



**XASSOCCNT**

**Associated counters stepping simultaneously  
(and other gadgets)**

**Documentation**

**Version 1.4**

**2017/04/30**


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# Contents








<b>Contents</b>	<b>3</b>
<b>I Introduction</b>	<b>7</b>
1 Introduction	7
2 Requirements, loading and incompatibilities	8
2.1 Required packages and T <sub>E</sub> X engine	8
2.2 Loading of the package	8
2.3 Incompatibilities	9
2.4 Package options	9
<b>II Tools for counters</b>	<b>11</b>
3 Additions to standard commands	11
3.1 Extension of L <sup>A</sup> T <sub>E</sub> X 2 <sub>ε</sub> commands	11
3.2 L <sup>A</sup> T <sub>E</sub> X 2 <sub>ε</sub> additions	12
3.3 \IfIsDocumentCounter-Queries	15
3.4 Information macros	16
4 Counter reset lists	18
4.1 Addition and Removal	18
4.2 Information macros about the reset list	19
5 Loops on multiple counters	21
6 Counter output	25
6.1 Extra counter output types	25
6.2 Quick counter output changes	25
<b>III Features</b>	<b>30</b>
7 Associated counters	31
7.1 Association macros	31
7.2 Driver macros	35
7.3 Query macros	35

<b>8 Counter backup/restoration</b>	<b>38</b>
8.1 Key philosophy in backup/restore . . . . .	38
8.2 The default counter group "scratch" . . . . .	39
8.3 Description of basic backup/restore macros . . . . .	39
8.3.1 Common options to (most) of the backup/restore macros . . . . .	39
8.3.2 Core backup/restore macros . . . . .	40
8.3.3 Declaring counter groups . . . . .	41
8.3.4 Populating counter groups . . . . .	41
8.3.5 Clearing backup states . . . . .	41
8.3.6 Clearing backup groups . . . . .	42
8.4 Query for backup features . . . . .	43
8.4.1 Querying for backup counter group existence . . . . .	43
8.4.2 Querying for backup counter entity . . . . .	43
8.4.3 Querying for backup state entity . . . . .	43
8.5 Some notes on the backup features . . . . .	44
<b>9 Coupled counters</b>	<b>44</b>
9.1 Common options for coupled counters . . . . .	45
9.2 Macros for coupled counters . . . . .	45
<b>10 Periodic counters</b>	<b>48</b>
10.1 Commands related to periodic counters setup . . . . .	48
10.2 Commands to query for periodic counter feature . . . . .	49
<b>11 Suspending and Resuming</b>	<b>50</b>
11.1 Macros for suspension and resume . . . . .	50
11.2 Query suspension . . . . .	51
<b>12 Total counters</b>	<b>52</b>
12.1 Defining total counters . . . . .	53
12.2 Queries about total counters . . . . .	54
<b>13 Super total counters</b>	<b>55</b>
13.1 Defining super total counters . . . . .	55
13.2 Queries about super total counters . . . . .	55
13.3 The  <b>numberofruns</b> counter . . . . .	56
<b>14 Experimental features</b>	<b>56</b>
14.1 Labels . . . . .	56
14.2 Hooks . . . . .	57

<b>IV</b>	<b>Meta-Information</b>	<b>59</b>
15	To - Do list	60
16	Acknowledgments	61
17	Version history	62
<b>V</b>	<b>Appendix</b>	<b>66</b>
<b>A</b>	<b>Total number of sections</b>	<b>66</b>
<b>B</b>	<b>Subsection with suspension</b>	<b>66</b>
B.1	First dummy subsection . . . . .	67
B.2	Second dummy subsection . . . . .	67
B.3	Third dummy subsection after removing the associated counter . . . . .	67
B.4	Suspension of a non-associated counter . . . . .	67
<b>C</b>	<b>Former Backup/Restore Feature</b>	<b>68</b>
C.1	Macros for backup/restoration . . . . .	68
	<b>Index</b>	<b>72</b>

## Typographical conventions

Throughout this documentation following symbols and conventions are used:

-  **foo** means a the class `foo`
-  **foo** names a package `foo`
-  **foo** indicates a counter named `foo`
-  `foo` will indicate either a file named `foo` or a file extension `foo`
-  `foo` will indicate some files
-  **foo** names a special feature or tag `foo`
-  **foo** deals with a command or package option named `foo`

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# Part I

## Introduction




### Table of Contents


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<b>1</b>	<b>Introduction</b>	<b>7</b>
<b>2</b>	<b>Requirements, loading and incompatibilities</b>	<b>8</b>
2.1	Required packages and T <sub>E</sub> X engine . . . . .	8
2.2	Loading of the package . . . . .	8
2.3	Incompatibilities . . . . .	9
2.4	Package options . . . . .	9


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### Preface

This package is the successor and a complete rewrite of  [assoccnt](#) . Not all features of that package are implemented yet – if some functionality of your document depends on  [assoccnt](#) , continue using the older version and shift gradually to  [xassoccnt](#) please.

 Most times class and package authors will benefit of this package, but there might be usual documents that need the features of `|xassoccnt|`

## 1 Introduction

The aim of this package is to provide some additional support for example for a package like  [totcount](#) .

For example, the total number of pages in a document could be achieved by using

```
%
\regtotcounter{page}
...
The number of pages in the document is \number\totvalue{page} page(s) -- but in }
    {fact it has \total{totalpages} pages.

... The number of pages in the document is 75 page(s) – but in fact it has 74 pages.
```

This will work, as long there is no reset of the page counter, as it might happen in the case of `\setcounter` or `\pagenumbering` being applied in the document. The result is a false page counter total value.

This package provides associate counters, i.e. counters that are increased simultaneously with a driver counter and are not influenced by a resetting of the driver counter, as long as not being added to the reset list by definition of the counter or explicitly by `\@addtoreset`.

This package defines some macros to handle associated counters. The only interception to the standard behaviour is within the redefined commands `\addtocounter` and `\stepcounter`. The usual commands still work, as there is code added to their definition. In a previous version `\refstepcounter` was redefined, but since these use `\addtocounter` effectively, it was decided to use the basic command.

Internally, the associated counters are stored in one list per counter – it is not recommended to operate on those lists directly.




Please note that this package does not provide means for simultaneous stepping of counters defined by plain  $\text{\TeX}$  `\newcount` command.




## 2 Requirements, loading and incompatibilities

### 2.1 Required packages and $\text{\TeX}$ engine

The package does not require features from  $\text{Xe}\text{\LaTeX}$  or  $\text{Lua}\text{\LaTeX}$  but can be run with those features as well as with  $\text{\LaTeX}$  or  $\text{pdf}\text{\LaTeX}$ . The compilation documentation requires however  $\text{pdf}\text{\LaTeX}$  as of version 1.4.

-  [xcolor](#)
-  [xparse](#)
-  [l3keys2e](#)

The documentation file requires some more packages such as  [tcolorbox](#) but those packages are widely available on CTAN, MikTeX and TeXLive as well.

### 2.2 Loading of the package




Loading is done with

```
\usepackage[options]{xassocnt}
```

For the relevant options see section 2.4





Concerning the packages  [hyperref](#) and  [cleveref](#) : The preferred loading order is the usually recommended on:











- other packages
-  **xassoccnt**
-  **hyperref**
-  **cleveref**




For potential problems see section 2.3




### 2.3 Incompatibilities



- This package cannot be used with plain T<sub>E</sub>X and will not provide support for counters (or better counter registers) that have defined with the T<sub>E</sub>X primitive `\countdef` directly in a L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> document nor will it hook into plain T<sub>E</sub>X `\advance` commands used otherwise than in the usual L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> wrappers `\addtocounter` etc.
- This package does not work really well with the  **calc** package if that one is loaded after  **xassoccnt** . Load  **calc** **before**  **xassoccnt** !

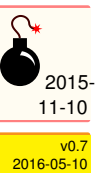
Especially the  **tcolorbox** bundle loads  **calc** indirectly, so placing any loading of  **tcolorbox** modules before  **xassoccnt** is mandatory!

 As of version 1.4  **xassoccnt** will abort compilation if  **calc** is loaded after this package, but will issue a warning only if  **calc** is loaded first.

 Of course any package other that loads  **calc** must be loaded before xassoccnt, i.e.  **mathtools** .

-  **xassoccnt** and  **perpage** are not compatible completely. As of version 1.4 it is not possible to use the command `\AddAbsoluteCounter` from  **perpage** – this feature is provided already by this package.

 It is not recommended to use counters under control of  **perpage** with the association method!



2015-11-10

### 2.4 Package options

As of version 1.4  **xassoccnt** supports the package options

`autodefinecounters`= $\langle true, false \rangle$  (initially false)

Setting this package option to `true`, all counters used with the special package macros will be autodefined, unless disabled locally. See the commands

## 2. REQUIREMENTS, LOADING AND INCOMPATIBILITIES

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- `\DeclareAssociatedCounters`<sup>→ P.31</sup>
- `\AddAssociatedCounters`<sup>→ P.33</sup>

**nonnumberofruns**

(initially not set)


Using this package option the super total counter  **numberofruns** counter will not be defined. See section 13.3 about this feature.

v0.6 2016-03-05

**redefinelabel**= $\langle true, false \rangle$

(initially  $\langle true \rangle$ )

This is an experimental feature as of version 1.4.

Enables the redefinition of the `\label`<sup>→ P.56</sup> command and takes care of the optional argument of `\label`<sup>→ P.56</sup> if  **cleveref** is used. This will provide `\label`<sup>→ P.56</sup> with a final optional argument that can be used to allow labels for associated counters (either all or only a specified list of counters), for more on this see `\label`<sup>→ P.56</sup> in section Experimental features.

Experimental  
v0.3-0.5

**standardcounterformats**= $\langle choice=on/off \rangle$

(initially  $\langle on \rangle$ )

This key enables ( $\langle on \rangle$ ) or disables ( $\langle off \rangle$ ) the definition of the standard counter formats to be used in the macro `\CounterFormat`<sup>→ P.25</sup>.

v1.4 2017-04-07

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# Part II

## Tools for counters

### Table of Contents

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<b>3</b>	<b>Additions to standard commands</b>	<b>11</b>
3.1	Extension of $\LaTeX 2_{\epsilon}$ commands . . . . .	11
3.2	$\LaTeX 2_{\epsilon}$ additions . . . . .	12
3.3	<code>\IfIsDocumentCounter-Queries</code> . . . . .	15
3.4	Information macros . . . . .	16
<b>4</b>	<b>Counter reset lists</b>	<b>18</b>
4.1	Addition and Removal . . . . .	18
4.2	Information macros about the reset list . . . . .	19
<b>5</b>	<b>Loops on multiple counters</b>	<b>21</b>
<b>6</b>	<b>Counter output</b>	<b>25</b>
6.1	Extra counter output types . . . . .	25
6.2	Quick counter output changes . . . . .	25

---

## 3 Additions and extensions to standard counter related commands

### 3.1 Extension of $\LaTeX 2_{\epsilon}$ commands

`\addtocounter{<counter>}{<increment value>}[<options>]`

The `\addtocounter` macro behaves like the usual `\addtocounter` counter, but takes care to specific counter features such as  **periodic counters** and has an optional argument in order to perform special settings.

As of 1.4, there is only one option used:

`wrap=<true/false>` (initially true)

This key determines whether addition of values to a periodic counter (see Periodic counters) will lead to a modulo part addition.

v0.9 2016-06-19

## 3.2 Additions to L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> commands

**\NewDocumentCounter** [*options*] {*counter1,counter2,...*} [*resetting counter*]

This command is a new interface to `\newcounter` and behaves effectively the same.

**initial**=*integer value* (initially 0)

This is used for the start value of the new counter.

This command allows multiple counters (specified as a comma separated list) to be defined at once, but all have the same resetting counter then and initial value is the same for all those counters (if those options are given).

v1.2  
2017-03-03

**\DeclareDocumentCounter** [*options*] {*counter*} [*resetting counter*]

This command is the preamble-only version of `\NewDocumentCounter`. This command allows multiple counters (specified as a comma separated list) to be defined at once, but all have the same resetting counter then and initial value is the same for all those counters (if those options are given), i.e. the behaviour is like in `\NewDocumentCounter`.

v1.2  
2017-03-03

**\SetDocumentCounter** [*options*] {*counter*} {*counter value*}

This command behaves like the standard macro `\setcounter`, but has an additional optional 1st argument.

#### Description of arguments of command `\SetDocumentCounter`

#1 [*options*]:

**associatedtoo**=*true/false* (initially false)

If enabled (*true*), `\SetDocumentCounter` will use the counter value for all counters associated to this driver counter as well. Initially, this option is set to *false*.

**onlycounters**=*comma separated list of counters* (initially empty)

If this key is used, only those associated counters are set as well that are given in the comma separated list.

Names, that are either not referring to counters at all or to counters that are not associated to the given driver counter will be ignored silently.

#2 {*counter*} Holds the name of the (driver) counter to be set.

#3 {*counter value*} Holds the value to be set

Some notes on `\SetDocumentCounter`

### 3. ADDITIONS TO STANDARD COMMANDS

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- The option keys associatedtoo and onlycounters are mutually exclusive!
- The counter to be set can be either a driver counter or an otherwise associated counter.

**\StepDownCounter** [*<options>*] {<counter>}

This macro subtracts the value of 1 from the counter and is the counterpart of \stepcounter.

v0.4 2016-01-26

#### Description of arguments of command \StepDownCounter

- #1 [*<options>*]: As of version 1.4, this option is not used
- #2 {<counter>} Holds the name of the first counter.

**\SubtractFromCounter** [*<options>*] {<counter>} {<delta value>}

This macro subtracts the (positive) delta value from the counter and is the counterpart of \addtocounter

v0.4 2016-01-26

#### Description of arguments of command \SubtractFromCounter

- #1 [*<options>*]: As of version 1.4, this option is not used
- #2 {<counter 1>} Holds the name of the first counter.
- #3 {<delta value>} Holds the (positive) value to be subtracted from the counter value.

**\CopyDocumentCounters** [*<options>*] {<source counter>} {<target counter>}

This document copies the counter value from the source counter in argument 2 to the target counter in argument 3.

#### Description of arguments of command \CopyDocumentCounters

- #1 [*<options>*]: As of version 1.4, this option is not used
- #2 {<source counter>} Holds the name of the source counter.
- #3 {<target counter>} Holds the name of the target counter.

**\SwapDocumentCounters** [*<options>*] {<counter 1>} {<counter 2>}

This macro swaps the values of the counters given in arguments 2 and 3

### 3. ADDITIONS TO STANDARD COMMANDS

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#### Description of arguments of command `\SwapDocumentCounters`

- #1 [*options*]: As of version 1.4, this option is not used
- #2 {*counter 1*} Holds the name of the first counter.
- #3 {*counter 2*} Holds the name of the second counter.

#### `\SyncCounters` [*options*] {*driver counter*}

This document synchronizes the driver counter value to the associated values. It has the same options as `\SetDocumentCounter`<sup>→ P. 12</sup>. If the given counter is no driver counter, nothing is done.

#### Description of arguments of command `\SyncCounters`

- #1 [*options*]: see `\SetDocumentCounter`<sup>→ P. 12</sup>
- #2 {*source counter*} Holds the name of the source counter.

```
%[breakable=true]
\SetDocumentCounter{foocntr}{17}
\SetDocumentCounter{foobarcntr}{20}

\begin{itemize}
\item Displaying counters

    \thefoocntr\ and \thefoobarcntr
\item Swapping counters

    \SwapDocumentCounters{foocntr}{foobarcntr}

    \thefoocntr\ and \thefoobarcntr

\item Step down counters

\StepDownCounter{foocntr}
\StepDownCounter{foobarcntr}

    \thefoocntr\ and \thefoobarcntr

\item Subtracting some value from the counters
    \SubtractFromCounter{foocntr}{5}
    \SubtractFromCounter{foobarcntr}{10}

    \thefoocntr\ and \thefoobarcntr
\end{itemize}
```

- 
- Displaying counters  
17 and 20
  - Swapping counters  
20 and 17
  - Step down counters  
19 and 16
  - Subtracting some value from the counters  
14 and 6

### 3.3 Commands checking whether a name refers to a counter

✉ **xassoccnt** provides three commands that are quite similar – all check whether  $\{\langle name \rangle\}$  is an already defined  $\text{\LaTeX 2}_{\epsilon}$  counter (name), in good tradition with the ✉ **xparse** - syntax:

- **\IfIsDocumentCounterTF** $[\langle \rangle]{\langle name \rangle}{\langle true branch \rangle}{\langle false branch \rangle}$

This macro performs the full branching

### 3. ADDITIONS TO STANDARD COMMANDS

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- `\IfIsDocumentCounterT[⟨⟩]{⟨name⟩}{⟨long⟩ true branch}`

This command executes only if the name is a counter.

`\IfIsDocumentCounterF[⟨⟩]{⟨name⟩}{⟨true branch⟩}`

This command executes only if the name is not a counter.

The optional argument is not used as of version 1.4 for none of those three commands.

#### 3.4 Information on counters

On occasions it might be important to have some information which counter has been changed last. Since there are four commands manipulating counter values, there are four corresponding routines for this:

##### `\LastAddedToCounter`

This command has no arguments and expands to the name of the counter which was used last in `\addtocounter`. There is no further typesetting done with the countername.

```
\newcounter{SomeCounter}
```

```
\addtocounter{SomeCounter}{10}
```

The last counter something added to was `\LastAddedToCounter`.

---

The last counter something added to was totalsubsections.

Expandable

v1.3  
2017-03-04

! Please note that `\LastAddedToCounter` might fail!

##### `\LastSteppedCounter`

This command has no arguments and expands to the name of the counter which was stepped last using `\stepcounter`. There is no further typesetting done with the countername.

```
\stepcounter{SomeCounter}
```

The last counter being stepped was `\LastSteppedCounter`.

---

The last counter being stepped was SomeCounter.

Expandable

v1.3  
2017-03-04



### 3. ADDITIONS TO STANDARD COMMANDS

#### `\LastRefSteppedCounter`

This macro gives the last counter being used in `\refstepcounter` and is expandable.

```
\begin{equation}
  E = mc^2 \label{eq:einstein}
\end{equation}
% \stepcounter{SomeCounter}
```

The last counter being refstepped was `\LastRefSteppedCounter`.

$$E = mc^2 \tag{1}$$

The last counter being refstepped was equation.

Expandable  
v1.3  
2017-03-04

#### `\LastSetCounter`

This command has no arguments and expands to the name of the counter which was set last using `\setcounter`. There is no further typesetting done with the countername.

```
\setcounter{SomeCounter}{21}%
```

The last counter being set was `\LastSetCounter`.

The last counter being set was SomeCounter.

Expandable  
v1.3  
2017-03-04

#### `\LastCounterValue`

This command has no arguments and expands to the value of the very last change of a counter, i.e. using `\setcounter` etc.

```
\setcounter{SomeCounter}{100}%
```

The last counter being set was `\LastSetCounter` and it had the value 2  
`\LastCounterValue{}` then, where as `\stepcounter{equation}` will yield 2  
`\fbox{\LastSteppedCounter}` and `\LastCounterValue!`

The last counter being set was SomeCounter and it had the value 100 then, where as will yield equation  
and 2!

The usage of `\LastSetCounter` is best together with one of the other `\Last...` macros.

! All of the `\Last...` macros are expandable, i.e. it is possible to store the value to an macro defined with `\edef`

## 4. COUNTER RESET LISTS

```
\setcounter{SomeCounter}{50}%  
  
\edef\lastcounterset{\LastSetCounter}  
\edef\lastcountervalue{\LastCounterValue}  
  
\setcounter{equation}{81}%
```



The last counter being set was `\fbox{\LastSetCounter}` and it had the value `\LastCounterValue{}` then, but we changed `\lastcounterset{}` earlier and it had the value `\lastcountervalue{}` then.

The last counter being set was `equation` and it had the value 81 then, but we changed `SomeCounter` earlier and it had the value 50 then.



Please note, that all of this commands are only working in the current run of compilation, i.e. after there has been some operation on the counters. They can't be used for information on the last changed counter in a previous run.

## 4 Counter reset lists

The package  **chngcntr** offers the possibility of add or remove counters to the reset list of a driver counter with the commands `\counterwithin` and `\counterwithout`, whereas the package  **rem-reset** provides `\@removefromreset` as a counterpart to the  $\text{\LaTeX 2}_{\epsilon}$  core command `\@addtoreset` macro.

### 4.1 Addition and Removal of counters from the reset list

v1.0 2016-07-28

v1.4  
2017-04-07

**`\RemoveFromReset`** $\{\langle counter name1, counter name2, \dots \rangle\}\{\langle driver counter name \rangle\}$

This macro removes the counters given in the comma separated list in the first argument from the reset list of the driver counter given in the 2nd argument.

If the 2nd argument does not point to a  $\text{\LaTeX 2}_{\epsilon}$  counter name an error message is shipped and the compilation fails.

v1.4  
2017-04-07

**`\RemoveFromFullReset`** $\{\langle counter name1, counter name2, \dots \rangle\}\{\langle driver counter name \rangle\}$

This macro removes the counters given in the comma separated list in the first argument and all of its own reset list from the reset list of the driver counter given in the 2nd argument.

## 4. COUNTER RESET LISTS

---

If the 2nd argument does not point to a  $\LaTeX 2_{\epsilon}$  counter name an error message is shipped and the compilation fails.

`\ClearCounterResetList{<driver counter name>}`

v1.4 2017-04-07

This macro removes all counters of the given driver counter reset list. The individual counter formatting macros `\theX` are reset both for the driver counter as well as the counters in the reset list to use the `\arabic` standard output macro. `X` means some arbitrary  $\LaTeX 2_{\epsilon}$  counter name. If the resetting shall not be applied, use `\ClearCounterResetList*` instead.

`\ClearCounterResetList*{<driver counter name>}`

v1.4 2017-04-07

This behaves like `\ClearCounterResetList` but does **not** reset the relevant `\theX` macros.

`\AddToReset{<counter name1, counter name2,...>}{<driver counter name>}`

v1.4  
2017-04-07

This macro adds the counters given in the comma separated list in the first argument to the reset list of the driver counter given in the 2nd argument.

If the 2nd argument does not point to a  $\LaTeX 2_{\epsilon}$  counter name an error message is shipped and the compilation fails.

An accidental specification of the driver counter to be added to its own reset list is ignored internally.

### 4.2 Information macros about the counter reset list

Sometimes it might be necessary or convenient to know how many counters are on a reset list of some other counters, i.e. added by `\newcounter{counter}[resetting counter]` or `\NewDocumentCounter`<sup>→ P. 12</sup>. There are some macros that provide this information:

`\countersresetlistcount{<counter name>}`

This macro determines the number of counters being in the reset list of the counter specified as mandatory argument.

Please note: This command isn't expandable. The number is stored internally to another macro, which can be accessed with `\getresetlistcount`, which returns a pure integer number.

`\getresetlistcount`

This macro returns the number of counters being in the reset list of the counter specified as mandatory argument. It needs a previous call of `\countersresetlistcount` first!




If the counter has no other counters in its reset list, the value of 0 is returned.

`\CounterFullResetList{<counter name>}`


v1.0 2016-07-28


#### 4. COUNTER RESET LISTS

This macro determines the full reset list of a counter as well of the counters being on the reset list, i.e. the list is tracked down until there are no counters left in a recursion.

The counter names are stored internally in  **expl3** - \seq - variable named `\xy_fullresetlist_seq` – the `\xy` is replaced by the counter name, e.g. if the counter is named  **foo**, the identifier would be `\foo_fullresetlist_seq`. Unless  **expl3** features are not applied, the `\CounterFullResetList` is not really useful on a document or package/class developing level. However, to loop through the full reset list with some action performed on the members of the sequence, the command `\LoopFullCounterResetList`<sup>→ P.23</sup> may be very useful.



- The driver counter  **foo** is not added to the relevant sequence.
- If the name given to `\CounterFullResetList`<sup>→ P.19</sup> does not indicate a  $\text{\LaTeX} 2_{\epsilon}$  counter an error message is shipped and the compilation fails.

**`\IfInResetListTF`** `{<resetting counter>}{<reset counter>}{<true branch>}{<false branch>}`

This command sequence tests whether the counter `<reset counter>` is in the reset list of `<resetting counter>` and expands the relevant branch then. See the short-circuit commands `\IfInResetListT` and `\IfInResetListF` as well.

**`\IfInResetListT`** `{<resetting counter>}{<reset counter>}{<true branch>}`

This command sequence tests whether the counter `<reset counter>` is in the reset list of `<resetting counter>` and expands to the true branch. See the related commands `\IfInResetListTF` and `\IfInResetListF` as well.

**`\IfInResetListF`** `{<resetting counter>}{<reset counter>}{<false branch>}`


This command sequence tests whether the counter `<reset counter>` is not in the reset list of `<resetting counter>` and expands to the false branch. See the related commands `\IfInResetListTF` and `\IfInResetListT` as well.

**`\DisplayResetList`** `[<separator=,>]{<resetting counter>}`

This command displays the reset list of a counter as a separated list. If the counter has no resetting list, nothing is shown.

v0.8 2016-06-10

##### Description of arguments of command `\DisplayResetList`

- #1**  `[<separator>]` This separator is used for display, it defaults to a comma character.
- #2** `{<resetting counter>}`  
Contains the name of counter whose resetting list should be displayed.

## 5. LOOPS ON MULTIPLE COUNTERS

---

### `\ShowResetList{⟨resetting counter⟩}`

This command displays the reset list of a counter on the terminal as the `\show` command would do. This is rather useful for debugging purposes only.

v0.8 2016-06-10

### `\GetAllResetLists`

This determines all reset lists and stores the information internally. It should be called right before `\begindocument` or at any time inside the document environment, when new counters are added there (which is not recommended)

The information can be retrieved with `\GetParentCounter`.

v1.3 2017-03-04

### `\GetParentCounter{⟨counter⟩}`

This macro tries to detect the counter that was responsible for the resetting of the counter named `{⟨counter⟩}` and is expandable. In order to minimize the amount of searching and maintaining expandability, the counter reset data must be stored beforehand, i.e. with `\GetAllResetLists`.

Expandable

v1.3 2017-03-04

! If a counter has been added to more than one parent counter as their resetting driver counter, only the most recent addition is in action. This may be correct in some occasions but there is no guarantee that the given counter name really caused the last reset of the counter given as argument.

## 5 Performing the same action for many counters

Sometimes it might be necessary to set the values of many counters at once. This can be done with consecutive `\setcounter` statements, for example. This poses no problem, but might become tedious if there are more than three counters or if this task occurs more than once. [✉ xassocnt](#) provides some macros that can do the usual operations like stepping, refstepping, adding to, resetting or setting counter values.

v0.7 2016-05-10

All macros concerning this feature use the first macro argument having a comma-separated list of counters. Whether there's a second argument depends on the specific nature of the operation that should be performed.

- !
- As of version 1.4 `xassocnt` does not check whether the names given in the first argument refer to counters.
  - All macros use the extended counter macros, i.e. are aware of associated counters and step them too if their driver counter is given in the argument list. If an associated counter itself is given in the list, this one is stepped or operated on too!

### `\LoopAddtoCounters{⟨counter1, counter2, ...⟩}{⟨counter increment/decrement⟩}`

The 2nd argument value is added (or subtracted) to the counters given in the list of the 1st argument using the `\addtocounter`.

v0.7 2016-05-10

## 5. LOOPS ON MULTIPLE COUNTERS

- #1**  $\{\langle counter1, counter2, \dots \rangle\}$  Holds the comma separated list of counter names
- #2**  $\{\langle counter increment/decrement \rangle\}$  Specifies the value to be added or subtracted.  
No check is performed whether **#2** **is** or **expands** to an integer value.

**\LoopResetCounters** $\{\langle counter1, counter2, \dots \rangle\}$

All counters given in the first argument are set to zero using the regular `\setcounter`. This is a shorthand version of `\LoopSetCounters` for this specific case.

- #1**  $\{\langle counter1, counter2, \dots \rangle\}$  Holds the comma separated list of counter names

**\LoopRefstepCounters** $\{\langle counter1, counter2, \dots \rangle\}$

All counters given in the first argument are stepped using the regular `\refstepcounter` to allow labels – however, only the last counter will have the correct label reference.

**!** This macro is meant only to complete the number of `\Loop...Counters` but is not regarded as being really useful.

- #1**  $\{\langle counter1, counter2, \dots \rangle\}$  Holds the comma separated list of counter names

**\LoopSetCounters** $\{\langle counter1, counter2, \dots \rangle\}\{\langle new counter value \rangle\}$

The 2nd argument value is used as new counter value added (or subtracted) to the counters given in the list of the 1st argument using the `\addtocounter`.

- #1**  $\{\langle counter1, counter2, \dots \rangle\}$  Holds the comma separated list of counter names
- #2**  $\{\langle new counter value \rangle\}$  Specifies the value to be set.  
No check is performed whether **is** or **expands** to an integer value.

**\LoopStepCounters** $\{\langle counter1, counter2, \dots \rangle\}$

### Description of arguments of command `\LoopStepCounters`

All counters given in the first argument are stepped using the regular `\stepcounter`.

- #1**  $\{\langle counter1, counter2, \dots \rangle\}$  Holds the comma separated list of counter names

A more general command for doing "arbitrary" operations with counters (and more setup, for example) is

**\LoopCountersFunction** $\{\langle counter1, counter2, \dots \rangle\}\{\langle counter operation macro \rangle\}$

## 5. LOOPS ON MULTIPLE COUNTERS

### Description of arguments of command `\LoopAddToCounters`

The 2nd argument value should hold a macro with any number of arguments, but the last mandatory argument of this macro is reserved for counter name.

- #1 `{⟨counter1, counter2, ...⟩}` Holds the comma separated list of counter names
- #2 A macro name that is to be called and that operates on a counter.

```
% We assume we have the counters fooctr and foobarctr
\newcommand{\showcountervalues}[2]{%
  \textcolor{#1}{\csname the#2\endcsname}% Now, an extra empty line to show the ↵
  ↵ values in rows
}
% Note that the 2nd argument is not given here -- it's added by the ↵
  ↵ \LoopCountersFunction macro
\LoopCountersFunction{fooctr,foobarctr}{\showcountervalues{blue}}
```

14  
6

v1.4 2017-  
04-07

`\LoopCounterResetList{⟨counter name⟩}{⟨counter operation macro⟩}`

This macro will perform the same action on the reset list of a the counter name given as first argument, the action is a control sequence name specified by the in the second mandatory argument. The loop provides all counters on the reset list of a counter.

As of version 1.4 the counter operation macro must have two mandatory arguments, the second one is meant for the current counter in the loop.

Do not confuse this command with `\LoopFullCounterResetList` which tracks all counters recursively on the reset list, so `\LoopCounterResetList` steeps only level down in the reset list hierarchy.

v1.0 2016-  
07-28

`\LoopFullCounterResetList{⟨counter name⟩}{⟨counter operation macro⟩}`

This macro determines the full reset list of a counter, i.e. it cascades down the reset list and tracks the reset lists of all 'sub'-counters too and performs the counter operation macro on this.

- #1 `{⟨counter name⟩}`  
Holds the comma separated list of counter names
- #2 `{⟨counter operation macro⟩}` A macro name that is to be called and that expects the name of a counter as the last argument.

## 5. LOOPS ON MULTIPLE COUNTERS

---

See the macro `\CounterFullResetList`<sup>→ P.19</sup> for more information about the internal storage of the full reset list.

v1.4 2017-  
04-07

**`\CounterWithin`**{*<counter nameA, counter nameB,...>*}{*<drivercounter>*}

This macro sets all counters nameA, nameB, ... to the reset list of the {*<drivercounter>*} and redefines the corresponding macros `\thenameA`, etc. to be prepended with `\thedrivercounter`, i.e. `\CounterWithin{equation}{section}` would mean that `\theequation` expands to `\thesection.\arabic{section}`

The default format for the counter output is arabic numbers, i.e. `\arabic` will be used.

If the macros `\thenameA` etc. should not be changed, use the starred version of this command: `\CounterWithin*`.



Please note that the redefinition of `\thenameA` etc. is only local, i.e. it is group safe.

v1.4 2017-  
04-07

**`\CounterWithin*`**{*<counter nameA, counter nameB,...>*}{*<drivercounter>*}

This macro sets all counters nameA, nameB, ... to the reset list of the {*<drivercounter>*}, but does not change the corresponding macros `\thenameA`, etc. at all.

The default format for the counter output is arabic numbers, i.e. `\arabic` will be used.

If the macros `\thenameA` etc. should be changed, use non-starred version of this command: `\CounterWithin`.

v1.4 2017-  
04-07

**`\CounterWithout`**{*<counter nameA, counter nameB,...>*}{*<drivercounter>*}

This macro removes all counters nameA, nameB, ... from the reset list of the {*<drivercounter>*} and redefines the corresponding macros `\thenameA`, etc. without `\thedrivercounter`, i.e. `\CounterWithout{equation}{section}` would mean that `\theequation` expand to `\arabic{section}`

The default format for the counter output is arabic numbers, i.e. `\arabic` will be used.

If the macros `\thenameA` etc. should not be changed, use the starred version of this command: `\CounterWithout*`.



Please note that the redefinition of `\thenameA` etc. is only local, i.e. it is group safe.

v1.4 2017-  
04-07

**`\CounterWithout*`**{*<counter nameA, counter nameB,...>*}{*<drivercounter>*}

This macro removes all counters nameA, nameB, ... from the reset list of the {*<drivercounter>*}, but does not redefine the corresponding macros `\thenameA`, etc.

If the macros `\thenameA` etc. should be changed, use the non-starred version of this command: `\CounterWithout`.



## 6 Counter output

Once in a while it might be necessary to provide counter output not only as integer numbers, letters or Roman figures but also using binary, octal or hexadecimal number output. The [☒ `fmtcount`](#) package has support for this already – here are some alternatives.

v0.7 2016-05-10

### 6.1 Extra counter output types

! None of the commands checks whether the argument refers to counter name.

`\BinaryValue{⟨counter name⟩}`

This command will print the value of the counter using binary digits.

v0.7  
2016-05-10  
10

`\hexValue{⟨counter name⟩}`

This command will print the value of the counter using lowercase hexadecimal digits.

v0.7 2016-05-10

`\HexValue{⟨counter name⟩}`

This command will print the value of the counter using uppercase hexadecimal digits.

v0.7 2016-05-10

`\OctalValue{⟨counter name⟩}`

This command will print the value of the counter using octal digits.

v0.7 2016-05-10

`\xalphalph{⟨counter name⟩}`

This allows to use more than 26 characters for the usual alphabet and prints the counter value with style aa etc. in the same manner as the [☒ `alphalph`](#) does, but with the `\int_to_alph:n` macro from the [☒ `expl3`](#) bundle. For usage with uppercase characters see `\xAlphAlph`.

v1.4 2017-04-07

`\xAlphAlph{⟨counter name⟩}`

This allows to use more than 26 characters for the usual alphabet and prints the counter value with style AA etc. in the same manner as the [☒ `alphalph`](#) does, but with the `\int_to_Alph:n` macro from the [☒ `expl3`](#) bundle. For usage with uppercase characters see `\xalphalph`.

v1.4 2017-04-07

### 6.2 Quick counter output changes

`\CounterFormat[⟨options⟩]{⟨counter1!formatname1,counter2!formatname2,...⟩}`

v1.4 2017-04-07

! This macro needs the package option `standardcounterformats→ P. 10` to be activated with `⟨standardcounterformats=on⟩`, which is the default.

v1.4 2017-04-07

## 6. COUNTER OUTPUT

### #1 [*options*]

**recursive**=*<true/false>* (default: false)

If this key is set, the same counter format is used for the relevant counter and its resetting counters, i.e. the macro will pursue the reset counter list chain and recursively adds \the... to the output format of \thenameA etc.

! Since the *<recursive>* option needs information on the parent counters, the macro `\GetAllResetLists`<sup>→ P.21</sup> must have been called before `\CounterFormat`<sup>→ P.25</sup> with this option can be applied. In order to provide the most recent information (which includes recently added counters or changed resetting levels), use `\GetAllResetLists`<sup>→ P.21</sup> just before `\CounterFormat`<sup>→ P.25</sup>.

**separator**=*<separator character/string>* (default: !)

Specifies the separator that is used to split the counter name from the format, e.g. *<chapter!R>* where *<chapter>* is the counter name and *<R>* will be recognized as a counter format, meaning \Roman here, see table 1 for a list of predefined counter formats.

! The chosen separator must be the same for all counters in the given list of the 2nd argument (see below) and mustn't occur in the counter name itself<sup>a</sup>.

<sup>a</sup>It is not recommended to use counter names with non alphabetic characters anyway.

**#2** *{<counter1!formatname1,counter2!formatname2,...>}* A comma separated list of counters with a given format name, each separated with a separator character, default is *<!>*. If the format is omitted, the default format is `\arabic`, i.e. arabic numbers are used.

#### Simple usages of `\CounterFormat`<sup>→ P.25</sup>

```
% Assume foobar is a defined counter
\setcounter{foobar}{17}

\CounterFormat{foobar!b}
\thefoobar

\CounterFormat{foobar!h}
\thefoobar

\CounterFormat{foobar!H}
\thefoobar

\CounterFormat{foobar!R}
\thefoobar
```

## 6. COUNTER OUTPUT

Currently following counter formats shorthands and their output macros are stored in `\AtBeginDocument` if the package option `standardcounterformats`<sup>→ P.10</sup> is set to on, which is the default behaviour of the package.

a	<code>\alph</code>
A	<code>\Alph</code>
aa	<code>\xalphalph</code> <sup>→ P.25</sup>
AA	<code>\xAlphAlph</code> <sup>→ P.25</sup>
b	<code>\BinaryValue</code> <sup>→ P.25</sup>
h	<code>\hexValue</code> <sup>→ P.25</sup>
H	<code>\HexValue</code> <sup>→ P.25</sup>
n	<code>\arabic</code>
o	<code>\OctalValue</code> <sup>→ P.25</sup>
r	<code>\roman</code>
R	<code>\Roman</code>

Table 1: List of predefined counter format shorthands – please note that  $\langle n \rangle$  has been used in order to allow  $\langle a \rangle$  to be used for output with lowercase characters.

```
\setcounter{foobar}{30}

\CounterFormat{foobar!aa}
\thefoobar

\CounterFormat{foobar!o}
\thefoobar

\CounterFormat{foobar!AA}
\thefoobar
```

```
10001
11
11
XVII
ad
36
AD
```

Showing the  $\langle recursive \rangle$  option of `\CounterFormat`<sup>→ P.25</sup>

```
% All counters are using \arabic by default from \newcounter or \NewDocumentCounter
\NewDocumentCounter{foolevelzero}
\NewDocumentCounter{foolevelone}[foolevelzero]
```

## 6. COUNTER OUTPUT

```
\NewDocumentCounter{fooleveltwo}[foolevelone]

% Get the current reset lists! (Important)

\GetAllResetLists

% Now change to Hex format (!H) for all counters in the hierarchy.
\CounterFormat[recursive]{fooleveltwo!H}

\setcounter{foolevelzero}{20}% Should be 14
\setcounter{foolevelone}{15}% Should be F
\setcounter{fooleveltwo}{10}% Should be A

\thefoolevelzero % -> 14

\thefoolevelone % 14.F

\thefooleveltwo % 14.F.A
```

---

```
14
14.F
14.F.A
```

**\StoreCounterFormats**[*<options>*]{*<formatshorthandA!formatmacroA,formatshorthandB!formatmacroB,...>*}

Stores the counter formats separated by the separator character as given in the option to the global list. Existing formats will be overwritten if the format shorthand already exists. There is no warning about this! The only handled option is `separator`<sup>→ P.26</sup> and has the same meaning as in `\CounterFormat`<sup>→ P.25</sup>.

The `formatmacro` must be a command sequence with exactly one mandatory argument, which may not be specified in the format storage process.

v1.4 2017-04-07

**!** This macro will become a preamble-only command most likely.

```
\StoreCounterFormats{foo!\Roman,foobarnice!\OctalValue}
\setcounter{foobar}{17}
\CounterFormat{foobar!foo}
\thefoobar

\CounterFormat{foobar!foobarnice}
\thefoobar
```

---

```
XVII
21
```

## 6. COUNTER OUTPUT

---

**\AddCounterFormats** [*options*] {*formatshorthandA!formatmacroA,formatshorthandB!formatmacroB,...*}

Adds the counter formats separated by the separator character as given in the option to the global list, similar to `\StoreCounterFormats`<sup>→ P.28</sup>. Existing formats will be overwritten if the format shorthand already exists. There is no warning about this! The only handled option is `separator`<sup>→ P.26</sup> and has the same meaning as in `\CounterFormat`<sup>→ P.25</sup>.

The `formatmacro` must be a command sequence with exactly one mandatory argument, which may not be specified in the format storage process.

v1.4 2017-  
04-07

**\RemoveCounterFormats** [*options*] {*formatshorthandA,formatshorthandB,...*}

Removes the given counter formats from the global list.

The optional argument is ignored as of version 1.4.

v1.4 2017-  
04-07

---


## Part III

# Features

## Table of Contents

---

<b>7 Associated counters</b>	<b>31</b>
7.1 Association macros . . . . .	31
7.2 Driver macros . . . . .	35
7.3 Query macros . . . . .	35
<b>8 Counter backup/restoration</b>	<b>38</b>
8.1 Key philosophy in backup/restore . . . . .	38
8.2 The default counter group "scratch" . . . . .	39
8.3 Description of basic backup/restore macros . . . . .	39
8.4 Query for backup features . . . . .	43
8.5 Some notes on the backup features . . . . .	44
<b>9 Coupled counters</b>	<b>44</b>
9.1 Common options for coupled counters . . . . .	45
9.2 Macros for coupled counters . . . . .	45
<b>10 Periodic counters</b>	<b>48</b>
10.1 Commands related to periodic counters setup . . . . .	48
10.2 Commands to query for periodic counter feature . . . . .	49
<b>11 Suspending and Resuming</b>	<b>50</b>
11.1 Macros for suspension and resume . . . . .	50
11.2 Query suspension . . . . .	51
<b>12 Total counters</b>	<b>52</b>
12.1 Defining total counters . . . . .	53
12.2 Queries about total counters . . . . .	54
<b>13 Super total counters</b>	<b>55</b>
13.1 Defining super total counters . . . . .	55

13.2 Queryies about super total counters . . . . .	55
13.3 The  <b>numberofruns</b> counter . . . . .	56
<b>14 Experimental features</b>	<b>56</b>
14.1 Labels . . . . .	56
14.2 Hooks . . . . .	57

---

## 7 Associated counters

The main purpose of this package is co-stepping of counters, but there are some helper commands in addition to macros provided  $\text{\LaTeX} 2_{\epsilon}$  already, see section Additions to standard commands.

- Section Association macros describes the most important macros for setting up associated counters
- Section Driver macros informs about the macros for setting up, removing or clearing driver counters
- Section Query macros deals with query command sequences about counters being a driver or an associated counters
- Section Information macros contains routines that show which counters have been changed last

### 7.1 Associated counters commands

All macros have the general rule, that the driver counter is specified as 1st mandatory argument to the macro, which is in almost all cases the 2nd argument of the macro.

`\DeclareAssociatedCounters` [*options*] {*driver counter*} {*associated counters list*}

This command is the main macro of the package. It declares the counter names being specified in comma - separated - list (CSV) which should be stepped simultaneously when the driver counter is increased by `\stepcounter`. If only counter is to be associated, omit a trailing `","`!

*#1* [*options*]:

`autodefine`=*choice* (initially none)

This choice - key can be specified if the specified counters should be defined if they not already available. Possible values are

- `none` – no counter is autodefined

## 7. ASSOCIATED COUNTERS

---

- all – all counters will be autodefined
- driver – only driver counters will be autodefined
- associated – only associated counters will be autodefined

Default is none

### sloppy

If `autodefine`<sup>→P.31</sup> key is used, the `sloppy` key disables the check whether a counter is defined already.

### #2 {<driver counter>}

Holds the name of the driver counter to which the list of counters should be associated

### #3 {<associated counters list>}

A comma separated list of counter names that should be associated to the driver counter

- This command is a preamble command, i.e. it can be used in the preamble of the document or within other packages or class files only.
- This command should be used as early as possible, i.e. in the preamble of the document, since the driven counters are not increased as long as they are not associated to the driver counter. On the hand, it is possible or may be required to control the starting point of the association at any position in the body of the document, when the association should start later on. Use the command `\AddAssociatedCounters`<sup>→P.33</sup> if counters should be associated within the document body.

```
%%% The association of anotherTotalpages in this example just takes place 2
      (here, so the stepping of the counter will start from here and providing 2
      (a 'wrong' value.
```





```
%%%
```

```
\DeclareAssociatedCounters{page}{totalpages,anotherTotalpages}%
```

```
This document has \number\totvalue{totalpages} (note: 2
      (\number\totvalue{anotherTotalpages}) pages.
```

---


This document has 74 (note: 32) pages.

- Current version (1.4) rules:
    - No checking whether the 2nd and 3rd arguments hold counter names is applied.
    - Mutually cross - association of two counters is not supported! The compilation will stop on this!
- A driver counter, say,  **foo**) of, say  **foobar** can not be an associated counter of  **foobar**, which in turn can be a driver counter of other counters, of course.
- A contrary feature are the  **coupled counters** – If some counters should share a common base, i.e. increasing one arbitrary member counter of a group of counters



## 7. ASSOCIATED COUNTERS

then all should be increased, this called coupling of counters – all group members are on an equal footing. See section 9 about this feature.

On the other side,  **associated counters** belong to a hierarchy. The driver counter dominates the associated counters.

- A self-association of the driver counter to itself is ignored internally as this would lead to inconsistent counter values.
- The order of the specification of associated counters in the 2nd arguments is of no importance.
- Specifying an associated counter name multiple times has no effect, only the first occurrence of the name will be used.

`\AddAssociatedCounters` [*options*] {*driver counter*} {*associated counters list*}

The usage of this macro is similar to `\DeclareAssociatedCounters`<sup>→ P.31</sup>; if it is called in the document preamble (or in package file), `\AddAssociatedCounters` falls back to

`\DeclareAssociatedCounters`<sup>→ P.31</sup>,

having the same optional argument functionality with `autodfne`<sup>→ P.31</sup> and `sloppy`<sup>→ P.32</sup>; if it is called in the document body, this command adds some counters to the associated counter list for a specific driver counter – if this list does not exist, the  $\text{\LaTeX}$  run will issue a warning, but add the driver counter to the driver list and the associated counters analogously.

Using `\AddAssociatedCounters` in the document body automated generation of counters is disabled.



### Description of arguments of command `\AddAssociatedCounters`

- #1** [*options*]: As of version 1.4, the optional argument [*options*] are the same as for `\DeclareAssociatedCounters`<sup>→ P.31</sup>, see `autodfne`<sup>→ P.31</sup> and `sloppy`<sup>→ P.32</sup>.
- #2** {*driver counter*}
- Holds the name of the driver counter to which the list of counters should be associated
- #3** {*associated counters list*}
- A comma separated list of counter names that should be associated to the driver counter

`\RemoveAssociatedCounter` {*driver counter*} {*associated counter*}

This command removes a counter from the existing list for a driver counter, i.e. the counter will not be increased any longer by `\stepcounter`. It can be increased however manually, of course.

## 7. ASSOCIATED COUNTERS

---

```
\RemoveAssociatedCounter{page}{anothertotalpages}
This document has \number\totvalue{totalpages} (beware: 2)
  \number\totvalue{anothertotalpages}) pages.
```

---

This document has 74 (beware: 32) pages.

### `\RemoveAssociatedCounters`{*<driver counter>*}{*<list of associated counters>*}

This command removes the comma-separated-value list of counters from the existing list for a driver counter, i.e. the counters will not be increased any longer by `\stepcounter`. They can be increased however manually, of course.

Take care not to confuse the commands `\RemoveAssociatedCounters` and `\RemoveAssociatedCounter` <sup>→ P.33</sup>

### `\ClearAssociatedCounters`[*<options>*]{*<driver counter>*}

This command clears the internal list for all counters associated to the {*<driver counter>*}. The counters will not be increased automatically any longer.

The optional argument is not used as of version 1.4.

Please note that the driver counter is not removed from the list of driver counters – this simplifies reassociating of (other) counters to this one later on with the macro `\AddAssociatedCounters` <sup>→ P.33</sup> and suppress the relevant warning.

If the driver counter and all its associated counters should be removed, use `\RemoveDriverCounter` <sup>→ P.35</sup> instead.

### `\DeclareTotalAssociatedCounters`[*<options>*]{*<driver counter>*}{*<associated counters list>*}

v1.2 2017-03-03

This command combines the features of  **associated counters** and  **total counters**, i.e. the associated counters are defined with `\NewTotalDocumentCounter` <sup>→ P.55</sup> and associated to the driver counter.

See section 12 for more information on  **total counters**.

### 7.2 Driver counter commands

`\AddDriverCounter` [*<options>*] {*<driver counter name>*}

#### Description of arguments of command `\AddDriverCounter`

#1 [*<options>*]: As of 1.4, the optional argument [*<options>*] is not used so far, but is reserved for later purposes.

#2 {*<driver counter name>*}

Holds the name of the driver counter that should be added to the list of driver counters.

`\RemoveDriverCounter` [*<options>*] {*<driver counter>*}

This command clears the internal list for all counters associated to the {*<driver counter>*}. The counters will not be increased automatically any longer.

The optional argument is not used as of version 1.4.

If all driver counters should be unregistered, use `\ClearDriverCounters` instead!

`\ClearDriverCounters` [*<options>*]

This clears completely the list of driver counters, such that no counters are regarded as being associated – i.e. no driver is hold as being a driver counter.

The optional argument is not used as of version 1.4.

### 7.3 Commands for queries

Sometimes it might be necessary to get information, whether a counter is regarded as a driver or as an associated counter. This section describes some query macros in order to obtain this information.

`\IsAssociatedToCounter` {*<driver counter>*} {*<associated counter>*} {*<True branch>*} {*<False branch>*}

This macro checks, whether a counter is associated to a particular given driver counter and expands the corresponding branch. If the internal driver counter list does not exist, the false branch will be used, since this also means, that the possibly associated counter is not associated at all.

### Description of arguments of command `\IsAssociatedToCounter`

**#1** `{\langle driver counter \rangle}`

Holds the name of the driver counter to which `{\langle associated counter \rangle}` the could possibly be associated.

**#2** `{\langle associated counter \rangle}`

Contains the name of the possibly associated counter.

**#3** `{\langle True branch \rangle}`

This code is expanded if the counter is associated to the driver, otherwise it is ignored.

**#4** `{\langle True branch \rangle}`

This code is expanded if the counter is **not** associated to the driver, otherwise it is ignored.

```
% Remove associated counter first for demonstration purposes
\RemoveAssociatedCounter{page}{anothertotalpages}
\IsAssociatedToCounter{page}{totalpages}{Yes, totalpages is associated}{No, }
  {totalpages is not associated}

\IsAssociatedToCounter{page}{anothertotalpages}{Yes, anothertotalpages is }
  {associated}{No, anotherpages is not associated}

-----
Yes, totalpages is associated
No, anotherpages is not associated
```

See also

- `\IsAssociatedCounter`<sup>→ P.37</sup> for checking whether a counter is associated
- `\IsDriverCounter`<sup>→ P.37</sup> in order to check whether a counter is a driver.
- `\GetDriverCounter` returns the driver counter name for a given associated counter name

`\GetDriverCounter``{\langle counter name \rangle}`

This commands returns the driver counter to which the counter name of the first argument is connected to. If the counter is not defined, the macro returns nothing.

- No check whether the counter name is defined is performed
- No check whether the counter is associated at all is performed. Usage of this command in conjunction with `\IsAssociatedCounter`<sup>→ P.37</sup> is strongly encouraged.

## 7. ASSOCIATED COUNTERS

---

```
%
totalpages is associated to the }
  {\textcolor{blue}{\textbf{\GetDriverCounter{totalpages}}}} counter.
% Try with an undefined counter name
humptydumpty is associated to the }
  {\textcolor{blue}{\textbf{\GetDriverCounter{humptydumpty}}}} counter.
```

---

totalpages is associated to the **page** counter. humptydumpty is associated to the – counter.

**\IsAssociatedCounter**{<counter name>}{<True branch>}{<False branch>}

This command tests, whether a given counter name is an associated counter and expands correspondingly the true or the false branch. The command does not tell to which driver the counter it is associated – this information can be obtained by `\GetDriverCounter`<sup>→ P.36</sup>.

### Description of arguments of command `\IfAssociatedCounter`

**#1** {<counter name>}

Contains the name of the possibly associated counter

**#2** {<True branch>}

This code is expanded if the counter is associated to a driver, otherwise it is ignored

**#3** {<True branch>}

This code is expanded if the counter is **not** associated a driver, otherwise it is ignored

```
\IsAssociatedCounter{section}{Yes, section is an associated counter}{No, }
  {\section counter does not have the associated counter properties}
\IsAssociatedCounter{totalpages}{Yes, totalpages is an associated counter}{No, }
  {\totalpages counter does not have the associated counter properties}
```

---

No, section counter does not have the associated counter properties Yes, totalpages is an associated counter

**\IsDriverCounter**{<driver counter name>}{<True branch>}{<False branch>}

This command tests, whether a given counter name is a driver counter and expands correspondingly the true or the false branch.

### Description of arguments of command `\IfDriverCounter`

**#1** {`<driver counter name>`}

Contains the name of the possible driver counter

**#2** {`<True branch>`}

This code is expanded if the counter is a driver, otherwise it is ignored

**#3** {`<True branch>`}

This code is expanded if the counter is **not** a driver, otherwise it is ignored

```
\IsDriverCounter{section}{Yes, section is a driver counter}{No, section counter }
{does not have driver properties}
```

Yes, section is a driver counter

## 8 Backup and restore of counter values

It might be necessary to interrupt the current sectioning, e.g. including another document's structure (an external paper, for example) such that the counting should start again and after finishing of the external structure the old values should be restored.

v1.0 2016-07-28

Since version Version v1.0 2016-07-28 the commands and feature behaviour of backup and restoration of counter values has changed.

- ! The old behaviour is still available using the macros `\Former . . .` prefixed macros, see section C for this.

### 8.1 Key philosophy in backup/restore

The basic idea is to provide a scheme that allows easy storage and restoration of counter values. For a single counter this is quite easy, using some other temporary counter, storing the old value there and copy the values back at the right position – if many counters should be controlled to have a backup this procedure might get tedious, however.

✉ **xassoccnt** provides some tools to define groups of counters that should be under control of backup and restoration. A backup counter group can be used multiple times, each using an individual ID, this allows maintaining 'complete' counter states and reinjecting them at any position later on. Those are the basic steps (in pseudo code) to use the backup feature:

1. Define a symbolic backup counter group name

Note that counter group names are providing something like a namespace. A group of coupled counters (see section Coupled counters) may have the same name as a group of counters designed to be backed up – however, each feature has its own namespace. In each namespace there can be only one counter group with a specific name, duplicates are not allowed within the same feature namespace.

2. Populate the counter group name with counter names
3. Define a backup state and a corresponding id
4. Restore at any place

### 8.2 The default counter group "scratch"

There is a default counter group for backup named "scratch", if no specific counter group name is given using the `name→ P. 45` option (see section 8.3.1 for a detailed description of available backup/restore options).

### 8.3 Description of basic backup/restore macros

#### 8.3.1 Common options to (most) of the backup/restore macros

- `resetbackup=<true/false>` (initially true)  
This key decides whether **all** counters in the backup list should be reset to zero or should keep the current value when the backup command is given. The default value is `<true>`.
- `cascading=<true/false>` (initially false)  
This key decides whether all counters in the reset list of a driver counter shall be added to the counter group – the driver counter is added itself too. If the driver counter has no reset list, it is added nevertheless.  
Please note that the reset lists of the individual counters are tracked as well – this is done recursively.  
This provides a very convenient feature to backup and restore the value of a certain sectioning level, say `\chapter`. Using `cascading` this would mean<sup>1</sup> that `chapter`, `section`, `subsection`, `subsubsection`, `paragraph`, `subparagraph`, `equation`, `figure` and `table` would be added to the counter group.
- `backup-id=string` (no default value)  
This key declares a string-like backup id under which the backup of a certain group is stored and can be retrieved later on. The id should be a string containing only alphanumeric characters.

---

<sup>1</sup>Assuming `book` is used, for example!

- `restore-id=string` (no default value)

This key declares a string-like restore id for unique [hyperref](#) names. The id should be a string containing only alphanumeric characters.

This key is only needed if the same backup-id should be restored more than once and the package [hyperref](#) is used in order to provide unique hyper anchors.

- `keep-after-restore=<true/false>` (initially false)

This key decides whether the values of a certain backup id (see `backup-id`<sup>→ P.39</sup>) shall be kept after a restore has been issued. The default operation is to remove the `backup-id`<sup>→ P.39</sup> and the values of the counters belonging to the given `backup-id`<sup>→ P.39</sup>.

This option is useful if the same backup state (i.e. `backup-id`<sup>→ P.39</sup>) is to be used more than once.

Reusing the same counter group for restore after having restored them already with the `keep-after-restore` option being false will be ignored, i.e. the counter values are not changed.

- `name`<sup>→ P.45</sup> The meaning of this key is basically the same as for the Coupled counters feature. However, depending on the stage of the backup/restore process the precise action differs:
  - If `name`<sup>→ P.45</sup> is used in `\AssignBackupCounters`<sup>→ P.41</sup> the counters are added to group indicated by the value of `name`<sup>→ P.45</sup>.
  - If `name`<sup>→ P.45</sup> is used either for `\BackupCounterGroup` or in `\RestoreBackupCounterGroup` to indicate the counter group for a certain backup state, either for storing or restoring.

### 8.3.2 Core backup/restore macros

`\BackupCounterGroup`[*<options>*]{*<counter group name>*}

Concerning the backup feature this performs the storing of counter values at the position where the command is expanded! A backup operation needs

- `backup-id`<sup>→ P.39</sup> to be able to refer to a certain backup state
- `name`<sup>→ P.45</sup> to identify the group of counters

`\RestoreBackupCounterGroup`[*<options>*]{*<counter group name>*}

This command restores the value of the given counter group. Useful options are (see Common options to (most) of the backup/restore macros)

- `backup-id`<sup>→ P.39</sup>
- `keep-after-restore`
- `restore-id`
- `name`<sup>→ P.45</sup>



### 8.3.3 Declaring counter groups

`\DeclareBackupCountersGroupName[⟨⟩]{⟨counter group name⟩}`

This command declares (better: reserves a name for a backup counter group) – the name has to be specified as first mandatory argument.

A counter group name consists of alphanumeric characters, special symbols etc. are not allowed. The name must not contain commas!

As of version 1.4 the optional argument is not used and reserved for later purposes.

### 8.3.4 Populating counter groups

`\AssignBackupCounters[⟨options⟩]{⟨counter name1,counter name2,...⟩}`

This macro populates the counter group (given as optional key - value  $\text{name}^{\rightarrow P.45}$ ) with the comma separated list of counters from the first mandatory argument. The meaning of  $\text{name}^{\rightarrow P.45}$  is the same as in Coupled counters, but the counter group names are not related to that feature – the namespace is safe then.

Some important notes about the behaviour of `\AssignBackupCounters`

- If  $\text{name}^{\rightarrow P.45}$  is not given or empty, the default counter group "scratch" is used.
- If the counter group given to  $\text{name}^{\rightarrow P.45}$  does not exist, it will be created automatically.

`\AddBackupCounter[⟨options⟩]{⟨counter name1,counter name2,...⟩}`

This command is similar to `\AssignBackupCounters`, adding counters to a counter group named by  $\text{name}^{\rightarrow P.45}$  option. If the counter group name does not exist, no action is performed, i.e. the adding operation is ignored.

v1.0 2016-07-28

### 8.3.5 Clearing backup states

It might be necessary to remove a certain backup state, i.e. a collection of counter values to be referred to with a  $\text{backup-id}^{\rightarrow P.39}$ . This can be done either for a certain counter (with `\ClearCounterBackupState`) in a counter group only or for all counters in group (with `\ClearBackupState`<sup>P.42</sup>).

`\ClearCounterBackupState[⟨options⟩]{⟨countergroup name⟩}{⟨counter name⟩}`

This macro removes the given backup-id state value for a specific counter only. Use the  $\text{backup-id}^{\rightarrow P.39}$  option in the first optional argument to specify which backup-id should be cleared.

- If the backup-id does not exist, the operation is ignored silently.
- The counter is still part of the group, but can't be restored to the previous state that was identified with  $\text{backup-id}^{\rightarrow P.39}$ .

Use this macro with care!

v1.0 2016-07-28



`\ClearBackupState` [*<options>*] {*<countergroup name>*}

v1.0 2016-07-28

This macro removes the given backup-id state value for a whole counter group. Use the `backup-id→P.39` option in the first optional argument to specify which backup-id should be cleared.

- If the backup-id does not exist, the operation is ignored silently.
- The `backup-id→P.39` is removed from the list of possible backup-ids for the relevant counter group.

### 8.3.6 Clearing and deleting backup counter groups

From time to time it might be necessary to remove counters from a group or to clear the whole group or remove even the whole group. Those operations can be achieved with `\RemoveCountersFromBackupGroup`, `\ClearBackupCounterGroups` and `\DeleteBackupCounterGroups`. All macros remove at least all stored values belonging to a counter group. A `\RestoreBackupCounterGroup→P.40` call does nothing after any of the mentioned macros have been issued.

`\RemoveCountersFromBackupGroup` [*<options>*] {*<countergroup name>*} {*<counter name 1, counter name 2,...>*}

v1.0 2016-07-28

This command removes the given counter names from a counter group. The stored values are deleted completely and are lost afterwards. A non-existing counter group name is ignored as well as counters that do not belong to the given group name.

As of version 1.4 the optional argument is not used and reserved for later purposes.

If complete counter groups shall be deleted and be unavailable afterwards, use `\DeleteBackupCounterGroups` instead.

`\ClearBackupCounterGroups` [*<options>*] {*<countergroup name 1, countergroup name 2,...>*}

v1.0 2016-07-28

This command removes all names of the counter groups given as comma separated list in the 2nd argument, the internal storage of counter values is removed as well, i.e. older counter values aren't available any longer. The counter group names remain valid, any subsequent call to `\BackupCounterGroup→P.40` or `\RestoreBackupCounterGroup→P.40` with one of the provided group names will be ignored.

As of version 1.4 the optional argument is not used and reserved for later purposes.

If counter groups shall be deleted and be unavailable, use `\DeleteBackupCounterGroups`.

`\DeleteBackupCounterGroups` [*<options>*] {*<countergroup name 1, countergroup name 2,...>*}

v1.0 2016-07-28

This command clears the counter groups given as comma separated list in the 2nd argument with `\ClearBackupCounterGroups` and removes the names as well, i.e. those names are not available any longer.

As of version 1.4 the optional argument is not used and reserved for later purposes.

### 8.4 Query for backup features

As usual, some macros to ask whether a certain counter is under backup control or whether a certain backup-id<sup>→P.39</sup> exists might be useful!

v1.0 2016-07-28

#### 8.4.1 Querying for backup counter group existence

**\IsBackupCounterGroupTF**{*<counter group name>*}{*<true branch>*}{*<false branch>*}

v1.0 2016-07-28

This macro tests if the given name is a backup counter group and expands to the *<true>/<false>* branch accordingly. There are two short-circuit commands: **\IsBackupCounterGroupT** and **\IsBackupCounterGroupF**.

**\IsBackupCounterGroupT**{*<counter group name>*}{*<true branch>*}

v1.0 2016-07-28

This macro tests if the given name is a backup counter group and expands to the *<true>* branch accordingly. There are two related macros: **\IsBackupCounterGroupF** and **\IsBackupCounterGroupTF**.

**\IsBackupCounterGroupF**{*<counter group name>*}{*<false branch>*}

v1.0 2016-07-28

This macro tests if the given name is a backup counter group and expands to the *<false>* branch accordingly. There are two related macros: **\IsBackupCounterGroupT** and **\IsBackupCounterGroupTF**.

#### 8.4.2 Querying for backup counter entity

**\IsBackupCounterTF**{*<counter name>*}{*<true branch>*}{*<false branch>*}

v1.0 2016-07-28

This macro tests if a counter is under the administration of the backup counter commands and expands to the relevant *<true>/<false>* branch then. There are two short-circuit commands: **\IsBackupCounterT** and **\IsBackupCounterF**.

**\IsBackupCounterT**{*<counter name>*}{*<true branch>*}

v1.0 2016-07-28

This macro tests if a counter is under the administration of the backup counter commands and expands to the *<true>* branch then. There are related commands: **\IsBackupCounterTF** and **\IsBackupCounterF**.

**\IsBackupCounterF**{*<counter name>*}{*<false branch>*}

v1.0 2016-07-28

This macro tests if a counter is under the administration of the backup counter commands and expands to the *<false>* branch if this not the case. There are related commands: **\IsBackupCounterTF** and **\IsBackupCounterT**.

#### 8.4.3 Querying for backup state entity

**\IsBackupStateTF**{*<counter group name>*}{*<counter backup-id>*}{*<true branch>*}{*<false branch>*}

v1.0 2016-07-28

This macro tests if the backup-id exists for the given counter group and executes the relevant *<true>/<false>* branch accordingly. There are two short-circuit commands: **\IsBackupStateT**<sup>→P.44</sup> and **\IsBackupStateF**<sup>→P.44</sup>.

`\IsBackupStateT{<counter group name>}{<counter backup-id>}{<true branch>}`

v1.0 2016-07-28



This macro tests if the backup-id exists for the given counter group and executes the relevant *<true>* branch accordingly. There are two related: `\IsBackupStateTF`<sup>→ P.43</sup> and `\IsBackupStateF`.


`\IsBackupStateF{<counter group name>}{<counter backup-id>}{<false branch>}`

v1.0 2016-07-28

This macro tests if the backup-id exists for the given counter group and executes the relevant *<false>* branch accordingly. There are two related: `\IsBackupStateTF`<sup>→ P.43</sup> and `\IsBackupStateT`.

### 8.5 Some notes on the backup features

Principally backing up counter values and restoring them later on is not really difficult – with one exception: If the  **hyperref** package is used, the counter values form up the hypertarget anchors, for example `chapter.1` for the first chapter. If the chapter counter is reset, there would be a chapter with number one again and as well an anchor name `chapter.1` –  **hyperref** will complain 'only' about this but it will put the wrong hyperlink as well, for example for the table of contents and the bookmarks – this is an undesirable feature.

However, there is a solution to this problem: The hypertarget anchors are built up from the specifications of a macro `\theH...` where the ellipses stands for the counter name. If for example `\theHchapter` is changed after a counter was reset the hypertargets will again be correct, since this will provide a different target name. `\BackupCounterGroup`<sup>→ P.40</sup> does this resetting automatically in an unique way and `\RestoreBackupCounterGroup`<sup>→ P.40</sup> restores as well the old `\theH...` macros of all counters that are in the backup list. It tracks the number of calls to `\BackupCounterGroup`<sup>→ P.40</sup> and changes the relevant `\theH...` macro definitions to use unique anchor names then – this way multiple `\BackupCounterGroup`<sup>→ P.40</sup> calls are possible without destroying the hyperlink facilities with  **hyperref**.

## 9 Coupled counters

v0.5 2016-02-27



The features described here are very experimental and not fully implemented so far.

Occasionally there are requests where the figure or table environment should use the same counter in the sense of using continued counter values, e.g figure 1 is followed by table 2, the next figure is numbered as 3 etc.

This can be achieved with the concept of coupled counters. As usual, those counters belonging to a 'group' should be declared first in the preamble. In some sense coupled counters are similar to associated counters.

### 9.1 Common options for most of the coupled counter macros

**name**= $\langle$ *name of a group* $\rangle$

This option has the name of the counter group that should be coupled, say “figuretablegroup” etc.

v0.6 2016-03-05

**multiple**= $\langle$ *true, false* $\rangle$  (initially false)

This option allows to add a counter multiple times to a counter group. In general, using this style is not recommended.

v0.6 2016-03-05

### 9.2 Macros for declaring, adding and removing coupled counters

**\DeclareCoupledCounters**[ $\langle$ *options* $\rangle$ ]{ $\langle$ *counter name1, counter name2, ...* $\rangle$ }

v0.5 2016-02-27

**#1** [ $\langle$ *options* $\rangle$ ]: See section 9.1 for a explanation about available options.

**#2** { $\langle$ *counter name 1, counter name2, ...* $\rangle$ }: The list of counters that should be stepped together for the given counter group.

This macro is a preamble-only command.

**\DeclareCoupledCountersGroup**{ $\langle$ *counter group name* $\rangle$ }

This macro defines a name for a counter group and allocates a new group list for the counter names. If the name already exists, nothing is done.

v0.5 2016-02-27

**#1** { $\langle$ *counter group name* $\rangle$ }: The name of the counter group.

This macro is a preamble-only command and does not add counters to the group container. Use **\DeclareCoupledCounters** or **\AddCoupledCounters**<sup>→ P.46</sup> to add counters to the relevant group.

**\RemoveCoupledCounters**[ $\langle$ *options* $\rangle$ ]{ $\langle$ *counter name1, counter name2, ...* $\rangle$ }

This removes the comma separated counter names from the coupled counter list given in the name option.

v0.5 2016-02-27

**#1** [ $\langle$ *options* $\rangle$ ]: As of version 1.4 the only recognized option is *name*.

**#2** { $\langle$ *counter name 1, counter name2, ...* $\rangle$ }: The list of counters that should be removed from the given counter group.



- The list name itself is still available
- If the list given by the *name* option does not exist, **\RemoveCoupledCounters** issues a warning on the console and ignores this list then.

If all counters from a group name should be removed, this is equal to clearing – just use **\ClearCoupledCounters**<sup>→ P.46</sup> for simpler usage of this feature.

## 9. COUPLED COUNTERS

`\AddCoupledCounters`[*<options>*]{*<counter name1, counter name2, ...>*}

This adds the listed counter names to coupled counter list. It acts like `\DeclareCoupledCounters` but does not setup new counter groups. Please use `\DeclareCoupledCounters`<sup>→ P.45</sup> first, then apply `\AddCoupledCounters` later on.

P.45 v0.6  
2016-03-05

**#1** [*<options>*]: See section 9.1 for a explanation about available options.

**#2** {*<counter name 1, counter name2, ...>*}: The list of counters that should be stepped together for the given counter group.

! If the list given by the `name`<sup>→ P.45</sup> option does not exist, `\AddCoupledCounters` issues a warning on the console and ignores this list then. The counters are not added to any list at all.

`\ClearCoupledCounters`{*<options>*}

This removes all names from the given name of a group of coupled counters.

v0.6 2016-  
03-05

**#1** [*<options>*]: As of version 1.4 the only recognized option is `name`<sup>→ P.45</sup>.

After clearing a list, the coupling stops for the counters on that list (unless they are part of another list, which is possible, but not recommended). using `\AddCoupledCounters` with the relevant `name`<sup>→ P.45</sup> option adds counters again to the list and the coupling is active again, however, for different counters (eventually).

In order to clear all coupled counter lists, use `\ClearAllCoupledCounters` instead.

! 

- The list name itself is still available
- If the list given by the `name`<sup>→ P.45</sup> option does not exist, `\ClearCoupledCounters` issues a warning on the console and ignores this list then.

`\ClearAllCoupledCounters`

This removes all coupled counter groups, but not the group names, i.e. the list names can be used later on to add counter names again. In order to clear a specific list, use `\ClearCoupledCounters`.

v0.6 2016-  
03-05

`\IsCoupledCounterTF`{*<counter name>*}{*<true branch>*}{*<false branch>*}

This macro tests if a counter is under the administration of the coupled counter commands and expands to the relevant branch then. There are two short-circuit commands `\IsCoupledCounterT`<sup>→ P.47</sup> and `\IsCoupledCounterF`<sup>→ P.47</sup>.

v0.6 2016-  
03-05

`\IsCoupledCounterT`{*<counter name>*}{*<true branch>*}

This macro tests if a counter is under the administration of the coupled counter commands and executes the true branch then. There are two related commands `\IsCoupledCounterTF` and `\IsCoupledCounterF`<sup>→ P.47</sup>.


v0.6 2016-  
03-05

`\IsCoupledCounterF{<counter name>}{<false branch>}`

This macro tests if a counter is under the administration of the coupled counter commands and executes the false branch then if this is not the case. There are two related commands `\IsCoupledCounterTF` and `\IsCoupledCounterT`<sup>P.47</sup>.

v0.6 2016-  
03-05

## 10 Periodic counters

It might be very convenient to have counters that are automatically reset not only by a driving counter such as  **chapter** but also periodically, i.e. after a certain amount of steps – this can be achieved with the concept of periodic counters.

### 10.1 Commands related to periodic counters setup

`\DeclarePeriodicCounter[⟨⟩]{⟨counter name⟩}{⟨counter threshold value⟩}`

This defines the counter given in the first mandatory argument as a periodic counter and is automatically reset if the threshold value is reached.

**!** The command `\DeclarePeriodicCounter` does not define a new counter, however but is the preamble-only version of `\AddPeriodicCounter`.

Please note that in case of `\addtocounter` applied to a periodic counter the value to be added leads to a modulo division such that the counter might be reset if the addition would increase the counter beyond the threshold value, the modulo part will be added then. In order to prevent this wrapping, use the `wrap→P.11` option to `\addtocounter→P.11`:

```
\setcounter{foocntr}{3}%
\AddPeriodicCounter{foocntr}{8}%

Value of foocntr is: \thefoocntr % Should be 3

\addtocounter{foocntr}{20} % Is it 23? No, it is 23 % 8 = 7
Value of foocntr is \thefoocntr\ now!

Adding a value of 4 again:
\addtocounter{foocntr}{4} % Is it 11? No, it is 11 % 8 = 3
Value of foocntr is \thefoocntr\ now!

Now prevent the wrapping
\addtocounter{foocntr}{10}[wrap=false] % Is it 13? Yes, it is!
Value of foocntr is \thefoocntr\ now!
```

---

```
Value of foocntr is: 3
Value of foocntr is 7 now!
Adding a value of 4 again: Value of foocntr is 3 now!
Now prevent the wrapping Value of foocntr is 13 now!
```

`\AddPeriodicCounter[⟨⟩]{⟨counter name⟩}{⟨counter threshold value⟩}`

This defines the counter given in the first mandatory argument as a periodic counter and is automatically reset if the threshold value is reached.



`\RemovePeriodicCounter` [*options*] {*counter name*}

v0.9 2016-06-19

This removes the counter given in the first mandatory argument as a periodic counter. The counter is reset unless the `reset` is set to *false*.

#1 [*options*]

As of version 1.4, there is only one option:

`reset`=*true/false* (initially true)

v0.9 2016-06-19

Use 'false' to prevent the resetting of the relevant counter after removal!

#2 {*counter name*} – the name of the counter that should be no periodic counter any longer.

If all periodic counters should be removed, use the macro `\RemoveAllPeriodicCounters` instead.

`\RemoveAllPeriodicCounters` [*options*]

v1.0 2016-07-28

This command removes all counters given in the first mandatory argument as a periodic counter. All counters are reset unless the `reset` option is set to *false*.

#1 [*options*] As of version 1.4, there is only one option: `reset`, having the same meaning as in `\RemovePeriodicCounter`.

#2 {*counter name*} – the name of the counter that should be no periodic counter any longer.

If only a specific counter shall be removed from the periodic counter property use the command `\RemovePeriodicCounter` instead.

`\ChangePeriodicCounterCondition` [*options*] {*counter name*} {*new counter threshold value*}

v0.9 2016-06-19

This changes the counter threshold condition – the counter is reset automatically if not specified otherwise with the `reset` option.

#1 [*options*]

As of version 1.4, there is only one option: `reset`, which serves the same functionality as in `\RemovePeriodicCounter`.

#2 {*counter name*} – the name of the counter that should be no periodic counter any longer.

#3 {*new counter value threshold*} – the new value after which an automatic resetting will occur.

## 10.2 Commands to query for periodic counter feature

`\IsPeriodicCounterTF` {*counter name*} {*true branch*} {*false branch*}

v0.9 2016-06-19

This macro tests if a counter is under the administration of the periodic counter commands and expands to the relevant branch then. There are two short-circuit commands: `\IsPeriodicCounterT`<sup>P.50</sup> and `\IsPeriodicCounterF`<sup>P.50</sup>.

`\IsPeriodicCounterT{<counter name>}{<true branch>}`


This macro tests if a counter is under the administration of the periodic counter commands and expands to the `<true>` branch then. There are two related commands: `\IsPeriodicCounterTF` and `\IsPeriodicCounterF`<sup>P.50</sup>.

`\IsPeriodicCounterF{<counter name>}{<false branch>}`

This macro tests if a counter is under the administration of the periodic counter commands and expands to the `<false>` branch then if this is not the case. There are two related commands: `\IsPeriodicCounterTF`<sup>P.49</sup> and `\IsPeriodicCounterT`.

## 11 Suspending and resuming (associated) counters

Rather than removing an associated counter from the list, it is possible to suspend the automatic stepping for a while and then resume it (or completely drop it), for example, if the value of a counter should not be stepped within a specific chapter etc.

! Suspension and resuming counters can cause wrong hyper links if  **hyperref** is used.

### 11.1 Macros for suspension and resume

`\SuspendCounters[<options>]{<counters list>}`

#### Description of arguments of command `\SuspendCounters`

#1 [`<options>`]






Not used so far, reserved for later usage.

#2 {<counters list>}

Contains the name of counters to be suspended, separated by commas (CSV - list)

`\CascadeSuspendCounters[<options>]{<counters list>}`

This macro is more powerful than `\SuspendCounters`, since it tries to detect whether a counter has a reset list and 'mutes' the counters on this list as well and checks whether those counters themselves have reset lists and cascades down to the final state.

! Stated differently: All counters anyhow connected to a counter named  **foo** will be suspended, e.g. for the  **book** class and  **chapter**, this means in a standard setup, that  **section,figure,table,equation,footnote** will be suspended, as well as in consequence  **subsection,subsection,paragraph,subparagraph**, assuming hereby no other counters have been added to the reset lists.

### Description of arguments of command `\CascadeSuspendCounters`

#1 [*options*]

Not used so far, reserved for later usage.

#2 {*counters list*}

Contains the name of counters to be suspended, separated by commas (CSV - list)

`\ResumeSuspendedCounters` [*options*] {*counters list*}

As of version 1.4 the optional argument is not used and reserved for later purposes. This command revokes the suspension of the counters in the {*counters*} list.

`\ResumeAllSuspendedCounters` [*options*]

As of version 1.4 the optional argument is not used and reserved for later purposes. This command revokes all suspended counters.

v0.8 2016-06-10

## 11.2 Query suspension

`\IsSuspendedCounter` {*counter name*} {*true branch*} {*false branch*}

See Suspending and Resuming on this topic.

This command checks, whether a counter is suspended, i.e. not updated at all and expands the corresponding branches.

#1 {*counter name*}

Contains the name of counter presumed to be suspended

#2 {*True branch*}

This code is expanded if the counter is suspended, otherwise it is ignored

#3 {*True branch*}

This code is expanded if the counter is **not** suspended, otherwise it is ignored



If a driver counter is suspended, all counters associated to it are suspended too!

```
\textbf{This example shows 4 equations, but only two of them are counted}
```

```
\begin{equation}
E_{0} = mc^2
\end{equation}
```

Now suspend the equations:

```
\SuspendCounters{equation}
\begin{equation}
E^2 = \left(\text{pc}\right)^2 + E_{2\_0}^2
\end{equation}
```

```
\begin{equation}
m(v) = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}
\end{equation}
```

And resume it: `\ResumeSuspendedCounters{equation}`

```
\begin{equation}
E = h \nu
\end{equation}
```

There are `\number\totvalue{totalequations}` equations in here!

---

**This example shows 4 equations, but only two of them are counted**

$$E_0 = mc^2 \tag{1}$$

Now suspend the equations:

$$E^2 = (pc)^2 + E_0^2 \tag{1}$$



$$m(v) = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{1}$$

And resume it:

$$E = h\nu \tag{2}$$

There are 2 equations in here!

## 12 Total counters

Similarly to the package  **totcount** or the features of  **totalcount** by Axel Sommerfeldt this package provides the possibility of defining a counter that stores its finally value to the auxiliary file and starts from this value then, if not set otherwise to another value.

## 12. TOTAL COUNTERS

The declaration of a total counter is a preamble - only event and `\DeclareTotalDocumentCounter`<sup>→ P.55</sup> is a preamble-only command in order to prevent counter register confusion. If a certain existing counter should be treated with total counter features, use `\RegisterTotalDocumentCounter`<sup>→ P.53</sup> instead.

Use `\NewTotalDocumentCounter`<sup>→ P.55</sup> only in rare cases, if a total counter must be defined within the document body.



The standard  $\text{\LaTeX} 2_{\epsilon}$  commands `\stepcounter`, `\addtocounter` and `\setcounter` support the specification of a total counter, but `\refstepcounter` will fail since the usage of a total counter for labelling purposes is most probably of no use (as of version 1.4)



### 12.1 Defining total counters


`\RegisterTotalDocumentCounter`[*<options>*]{*<total counter name>*}

v0.5 2016-02-27

#1 [*<options>*]: As of version 1.4, only this option is used

`supertotal`=*<true,false>* (false)

Set this key to switch the super total counter on or off.

#2 {*<total counter name>*}: The name of the total counter. This must be the same like the name of an already existing counter. Internally another counter is defined which has a prefix to prevent name clashes with counter names defined by the package  **totalcount**. If the counter name does not exist, the compilation exits with an error message.

`\TotalCounterInternalName`{*<counter name>*}

This command reports the internal name of a total counter or the usual name if this counter is not a total one.

```
\TotalCounterInternalName{chapter}
```

```
\TotalCounterInternalName{foototal}
```

chapter

xassocnt@total@foototal

Expandable

`\TotalCounterInternalNameExp`{*<counter name>*}

v1.0 2016-07-28

This command is the expandable version of `\TotalCounterInternalName`

`\TotalValue{<counter name>}`

This command prints the value of a total counter or falls back to the value of the counter if this is not a total counter.

```
‘‘Total’’ value of the section non-total counter: \TotalValue{section}

Total value of the foototal total counter: \TotalValue{foototal}

-----

“Total” value of the section non-total counter: 3
Total value of the foototal total counter: 1
```

## 12.2 Queries about total counters

`\IsTotalCounterTF{<counter name>}{<true branch>}{<false branch>}`

This macro tests if a counter is under the administration of the total counter commands and expands to the relevant branch then. There are two short-circuit commands `\IsTotalCounterT` and `\IsTotalCounterF`.

`\IsTotalCounterT{<counter name>}{<true branch>}`

This macro checks if a counter is under the administration of the total counter commands and expands to the code in the second argument if this is true.

`\IsTotalCounterF{<counter name>}{<false branch>}`

This macro checks if a counter is under the administration of the total counter commands and expands to the code in the second argument if this is not the case.

```
\IsTotalCounterTF{foototal}{Yes, this is a total counter}{No, this is no total }
  {counter}



\IsTotalCounterTF{section}{Yes, this is a total counter}{No, this is no total }
  {counter}

\IsTotalCounterT{foototal}{Yes, this is a total counter}


\IsTotalCounterF{page}{No, page isn't a total counter}
```

```
Yes, this is a total counter
Yes, this is a total counter
Yes, this is a total counter
No, page isn't a total counter
```



The features of using other  aux files or a different external file as provided by  **totcount** is not (yet) support as of version 1.4.

## 13 Super total counters

In addition to the concept of a total counter, there is also the possibility of using super total counters – those counters survive the reset at the beginning of a compilation, i.e. the value of a super total counter might be stepped in each run and as such the number of compilation runs etc. can be tracked. The values of the last run are persistent as long as the  .aux file isn't deleted.

2015-11-25


### 13.1 Defining super total counters

`\NewTotalDocumentCounter` [*options*] {*total counter name1, total counter name2,...*}

This macro defines a new counter (which mustn't exist before of course) and puts it under control of the total counter features.

**#1** [*options*]: As of version 1.4, only this option is used

`supertotal` <sup>→ P.53</sup> – this has the same meaning as in `\RegisterTotalDocumentCounter` <sup>→ P.53</sup> and defaults to `false`.

**#2** {*total counter name1, total counter name2,...*}: The names of the total counter, separated by a comma. This must not be the same like the name of any already existing counter. Internally another counter is defined which has a prefix to prevent name clashes with counter names defined by the package  **totcount**.

`\DeclareTotalDocumentCounter` [*options*] {*total counter name1, total counter name2,...*}

This is the preamble - only version of `\NewTotalDocumentCounter` and should be preferred in most cases over that command.

If an already existing counter should be tracked with total counter features, use `\RegisterTotalDocumentCounter` instead.

This command allows multiple counters (specified as a comma separated list) to be defined at once.

v1.2  
2017-03-03

### 13.2 Queryies about super total counters

`\IsSuperTotalCounterTF` {*counter name*} {*true branch*} {*false branch*}

This macro tests if a counter is under the administration of the super total counter commands and expands to the relevant branch then. There are two short-circuit commands `\IsSuperTotalCounterT` and `\IsSuperTotalCounterF` <sup>→ P.56</sup>.

`\IsSuperTotalCounterT` {*counter name*} {*true branch*}

This macro checks if a counter is under the administration of the super total counter commands and expands to the code in the second argument if this is true.

`\IsSuperTotalCounterF{<counter name>}{<false branch>}`

This macro checks if a counter is under the administration of the super total counter commands and expands to the code in the second argument if this is not the case.


```
\IsSuperTotalCounterTF{numberofruns}{Yes, this is a super total counter}{No, this is no super total counter}
```

```
\IsSuperTotalCounterT{numberofruns}{Yes, this is a super total counter}
```

```
\IsSuperTotalCounterTF{chapter}{Yes, this is a total counter}{No, this is no super total counter}
```

No, this is no super total counter  
No, this is no super total counter

### 13.3 The **numberofruns** counter

This package adds a counter of its own:  **numberofruns** which is a super total counter and is stepped each compilation run. It's added in `\AtBeginDocument` and can be retrieved with `\TotalValue`<sup>→ P.54</sup>. Use the `nonnumberofruns`<sup>→ P.10</sup> package option to prevent the definition of this counter.

## 14 Experimental features



The content here is only of experimental nature and there is no guarantee that the feature will be maintained in future releases.



### 14.1 Labels



To enable the redefined `\label` macro, specify the package option `redefineLabel`<sup>→ P.10</sup>

`\label[<cleveref-counter-override>]{<label name>}[<options for associated counters>]`

`all`=<true,false> (initially <false>)

This will enable that all associated counters to a driver counter will cause the generation of a label too. By default this option is <false>. This option deliberately overrides `select`, the value of the option `prefix`<sup>→ P.57</sup> is disregarded.

`select`=counter1, counter2,... (initially empty)

v1.2 2017-03-03

v1.2 2017-03-03

v1.2 2017-03-03

v1.2 2017-03-03

v1.2 2017-03-03



Select only some of the associated counters to be able to be labeled. As of version 1.4 there is no check whether the given names refer to counters at all or are associated counters to the last counter that has been used with `\refstepcounter`.

**prefix**=*<text>* (initially empty)

This gives the prefix of the label of the associated counter. If the option `all`<sup>→P.56</sup> is enabled, the label name is generated from the name of the associated counter, the value of `prefix-sep` and the value of the 2nd argument.

```
% Assume that some counter has the associated counters foobar, 2
% morefoobar and yetanotherfoobar
\label{foo}[prefix=assoc,all]
```

will cause a label named `foobar::foo`, `morefoobar::foo` and `yetanotherfoobar::foo`, whereas

```
\label{foo}[prefix=assoc,select=morefoobar]
```

would generate the label `assoc::foobar` only and will be tied to the value of the counter `morefoobar`

**prefix-sep**=*<text>* (initially `::`)

Defines the separator between the `prefix` and the label name for the driver counter, i.e. the 2nd argument of the `\label`<sup>→P.56</sup> command.

v1.2 2017-03-03

v1.2 2017-03-03

v1.2 2017-03-03

v1.2 2017-03-03



! If the package option `redefinelabel`<sup>→P.10</sup> is set to `<false>`, the usage of the third optional argument will leave spurious content at the position `\label` was used. The reason is that the content of third optional argument with `[]` is not recognized as an argument any longer.

**\LaTeXLabel**[*<cleveref-counter-override>*]{*<label name>*}

This is the default label macro, either with the **cleveref** extension or the classical  $\text{\LaTeX}2\epsilon$  macro (eventually modified by **hyperref**) and is not modified by this package.

The feature of label hooks from `\RegisterPreLabelHook`<sup>→P.58</sup> or `\RegisterPostLabelHook`<sup>→P.58</sup> is not used here.

v1.3 2017-03-04

## 14.2 Hooks

This feature is experimental and only realized for the modified `\label`<sup>→P.56</sup> command until now. See `xassocnt_getparentcounter_example.tex` as an example of usage.

`\RegisterPreLabelHook{<command name1, command name2,...>}`

v1.3 2017-  
03-04

This macro declares a possible list of hooks (commands) that should be executed **before** the traditional `\label` command is applied. If the hook name refers to some unknown macro, nothing is done.

The hook names must be given with the `\` as command sequence indicator, i.e. `\zlabel`, more than one macro name is possible by using comma as separator.

As of version 1.4 the hook macro does not allow more than one argument, which is automatically used from the surrounding `\label` call and is the usual label name.

`\RegisterPostLabelHook{<command name1, command name2,...>}`

v1.3 2017-  
03-04

This macro declares a possible list of hooks (commands) that should be executed after the traditional `\label` command is applied. If the hook name refers to some unknown macro, nothing is done.

The hook names must be given with the `\` as command sequence indicator, i.e. `\zlabel`, more than one macro name is possible by using comma as separator.

As of version 1.4 the hook macro does not allow more than one argument, which is automatically used from the surrounding `\label` call and is the usual label name.

---

## Part IV

# Meta-Information


### Table of Contents

---


15 To - Do list	60
16 Acknowledgments	61
17 Version history	62

---

## 15 To - Do list

- Merging of counter groups, removing counters from counter groups
- Backup and restoration of individual counters not being member of a counter group
- Switch to the container support for all features – this is a major task and will be done in (tiny) steps.
- Better counter definition/copy counter routines → another package perhaps
- More examples
- Some macro names might be non-intuitive
- Improve documentation
- Hooks for conditionals on  **numberofruns** (see section 13.3)

Some issues that have been addressed partially are:

- Add counter group support for the  **backup** feature, i.e. define a symbolic name for a group of counters that should be controlled by the backup feature. This will allow multiple backup groups, which might be necessary.

v1.0 2016-07-28


If you

- find bugs
- errors in the documentation
- have suggestions
- have feature requests

don't hesitate and contact me using my mail address: [typography.with.latex@gmail.com](mailto:typography.with.latex@gmail.com).


## 16 Acknowledgments

I would like to express my gratitudes to the developpers of fine  $\text{\LaTeX}$  packages and of course to the users at [tex.stackexchange.com](http://tex.stackexchange.com), especially to

- Paulo Roberto Massa Cereda
- Enrico Gregorio
- Joseph Wright
- David Carlisle
- Werner Grundlingh
- Gonzalo Medina
- Cosmo Huber (for providing the bug report with the  **calc** package.)




for their invaluable help on many questions on macros.




A special gratitude goes to Prof. Dr. Dr. Thomas Sturm for providing the wonderful  **tcolorbox** package which was used to write this documentation.

## 17 Version history

- Version v1.4 2017-04-07

- Improved the core macros `\refstepcounter` and `\stepcounter` in order to fit the  **expl3** and  **xparse** changes of Februar - April 2017.
- Added following experimental features:
- `\CounterFormat`<sup>→P.25</sup> with quick and possible recursive change of the counter output
- `\StoreCounterFormats`<sup>→P.28</sup>, `\AddCounterFormats`<sup>→P.29</sup> and `\RemoveCounterFormats`<sup>→P.29</sup> for defining own short hand counter formats.
- Provided the macros `\xalphalph`<sup>→P.25</sup> and `\xAlphAlph`<sup>→P.25</sup> in order to allow counter output in the same manner as the  **alphalph** does.
- Added the macros `\CounterWithin`<sup>→P.24</sup>, `\CounterWithin*`<sup>→P.24</sup>, `\CounterWithout`<sup>→P.24</sup> and `\CounterWithout*`<sup>→P.24</sup> which provides a quicker access to add or remove counters from the reset list and changing the corresponding `\the...` macros.
- Provided the `\LoopCounterResetList`<sup>→P.23</sup> to perform the same action on all counters being in the reset list of a given counter.
- New macros `\ClearCounterResetList`<sup>→P.19</sup> and `\ClearCounterResetList*`<sup>→P.19</sup> to remove all counters on first level of a driver counter.
- Added the explanation (missing in previous versions) to the documentation that the `\AddToReset`<sup>→P.19</sup>, `\RemoveFromReset`<sup>→P.18</sup> and `\RemoveFromFullReset`<sup>→P.18</sup> macros actually support a comma separated list of counter names for the first argument.

- Version v1.3 2017-03-04

- Provided the `\LaTeXLabel`<sup>→P.57</sup> macro to access the non-xassoccnt version of the `\label`<sup>→P.56</sup> command.
- Added the concept of label hooks, see section 14 for more information.
- The macros `\Last...` are defined with  **expl3** methods.
- Added `\GetAllResetLists`<sup>→P.21</sup> and `\GetParentCounter`<sup>→P.21</sup> for information on parent (or driver) counters.

Experimental

- Version v1.2 2017-03-03

- Corrected some typos in the manual.
- The macros `\NewDocumentCounter`<sup>→P.12</sup>, `\DeclareDocumentCounter`<sup>→P.12</sup> and `\NewTotalDocumentCounter` allow multiple counters to be specified and defined.




## 17. VERSION HISTORY

---



- Added the macro `\DeclareTotalAssociatedCounters`<sup>→P.34</sup> in order to combine total counters and the associated feature, i.e. the counters are total ones and associated to a driver counter.
- An extended version of `\label`<sup>→P.56</sup> is provided to allow labels also for associated counters during the stepping process of the driver counter.

Experimental

- Version v1.1 2016-10-29

- Added some missing basic functions needed after the more restrictive  **expl3** update from 2016/10/19
- Added a statement about the requirement to load  **tcolorbox** before  **xassocnt** in the documentation (i.e. this file!)

- Version v1.0 2016-07-28

- Restructured the  **xassocnt** manual file.
- Added some improvements for counter reset lists macros
- Added new backup/restore features, with cascading counters possibility – the old backup/restore macros are still available but renamed with a prefix `\Former...`
- Added the `\RemoveAllPeriodicCounters`<sup>→P.49</sup> – it was missing in the  **periodic counter** features – see Periodic counters for more information on this.
- Added the expandable version of `\TotalCounterInternalName`<sup>→P.53</sup> named `\TotalCounterInternalNameExp`<sup>→P.53</sup>.

v1.0 2016-07-28


v1.0 2016-07-28

v1.0 2016-07-28

v1.0 2016-07-28

v1.0 2016-07-28

- Version v0.9 2016-06-19

- `\TotalValue`<sup>→P.54</sup> is an expandable command now.
- Added the  **periodic counter** features – see Periodic counters for more information on this.

v0.9 2016-06-19

v0.9 2016-06-19

- Version v0.8 2016-06-10

- ✓ Fixed the `\SuspendCounters`<sup>→P.50</sup> and `\ResumeSuspendedCounters`<sup>→P.51</sup> macros – the comma separated list of counters was not used (contrary to the purpose and the documentation description).
- ✓ Additions of commands
  - ▷ `\ResumeAllSuspendedCounters`<sup>→P.51</sup>

v0.8 2016-06-10


v0.8 2016-06-10

## 17. VERSION HISTORY

---

- ▷ \CascadeSuspendCounters<sup>→ P.50</sup>
- ▷ \DisplayResetList<sup>→ P.20</sup>
- ▷ \ShowResetList<sup>→ P.21</sup>

- Version v0.7 2016-05-10


- ✓ Fixed a small bug in the  **xassocnt** version of \stepcounter
- ✓ Added some macros that support the output of binary, octal or hexadecimal (both lower/uppercase) values of counters.
- ✓ Added the \Loop...Counters macros that perform an action in loop on all given counter names.

v0.7  
2016-05-10

v0.7 2016-  
05-10

v0.7 2016-  
05-10


- Version v0.6 2016-03-05

- ✓ The coupled counters allow to specify a counter group to which all relevant counters belong, this allows several coupled counter groups then
- ✓ Fixed a small bug within backup counter support – the resetting was not done any more
- ✓ Added the  **nonumberofruns** package option.

v0.6 2016-  
03-05

v0.6 2016-  
03-05

- Version v0.5 2016-02-27

- ✓ Added support (very experimental!) for the  **coupled counters** feature, see section 9 about this feature!
- ✓ Added \RegisterTotalDocumentCounter and improved \TotalValue support

v0.5 2016-  
02-27

v0.5 2016-  
02-27






- Version v0.4 2016-01-26

- ✓ Added \BackupCounterValues and \RestoreCounterValues support
- ✓ Added \StepDownCounter and \SubtractFromCounter macros

v0.4 2016-  
01-26

v0.4 2016-  
01-26

- Version v0.3 2016-01-08

- ✓ Added the  **totalcounter** features similar to the packages  **totcount** or  **totalcount**
- ✓ Added the  **super total counter** features
- ✓ Added the  **numberofruns** counter

v0.3  
2016-01-08

2015-11-  
11

2015-25-  
11

2015-25-  
11



## 17. VERSION HISTORY

---

- Version v0.2 2016-11-14

Improved `\stepcounter` to remove some incompatibilities with the [✉ perpage](#). This is only partially managed so far.

v0.2  
2016-11-14

- Version v0.1 2016-11-07

A major bug fixed due to some error in usage together with [✉ calc](#) when the driven counters are not stepped any longer. The culprit was in [✉ assocnt](#) that the counter reset list was not really disabled.

Thanks to this question <http://tex.stackexchange.com/questions/269731/calc-breaks-assocnt> this bug was detected.

This however lead to some internal inconsistencies and it was decided to rewrite [✉ assocnt](#) with [✉ expl3](#) and the features of the new  $\text{\LaTeX}$  3 - Syntax.

---

## Part V

# Appendix

Note: The `\DeclareAssociatedCounters` command has to be used in the preamble of the document. It's missing here for the sake of a compact example.

### A Example: Total number of sections

In this example, all sections of this document are counted, i.e. the current one as well as all following ones.

```
This document has \total{totalsections} section(s)%
```

---

```
This document has 20 section(s)
```

### B Example: Total number of subsections with suspension

In this example, the subsections of this document are counted but later on, the associatedcounter is removed from the list, so it is frozen.

```
\subsection{First dummy subsection}
SubSection counter: \thesubsection~-- \number\totvalue{totalsubsections}
\subsection{Second dummy subsection}
SubSection counter: \thesubsection~-- \number\totvalue{totalsubsections}

\RemoveAssociatedCounter{subsection}{totalsubsections}%
\subsection{Third dummy subsection after removing the associated counter}

SubSection counter: \thesubsection~-- \number\totvalue{totalsubsections}
```

---

### B.1 First dummy subsection

SubSection counter: B.1 – 35

### B.2 Second dummy subsection

SubSection counter: B.2 – 35

### B.3 Third dummy subsection after removing the associated counter

SubSection counter: B.3 – 35

### B.4 Suspension of a non-associated counter

This example will show the suspension of a non-associated counter

```
\setcounter{equation}{0}%
\SuspendCounters{equation}%
\begin{equation}
E_{0} = mc^2
\end{equation}

\begin{equation}
E^2 = \left(\{ pc\}\right)^2 + E_{2}_{0}^2
\end{equation}

\begin{equation}
m(v) = \frac{m_{0}}{\sqrt{1-\frac{v^2}{c^2}}}
\end{equation}
```

There are \number\value{equation}~equations in here!

$$E_0 = mc^2 \quad (0)$$

$$E^2 = (pc)^2 + E_0^2 \quad (0)$$

$$m(v) = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (0)$$

There are 0 equations in here!

## C Former backup and restore of counter values

v1.0  
2016-07-28

### C.1 Description of backup and restoring macros for counter values

`\FormerBackupCounterValues` [*options*] {*counter name1, counter name2,...*}

This macro adds counter names (separated by a comma) to a list and stores the current values of the counters to another list. The values are used from the current state where this command is used, not a previous or a later state is stored.

- All counters in the list will be reset to zero (after storing the values) for the next usage, unless the `resetbackup`<sup>→ P.69</sup> key is set to *false*.
- Multiple specification of the same counter name is possible, but only the first occurrence will be regarded – consecutive occurrences of the same counter name are not taken into account.

v0.5 2016-  
02-27

### C. FORMER BACKUP/RESTORE FEATURE

---

`resetbackup=<true/false>` (initially true)

This key decides whether **all** counters in the backup list should be reset to zero or should keep the current value. The default value is `<true>`.

Please note: If a name does not belong to a counter register the compilation aborts with an error message!

Some remarks

! If a specific counter name is suffixed with an \* at its end the resetting is disabled for this particular counter, regardless whether `resetbackup` is set to true or not.

v0.4 2016-01-26

! Strangely enough, a counter name like `foo*` is possible, but `\thefoo*` would fail. Be careful about choosing counter names for new counters – just restrict yourself to the usual letters (and if really needed, using @)

`\FormerRestoreAllCounterValues[<options>]`

This macro restores all stored counter values corresponding to the counter names. As of version 1.4 the optional argument isn't used and reserved for later purposes. The backup list is cleared after the restoring has been finished.

v0.5 2016-02-27

! The command `\FormerRestoreAllCounterValues` was previously called `\FormerRestoreCounterValues` – that macro is now reserved for updating only particular counters, not all in a row.

`\FormerRestoreCounterValues[<options>]{<counter name1,counter name2,...>}`

This macro restores only the stored counter values given by the counter names. As of version 1.4 the optional argument isn't used and reserved for later purposes.

v0.5  
2016-02-27

```
\captionof{figure}{A dummy figure}
\captionof{table}{A dummy table}

\FormerBackupCounterValues{figure,table*}

\captionof{figure}{Another dummy figure}
\captionof{table}{Another dummy table}
\captionof{figure}{Even another dummy figure}
\captionof{table}{Even another dummy table}

Before restoring: \thefigure\ and \thetable

\FormerRestoreAllCounterValues

Restored the values: \thefigure\ and \thetable

\captionof{figure}{Yet another dummy figure}
\captionof{table}{Yet another dummy table}
```

Figure 1: A dummy figure

Table 2: A dummy table

Figure 1: Another dummy figure

Table 3: Another dummy table

Figure 2: Even another dummy figure

Table 4: Even another dummy table

Before restoring: 2 and 4

Restored the values: 1 and 2

Figure 2: Yet another dummy figure

Table 3: Yet another dummy table

`\FormerAddBackupCounter` [*options*] {*counter name1,counter name2,...*}


### C. FORMER BACKUP/RESTORE FEATURE

---

This is similar to `\FormerBackupCounterValues`<sup>→ P.68</sup>, but adds the counter names to an existing global list and can be applied after `\FormerBackupCounterValues`<sup>→ P.68</sup>.

`\FormerRemoveBackupCounters` [*options*] {*counter name1, counter name2,...*}

This macro removes the counters from the list of backup counters and immediately restores the counter value unless the starred version `\FormerRemoveBackupCounters*` is used.

If the package  **hyperref** is used, the macro `\theH...` (see Some notes on the backup features on this) is restored to the original meaning.

As of version 1.4 the optional argument isn't used and reserved for later purposes.

v0.5 2016-02-27

`\FormerRemoveBackupCounters*` [*options*] {*counter name*}

This command is basically similar to `\FormerRemoveBackupCounters`, but does not restore the counter value right at the place the macro is used.

As of version 1.4 the optional argument isn't used and reserved for later purposes.

v0.5 2016-02-27

## Index

- \AddAssociatedCounters, 33
- \AddBackupCounter, 41
- \AddCounterFormats, 29
- \AddCoupledCounters, 46
- \AddDriverCounter, 35
- \AddPeriodicCounter, 48
- \addtocounter, 11
- \AddToReset, 19
- all key, 56
- \AssignBackupCounters, 41
- associatedtoo key, 12
- autodefine key, 31
- autodefinecounters key, 9
  
- backup-id key, 39
- \BackupCounterGroup, 40
- \BinaryValue, 25
  
- \CascadeSuspendCounters, 50
- cascading key, 39
- \ChangePeriodicCounterCondition, 49
- \ClearAllCoupledCounters, 46
- \ClearAssociatedCounters, 34
- \ClearBackupCounterGroups, 42
- \ClearBackupState, 42
- \ClearCounterBackupState, 41
- \ClearCounterResetList, 19
- \ClearCounterResetList\*, 19
- \ClearCoupledCounters, 46
- \ClearDriverCounters, 35
- \CopyDocumentCounters, 13
- Counter
  - chapter, 39, 50
  - equation, 39
  - figure, 39
  - foo, 32, 50
  - foo\*, 69
  - foobar, 32
  - numberofruns, 4, 10, 31, 56
  - paragraph, 39
  - section, 39
  - subparagraph, 39
  - subsection, 39
  - subsubsection, 39
  - table, 39
- \CounterFormat, 25
- \CounterFullResetList, 19
- \countersresetlistcount, 19
- \CounterWithin, 24
- \CounterWithin\*, 24
- \CounterWithout, 24
- \CounterWithout\*, 24
  
- \DeclareAssociatedCounters, 31
- \DeclareBackupCountersGroupName, 41
- \DeclareCoupledCounters, 45
- \DeclareCoupledCountersGroup, 45
- \DeclareDocumentCounter, 12
- \DeclarePeriodicCounter, 48
- \DeclareTotalAssociatedCounters, 34
- \DeclareTotalDocumentCounter, 55
- \DeleteBackupCounterGroups, 42
- \DisplayResetList, 20
  
- Feature
  - associated counters, 33, 34
  - backup, 60
  - coupled counters, 32, 64
  - expl3, 20
  - periodic counter, 63
  - periodic counters, 11
  - super total counter, 64
  - total counters, 34
  - totalcounter, 64
- \FormerAddBackupCounter, 70
- \FormerBackupCounterValues, 68
- \FormerRemoveBackupCounters, 71
- \FormerRemoveBackupCounters\*, 71
- \FormerRestoreAllCounterValues, 69
- \FormerRestoreCounterValues, 69



- 
- \GetAllResetLists, 21
  - \GetDriverCounter, 36
  - \GetParentCounter, 21
  - \getresetlistcount, 19
  - \HexValue, 25
  - \hexValue, 25
  - \IfInResetListF, 20
  - \IfInResetListT, 20
  - \IfInResetListTF, 20
  - \IfIsDocumentCounterF, 16
  - \IfIsDocumentCounterT, 16
  - \IfIsDocumentCounterTF, 15
  - initial key, 12
  - \IsAssociatedCounter, 37
  - \IsAssociatedToCounter, 35
  - \IsBackupCounterF, 43
  - \IsBackupCounterGroupF, 43
  - \IsBackupCounterGroupT, 43
  - \IsBackupCounterGroupTF, 43
  - \IsBackupCounterT, 43
  - \IsBackupCounterTF, 43
  - \IsBackupStateF, 44
  - \IsBackupStateT, 44
  - \IsBackupStateTF, 43
  - \IsCoupledCounterF, 47
  - \IsCoupledCounterT, 46
  - \IsCoupledCounterTF, 46
  - \IsDriverCounter, 37
  - \IsPeriodicCounterF, 50
  - \IsPeriodicCounterT, 50
  - \IsPeriodicCounterTF, 49
  - \IsSuperTotalCounterF, 56
  - \IsSuperTotalCounterT, 55
  - \IsSuperTotalCounterTF, 55
  - \IsSuspendedCounter, 51
  - \IsTotalCounterF, 54
  - \IsTotalCounterT, 54
  - \IsTotalCounterTF, 54
  - keep-after-restore key, 40
  - Keys
    - all, 56
    - associatedtoo, 12
    - autodefine, 31
    - autodefinecounters, 9
    - backup-id, 39
    - cascading, 39
    - initial, 12
    - keep-after-restore, 40
    - multiple, 45
    - name, 45
    - nonnumberofruns, 10
    - onlycounters, 12
    - prefix, 57
    - prefix-sep, 57
    - recursive, 26
    - redefinelabel, 10
    - reset, 49
    - resetbackup, 39, 69
    - restore-id, 40
    - select, 56
    - separator, 26
    - sloppy, 32
    - standardcounterformats, 10
    - supertotal, 53
    - wrap, 11
  - \label, 56
  - \LastAddedToCounter, 16
  - \LastCounterValue, 17
  - \LastRefSteppedCounter, 17
  - \LastSetCounter, 17
  - \LastSteppedCounter, 16
  - \LaTeXLabel, 57
  - \LoopAddtoCounters, 21
  - \LoopCounterResetList, 23
  - \LoopCountersFunction, 22
  - \LoopFullCounterResetList, 23
  - \LoopRefstepCounters, 22
  - \LoopResetCounters, 22
  - \LoopSetCounters, 22
  - \LoopStepCounters, 22
  - multiple key, 45
  - name key, 45
-

- \NewDocumentCounter, 12
- \NewTotalDocumentCounter, 55
- nonnumberofruns key, 10
- \OctalValue, 25
- onlycounters key, 12
- Option
  - nonnumberofruns, 64
- Package
  - alphalph, 25, 62
  - assoccnt, 7, 65
  - book, 39, 50
  - calc, 9, 61, 65
  - chngcntr, 18
  - cleveref, 8–10, 57
  - expl3, 20, 25, 62, 63, 65
  - fntcount, 25
  - hyperref, 8, 9, 40, 44, 50, 57, 71
  - l3keys2e, 8
  - mathtools, 9
  - perpage, 9, 65
  - remreset, 18
  - tcolorbox, 8, 9, 61, 63
  - totalcount, 52, 53, 64
  - totcount, 7, 52, 54, 55, 64
  - xassoccnt, 7, 9, 15, 21, 38, 63, 64
  - xcolor, 8
  - xparse, 8, 15, 62
- prefix key, 57
- prefix-sep key, 57
- recursive key, 26
- redefinelabel key, 10
- \RegisterPostLabelHook, 58
- \RegisterPreLabelHook, 58
- \RegisterTotalDocumentCounter, 53
- \RemoveAllPeriodicCounters, 49
- \RemoveAssociatedCounter, 33
- \RemoveAssociatedCounters, 34
- \RemoveCounterFormats, 29
- \RemoveCountersFromBackupGroup, 42
- \RemoveCoupledCounters, 45
- \RemoveDriverCounter, 35
- \RemoveFromFullReset, 18
- \RemoveFromReset, 18
- \RemovePeriodicCounter, 49
- reset key, 49
- resetbackup key, 39, 69
- restore-id key, 40
- \RestoreBackupCounterGroup, 40
- \ResumeAllSuspendedCounters, 51
- \ResumeSuspendedCounters, 51
- select key, 56
- separator key, 26
- \SetDocumentCounter, 12
- \ShowResetList, 21
- sloppy key, 32
- standardcounterformats key, 10
- \StepDownCounter, 13
- \StoreCounterFormats, 28
- \SubtractFromCounter, 13
- supertotal key, 53
- \SuspendCounters, 50
- \SwapDocumentCounters, 13
- \SyncCounters, 14
- \TotalCounterInternalName, 53
- \TotalCounterInternalNameExp, 53
- \TotalValue, 54
- wrap key, 11
- \xAlphAlph, 25
- \xalphalph, 25