Graph35*
A \LaTeX\ package to display keys and screen of (some) \textsc{Casio} calculators.

Louis Paternault
spalax(at)gresille(dot)org
April 4, 2023

Abstract
This package provides macros to display keys and menu items of some \textsc{Casio} calculators (including \textsc{Graph25}, \textsc{Graph35}, \textsc{Graph75} and others—).  

Foreword
My dear English readers, I am really sorry… I had my French colleagues in mind when I wrote this package, so, once in a while, the main documentation is written in French. The document you are reading now is only a translation, and I fear that my English translation is worse than what you would have read if I had written it directly in English. Sorry. And good luck reading this...

Contents
1 Introduction 2
  1.1 Licence .................................................. 2
  1.2 Summary .................................................. 2
2 Download and install 2
  2.1 GNU/Linux Distribution .................................. 2
  2.2 \LaTeX\ distribution .................................... 3
  2.3 Manual install .......................................... 3
3 Usage 3
  3.1 Supported calculators ................................. 3
  3.2 Package options ........................................ 3
  3.3 Colors .................................................. 3
  3.4 Calculators ............................................. 5
  3.5 Keys .................................................... 5
  3.6 Screen .................................................. 7
  3.7 Scaling .................................................. 7

*This document corresponds to \texttt{graph35} 0.1.4, dated 2023-04-04. Home page, bug requests, etc. at \url{http://framagit.org/spalax/graph35}. 

1
1 Introduction

This document introduces the graph35 package.

1.1 Licence

This work may be distributed and/or modified under the conditions of the \LaTeX\ Project Public License, either version 1.3 of this license or (at your option) any later version.

Further information can be found in the .dtx file used to build the .sty document and the main (French) documentation, available at http://ctan.org/pkg/graph35.

1.2 Summary

Section 2 covers installation instruction. Macros and package options are introduced in section 3. Some software developed together with this package are described in section 4. Appendixes A to D list available calculators, keys, menu items, and illustrates some options. This document does not include the implementation: it is available in the main (French) documentation.

2 Download and install

2.1 Gnu/Linux Distribution

If applicable, the easiest way to get graph35 working is by installing it by your distribution package. In Debian (and Ubuntu, and surely other distributions that inherit from Debian) it is packaged in texlive-pictures since version 2018.20180404-1. So you can install it by running:

```bash
sudo apt install texlive-pictures
```
2.2 \LaTeX\ distribution

This package is included both in \TeX\Live and MiK\TeX\. It can be installed by their respective package managers.

2.3 Manual install

- Download the archive:
  
  **Stable version** [http://mirrors.ctan.org/graphics/graph35.zip](http://mirrors.ctan.org/graphics/graph35.zip)
  
  **Development version** [https://framagit.org/spalax/graph35/repository/archive.zip?ref=main](https://framagit.org/spalax/graph35/repository/archive.zip?ref=main)
  
- Uncompress the archive.
- Compile the package: `latex graph35.ins`
- Move the several `.sty` files in a directory that is part of the \LaTeX\ path.

3 Usage

3.1 Supported calculators

**Case and keys** The macros can display case and keys of the Graph35 calculator only (although it can have another name in another country).

**Screen** This package implements screen items of models Graph25, Graph35, Graph75, FX-9860GII, FX-9750GII, and others.

3.2 Package options

This package has a single `color` option, which is set to `color=real` by default.

This option accepts two values: `real` and `blackandwhite`, defining the default key and case color. See next section for more details.

Moreover, this is not, strictly speaking, a package option, but it is possible, to make compilation faster, to add the following line before loading this package:

```
\PassOptionsToPackage{draft}{pixelart0}
```

This line will disable pixelart images (mainly the \texttt{\textbackslash function} macros, see part C.2). Indeed, having a lot of those macros can make compilation very long, and adding this line can make it faster\footnote{For instance, on my computer, adding this line to this files make compiling thirty times faster, from eight minutes to sixteen seconds.}.

3.3 Colors

3.3.1 Preset colors

You can chose the case and key colors from preset profiles, or customize them. Those preset profiles are:

**real** Realistic colors, but can be hard to read when printed in black and white.
3.3.2 Color choice

There are several ways to set colors.

- Package argument \color defines the default color to use (which can be later overloaded using option color of the macros). For instance, to make all drawing black and white, load the package using the following line.

\begin{verbatim}
\usepackage[color=blackandwhite]{graph35}
\end{verbatim}

By default, realistic color are used (color=real).

- Option color of macros \key and \calculator can have an additional value default. Using this explicitly uses the default color defined while loading the package.

\begin{verbatim}
\setgraphcolor\{real\}
\end{verbatim}

At last, default color can be redefined at any time using macro \setgraphcolor{⟨color⟩}. For instance, if the package was loaded with option color=blackandwhite, use \setgraphcolor{real} to use the real colors by default.

3.3.3 Custom colors

Arbitrary colors can also be used, by defining the following colors.

\begin{verbatim}
graph35ACON : Key ACON.
graph35ACONBORDER : Border of key ACON.
graph35ALPHA : Key ALPHA.
graph35ALPHABORDER : Border of key ALPHA.
graph35SHIFT : Key SHIFT.
graph35SHIFTBORDER : Border of key SHIFT.
graph35SCREEN : Screen pixels.
graph35SCREENBG : Screen background.
graph35CASE : Case.
graph35CASEBORDER : Case border.
graph35EXE : Key EXE.
graph35EXEBORDER : Border of key EXE.
graph35NUMBER : Number keys.
graph35NUMBERBORDER : Border of number keys.
graph35KEYTEXT : Text on keys.
graph35ALPHATEXT : Text alpha above keys.
\end{verbatim}
Those colors are color names as defined by package xcolor, and can be defined using macros from this package. For instance, to display \textcolor{graph35 KEYTEXT}{green}, use the following code:
\begin{verbatim}
\colorlet{graph35 KEYTEXT}{green}
\end{verbatim}

3.4 Calculators

\texttt{\textbackslash calculator} Right now, only one model is available: \texttt{GRAPH35+}.
Syntax is: \texttt{\textbackslash calculator\{\langle color, scale\rangle\}\{\langle model\rangle\}}.

- \{\langle model\rangle\} The list of available models is available in appendix A (page 9).
- \{\langle color\rangle\} Change calculator colors (see previous part 3.3).
- \{\langle scale\rangle\} Change calculator scale. The drawing you get might not be what you expect: see part 3.7 for more information.

For instance, command \texttt{\textbackslash calculator\{color=real\}\{graph35+E\}} displays a calculator ten times bigger than the following calculator (scaled down here for readability; a bigger version is displayed in appendix A, page 9).

One can include a calculator in a TikZ drawing, using command \texttt{\textbackslash tikzcalculator\{\langle model\rangle\}}. This command takes a single argument \{\langle model\rangle\}, and displays a calculator around coordinates \((0; 0)\). To draw a calculator elsewhere, or with another scale, use the \texttt{scope} environment, as in the following example.
\begin{verbatim}
\begin{tikzpicture}
\begin{scope}[shift={(1, 2)}, scale=.5]
\tikzcalculator{graph35+E}
\end{scope}
\end{tikzpicture}
\end{verbatim}

Anchors are defined for each keys, case borders, and screen, to be used within your TikZfigures. See appendix B for more information.

3.5 Keys

\texttt{\textbackslash key} To draw a calculator key, use:
\texttt{\textbackslash key\{\langle color, prefix, suffix, scale, shift, alpha\rangle\}\{\langle key\rangle\}}.
For instance, \key[color=blackandwhite]{DEL} displays \texttt{DEL} while \key[shift, alpha]{DEL} displays \texttt{DEL INS UNDO}.

Arguments are:

- \{(key)\} Key name to display (for instance 1 for \texttt{1}, and \texttt{EXE} for \texttt{EXE}). Key name is more or less what is displayed on it. Key names are available as a list in appendix D.1, or as a calculator with captions in figure 6.

- \{[color, scale]\} Scale and color of key. Those options have the same syntax and limitations as options of command \texttt{calculator} (see section 3.3 for colors, and 3.7 for scale).

- \{[shift, alpha]\} Those options enable or disable yellow and red text describing the key meaning when pressed after the \texttt{SHIFT} or \texttt{ALPHA} keys. By default, those texts are hidden (equivalent to \texttt{shift=false, alpha=false}); to enable the, use \texttt{shift=true} and \texttt{alpha=true} or \texttt{shift} and \texttt{alpha}.

- \{[prefix, suffix]\} For each key, anchors are defined, allowing references to the key in TikZ pictures (for instance, they are used to draw figure 6, page 30). By default, anchor names are \texttt{key} followed by the key name (for instance \texttt{keyDEL} for the \texttt{DEL} key). The \texttt{prefix} and \texttt{suffix} options make the anchor names customizable (as used in the following pictures). With those options, two keys can have different anchors on the same figure, making it possible to use each of those keys. Those options also define anchor names for \texttt{SHIFT} et \texttt{ALPHA} texts.

Without options : anchors \texttt{keyDEL}, \texttt{keyDELshift}, \texttt{keyDELalpha}.

With options \texttt{prefix=foo, suffix=bar} : anchors \texttt{fooDELbar}, \texttt{fooDELbarshift}, \texttt{fooDELbaralpha}.

The anchor names are listed in appendixes B.1 and B.2.

Peeking at the source code, you may see that more options are used. Those options are not described here because they are not meant to be used by final users, and might change in a later version without notice.

As with \texttt{calculator} and \texttt{tikzcalculator}, macro \texttt{tikzkey} does the same as \texttt{key}, excepted that it is meant to be called from within a TikZ environment. Its syntax is:

\texttt{tikzkey\{(options)\}\{(key)\}\{(coordinates)\}}

Its arguments are

- \{(options)\}: same options as macro \texttt{key} ;
- \{(key)\}: name of the key ;
- \{(coordinates)\}: coordinates the key is drawn around.
3.6 Screen

Three macros can be used to draw parts of the screen: menu items, captions of function keys, battery level.

3.6.1 Menu

\texttt{\textbackslash menu\{\{icon\}\{\{shortcut\}\}} draws an icon from the main menu. For instance, \texttt{\textbackslash menu\{RUNMAT\}\{A\}} displays \includegraphics{runningMat}. Shortcut (the character at the bottom right corner of the item) is independant from the icon, because depending of the calculator model or its version, it can change.

Appendix C.1 is a list of every menu icon and shortcut.

\texttt{\textbackslash tikzmenu} The \texttt{\textbackslash tikzmenu} macro draws a menu item in a Ti\textit{k}\textit{Z} environment. Its syntax is:

\texttt{\textbackslash tikzmenu\{\{options\}\{\{icon\}\{\{shortcut\}\{\{coordinates\}\}}

Its arguments are:

- \texttt{\{icon\}} and \texttt{\{shortcut\}}: same meaning as the corresponding \texttt{\textbackslash menu} options;
- \texttt{\{coordinates\}}: coordinates of the top-left corner of the menu item;
- \texttt{\{\{options\}\}}: some options, that are passed as-is to the \texttt{\textbackslash bwpixelart} macro (from the \texttt{pixelart0} package). They can be used to change the scale and color of the drawing (for instance \texttt{scale=.5, color=red}).

3.6.2 Functions

\texttt{\textbackslash function\{\{function\}\}} macro displays the caption of the keys \begin{symbol}{1}{5} to \begin{symbol}{1}{5} (for instance \begin{symbol}{4}{2} or \begin{symbol}{4}{2}). Available pixel-arts are listed in appendix C.2.

\texttt{\textbackslash tikzfunction\{\{options\}\{\{function\}\{\{coordinates\}\}} is the same as \texttt{\textbackslash function}, but from within a Ti\textit{k}\textit{Z} environment. The \texttt{\{function\}} argument is the same as for \texttt{\textbackslash function}; see macro \texttt{\textbackslash tikzmenu} for the meaning of arguments \texttt{\{\{options\}\}} and \texttt{\{\{coordinates\}\}}.

3.6.3 Battery

\texttt{\textbackslash battery\{\{state\}\}} displays the state of charge of the battery (for instance \begin{symbol}{5}{3}). Available pixel-arts (and arguments) are listed in appendix C.3.

\texttt{\textbackslash tikzbattery\{\{options\}\{\{state\}\{\{coordinates\}\}} is identical to macro \texttt{\textbackslash battery}, but from within a Ti\textit{k}\textit{Z} environment. Its \texttt{\{state\}} argument is the same as for \texttt{\textbackslash battery}; see macro \texttt{\textbackslash tikzmenu} for the meaning of arguments \texttt{\{\{options\}\}} and \texttt{\{\{coordinates\}\}}.

3.7 Scaling

Option \texttt{scale} used to set size of calculators and keys does not change line width or border radius. The unexpected result is the following drawing of a calculator at a \texttt{1/10} scale: the case border (green) is too big, and the screen is almost an ellipsis (among other flaws).
There are several solutions to fix this, but none of them is perfect, which is why they are not implemented.

- Get used to those flaws. Indeed, for small scale changes, they are barely noticable.
- Embed the drawing in a \scalebox or \resizebox macro: command \resizebox{.1}\{\calculator{graph35+E}\} gives the following drawing.

- Use option transform canvas from the pgf package (for instance: \begin{tikzpicture}[scale=.1, transform canvas={scale=.1}] Line width and border radius will be correctly scaled, but the bounding box will not be changed, neither will be the coordinates (thus anchors will be useless).

At last, when including drawings in a tikzpicture environment using the scale option, do not forget to add option transform shape, so that bounding box is also changed.

4 Binaries

A few Python3 software are maintained together with this \LaTeX package. They are not distributed with it, so they have to be downloaded directly from the code repository. They are specialized enough to share this package repository, but if you were to use them for something else, good for you!

Most of those handle .pxl files. This is a custom file format, coding a pixel-art picture as lines of 0s and 1s. Each menu, battery, function icon is stored as one of those files, and converted to \LaTeX code before being included in this package.

- catpxl Display a .pxl file to the terminal.
- completefunctionchars Each function icon has its readable characters associated to it (it is used in appendix C.2). This software look for function icons without such characters, and asks user for them.
- generate.keys and generate.pixelart Generate the \LaTeX files generating the pixel-art and keys, from the source files in this repository.
- screenshot2pixelart Parse a calculator screenshot to find new function and menu icons.
A Calculators

Here is the list of available calculators, together with their keyword (used as argument for macros \calculator and \tikzcalculator).

- graph35+E: figure 1.

B Anchors

Anchors of keys, shift and alpha texts, screen, etc.

B.1 Anchors of keys

Each key defines the anchors shown in figure 2.

B.2 Anchors of key REPLAY

The REPLAY key defines some additionnal anchors, for each of its arrows. They are illustrated in figure 3.

B.3 Screen anchors

Anchors of the screen are illustrated in figure 4.

B.4 Case anchors

Anchors of the case are illustrated in figure 5.
\key{DEL}

Figure 2: Key anchors

\key{REPLAY}

Figure 3: REPLAY key anchors
C Pixel art

C.1 Menu

Two special icons and shortcuts are available: black, which produces a black pixel-art; and blank, which produces nothing.

C.1.1 Icons

- \( \text{menu}(\text{black})\{\text{black}\} \)
- \( \text{menu}(\text{blank})\{\text{black}\} \)
- \( \text{menu}(\text{CONICS})\{\text{black}\} \)
- \( \text{menu}(\text{DYNA})\{\text{black}\} \)
- \( \text{menu}(\text{eACT})\{\text{black}\} \)
- \( \text{menu}(\text{ECON2})\{\text{black}\} \)
- \( \text{menu}(\text{eCON3})\{\text{black}\} \)
- \( \text{menu}(\text{EQUA})\{\text{black}\} \)
- \( \text{menu}(\text{GEOM})\{\text{black}\} \)
- \( \text{menu}(\text{GEDM})\{\text{black}\} \)
- \( \text{menu}(\text{GRAPH})\{\text{black}\} \)
- \( \text{menu}(\text{LINK})\{\text{black}\} \)
- \( \text{menu}(\text{MEMORY})\{\text{black}\} \)
- \( \text{menu}(\text{PRGM})\{\text{black}\} \)
- \( \text{menu}(\text{RECUR})\{\text{black}\} \)
- \( \text{menu}(\text{RUN})\{\text{black}\} \)
- \( \text{menu}(\text{RUNMAT})\{\text{black}\} \)
- \( \text{menu}(\text{SSHT})\{\text{black}\} \)
- \( \text{menu}(\text{STAT})\{\text{black}\} \)
- \( \text{menu}(\text{SYSTEM})\{\text{black}\} \)
- \( \text{menu}(\text{TABLE})\{\text{black}\} \)
- \( \text{menu}(\text{TVM})\{\text{black}\} \)

C.1.2 Shortcuts

Figure 4: Screen anchors
Figure 5: Case anchors
C.2 Functions

Available pixel arts are sorted according to the visible characters (latin letters and figures). To find the keyword corresponding to the picture you want, look at its visible characters, and find your picture in the corresponding part of this index.

For example, no character is visible on \( \alpha \) or \( \beta \) (indeed, letters of \( \gamma \) are greek letters, not latin ones); on \( \delta \), letters \( \alpha \, \gamma \, \eta \) are visible; on \( \gamma \), only the letter \( r \) is visible; and so on.

**Empty**

- $\text{battery}$
- $\text{blank}$
- $\text{colon-b}$
- $\text{contrast-b}$
- $\text{degree-b}$
- $\text{Delta-b}$
- $\text{different}$
- $\text{different-b}$
- $\text{dms}$
- $\text{dms-b}$
- $\text{dollar-b}$
- $\text{doublequote-b}$
- $\text{doulerightarrow-b}$
- $\text{equal-b}$
- $\text{geq-b}$
- $\text{GREEK}$
- $\text{gt}$
- $\text{gt-b}$
- $\text{key}$
- $\text{leq-b}$
- $\text{lt}$
- $\text{lt-b}$
- $\text{micro-b}$
- $\text{next}$
- $\text{nextb}$
- $\text{output-b}$
- $\text{percent-b}$
- $\text{period-b}$
- $\text{question-b}$
- $\text{quote-b}$
- $\text{rightarrow}$
- $\text{Sigma-b}$
- $\text{square-b}$
- $\text{style1}$
- $\text{style2}$
- $\text{style3}$
- $\text{style4}$
- $\text{style5}$
- $\text{style6}$
- $\text{style7}$
- $\text{tilde-b}$
10 10  3 3-b  a1  31  a1  a1-b
100  3x1  a2  33  a2-b  aa
1p  3x3  ab  38k  Aa
1s  to38k  ab  3pin  ab
1var  4  ab  3VAR
2  4-b  2x1  abc  3PIN
2  5  2x2  4 VAR
200  5-b  200  3VAR-b
21  6-b  4-b  6x1
22  60  4x2  6x2
2 7400  4x3  7400
2p  9850  2x1  abx  9850
2s  9850  2x2  aplusbx  9860
2var  9860  a  aplusbx-b
2way  a-b  ac  9860
3  a0  ac  9860
3  a0-b  add  9860
3 Pin  acn
ADD

ADD-b

adf

And-b

adv

ANGL-b

anov

anPl-b

apl

anSt-b

anPl-b

app

 AREA-b

arg

Arg-b

as

AandS-b

asgn

ASGN

aug

Aug-b

aut

auto

and

And-b

angl

ANGL-b

anov

axb

anpl

b

anSt

b1

apl

b2

app

b

amt

APR-b

tAPR

an

arg

bc

as

bc

an1

arg

bc

arg

bc

an2

arg

bcd

asgn

bcd

asgn

bcd

ancn

bin
<table>
<thead>
<tr>
<th>Original</th>
<th>Lowercase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fab</td>
<td>fab</td>
</tr>
<tr>
<td>Fab-b</td>
<td>fab-b</td>
</tr>
<tr>
<td>fact</td>
<td>fact-b</td>
</tr>
<tr>
<td>FCD</td>
<td>fcdb</td>
</tr>
<tr>
<td>FCD-b</td>
<td>fcdb-b</td>
</tr>
<tr>
<td>fast</td>
<td>fast-b</td>
</tr>
<tr>
<td>Fb</td>
<td>fb</td>
</tr>
<tr>
<td>Fb-b</td>
<td>fb-b</td>
</tr>
<tr>
<td>fcd</td>
<td>fcd</td>
</tr>
<tr>
<td>FCD</td>
<td>fcd</td>
</tr>
<tr>
<td>FILE</td>
<td>file</td>
</tr>
<tr>
<td>FILE-b</td>
<td>file-b</td>
</tr>
<tr>
<td>fill</td>
<td>fill</td>
</tr>
<tr>
<td>FILL</td>
<td>fill</td>
</tr>
<tr>
<td>FILL-b</td>
<td>fill-b</td>
</tr>
<tr>
<td>FMax</td>
<td>fmax</td>
</tr>
<tr>
<td>FMax-b</td>
<td>fmax-b</td>
</tr>
<tr>
<td>FMin</td>
<td>fmin</td>
</tr>
<tr>
<td>FMin-b</td>
<td>fmin-b</td>
</tr>
<tr>
<td>FOR-C</td>
<td>for</td>
</tr>
<tr>
<td>FOR-C-b</td>
<td>for-b</td>
</tr>
<tr>
<td>FOR</td>
<td>forc</td>
</tr>
<tr>
<td>FOR-b</td>
<td>forc-b</td>
</tr>
<tr>
<td>FORM</td>
<td>form</td>
</tr>
<tr>
<td>FORM-b</td>
<td>form-b</td>
</tr>
<tr>
<td>geo</td>
<td>geo</td>
</tr>
<tr>
<td>GCD</td>
<td>gcd</td>
</tr>
<tr>
<td>GCD-b</td>
<td>gcd-b</td>
</tr>
<tr>
<td>GCON</td>
<td>gcon</td>
</tr>
<tr>
<td>GCON-b</td>
<td>gcon-b</td>
</tr>
<tr>
<td>Gdx</td>
<td>gdx</td>
</tr>
<tr>
<td>Gdx-b</td>
<td>gdx-b</td>
</tr>
<tr>
<td>GEM</td>
<td>gmem</td>
</tr>
<tr>
<td>GEM-b</td>
<td>gmem-b</td>
</tr>
<tr>
<td>GOF</td>
<td>gof</td>
</tr>
<tr>
<td>GOF-b</td>
<td>gof-b</td>
</tr>
<tr>
<td>GO</td>
<td>go</td>
</tr>
<tr>
<td>GO-b</td>
<td>go-b</td>
</tr>
<tr>
<td>GPH1</td>
<td>gph1</td>
</tr>
<tr>
<td>GPH1-b</td>
<td>gph1-b</td>
</tr>
<tr>
<td>GPH2</td>
<td>gph2</td>
</tr>
<tr>
<td>GPH2-b</td>
<td>gph2-b</td>
</tr>
<tr>
<td>GPH3</td>
<td>gph3</td>
</tr>
<tr>
<td>GPH3-b</td>
<td>gph3-b</td>
</tr>
<tr>
<td>GPT</td>
<td>gplt</td>
</tr>
<tr>
<td>GPT-b</td>
<td>gplt-b</td>
</tr>
<tr>
<td>GRAB</td>
<td>grab</td>
</tr>
<tr>
<td>GRAB-b</td>
<td>grab-b</td>
</tr>
<tr>
<td>GRPH</td>
<td>grph</td>
</tr>
<tr>
<td>GRPH-b</td>
<td>grph-b</td>
</tr>
<tr>
<td>GDX</td>
<td>gdx</td>
</tr>
<tr>
<td>GDX-b</td>
<td>gdx-b</td>
</tr>
</tbody>
</table>
GSLV-b

gtky

Gtky-b

hcd

Hcd

help

HELP-b

hgeo

HGEQ-b

hist

Hist-b

hpd

Hpd

hyp

HYP-b

hztl

Hztl-b

i

I-b

Ipercent

Ipercent-b

iden

Iden-b

iend

IEnd-b

if

If-b

imp

Imp-b

inv

IN

IN

IN

IN

invf

InvF

invg

InvG

inh

InvH

invn

InvN

invp

InvP

invt

Invt

io

IO-b

irr

IRR

Isct

ISCT

isz

Isz-b

join

Join-b

jump

JUMP-b

k

kilo-b

lang

LANG-b
null
OPT OPT
OPT OPT-b
or
Or Or-b
orig
ORIG ORIG
out
OUT OUT
p
p-
P p-b
P Peta-b
P phat-b
P pico-b
Psnd-b
p1
p1-
phat1-b
p2
p2-
phat2-b
pa
pa-
pa-b
pab
pab-
pab-b
parm
PARM Parm
Parm Parm-b
pb
pb-
pb-b
pbp
plot
plot
Plot Plot
PLOT PLOT-b
Plot Plot-b
pmt
PMT PMT-b
pmt
poisn
POISN POISN-b
p
PgUp
PgUp
pol
POL POL-b
poly
POLY POLY-b
ppd
Ppd
prc
PRC PRC-b
prd
PRD PRD-b
pre
PRE PRE-b
pres
PRES PRES-b
prn
PRN PRN-b
PRN SPRN
PRN SPRN-b
prob
snd

Snd

solv

SOLV

SOLV-b

stat

SolvN

SolvN-b

sonic

sonic

sp

sp-b

sqr

SQR

src

SRC

SRC-b

Src-b

srsa

SRTA

SrtA-b

srtd

SRTD

SrtD-b

ssa

SSa

SSa-b

ssab

SSab

SSab-b

solv

SOLV

SOLV-b

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve

solve

Solve
tang
Tang
Tang-b

\text{tanh}
\text{tanh-b}

\text{tanh1}
\text{tanh1-b}

tcd
tcd

test
TEST
TEST-b

\text{Test-b}

\text{text}
TEXT
Text
Text-b

then

\text{Then-b}

\text{time}
TIME
TIME-b

tlow
tLow-b

tmpr
TMPR
TMPR-b

to
To
To-b

\text{tool}
TOOL
TOOL-b

top

\text{vct}
VCT
VCT-b

velo

\text{Velo}
VELO
VELO-b

\text{ver}
VER
VER-b

\text{vert}
Vert
Vert-b

\text{vlum}
Vlum
Vlum-b

\text{vnlk}
Vnlk
Vnlk-b

\text{vnr}
Vnr
Vnr-b

\text{vwin}
Vwin
Vwin-b

\text{Wake}
Wake
Wake-b

\text{Web}
Web
Web-b

\text{wend}
Wend
Wend-b

\text{while}
While
While-b

\text{Wiz}
Wiz
Wiz-b

\text{x}

\text{factorialx}
Factorial
Factorial-b

\text{sigmax}
Sigmax
Sigmax-b
C.3 Battery

List of status of battery charge.

- \texttt{battery\{empty\}}
- \texttt{battery\{low\}}
- \texttt{battery\{high\}}
- \texttt{battery\{medium\}}

D Keys

D.1 List of keys

Sorting order is arbitrary. To find them on a calculator, see figure 6.

- \texttt{ACON}
- \texttt{DEL}
- \texttt{ALPHA}
- \texttt{EXE}
- \texttt{F5}
- \texttt{F4}
- \texttt{F1}
- \texttt{F3}
- \texttt{F2}
- \texttt{MENU}
- \texttt{EXIT}
- \texttt{FD}
- \texttt{OPTN}
- \texttt{VARS}
- \texttt{XththetaT}
Figure 6: Keywords of keys
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calculator graph35+E</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Key anchors</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>REPLAY key anchors</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Screen anchors</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Case anchors</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>Keywords of keys</td>
<td>30</td>
</tr>
</tbody>
</table>