DETACHED SOLUTIONS

The Omnicalc User's Manual

Welcome to the Omnicalc User's Manual. Here you will find information regarding the usage of Omnicalc for your TI-83 Plus.

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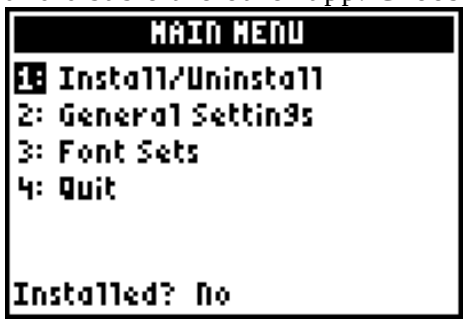
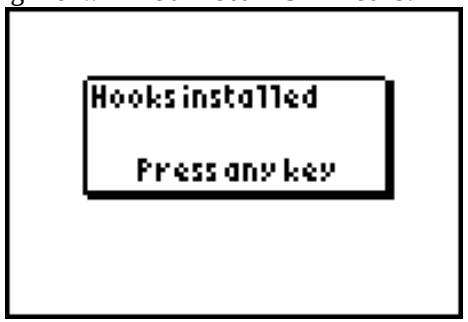
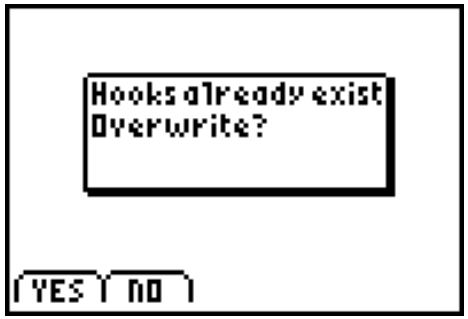
Installation : Installing

To install Omnicalc on your TI-83 Plus/TI-83 Plus Silver Edition, first you must send omnicalc.8xk to your calculator using the TI-GRAPHLINK or TI Connect software. Once it is on your calculator, press the APPS key. From the apps menu, select Omnicalc. The splash screen will appear. Press any key to clear it. At the main menu, choose 1: Install/Uninstall. The message "Hooks installed" should appear. In subsequent runs, Install/Uninstall will toggle between the installed and uninstalled states. If you see a message that says "Hooks exist. Overwrite?" this means that another application on the calculator is currently using a hook that Omnicalc needs. Choosing Yes will install Omnicalc and disable the other app. Choosing no will not install Omnicalc.







Installation : Symbolic Compatibility Top of Page

The usage of the key hook, token hook, and parser hook posed a problem for Omnicalc and Symbolic, which both make use of these hooks. However, Omnicalc detects and chains flash applications together to solve this problem. If you have the Symbolic app present on your calculator (you must have v1.8 or later), it will be automatically detected, and pressing MATH twice will display a menu with functions from Symbolic. In the same manner, Symbolic's pretty() links to the Pretty Print app; hence, you can use the functionality of all three apps via Omnicalc.

Installation : MirageOS Compatibility Top of Page

To run MirageOS via On+Apps with Omnicalc, first you must run MirageOS and press ALPHA to enter options. Scroll down to "Tasker And Key Hooks" and press Enter. Uncheck "Quick Key Repeat", "ALPHA/APPS+ON", and "Block the Memory Menu From Access". Now you can install Omnicalc. Upon pressing On+Apps, Omnicalc will automatically run MirageOS if it exists on your calculator. For On+Alpha functionality, this is always enabled whether MirageOS is on your calculator or not. On+Alpha will power off the calculator but leave it at the current screen for resuming later.

Installation : Uninstallation

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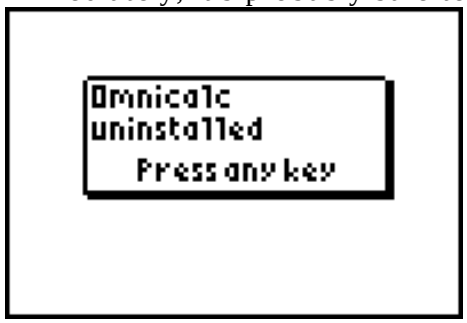
Uninstallation of Omnicalc is needed if you are planning to delete or replace the Omnicalc flash application. It is accomplished via the same "Install/Uninstall" option at the main menu. To check if Omnicalc is installed, look at the status indicator at the bottom of the screen. If it shows "Yes" then choosing "Install/Uninstall" will uninstall Omnicalc. Upon doing so, you will be prompted as shown below:

This question relates to the extra functions Omnicalc installs into the TI-OS. If Omnicalc is not present and installed, any of these functions that exist will fill the screen with garbage or crash your calculator when viewed. However, they can exist in BASIC programs and such (if ran without Omnicalc installed you will receive a version error). This option asks if you want to rename these tokens so if you have any in the entries list or such they will be safe. If you select yes, all extra functions will be changed to an upside-down question mark. If you select no, they will be left alone. If you plan to just overwrite Omnicalc with a newer version or reinstall immediately, it's probably safe to choose no.



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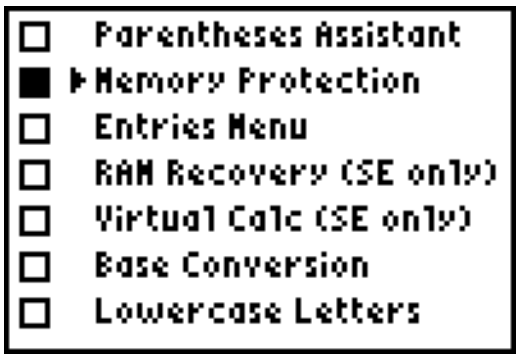
Options Screen : Usage

Options that enable or disable Omnicalc features are available in the General Settings screen, number 2 in the main menu. The up and down arrow keys move the cursor in the screen. Pressing 2nd or Enter will toggle the selected option. Clear returns to the main menu. For more specific information regarding each setting, see below.



Options Screen : Parentheses Assistant

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The first option in the options screen is the Parentheses Assistant. This feature manages the typing of parentheses in the homescreen. To enter a right parenthesis, a left one must have been already entered. In addition, parentheses levels flash upon completeting them. Parentheses within quotation marks are assumed to be strings and are exempted from the rules above.

Options Screen : Memory Protection

Top of Page

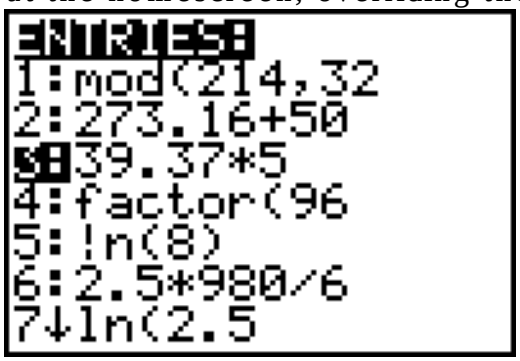
The Memory Protection feature of Omnicalc prevents users from deleting variables or resetting your memory. The Reset choice in the TI-OS memory menu

(2nd+MEM) is blocked, as well as the Del key in the Mem Mgmt/Del screen. The self-test key sequence is also blocked.

Options Screen : Entries Menu

Top of Page

The Entries Menu feature modifies your 2nd+Entry key to provide a scrolling full screen menu of past entries. The up/down arrow keys scroll, or a numeric/alpha key can be pressed to direct paste an item. Enter selects the currently highlighted item. In other words, the entries menu is identical in operation to the TI-OS menus. When enabled, the entries menu appears whenever 2nd+Entry is pressed at the homescreen, overriding the usual 2nd+Entry key behavior.



Options Screen : RAM Recovery

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If you have a TI-83 Plus Silver Edition (sorry, this feature will not work on a regular 83+), the RAM Recovery feature will automatically backup the contents of your RAM. When this option is enabled, whenever the calculator is turned off, a copy of all RAM will be created and stored. This feature works in conjunction with the RestoreMem() token. If your RAM is ever erased, run the RestoreMem() function to restore it. For more details, please see RestoreMem().

Options Screen : Virtual Calculators

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For the TI-83 Plus Silver Edition only, (the extra RAM used by this function does not exist on the regular 83+), this option will enable your calculator to create an extra 'virtual calculator' within it. This gives you the ability to use two calculators in one. To use this function, after enabling it, press On+Mode anywhere in the system OS. On+Mode will switch back and forth between the two virtual calculator states. Each state has a completely different RAM space, but remember the archive is shared. When you switch to a virtual calculator state, a "1" or "2" will appear in the upper right corner of the screen to remind you which state you are now in.

Options Screen : Base Conversion

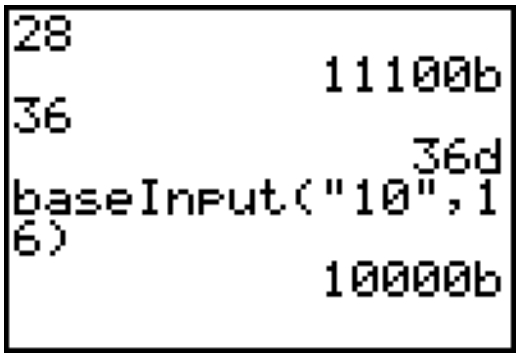
Top of Page

Omnicalc provides the ability to operate your TI-83 Plus in a variety of number bases. A number base is a number that forms the basis of the counting units of a number system, through powers. For example, decimal is base 10. As you move left in a decimal number, each digit's value increases by a factor of 10. Binary is base 2, hexadecimal is base 16, et cetera.

The base operation option, will output all homescreen real integers between 0-65535 in the number base of your choice. The default value is 10. To change base, press On+Log. Then enter the new base (valid range is 2-36). To enter a single digit value such as "5" you must enter as "05". There will be no immediate visual confirmation of the change.

Some common bases:

- Binary (base 2)
- Ternary (base 3)
- Quinary (base 5)
- Octal (base 8)
- Decimal (base 10)
- Hexadecimal (base 16)



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OS Extensions : Clipboard

The clipboard feature in Omnicalc allows the selecting, copying, and pasting of text at the homescreen. To copy and paste text:

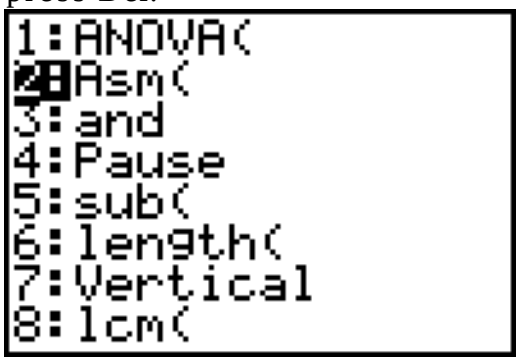
1. Move the cursor to the desired start point of the selection.
2. Press and hold ALPHA. Then, without releasing ALPHA, press the right arrow to select. If you select too far, pressing the left arrow will move the selection back.
3. Press the up arrow once.
4. Release alpha. The text is now copied to the clipboard and can be pasted at any time. When you are ready to paste:
5. Move the cursor to the desired start point of the paste.
6. Press and hold ALPHA. Then press the down arrow once. The text is pasted and you can release ALPHA.

OS Extensions : Custom Menu

Top of Page

Omnicalc provides a custom menu for your 83+, much like the CUSTOM menu on a TI-86. You can store frequently used functions from the Catalog in the CUSTOM menu for quick access. To access the custom menu, press VARS twice. To paste a function in the custom menu, scroll to it and press enter, or press the numeric key that corresponds with its entry.

Your custom menu will be empty at first. To put a function in a slot in the custom menu, go to the catalog by pressing 2nd+Catalog. Scroll to the function you want to insert and press On and the number of the slot to fill. For example, to put abs(in slot 4 you would scroll to abs(and press On+4. To remove a function from the custom menu, first press VARS twice to access the menu. Scroll to the item and press Del.



OS Extensions : Partial Clear Top of Page

When you press CLEAR at the homescreen, typically it erases the entire line. With Omnicalc, a 89-style CLEAR functionality is enabled, depending on the cursor location. If the cursor is at the end of the current entry in the homescreen, pressing CLEAR will erase the entire line. However, if the cursor is located inside the entry, pressing CLEAR will erase only tokens to the right of the cursor. Pressing CLEAR immediately again will clear the entire line.

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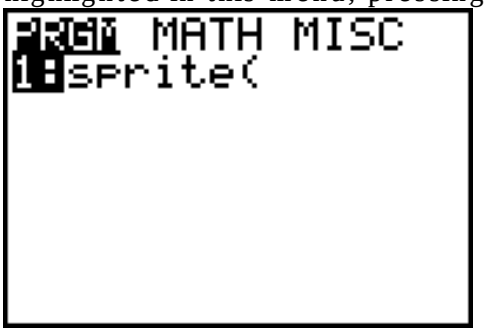
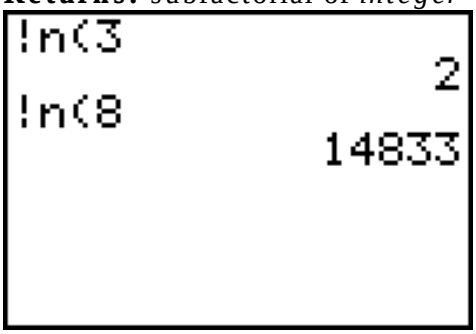
Functions : Accessing

Omnicalc provides additional functions for users and BASIC programmers. These functions can be accessed anywhere in the TI-OS by pressing the PRGM key twice. Also, if you have a function highlighted in this menu, pressing the + (Plus) key will show brief help regarding the function.



Functions : Subfactorial Top of Page

The subfactorial function will calculate the subfactorial of a positive integer. This is used in probability. The subfactorial is the number of permutations of a set with no element remaining in its original position. For example, the set {1,2,3} has only two possiblities: {3,1,2} and {2,3,1}. Hence !n(3) returns 2.
Syntax: !n(*integer*)
Returns: subfactorial of *integer*



Functions : Base Conversions Top of Page

The baseInput() function allows for the entering of numbers in other number bases than decimal, specifically base 2 through base 36. There are two required arguments, the first is the number in strings to be converted, the second is the base of the number. The number is converted to decimal and returned. If you wish to convert the inputted base to another base, there are two methods. Either use the Base Operations option to change the output format or add an optional third argument. The third argument is the bas e to convert to; it must be 2-36. The converted result of this function must be in the range 0-65535. Letters A-Z may be used in the string for bases above 10.

Syntax: baseInput(*string number, base, [new base]*)
Returns: the number converted into the current base display (usually decimal, use Base Operations to change)

```
baseInput("11001
001",2
              201d
baseInput("25",8
               15h
```

Functions : Constant Top of Page

The constant function will return the numeric value of a constant. There is one argument, a string containing the constant to return. Valid inputs are: NA, K, CC, EC, RC, GC, G, ME, MP, MN, H, C, U.
Syntax: const(*string*)
Returns: numeric value of *string*

```
const("C")
        299792458
const("G")
          9.80665
```

Functions : Factor Top of Page

The factor function numerically factors a positive integer. It takes one argument, the integer to factor. It outputs a list of the prime factors in ascending order.
Syntax: factor(*integer*)
Returns: list of prime factors of *integer*

```
factor(96
    {2 2 2 2 2 3}
factor(20
          {2 2 5}
factor(1284
      {2 2 3 107}
```

Functions : Gamma Top of Page

Gamma will return the gamma of a number. If you do not know what gamma is, then this function is not for you, read on to the next one :) It has one argument, a positive number.
Syntax: gamma(*number*)
Returns: gamma of *number*

```
gamma(8
                5040
gamma(2.47
      1.301880689
gamma(e
      1.567468256
```

Functions : Link Receive Top of Page

The linkGet() function will receive one byte over the link port. It has one argument, which is either 0 or 1. Zero indicates to try to get a byte immediately and fail if one is not present. One will make linkGet() wait indefinitely for a byte. linkGet returns either the byte received (0-255), or -1 if it failed.
Syntax: linkGet(*value*)
Returns: byte received or will return -1 if could not get byte.

```
linkGet(0
                 -1
linkGet(0
                 32
```

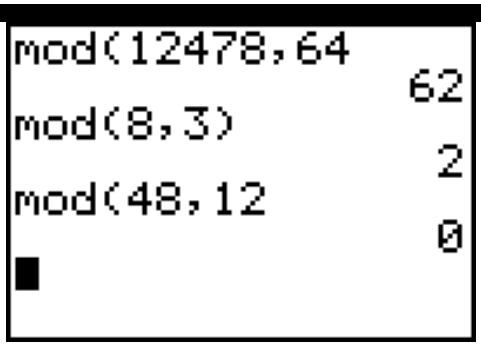
Functions : Link Send Top of Page

The linkSend function sends one byte over the link port. It has one argument, which is the value of the byte to send (0-255). It will send the byte immediately and return 0 if it was successful. If it was a failure and you are sending from a 83+ it will return -1. Due to the hardware assist in the TI-83 Plus Silver Edition it is not possible at this time to determine if sending a byte fails.
Syntax: linkSend(*value*)
Returns: 0 if success or -1 if failure

```
linkSend(64
                 -1
linkSend(78
                  0
```

Functions : Modulus Arithmetic Top of Page

The mod (modulo) function returns the integer remainder of a division. It takes two arguments, the first number is the dividend, the second is the divisor.
Syntax: mod(*dividend, divisor*)
Returns: remainder of (*dividend* ÷ *divisor*)

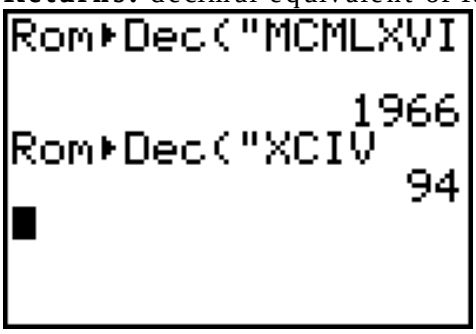


Functions : RAM Recover Top of Page

The RestoreMem() feature, if ran on a TI-83 Plus Silver Edition that has the "RAM Recovery" option enabled, will restore the memory from the last backup point. The calculator must have been turned off at least once for this function to work. This function may turn off your calculator in the process. If the screen goes blank after running, press On to turn the calculator on. Your memory should be restored.
Syntax: RestoreMem(*0*)

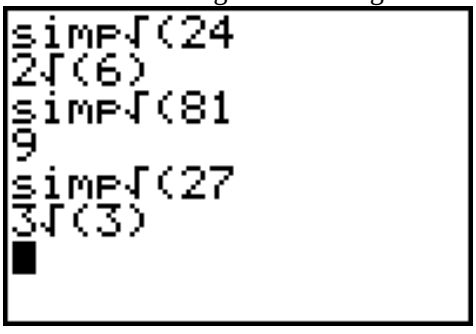
Functions : Roman Numerals Top of Page

The Rom>Dec function converts Roman numerals into our Arabic numerals. It has one argument, a string containing Roman numerals. Valid numerals are: I,V,X,L,C,D,M
Syntax: Rom>Dec(*string*)
Returns: decimal equivalent of Roman numeral *string*



Functions : Radical Simplification Top of Page

Simp√ returns the simplified form of a square root. It has one argument, a positive integer which is the radicand.
Syntax: simp√(*integer*)
Returns: string containing the simplified √(*integer*)

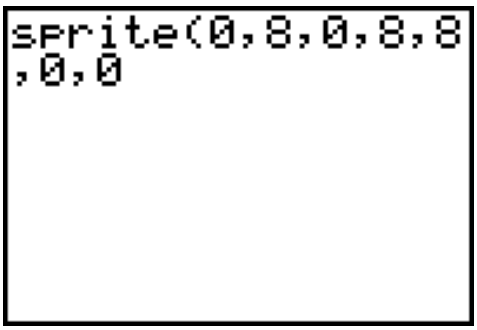


Functions : Sprites Top of Page

Sprite is the most complicated function in Omnicalc. It takes a part of a picture variable and displays it to the screen. It has 7 arguments, with an optional eighth. All arguments are integers. The arguments in order from left to right are explained below:

1. 0-9; this indicates which picture variable to use.
2. The X coordinate (0-94) where the desired sprite is in the picture variable. Must be a multiple of 8 bytes.
3. The Y coordinate (0-62) where the desired sprite is in the picture variable.
4. The width of the sprite in pixels, must be a multiple of 8 bytes.
5. The height of the sprite in pixels.
6. The X coordinate on the screen where you want to show the sprite.
7. The Y coordinate on the screen where you want to show the sprite.
8. **Optional:** This argument is optional and has 4 possible values that control the display options. If omitted, sprite() will assume value 0 (XOR logic, update screen also):
   - 0 - This will display the sprite to the graph buffer and update the display. It will use XOR logic.
   - 1 - This will display the sprite to the graph buffer, but not update the display. (Useful for erasing a sprite when you plan to immediately redraw it in a different place; or building a tilemap). It will use XOR logic.
   - 2 - This will display the sprite to the graph buffer and update the display. It will use OR logic.
   - 3 - This will display the sprite to the graph buffer, but not update the display. It will use OR logic.

Example: If Pic0 contains the screenshot on the left, and you ClrDraw, and then execute the sprite() command shown in the middle picture, the screen will look as shown in the right picture.
Syntax: sprite(*picture variable number, sprite X, sprite Y, sprite width, sprite height, destination X, destination Y,* [*options*])
Returns: 0



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Font Sets : Overview

Omnicalc provides the ability for external font sets to be loaded onto your calculator. These font sets are transferred into your RAM as programs, and are detected by Omnicalc. This lets you customize the large font set of your TI-83 Plus.

Font Sets : Creating

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A computer utility is provided to allow easy creation of font sets. To download, click here. Windows 95/98/ME/NT/2000/XP is required. You will need an unzipping utility such as WinZip to extract the installation files. After installing the Omnicalc Font Creator, a shortcut will be created in your Start menu. Click Start, Programs, Omnicalc, Omnicalc Font Creator. You can now create a font set. At the bottom of the window the number of the character you are editing is displayed. Characters 0-255 exist. By clicking in a box in the 5x7 grid you can edit the character. A preview is shown to the right. The Next button is a shortcut to quickly change to the next character. To switch characters, click on the Switch Character menu. The common characters are accessible via sub menus. For the other characters (0-31, 123-255) you will have to click and then enter the number of the character. The TI-OS normal font is the default for editing when you create a new font set, so this should serve as a guide to what each character number represents. The File menu is self-explanitory, consisting of standard file managing functions. When you have finished your set, click the Compile menu. You will then need to enter the calculator filename for the font set (limit 8 characters). Click OK and a DOS window should open. When its title contains the word "Finished" you should close it with a X. Your font set has been saved as a .8xp file in the Omnicalc Font Creator directory (default is C:\Program Files\Omnicalc). Send it to the RAM of your TI-83 Plus via the TI-GRAPHLINK or TI Connect software. For instructions on what next to do, please see the next section.

Font Sets : Using

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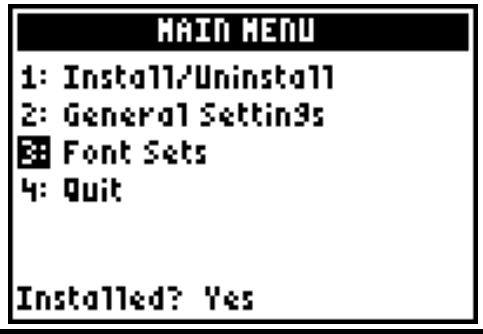
To access the font set selection screen, choose option "3: Font Sets" from the Omnicalc main menu. If you see the message "No font sets found" this means that Omnicalc could not locate any font sets in RAM; you must have at least one font set on the calc. Otherwise, you will see the font selection screen (see third picture below). Pressing the left/right arrows will scroll through the font sets available on your calculator. The current selected set's name is shown, and pressing the up/down arrows will scroll the character preview. Pressing 2nd/Enter toggles if font sets are activated; and Clear returns to the main menu.



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Credits : Support

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- Dan Englender - He discovered most of the TI-83 Plus hooks, which Omnicalc relies on for its operations. He also helped me with the bugs that seemed impossible to track down.
- Brandon Sterner - Our discussions on OS integration led to improved parser and token insert routines in Omnicalc and Symbolic, as well as interoperatiblity between our two applications.
- Kirk Meyer - He provided the math theory that I implemented for the factor() and simp√().
- Jason Kovacs - He helped with the aesthetics of Omnicalc and also provided some ideas for Omnicalc, most notably the idea for a clipboard.
- All the beta testers - They tracked down and reported numerous bugs in Omnicalc over months of testing.

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