Have fun with KCalc!

Bernd Johannes Wuebben

Chapter 2

Usage

2.1 General Usage

General usage is straight forward and similar to the way most simple scientific calculators operate, but take note of the following special KCalc features:

Result Stack Each time you left mouse button click on the = button or press your keyboard's **Enter** or = keys, the display result is written to KCalc's result stack. You can navigate through the result stack with your keyboard's Ctrl+Z and Ctrl+Shift+Z keys.

Percent Function The percent function works somewhat differently to that on most calculators. However, once understood, its enhanced functionality proves quite useful. See the section about the [percent](#) function for further details.

Cut and Paste • Pressing Ctrl+C will place the displayed number on to the clipboard.

- Pressing Ctrl+V will paste the clipboard content into the display if the content of the clipboard is a valid floating point number.
- It is still possible to copy/paste by clicking on KCalc's display, but this may disappear in future versions.

Advanced functions When you start KCalc for the first time, the calculator will only display buttons for basic arithmetic computations.

Under the menu entry Settings it is possible to open extra buttons for KCalc: it is for example possible to choose [Statistical](#) or [Trigonometric](#) buttons.

2.2 Statistical Mode

In this mode the left column of buttons is allocated to statistical functions:

Most of the functionality in this mode is centered around the Dat button. To create a data list of numbers, enter a number into the calculator and press Dat. A sequentially increasing number is shown on the display indicating which position in the Data 'list' the number occupies. A traditional calculator only stores three values for statistical functions: The number of discrete items in a list, the sum of the data items entered and the sum of the square of all data items in the list. KCalc differs by actually storing each discrete value, allowing you to calculate the median value of the data.

| Buttons | Function |
|---------|---|
| N | Recall the number of data items entered |
| InvN | Display the sum of all data items entered |
| Mea | Display the mean of the data items entered |
| InvMea | Display the sum of the square of all data items entered |
| Std | Display the standard deviation (n) |
| InvStd | Display the population standard deviation (n-1) |
| Med | Display the median |
| Dat | Enter a data item |
| InvDat | Clear last data item entered |
| Cst | Clear the store of all data item entered |

2.3 Trigonometric Mode

In this mode the left column of buttons is allocated to trigonometric functions:

| Buttons | Function |
|---------|---|
| Hyp | Enter Hyperbolic sub mode. Hyp Sin for example is the hyperbolic sine: $\sinh(x)$ |
| Sin | Compute the sine |
| InvSin | Compute the inverse sine |
| Cos | Compute the cosine |

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| | |
|--------|---|
| InvCos | Compute the inverse cosine |
| Tan | Compute the tangent |
| InvTan | Compute the inverse tangent |
| Log | Compute the Log base 10 |
| InvLog | Compute 10 to the power of x |
| Ln | Compute the natural logarithm. That is the log to base e |
| InvLn | Compute e to the power of x |

2.4 Memory Operations

KCalc supports the memory operations given by standard calculators plus six slots to hold constants.

2.4.1 Standard Memory Operations

KCalc can remember results of operations for you, and re-use them in later calculations. You can access these functions via several buttons labelled MR, MS, M+ and MC.

MS The MS button stores the currently displayed result in memory.

M+ The M+ button adds the current result to the one in memory. So, if you had stored a 20, and the current result is a 5, your memory would contain 25 when you press it. If the memory is empty, it acts like MS and simply stores the result.

MR The MR button gets the value stored in memory and puts it in the display.

MC The MC button clears the memory.

If a value is stored in memory a M will appear in the status bar, next to the calculator mode indicator

2.4.2 Constants

The six constants buttons C1 to C6 will only be visible after activating the item Constants Buttons in the menu Settings of the menu bar.

To store the number shown in the KCalc display in one of the six constants, first press Inv followed by the desired button key C1 up to C6.

To use the value stored in any of the constants in a calculation, just press the desired button (C1 to C6), and the corresponding number will appear in the display.

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It is possible to change the label of the constants button to make it easier to remember which button holds which constant. Click with the right mouse button on one of the buttons C1 to C6. A popup menu appears, in which you select Set Name.

There are many (mostly physical) predefined constants, which can be put on any of the six buttons C1 - C6 by selecting the desired constant in the popup menu that appears after right clicking on one of the constant buttons and selecting Choose from List. Though the predefined constants can also be accessed via the Constants in the menu bar, storing it on a constants button is very handy, if the number is used frequently.

2.5 Single Key Accelerators

To simplify entering calculations from the keyboard KCalc has single key accelerators for most functions. For example entering $7R$ or $7r$ will calculate the reciprocal of 7 ($1/7$).

During a computation, you can always press **Ctrl** to make each button display its key-binding.

| Key | Function | Notes |
|-----|----------|--|
| H | Hyp | Hyperbolic as in Hyp Sin, the $\sinh(x)$ |
| S | Sin | |
| C | Cos | |
| T | Tan | |
| N | Ln | log base e |
| L | Log | log base 10 |
| I | Inv | Inverse, e.g. if you want $\arcsin(x)$ type i s |
| \ | +/- | Change sign |
| [| x^2 | |
| ^ | x^y | |
| ! | $x!$ | Factorial |
| < | Lsh | Left shift. Note: InvLsh is Right shift |
| & | And | Logical AND |
| * | X | Multiply |
| / | / | Divide |
| D | Dat | Enter data item in statistical mode |
| O | Or | Logical OR. Note: InvOr is XOR |
| R | $1/x$ | Reciprocal |

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| | | |
|------------------|----|-----------|
| = | = | |
| Enter | = | |
| Return | = | |
| Page Up | C | Clear |
| Esc | C | Clear |
| Prior | C | Clear |
| Page Down | AC | Clear all |
| Next | AC | Clear all |
| Del | AC | Clear all |

Chapter 3

Comments on Specific Functions

3.1 Mod and Inv Mod

Mod gives the remainder of dividing the displayed number by the next input number.

22 Mod 8 = will give the result 6

22.345 Mod 8 = will give the result 6.345

Inv Mod does integer division of the displayed number by the next input number.

22 Inv Mod 8 = will give the result 2

22.345 Inv Mod 8 = also gives 2

3.2 %

Used instead of the = key, % interprets the final operation carried out in the current calculation as follows:

- If the final operator is + or - the second argument is interpreted as percentage of the first operand.
- If the final operator is * divide the result of the multiplication by 100.
- If the final operator is / give the left operand as a percentage of the right operand.
- In all other cases the % key gives identical results to the = key.

Examples: 150 + 50 % gives 225 (150 plus 50 percent of this amount)

42 * 3 % gives 1.26 (42 * 3 / 100)

45 / 55 % gives 81.81... (45 is 81.81.. percent of 55)

3.3 Lsh and Inv Lsh

Lsh left shifts the integer part of the displayed value (multiplies it by 2) n times, where n is the next input.

10 Lsh 3 = gives 80 (10 multiplied by 2 three times).

10.345 Lsh 3 = also gives 80.

Inv Lsh right shifts the value (performs an integer divide by 2) n times. 16 Inv

Lsh 2 = gives 4 (16 divided by 2 twice).

16.999 Inv Lsh 2 = also gives 4.

3.4 Cmp, And, Or and Xor

The Cmp, And and Or functions perform bitwise logical operations and therefore appear more meaningful if the Base is set to Hex, Oct or Bin rather than Dec. In the following examples Base is set to Bin.

Cmp performs a 1's complement (inverts the bits). 101 Cmp gives 111...111010

And does a logical AND. 101 And 110 = gives 100

Or does the logical OR. 101 Or 110 = gives 111

Xor performs the logical XOR (exclusive OR) operation. 101 Xor 110 = gives 11

Chapter 4

Questions and Answers

1. *How do I get e , the Euler number?*

Type 1 Inv Ln.

2. *How do I get two fixed digits after the period?*

Click on the Configure button, this will bring up the configuration dialog. Check Set fixed precision and adjust the spin control so that it shows a 2.

3. *What about Precision?*

The main factor determining the precision of KCalc is whether your libc and libmath supports the C data type long double. If this is the case, KCalc will detect this at compile time and use it as its fundamental data type to represent numbers. Adjust the Precision in KCalc's Configure dialog so that the above computations work correctly. I recommend a precision of 14 if the fundamental data type for your copy of KCalc is long double, otherwise 8 or 10. Higher precision doesn't necessarily lead to better results. Play with the precision and you will see what I mean.

Chapter 5

Command Reference

5.1 The File Menu

File → **Quit (Ctrl+Q)** Quit KCalc.

5.2 The Edit Menu

Edit → **Undo (Ctrl+Z)** Go back in the result stack.

Edit → **Redo (Ctrl+Shift+Z)** Go forward in the result stack.

Edit → **Cut (Ctrl+X)** Delete the displayed result and copy it to the clipboard.

Edit → **Copy (Ctrl+C)** Copy the displayed result to the clipboard.

Edit → **Paste (Ctrl+V)** Insert the cut or copied result in the display.

5.3 The Constants Menu

Constants → **Mathematics** Display Pi, Euler Number or Golder Ratio.

Constants → **Electromagnetism** Display Light Speed, Elementary Charge, Impedance of Vacuum, Permeability of Vacuum or Permittivity of Vacuum.

Constants → **Atomic & Nuclear** Display Planck's Constant, Elementary Charge or Fine-Structure Constant.

Constants → **Thermodynamics** Display Boltzmann Constant, Atomic Mass Unit, Molar Gas Constant, Stefan-Boltzmann Constant or Avogadro's Number.

Constants → **Gravitation** Display Constant of Gravitation or Earth Acceleration.

5.4 The Settings Menu

Settings → **Science/Engineering Buttons** Display science and engineering buttons.

Settings → **Statistic Buttons** Display [statistic buttons](#).

Settings → **Logic Buttons** Display [logic buttons](#).

Settings → **Constants Buttons** Display constants buttons.

Settings → **Show All** Display all buttons available.

Settings → **Hide All** Hide all extra buttons and display only standard default buttons.

Settings → **Configure Shortcuts...** Configure the keyboard shortcuts used by KCalc.

Settings → **Configure KCalc...** Display the KCalc settings dialog.

5.5 The Help Menu

Help → **KCalc Handbook (F1)** Invokes the KDE Help system starting at the KCalc help pages. (this document).

Help → **What's This? (Shift+F1)** Changes the mouse cursor to a combination arrow and question mark. Clicking on items within KCalc will open a help window (if one exists for the particular item) explaining the item's function.

Help → **Report Bug...** Opens the Bug report dialog where you can report a bug or request a 'wishlist' feature.

Help → **About KCalc** This will display version and author information.

Help → **About KDE** This displays the KDE version and other basic information.

Chapter 6

Credits and License

KCalc Program Copyright (c):

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KCalc was inspired by Martin Bartlett's xfrmcalc, whose stack engine is still part of KCalc.

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Appendix A

Installation

KCalc is part of the kdeutils package within the KDE project and will normally be provided as part of a KDE installation. For more details about KDE visit <http://www.kde.org>.

A.1 Compilation and Installation

KCalc is part of the KDE project <http://www.kde.org/>.

KCalc can be found in the kdeutils package on <ftp://ftp.kde.org/pub/kde/>, the main FTP site of the KDE project.

In order to compile and install KCalc on your system, type the following in the base directory of the KCalc distribution:

```
% ./configure
% make
% make install
```

Since KCalc uses **autoconf** and **automake** you should have no trouble compiling it. Should you run into problems please report them to the KDE mailing lists.

A.2 How to enable long double precision for KCalc

If your machine supports the C data type long double and if you have a working libc you can enable long double precision for KCalc.

Here is what to do:

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1. Check `../config.h` and see whether `HAVE_LONG_DOUBLE` is defined, i.e. you should be able to locate a line saying:

```
#define HAVE_LONG_DOUBLE 1
```

If you can't find such a line your system doesn't support long double IEEE precision.

2. Edit the files `kcalctype.h`, `configdlg.cpp`, `kcalc.cpp` and `kcalc_core.cpp` and remove the lines:

```
#ifdef HAVE_LONG_DOUBLE  
#undef HAVE_LONG_DOUBLE  
#endif
```

3. Recompile KCalc.