

The `pageslts` package

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Abstract

This L^AT_EX package puts the labels `LastPage` (`\AddToHook{enddocument/afterlastpage}`, formerly `\AtEndDocument`) and `VeryLastPage` (also `\AddToHook{enddocument/afterlastpage}`, but formerly `\AfterLastShipout`) into the `.aux` file, allowing the user to refer to the last page of a document. This might be particularly useful in places like headers or footers. When more than one page numbering scheme is used, these references do not give the total *number* of pages. For this case the label `LastPages` is introduced. Additionally, at the last page of each page numbering scheme a label `pagesLTS.<numbering scheme>` is placed, where `<numbering scheme>` is e.g. `arabic`, `roman`, `Roman`, `alph`, or `Alph`. For `fnsymbol` please use `\lastpageref{pagesLTS.fnsymbol}` instead of `\pageref{pagesLTS.fnsymbol}`. When the same numbering scheme is used twice, the page numbers are either reset to one or continued automatically, depending on the option given when the package is called. The command `\theCurrentPage` prints the current total/absolute page number – in contrast to `\thepage`, which gives only the page *name* in the current page numbering scheme. `\theCurrentPageLocal` gives the current number of pages in the current page numbering scheme. `\thepage` and `\theCurrentPageLocal` are different e.g. when `\addtocounter{page}{...}` or `\setcounter{page}{...}` were used. At the first page of the document a label `pagesLTS.0` is created. This label can be referred to, too. Further labels are provided for special cases.

The `alphalph` package is supported, i.e. page numbers `alph` or `Alph` > 26 and `fnsymbol` > 9 can be used (with according options set). Even zero and negative page numbers can be used with `arabic`, `alph`, `Alph`, `roman`, `Roman`, and `fnsymbol` page numbering (with `alphalph` package and according options).

`\pageref*` and `\lastpageref*`, for using `hyperref` but suppressing links, are supported.

Right after `\begin{document}` a `\pagenumbering{...}` should be called – with the appropriate argument out of e.g.
`arabic` (Arabic numerals: 1, 2, 3, 4,...),
`roman` (Lowercase Roman numerals: i, ii, iii, iv,...), `Roman` (Uppercase Roman numerals: I, II, III, IV,...),
`alph` (Lowercase letters: a, b, c, d,...), `Alph` (Uppercase letters: A, B, C, D,...),
`fnsymbol` (Footnote symbols: *, †, ‡, §,...).

This package first started as a revision of the `lastpage` package of **Jeffrey P. Goldberg** (Thanks!), but then it was deemed necessary to provide a separate, enhanced package. After updates of the kernel and the package, `lastpage` now does what it is supposed to do.

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1 Introduction

This package puts the labels `LastPage` (`\AddToHook{enddocument/afterlastpage}`, formerly `\AtEndDocument`; same as the `LastPage` package) and `VeryLastPage` (also `\AddToHook{enddocument/afterlastpage}`, but formerly `\AfterLastShipout`) into the `.aux` file, allowing the user to refer to the last page of a document via `\lastpageref{LastPage}` and `\lastpageref{VeryLastPage}`. This might be particularly useful in places like headers or footers. When more than one page numbering scheme is used, these references do not give the total *number* of pages. For this case the label `LastPages` is introduced (similar to the label `TotPages` of the `TotPages` package, but the label `LastPages` is set later in the document). Additionally, at the last page of each page numbering scheme a label `pagesLTS.<numbering scheme>` is placed, where `<numbering scheme>` is e.g. `arabic`, `roman`, `Roman`, `alph`, or `Alph`. For `fnsymbol` please use `\lastpageref{pagesLTS.fnsymbol}` instead of `\pageref{pagesLTS.fnsymbol}`. When the same numbering scheme is used twice, the page numbers are either reset to one or continued automatically, depending on the option given when the package is called. The command `\theCurrentPage` prints the current total/absolute page number – in contrast to `\thepage`, which gives only the page *name* in the current page numbering scheme. `\theCurrentPageLocal` gives the current number of pages in the current page numbering scheme. `\thepage` and `\theCurrentPageLocal` are different e.g. when `\addtocounter{page}{...}` or `\setcounter{page}{...}` were used. (See also L^AT_EX bug 3421: 3rd page is even (twoside, titlepage, abstract), <https://www.latex-project.org/cgi-bin/ltxbugs2html?category=LaTeX&responsible=anyone&state=anything&keyword=pagenumber&pr=latex%2F3421&search=>.) At the first page of the document a label `pagesLTS.0` is created. Also to this label it can be referred. Further labels are provided for special cases.

The `alphalph` package is supported, i.e. page numbers `alph` or `Alph` > 26 and `fnsymbol` > 9 can be used (with the according options set). Even zero or negative page numbers can be used with `arabic`, `alph`, `Alph`, and `fnsymbol` page numbering (with `alphalph` package and according options), and zero `roman` and `Roman` pages, too.

Right after `\begin{document}` a `\pagenumbering{...}` should be called – with the appropriate argument out of e.g. `arabic` (Arabic numerals: 1, 2, 3, 4,...), `roman` (Lowercase Roman numerals: i, ii, iii, iv,...), `Roman` (Uppercase Roman numerals: I, II, III, IV,...), `alph` (Lowercase letters: a, b, c, d,...), `Alph` (Uppercase letters: A, B, C, D,...), `fnsymbol` (Footnote symbols: *, †, ‡, §,...).

This package first started as a revision of the `lastpage` package of JEFFREY P. GOLDBERG (Thanks!), but then it became obvious that a replacement was needed to accomplish what this package does.

Trademarks appear throughout this documentation without any trademark symbol; they are the property of their respective trademark owner. There is no intention of infringement; the usage is to the benefit of the trademark owner.

logical page numbers **Tip:** For the display of the pdf file use **logical page numbers** together with `hyperref`!

- In Adobe Reader Continuos Release 2024.004.20272 enable:
Edit > Preferences > Categories: Page Display > Page Content and Information: Use logical page numbers
- Use the `hyperref` package with option `plainpages=false`.

The display will be e.g. “7 (7 of 9)”, or, in case of Roman instead of arabic numbers, “VII (7 of 9)”, and when different page numbers are used (see below) e.g. arabic after 10 Roman pages: “17 (27 of 30)”. Please try this with the compiled `pageslts-example` file!

The name of the `pageslts` package refers to Last, Total, and page numbering Schemes pages. `pagesLTS` was a former name of this package.

2 Usage

Just load the package by placing

```
\usepackage[<options>]{pageslts}
```

in the preamble of your L^AT_EX source file and place a `\pagenumbering{...}` with appropriate argument (e.g. arabic, roman, Roman, fnsymbol, alph, or Alph) right behind `\begin{document}` (see subsection 2.3.1)!

For example for various draft forms it is desirable to have a page reference to the last page, so that e.g. page footers can contain something like “page N of K ”, where N is the current page and K is the last page. Once the package is loaded, anywhere in the text references can be made to the labels `LastPage`, `VeryLastPage`, and `LastPages` (most times with `\pageref{...}`, but more save with `\lastpageref{...}`). In particular one can use the `fancyhdr` (<https://ctan.org/pkg/fancyhdr>) or `nccfancyhdr` (<https://ctan.org/pkg/nccfancyhdr>) package, or redefinitions of the page headings and footings to get a reference to the last page.

`\pageref*` If the `hyperref` package is used, the references are hyperlinked to their targets. If these hyperlinks shall be suppressed, `\pageref*{...}` `\lastpageref*` and `\lastpageref*{...}` can be used.

2.1 Options

`options` The `pageslts` package takes the following options:

2.1.1 pagecontinue

`pagecontinue` When option `pagecontinue=false` is **not** given (i.e. `pagecontinue` or `pagecontinue=true` or no `pagecontinue` option at all), at each `\pagenumbering{...}` command the number of the page will be continued with the page number following the last page of the same page numbering scheme. For example, if there are V Roman pages in the frontmatter, some arabic ones in the mainmatter, and then Roman ones again in the backmatter, the last ones will start with VI instead of I again.

If you want to start with I (or i, 1, a, A, *,...) again, set option `pagecontinue=false`. If you want to generally continue the numbers, but for some page numbering scheme do not want this, use `pagecontinue=true` and say `\setcounter{page}{1}` after `\pagenumbering{...}` for that page numbering scheme.

2.1.2 alphMult, AlphMulti, fnsymbolmult

The page number printed in `fnsymbol`¹ must be > 0 and < 10 and those printed in `alph`² and `Alph`³ must be > 0 and < 27 . After page Z L^AT_EX *should* continue with AA, AB, AC,... Some people prefer AA, BB, CC,..., but in hexadecimal it is $AA_{16} = 170_{10}$ and $171_{10} = AB_{16}$, whereas $BB_{16} = 187_{10}$. In any way it should continue at all (maybe even with a user option to choose between the two continuations), but instead only gives an error:

¹*, †, ‡, §, ¶, ||, **, ††, ‡‡

²a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z

³A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z

LaTeX Error: Counter too large
See the LaTeX manual or LaTeX Companion for explanation.
You've lost some text. Try typing <return> to proceed.
If that doesn't work, type X <return> to quit.

But thanks to the `alphalph` package these limitation no longer hold. With his `\erroralph` command now even negative or zero page “numbers” are possible.

Nevertheless, some T_EX capacity will be exceeded well before the 2 147 483 647th page.

alphMult The string option `alphMult` takes three values: `ab`, `bb`, `0`:

ab After page `z`, the page “numbers” continue with `aa`, `ab`, `ac`, `ad`,..., and before `a` with `0`, `-a`, `-b`,..., `-z`, `-aa`, `-ab`,...

bb After page `z`, the page “numbers” continue with `aa`, `bb`, `cc`, `dd`,..., and before `a` with `0`, `-a`, `-b`,..., `-z`, `-aa`, `-bb`,...

0 (zero) The `pageslts` package does nothing, thus the user is free to define the page “numbers” after `z` and before `a`.
(But if the user does not do anything at all, the
LaTeX Error: Counter too large
will appear again.)

AlphMulti The string option `AlphMulti` takes three values: `AB`, `BB`, `0`:

AB After page `Z`, the page “numbers” continue with `AA`, `AB`, `AC`, `AD`,..., and before `A` with `0`, `-A`, `-B`,..., `-Z`, `-AA`, `-AB`,...

BB After page `Z`, the page “numbers” continue with `AA`, `BB`, `CC`, `DD`,..., and before `A` with `0`, `-A`, `-B`,..., `-Z`, `-AA`, `-BB`,...

0 (zero) The `pageslts` package does nothing, thus the user is free to define the page “numbers” after `Z` and before `A`.
(But if the user does not do anything at all, the
LaTeX Error: Counter too large
will appear again.)

fnsymbolmult When option `fnsymbolmult=false` is **not** given (but `fnsymbolmult` or `fnsymbolmult=true` or no `fnsymbolmult` option at all), after 5 (¶) the page “number” is continued with the doubled “number” of the first, second, third,... page (`**`, `††`, `‡‡`, `§§`, `¶¶`), and after the tenth page the “number” is tripled (`***`, `†††`,...). Compile the `pageslts-example.tex` and see the resulting pdf file.

Before `*` (page 1) the page “numbers” are continued with `0`, `-*`, `-†`,..., `-¶`, `-**`, `-††`,...

If this is not wanted, set option `fnsymbolmult=false`, and `pageslts` will do nothing and allow the user to change the page “number”.

(But if the user does not do anything at all, the

LaTeX Error: Counter too large
will appear again.)

2.1.3 romanMult, RomanMulti

romanMult The options `romanMult(=true)` and `RomanMulti(=true)` expand the `\roman` and `\Roman` page numbering scheme to values below one (`< 1`), i.e. `0`, `-i`, `-ii`, `-iii`, `-iv`,... and `0`, `-I`, `-II`, `-III`, `-IV`,..., respectively.

Again the T_EX capacity will be exceeded well before $\pm \text{MAX} = \pm 2\,147\,483\,647$. If the expansion below 1 is not wanted, set options `romanMult=false` and/or `RomanMulti=false`, and `pageslts` will do nothing and allow the user to change the page “number”. (But if the user does not do anything at all, L^AT_EX will just ignore those values – not even a warning will be issued!)

2.1.4 Arabic page numbers

Arabic page numbers In L^AT_EX arabic (page) numbers are already possible between `-MAX...MAX`, where `MAX = 2147483647` (cf. the `alph` package), without any expansion necessary.

2.2 Labels

`pagesLTS.0` At the first page a label `pagesLTS.0` is created. If `\pagenumbering{...}` is used right after `\begin{document}`, this is much easier for the `pageslts` package (and chances for successful placing of all labels are much higher; cf. subsection 2.3.2).

`LastPage` `\AddToHook{enddocument/afterlastpage}` (formerly: `\AtEndDocument`) this package defines a label, `LastPage`, which the user can refer to with the `\lastpageref{LastPage}` command. In former times `\pageref{LastPage}` did not work when used together with the `hyperref` package and the `fnsymbol` page numbering scheme. This should work now.

`VeryLastPage` `\AddToHook{enddocument/afterlastpage}` (formerly: `\AfterLastShipout`) the label `VeryLastPage` is defined, which the user can also refer to with the `\lastpageref{VeryLastPage}` command. With the new kernel hooks `LastPage` as well as `VeryLastPage` point to the last page indeed.

`LastPages` When more than one page numbering scheme is used, neither `LastPage` nor `VeryLastPage` give the total **number** of pages. For example, `page number` for a document with VI+36 pages, both give “36” as reference to the last page. While this is correct, the total number of pages is `number of pages` 42, and this is given by the reference to `LastPages`: `\lastpageref{LastPages}` (note the “s” at the end). When the page number was manipulated by `\addtocounter{page}{...}` or `\setcounter{page}{...}`, `LastPages` ignores this. (At a page numbering change the page is automatically reset to one (without option `pagecontinue`). This is done by `\setcounter{page}{1}`, thus this is ignored, too.)

`totpages` `\pageref{totpages}` of the `totpages` package is similar to `\lastpageref{LastPages}`, but while the target for `\pageref{totpages}` is placed `\AtEndDocument`, the target for `\lastpageref{LastPages}` is placed in the hook `enddocument/afterlastpage`, therefore `\lastpageref{LastPages}` is safer to really get the total page number.

`\@abspage@last` Nowadays the kernel provides `\@abspage@last`, which contains the number of pages.

`\theCurrentPage` `\theCurrentPage` gives the current total/absolute page, in contrast to `\thepage`, which gives only the page *name* in the current page numbering scheme. For example, when there are Roman VII pages in the frontmatter and afterwards in the mainmatter you are at arabic page 9, then `\theCurrentPage` is 16, whereas `\thepage` is 9. When the page “number” (name) is manipulated by `\addtocounter{page}{...}` or `\setcounter{page}{...}`, `\theCurrentPage` ignores this. Because `CurrentPage` is a normal counter, you can also say e.g. `\Roman{CurrentPage}` to get the value in Roman page numbering scheme (e.g. VIII for 8).

`\theCurrentPageLocal` `\theCurrentPageLocal` gives the current (arabic) number of pages in the current page numbering scheme. `\thepage` and `\theCurrentPageLocal` are different e.g. when `\addtocounter{page}{...}` or `\setcounter{page}{...}` were used. `\theCurrentPageLocal` can be printed in other formats, e.g. `\roman{pagesLTS.current.local.roman}`, but probably it only makes sense if page numbering scheme and format are the same, e.g. `\Roman{pagesLTS.current.local.Roman}` or `\Alph{pagesLTS.current.local.Alph}`. `\arabic{pagesLTS.current.local....}` probably make sense even when combined with an-

other page numbering scheme. And this is exactly what `\theCurrentPageLocal` does:
`\def\theCurrentPageLocal{\arabic{pagesLTS.current.local.\pagesLTS@pnc}}.`

`pagesLTS.page numbering` If you want to refer to the last page of the first, second,... use of a page numbering scheme, you can refer to
`scheme . number` `pagesLTS.<page numbering scheme>.<number>`, e.g. `\lastpageref{pagesLTS.Roman.1}`, where `<number>` is the occurrence of the page numbering scheme. For details please see page 9.

`\lastpageref` In former times for pages with the `fnsymbol` page numbering scheme, `\lastpageref{...}` instead of `\pageref{...}` had to be used. `\lastpageref` can be used for all pages.

`\pagenumbering` 2.3 `\pagenumbering{...}`

2.3.1 If `\pagenumbering{...}` is not used

When the `pageslts` package is used, but `\pagenumbering{...}` (with an argument like `arabic`, `roman`, `Roman`, `fnsymbol`, `alph`, or `Alph`) is not used, there should be no problem, except that you might need more (!) compiler runs to get all references right, and some references might even be missing (see below). The `pageslts` package tries to determine the page numbering scheme at the first shipout, but success is not guaranteed. Thus please use `\pagenumbering{...}` at the beginning of your document!

Without `\pagenumbering{<something>}` (`<something>` e.g. = `arabic`) at the beginning of the document, the page numbers might be given in *arabic by (class) default*, but the `pageslts` package does not know about this without `\pagenumbering{arabic}`. –

The label `pagesLTS.0` is created at the first page even if no `\pagenumbering{...}` command is given. Maybe have a look at the `.aux` file after compiling your document to detect further labels (of other packages, too).

2.3.2 If `\pagenumbering{...}` is used once

`pagesLTS.0` At the first page a label `pagesLTS.0` is created. If `\pagenumbering{...}` is used right after `\begin{document}`, this is much easier for the `pageslts` package (and chances for successful placing of all labels are much higher).

2.3.3 If `\pagenumbering{...}` is used more than once

Everything from the preceding subsections applies and additionally the following:

When different page numbering schemes are used, e.g. Roman numbers for the frontmatter and arabic numbers for the mainmatter, please use `\pagenumbering{...}` for each of them! Even if you do this, the reference to neither the label `LastPage` nor the label `VeryLastPage` gives the **total** number of pages, but only the number of pages of the last used page numbering scheme (which could be exactly what you want, e.g. if you want to refer to the last page itself and do not want to give the total number of pages).

`LastPages` For remediation the label `LastPages` (with “s” at its end) is introduced. Please then refer to this label by `\lastpageref{LastPages}` instead of `LastPage` or `VeryLastPage`.

`pagesLTS.arabic` Additionally, at the last page of each page numbering scheme a label `pagesLTS.<numbering scheme>` is placed, where `<numbering scheme>` is e.g. `arabic`, `roman`, `Roman`, `alph`, `Alph`,...

`pagesLTS.Roman` Additional page numbering schemes are unknown for `pageslts`, see [subsection 3.4 Using an unknown page numbering scheme](#).

`pagesLTS.alph`

`pagesLTS.Alph`

`pagesLTS.fnsymbol`

2.3.4 If the same `\pagenumbering{...}` scheme is used more than once

Everything from the preceding subsections applies and additionally the following:

`pagecontinue` If the same page numbering scheme is used twice (or even more often) in one document (e.g. in the frontmatter Roman: I–V, in the mainmatter arabic: 1–20, and in the backmatter again Roman: VI–X), the second time it is used, the page numbering is either continued (option `pagecontinue` or `pagecontinue=true` or no option `pagecontinue`; the default) or reset to one (option `pagecontinue=false`). It is even possible to use a page numbering scheme more than twice.

`pagesLTS`. `page numbering scheme . number` If you want to refer to the last page of the first, second,... use of a page numbering scheme, page V in the example above, you can refer to `pagesLTS.<page numbering scheme>.<number>`, e.g. `\lastpageref{pagesLTS.Roman.1}`, where `<number>` is the occurrence of the page numbering scheme.

If you want to refer to the first page of a page numbering scheme, just place a label there, e.g.

```
\pagenumbering{Roman}
\section{Section title\label{RomanSection}}
```

(You know where you use `\pagenumbering{...}` and this is the `pageslts` package, not the `firstpage` package).

When you want to give the number of pages of each “sector” of the page numbering scheme, you can use

`pagesLTS`. `page numbering scheme . number` `\lastpages{<page numbering scheme>}{<number>}`, where `<page numbering scheme>` is e.g. Roman, arabic,... and `<number>` the “sector” number, e.g. `\lastpages{Roman}{2}`.
`.local.cnt` (Internally, the counter has the format `pagesLTS.<page numbering scheme>.<number>.local.cnt`.)

If you used the page numbering scheme Roman for three times, you could say

```
Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}\
There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\
\lastpages{Roman}{1}~pages in the first Roman sector
(\pageref{Roman} -- \lastpageref{pagesLTS.Roman.1}),\
\lastpages{Roman}{2}~pages in the second Roman sector
(\pageref{Roman2} -- \lastpageref{pagesLTS.Roman.2}), and\
\lastpages{Roman}{3}~pages in the third Roman sector
(\pageref{Roman3} -- \lastpageref{pagesLTS.Roman.3}).\
```

to get

```
Last Roman page (pagesLTS.Roman): VIII
There are 8 pages with Roman numbers:
3 pages in the first Roman sector (I – III),
4 pages in the second Roman sector (IV – VII), and
3 pages in the third Roman sector (VIII – X).
```

(see e.g. the compiled `pageslts-example` file).

If you want to continue one page numbering scheme, but later on (third use of it, or for another page numbering scheme) want to reset the page number, just say `\setcounter{page}{1}` there.

In your document the code

```
\makeatletter
\renewcommand{\@evenfoot}{%
  {\normalsize\slshape DRAFT \today\hfil \upshape page {\thepage} (\theCurrentPage) of\ %
   \lastpageref{pagesLTS.Roman} + \lastpageref{pagesLTS.arabic}\ = \lastpageref{LastPages} pages%
  }
\renewcommand{\@oddfoot}{\@evenfoot}
\makeatother
```

creates footers like

“DRAFT November 20, 2024 page V (5) of VII + 35 = 42 pages”

or

“DRAFT November 20, 2024 page 10 (17) of VII + 35 = 42 pages”

in the compiled document (cf. the `pageslts-example` file).

Code like

```
This book has \lastpageref{pagesLTS.Roman}+\lastpageref{pagesLTS.arabic} pages %
(\lastpageref{LastPages} pages in total).
```

produces output like

This book has X+85 pages (95 pages in total).

(when using the `hyperref` package, the references are even hyperlinked).

If `\addtocounter{page}{...}` or `\setcounter{page}{...}` have been used, the local version of `CurrentPage` can be used, `\theCurrentPageLocal`, see subsection [2.2](#).

2.4 `papermas(s)` package

There is a kind of an add-on to this package, the `papermas` package, which can be used to compute the number of sheets of paper needed to print a document (you can print more than one page of a document on one sheet of paper) as well as the approximate mass of the printout. <https://ctan.org/pkg/papermas>

3 A few warnings

3.1 Hyperref and repeated page numbers

When two (or more) different page numbering schemes are used, or the page number is reset, or for any other reason there are two pages with the same number (maybe in different format, e.g. 1 and I), and `hyperref` has not been configured right, this can cause problems. Use `hyperref` with `plainpages=false` and `pdfpagelabels=true`, and everything should be fine. More details can be found at <https://texfaq.org/FAQ-pdfpagelabels>.

3.2 showkeys package

When the `showkeys` package has been loaded in `draft` mode, in the margin for each label a box is displayed with the name of the label. `showkeys` accomplishes this by redefining `\label`, but `pageslts` does not always use `\label`, but sometimes writes directly into the `\jobname.aux`-file, and this is generally done after the according page has shipped out, therefore no box can be placed on the preceding page. At least `pageslts` gives a warning, that `showkeys` cannot present the respective label.

3.3 lastpage package

This package first started as a revision of the `lastpage` package of JEFFREY P. GOLDBERG (jeffrey+news at goldmark dot org), but then I deemed a replacement necessary to accomplish what this package does. For backward compatibility, a label named `LastPage` is provided. Thus `\usepackage{lastpage}` can be replaced by

```
\usepackage[pagecontinue=false,alphMult=0,AlphMulti=0,fnsymbolmult=false,romanMult=false,RomanMulti=false%
]{pageslts},
```

if the behaviour of the `lastpage` package should be simulated. It is also possible to load both packages (if recent versions are used).

3.4 Using an unknown page numbering scheme

While at the time of the latest revision of the `pageslts` package no other page numbering schemes (e.g. Greek, Hebraic) were known to the maintainer, this package in principle works with every scheme which is recognized by the original `\pagenumbering` command. But the `hyperref` package only then works with special page names, if the references to those pages are given in a certain way, thus the combination of a new page numbering scheme, the `hyperref` and the `pageslts` package might not work. – The `pageslts` package by itself also works with schemes, which the original `\pagenumbering{...}` does not recognize, but because the original `\pagenumbering{...}` is called by the `pageslts` package, this might cause an error. Especially if the last page uses this new page numbering scheme, you should check everything double (at least).

And if the number format is unknown to \LaTeX , the pages will have no number, and therefore cannot be referenced. You might be able to help yourself by using the `hyperref` package and manually placing `\phantomsectins` and `\label{...}`s or even `\hypertargets` and `\hrefs`.

4 Alternatives

There are similar packages, which do (or do not) similar things. As I neither know what exactly you want to accomplish when using this package (e.g. page number vs. page name, hyperlinks or not), nor what resources your system has, here is a list of some possible alternatives:

- LaTeX kernel** - The recent \LaTeX kernel already writes something like `\gdef \@abspage@last{42}` to the end of the aux file, where 42 is the number of pages, regardless of `\pagenumbering{...}` schemes, `\setcounter{page}{...}`, `\addtocounter{page}{...}` or whatever. `\the\ReadonlyShipoutCounter` contains the number of currently shipped out pages, i.e. current page minus one.
- LastPage** - The `lastpage` package also provides the `LastPage` label (but not `VeryLastPage` or `LastPages`). If you only want this and/or have a quite limited amount of \TeX resources, you might want to use that package instead. It includes versions for older \LaTeX -kernels and even for \LaTeX 2.09.
<https://ctan.org/pkg/lastpage>
- totpages** - The `totpages` package provides a `totpages` label similar to `LastPages`, but `\AtEndDocument` instead of `\AfterLastShipout`. Therefore you should stay with `pageslts`. The `totpages` package additionally computes the number of paper sheets needed to (double) print the document (with one, two, three,... pages on one sheet of paper). This can also be accomplished with the `papermas` package (see [subsection 2.4](#)).
<https://ctan.org/pkg/totpages>
- totcount** - The `totcount` package provides the last value of a counter, thus also the value of the `page` counter. You do not get a hyperlink to the last page, only the numerical value of the last page name is given (i.e. X+72 pages gives 72 instead of 82 as total number of pages), and the number of pages can be changed for example by `\addtocounter`.
<https://ctan.org/pkg/totcount>
- nofm** - “There is a package `nofm.sty` available, but some versions of it are defective, and most don’t work with `fancyhdr` because they take over the complete page layout.” (PIET VAN OOSTRUM: Page layout in \LaTeX , March 2, 2004, section 16; `fancyhdr.pdf`)
`nofm` as of 1991/02/25 (without version number), available at
<https://mirror.ctan.org/obsolete/macros/latex209/contrib/misc/nofm.sty>,
does not work with e.g. `hyperref`, redefines `\enddocument` as well as `\@oddhead`, `\@evenhead`, `\@oddfoot`, and `\@evenfoot`.
If you know the (<https://CTAN.org>) location of a **working** (!) version, please send me an e-mail, thanks!
- count1to** - The `count1to` package “sets `\count1` to `\count8` with the values of page to subparagraph. `\count9` is used to flag odd pages. ... [T]he code for the `TotalPages` label” (package manual, 2024-06-13) has been removed from the current package version.
<https://ctan.org/pkg/count1to>
- zref** - The `zref` package “implements an extensible referencing system” (package manual, 2023-09-14).
<https://ctan.org/pkg/zref>

(You programmed or found another alternative, which is available at <https://CTAN.org>?
OK, send an e-mail to me with the name, location at CTAN, and a short notice, and I will probably include it in the list above.)

5 Example

```
1 (*example)
2 \documentclass[british]{article}[2024/02/08]% v1.4n
3 \usepackage{lipsum}[2021-09-20]% v2.7
4 \usepackage[draft]{showkeys}[2024/05/23]% v3.21
5 %%      Use final instead of draft to hide the keys. %%
6 \PassOptionsToPackage{hyperref}{pdfpagelabels=true,hyperindex=false}
7 \usepackage{hyperref}[2024-10-30]% v7.01k
8 \hypersetup{%
9  extension=pdf,%
10 plainpages=false,%
11 pdflang={en},%
12 pdftitle={pageslts package example},%
13 pdfauthor={Hans-Martin Muench},%
14 pdfsubject={Example for the pageslts package},%
15 pdfkeywords={LaTeX, pageslts, H.-Martin Muench},%
16 pdfview=Fit,%
17 pdfstartview=Fit,%
18 pdfpagelayout=SinglePage,%
19 bookmarksopen=true%
20 }
21 \usepackage[pagecontinue=true,alphMult=ab,AlphMulti=AB,fnsymbolmult=true,%
22 romanMult=true,RomanMulti=true]{pageslts}[2024-11-20]% v2.0a
23 %% These are the default options. %%
24
25 \makeatletter
26 \renewcommand{\@evenfoot}%
27   {Page \thepage\ (\thecurrentpage; local: \thecurrentpagelocal) of %
28   \lastpageref{pagesLTS.roman}(\lastpageref{pagesLTS.roman.local}) + %
29   \lastpageref{pagesLTS.Roman}(\lastpageref{pagesLTS.Roman.local}) + %
30   \lastpageref{pagesLTS.arabic}(\lastpageref{pagesLTS.arabic.local}) + %
31   \lastpageref{pagesLTS.fnsymbol}(\lastpageref{pagesLTS.fnsymbol.local}) + %
32   \lastpageref{pagesLTS.alph}(\lastpageref{pagesLTS.alph.local}) + %
33   \lastpageref{pagesLTS.Alph}(\lastpageref{pagesLTS.Alph.local}) = %
34   \lastpageref{LastPages} pages.%
35   }
36 \renewcommand{\@oddfoot}{\@evenfoot}
37 \def\pagesLTSexampleArabic{3}
38 \def\pagesLTSexamplealph{23}
39 \makeatother
40
41 \listfiles
42
```

```

43 \begin{document}
44 \pagenumbering{roman}
45 %% Note the first \pagenumbering immediately behind \begin{document}! %%
46 %%\addtocounter{page}{-2} %%
47
48 \section*{Example for pageslts}
49 \addcontentsline{toc}{section}{Example for pageslts}
50 \markboth{Example for pageslts}{Example for pageslts}
51
52 This example demonstrates the most common uses of package\
53 \textsf{pageslts}, v2.0a as of 2024-11-20 (HMM);\
54 \url{https://ctan.org/pkg/pageslts}.\
55
56 The used options were \texttt{pagecontinue=true},
57 \texttt{alphMult=ab}, \texttt{AlphaMulti=AB}, \linebreak
58 \texttt{fnsymbolmult=true},
59 \texttt{romanMult=true}, and \texttt{RomanMulti=true}
60 (the default\linebreak ones). -- For more details please see the documentation!\
61
62 \label{keys} To hide the \pageref{keys}{\quad } use option
63 \texttt{final} instead of \texttt{draft} with the \textsf{showkeys}
64 package (or remove the package call from the preamble of
65 this document).\
66
67 \textbf{Hyperlinks or not:} If the \textsf{hyperref} package is loaded,
68 the references are also hyperlinked:\
69 \smallskip
70 Page \thepage\ (\thecurrentpage; local: \thecurrentpagelocal) of %
71 \lastpageref{pagesLTS.roman}(\lastpageref{pagesLTS.roman.local}) + %
72 \lastpageref{pagesLTS.Roman}(\lastpageref{pagesLTS.Roman.local}) + %
73 \lastpageref{pagesLTS.arabic}(\lastpageref{pagesLTS.arabic.local}) + %
74 \lastpageref{pagesLTS.fnsymbol}(\lastpageref{pagesLTS.fnsymbol.local}) + %
75 \lastpageref{pagesLTS.alph}(\lastpageref{pagesLTS.alph.local}) + %
76 \lastpageref{pagesLTS.Alph}(\lastpageref{pagesLTS.Alph.local}) = %
77 \lastpageref{LastPages} pages.\
78 If the \textsf{hyperref} package is loaded, but the hyperlinks of the
79 references shall be suppressed, \verb|\pageref*{...}|
80 and \verb|\lastpageref*{...}| can be used:\[0.5\baselineskip]
81 Page \thepage\ (\thecurrentpage; local: \thecurrentpagelocal) of %
82 \lastpageref*{pagesLTS.roman}(\lastpageref*{pagesLTS.roman.local}) + %
83 \lastpageref*{pagesLTS.Roman}(\lastpageref*{pagesLTS.Roman.local}) + %
84 \lastpageref*{pagesLTS.arabic}(\lastpageref*{pagesLTS.arabic.local}) + %
85 \lastpageref*{pagesLTS.fnsymbol}(\lastpageref*{pagesLTS.fnsymbol.local}) + %
86 \lastpageref*{pagesLTS.alph}(\lastpageref*{pagesLTS.alph.local}) + %
87 \lastpageref*{pagesLTS.Alph}(\lastpageref*{pagesLTS.Alph.local}) = %
88 \lastpageref*{LastPages} pages.\

```

89

90

91 \textbf{Trademarks} appear throughout this example without any

92 trademark symbol; they are the property of their respective

93 trademark owner. There is no intention of infringement; the

94 usage is to the benefit of the trademark owner.\\

95

96 \textbf{Tip}: Use \textit{logical page numbers}

97 for the display of the pdf (in Adobe Reader Continuous Release 2024.004.20272:\\

98 Edit \$>\$ Preferences \$>\$ Categories: Page Display \$>\$

99 Page Content and Information: Use logical page numbers)!\\

100

101 You want negative page numbers? Not only arabic, but even roman,

102 Roman, alph, Alph or fnsymbol ones? No problem, e.\,g. just give a\\

103 \verb|\addtocounter{page}{|-\textit{some number}\verb|}| in the

104 source code of this example file (or uncomment the prepared line)!

105

106 \pagebreak

107

108 \tableofcontents

109

110 \newpage

111

112 \pagenumbering{roman}

113 %% in case the page numbering is changed before,

114 %% otherwise pagesLTS.current.local.roman on this page would be undefined

115

116 \section{roman}

117

118 \noindent (\texttt{roman} page numbering was started before,

119 because the page numbering scheme was needed to start at

120 the first page, of course.)\\

121

122 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):

123 \lastpageref{pagesLTS.0}\\

124

125 \noindent The page (\verb|\thepage|): \thepage \\

126

127 \noindent Current page (\verb|\theCurrentPage|),

128 i.\,e.\ counted continuously from the first\linebreak page):~\theCurrentPage \\

129 You can get this also in other formats:

130 \roman{CurrentPage}, \Roman{CurrentPage}, \arabic{CurrentPage},

131 \fnsymbol{CurrentPage}, \alph{CurrentPage}, \Alph{CurrentPage}.

132

133 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
134 i.\,e.\ counted continuously from the first page of the
135 current page numbering scheme): \theCurrentPageLocal \\

136 You can get also this in other formats, too:
137 \roman{pagesLTS.current.local.roman}, \Roman{pagesLTS.current.local.roman},
138 \arabic{pagesLTS.current.local.roman}, \fnsymbol{pagesLTS.current.local.roman},
139 \alph{pagesLTS.current.local.roman}, \Alph{pagesLTS.current.local.roman},
140 but probably it only makes sense if page numbering scheme and format are
141 the same, e.\,g.\\

142 \verb|\Roman{pagesLTS.current.local.Roman}|\\
143 or \verb|\Alph{pagesLTS.current.local.Alph}|. \verb|\arabic{...}| could
144 make sense even if combined with another page numbering scheme.
145 And this is exactly what \verb|\theCurrentPageLocal| does:\\

146 \nolinebreak{\verb|\def\theCurrentPageLocal{\arabic{pagesLTS.current.local.\pagesLTS@pnc}}|.}\\

147

148 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
149 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\\

150

151 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
152 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\\

153 \lastpages{Roman}{1}~pages in the first Roman sector
154 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\\

155 \lastpages{Roman}{2}~pages in the second Roman sector
156 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\\

157 \lastpages{Roman}{3}~pages in the third Roman sector
158 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\\

159

160 When the option \texttt{pagecontinue=false} is used with the
161 \textsf{pageslts} package, the \verb|\lastpageref{pagesLTS.Roman}| will
162 point to the same page as before, but this will have a lower number.\\

163 The \verb|\lastpageref{pagesLTS.Roman.local}| will not change,
164 because the number of pages does not change (only the page numbers).\\

165

166 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
167 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
168 because an \verb|\addtocounter{page}{\pagesLTSexampleArabic\verb|}| was used.)\\

169

170 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\\

171 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\\

172 \verb|\pageref{pagesLTS.fnsymbol}|!)\\

173 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\\

174

175 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
176 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
177 because an \verb|\addtocounter{page}{\pagesLTSexamplealph\verb|}| was used.)\\

178

```

179 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
180 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\
181
182 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\
183
184 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\
185 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
186 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\
187 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\
188
189 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
190 (=total number of pages)\
191
192 \lipsum[1-3]
193
194 \newpage
195
196 \pagenumbering{Roman}
197
198 \section{Roman\label{Roman}}
199 \subsection{Common Roman page numbering}
200
201 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
202 \lastpageref{pagesLTS.0}\
203
204 \noindent The page (\verb|\thepage|): \thepage \
205
206 \noindent Current page (\verb|\theCurrentPage|),
207 i.\,e.\ counted continuously from the first page): \theCurrentPage \
208
209 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
210 i.\,e.\ counted continuously from the first page of the
211 current page numbering scheme): \theCurrentPageLocal \
212
213 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
214 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\
215
216 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
217 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\
218 \lastpages{Roman}{1}~pages in the first Roman sector
219 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\
220 \lastpages{Roman}{2}~pages in the second Roman sector
221 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\
222 \lastpages{Roman}{3}~pages in the third Roman sector
223 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\
224

```

225 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
226 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
227 because an \verb|\addtocounter{page}{\pagesLTSexampleArabic\verb|}| was used.)\\
228
229 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\\
230 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\\
231 \verb|\pageref{pagesLTS.fnsymbol}|!)\\
232
233 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\\
234
235 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
236 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
237 because an \verb|\addtocounter{page}{\pagesLTSexamplealph\verb|}| was used.)\\
238
239 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
240 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\\
241
242 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\\
243
244 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\\
245 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
246 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\\
247 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\\
248
249 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
250 (=total number of pages)\\
251
252 \lipsum[1-4]
253
254 \newpage
255
256 \subsection{Last page of first Roman sector}
257 \verb|\lastpageref{pagesLTS.Roman}| does \textbf{not}
258 refer to this page (but there: \lastpageref{pagesLTS.Roman}),
259 because the option \texttt{pagecontinue=true}
260 was chosen. When a reference to this page is wanted,\\
261 \verb|\lastpageref{pagesLTS.Roman.1}| can be used: \lastpageref{pagesLTS.Roman.1}.\\
262
263 \bigskip
264 There are \lastpages{Roman}{1}~pages (\verb|\lastpages{Roman}{1}|)
265 in this first Roman sector.\\
266 The Roman page numbering scheme is continued later in section~\ref{Roman2})!
267
268 \newpage
269

```

270 \pagenumbering{arabic}
271
272 \section{arabic}
273
274 \subsection{Standard page numbering}
275
276 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
277 \lastpageref{pagesLTS.0} \\
278
279 \noindent The page (\verb|\thepage|): \thepage \\
280
281 \noindent Current page (\verb|\theCurrentPage|),
282 i.\,e.\ counted continuously from the first page): \theCurrentPage \\
283
284 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
285 i.\,e.\ counted continuously from the first page of the
286 current page numbering scheme): \theCurrentPageLocal \\
287
288 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
289 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.) \\
290
291 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
292 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\\
293 \lastpages{Roman}{1}~pages in the first Roman sector
294 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }), \\
295 \lastpages{Roman}{2}~pages in the second Roman sector
296 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and \\
297 \lastpages{Roman}{3}~pages in the third Roman sector
298 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\ \\
299

```

```

300 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
301 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
302 because an \verb|\addtocounter{page}{\pagesLTSexampleArabic\verb|}| was used.)\
303
304 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\
305 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\
306 \verb|\pageref{pagesLTS.fnsymbol}|!)\
307
308 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\
309
310 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
311 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
312 because an \verb|\addtocounter{page}{\pagesLTSexamplealph\verb|}| was used.)\
313
314 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
315 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\
316
317 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\
318
319 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\
320 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
321 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\
322 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\
323
324 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
325 (=total number of pages)\
326
327 \lipsum[1-4]
328 \newpage
329
330 \subsection[Empty page style]{Also an empty page style is no problem %
331 for the current or total page count}
332
333 \bigskip
334
335 \thispagestyle{empty}
336
337 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
338 \lastpageref{pagesLTS.0}\
339
340 \noindent The page (\verb|\thepage|): \thepage \
341
342 \noindent Current page (\verb|\thecurrentpage|),
343 i.\,e.\ counted continuously from the first page): \thecurrentpage \
344

```

345 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
346 i.\,e.\ counted continuously from the first page of the
347 current page numbering scheme): \theCurrentPageLocal \\
348
349 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
350 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\\
351
352 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
353 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\\
354 \lastpages{Roman}{1}~pages in the first Roman sector
355 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\\
356 \lastpages{Roman}{2}~pages in the second Roman sector
357 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\\
358 \lastpages{Roman}{3}~pages in the third Roman sector
359 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\ \\
360
361 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
362 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
363 because an \verb|\addtocounter{page}{|\pagesLTSexampleArabic\verb|}| was used.)\\
364
365 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\\
366 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\\
367 \verb|\pageref{pagesLTS.fnsymbol}|!)\\
368
369 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\\
370
371 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
372 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
373 because an \verb|\addtocounter{page}{|\pagesLTSexamplealph\verb|}| was used.)\\
374
375 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
376 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\\
377
378 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\\
379
380 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\\
381 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
382 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\\
383 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\\
384
385 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
386 (=total number of pages)\\
387
388 \lipsum[1-4]
389
390 \newpage

```

391
392 \subsection[addtocounter, setcounter]{Neither %
393 \texttt{\textbackslash addtocounter\{page\}} nor %
394 \texttt{\textbackslash setcounter\{page\}} is a problem for the %
395 current or total page numbers}
396
397 (Here is an \verb|\addtocounter{page}{|\pagesLTsexampleArabic\verb|}|
398 in the source code.)\
399 \addtocounter{page}{\pagesLTsexampleArabic}
400
401 \noindent The page (from \verb|\thepage| command): \thepage \
402
403 \noindent Current page (from \verb|\theCurrentPage|\ %
404 command), i.\,e.\ counted continuously from the first page): \theCurrentPage \
405
406 \noindent CurrentPageLocal (from \verb|\theCurrentPageLocal|\ %
407 command), i.\,e.\ counted continuously from the first page of the
408 current page numbering scheme): \theCurrentPageLocal\
409
410 \noindent Last page's number (LastPages): \lastpageref{LastPages}{\hskip3em }
411 (= total number of pages)\
412
413 \lipsum[1-7]
414
415 \newpage
416
417 \pagenumbering{fnsymbol}
418
419 \section{fnsymbol}
420
421 Without option \texttt{fnsymbolmult=true} of the \textsf{pageslts} package
422 (and the help of the \textsf{alphalph} package),
423 after page~9 (\textquotedblleft \ensuremath {\ddagger} \textquotedblright )
424 (and also for negative page numbers) there would just appear a
425 \begin{quote}
426 \begin{verbatim}
427 LaTeX Error: Counter too large
428 See the LaTeX manual or LaTeX Companion for explanation.
429 You've lost some text. Try typing <return> to proceed.
430 If that doesn't work, type X <return> to quit.
431 \end{verbatim}
432 \end{quote}
433 Now the page numbers after 5 (\ensuremath {\mathparagraph }) are
434 continued with the doubled \textquotedblleft number\textquotedblright{} of
435 the first, second, third,\ldots\ page (\ensuremath {**},
436 \ensuremath {\dagger} \dagger }, \ensuremath {\ddagger} \ddagger },

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```

437 \ensuremath {\mathsection \mathsection },
438 \ensuremath {\mathparagraph \mathparagraph },
439 and after the tenth page the \textquotedblleft number\textquotedblright{} is
440 tripled (\ensuremath {***}, \ensuremath {\dagger \dagger \dagger },\ldots).
441 Page zero is named 0 and negative pages are just named like the positive ones
442 with addition of a minus \mbox{sign ($-$)}.)
443
444 \bigskip
445
446 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
447 \lastpageref{pagesLTS.0}\
448
449 \noindent The page (\verb|\thepage|): \thepage \
450
451 \noindent Current page (\verb|\theCurrentPage|),
452 i.\,e.\ counted continuously from the first page): \theCurrentPage \
453
454 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
455 i.\,e.\ counted continuously from the first page of the
456 current page numbering scheme): \theCurrentPageLocal \
457
458 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
459 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\
460
461 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
462 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\
463 \lastpages{Roman}{1}~pages in the first Roman sector
464 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\
465 \lastpages{Roman}{2}~pages in the second Roman sector
466 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\
467 \lastpages{Roman}{3}~pages in the third Roman sector
468 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\
469
470 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
471 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
472 because an \verb|\addtocounter{page}{\pagesLTSexampleArabic\verb|}| was used.)\
473
474 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\
475 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\
476 \verb|\pageref{pagesLTS.fnsymbol}|!)\
477
478 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\
479
480 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
481 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
482 because an \verb|\addtocounter{page}{\pagesLTSexamplealph\verb|}| was used.)\

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483
484 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
485 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\\
486
487 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\\
488
489 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\\
490 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
491 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\\
492 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\\
493
494 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
495 (=total number of pages)\\
496
497 \lipsum[1-60]
498
499 \newpage
500
501 \pagenumbering{Roman}
502
503 \section{Roman -- again!\label{Roman2}}
504
505 The page number would start with \textquotedblleft I\textquotedblright{} again --
506 but for the \textsf{pageslts} package (with option \texttt{pagecontinue=true},
507 or with option just \texttt{pagecontinue}, or even just
508 \nolinebreak{with\textbf{out}} option \texttt{pagecontinue=false}).
509 This package remembered the
510 \arabic{pagesLTS.double.Roman}-1,
511 i.\,e.\,~\the\numexpr\value{pagesLTS.double.Roman}-1\relax, pages
512 already done in Roman output, and therefore continues with page
513 \textquotedblleft \thepage \textquotedblright .\\
514 If you want to start with \textquotedblleft I\textquotedblright{} all
515 over again, you will have two pages with the same name,
516 but nevertheless you can do this by using option \texttt{pagecontinue=false}
517 or a \verb|\setcounter{page}{1}|\ here (not demonstrated in this example file).\\
518
519 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
520 \lastpageref{pagesLTS.0}\\
521
522 \noindent The page (\verb|\thepage|): \thepage \\
523
524 \noindent Current page (\verb|\theCurrentPage|),
525 i.\,e.\, counted continuously from the first page): \theCurrentPage \\
526

```

527 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
528 i.\,e.\ counted continuously from the first page of the
529 current page numbering scheme): \theCurrentPageLocal \\
530

531 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
532 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\\
533

534 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
535 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\\
536 \lastpages{Roman}{1}~pages in the first Roman sector
537 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\\
538 \lastpages{Roman}{2}~pages in the second Roman sector
539 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\\
540 \lastpages{Roman}{3}~pages in the third Roman sector
541 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\ \\
542

543 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
544 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
545 because an \verb|\addtocounter{page}{|\pagesLTSexampleArabic\verb|}| was used.)\\
546

547 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\\
548 (\verb|\lastpageref{pagesLTS.fnsymbol}| -- never
549 \verb|\pageref{pagesLTS.fnsymbol}|!)\\
550 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\\
551

552 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
553 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
554 because an \verb|\addtocounter{page}{|\pagesLTSexamplealph\verb|}| was used.)\\
555

556 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
557 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\\
558

559 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\\
560

561 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\\
562 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
563 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\\
564 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\\
565

566 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
567 (=total number of pages)\\
568

569 \lipsum[1-6]
570
571 \newpage
572

573 \verb|\lastpageref{pagesLTS.Roman}| does \textbf{not}
574 refer to this page (but there: \lastpageref{pagesLTS.Roman}),
575 because the option \texttt{pagecontinue=true}
576 was chosen. When a reference to this page is wanted,\
577 \verb|\lastpageref{pagesLTS.Roman.2}| can be used: \lastpageref{pagesLTS.Roman.2}.\\
578
579 \bigskip
580 There are \lastpages{Roman}{2}~pages (\verb|\lastpages{Roman}{2}|) in this
581 second Roman sector.\
582 The Roman page numbering scheme is continued later in section~\ref{Roman3})!
583
584 \newpage
585
586 \pagenumbering{alph}
587
588 \section{alph\label{alph}}
589
590 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
591 \lastpageref{pagesLTS.0}\
592
593 \noindent The page (\verb|\thepage|): \thepage \
594
595 \noindent Current page (\verb|\theCurrentPage|),
596 i.\,e.\ counted continuously from the first page): \theCurrentPage \
597
598 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
599 i.\,e.\ counted continuously from the first page of the
600 current page numbering scheme): \theCurrentPageLocal \
601
602 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
603 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\
604
605 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
606 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\
607 \lastpages{Roman}{1}~pages in the first Roman sector
608 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\
609 \lastpages{Roman}{2}~pages in the second Roman sector
610 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\
611 \lastpages{Roman}{3}~pages in the third Roman sector
612 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\\
613
614 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
615 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
616 because an \verb|\addtocounter{page}{|\pagesLTSexampleArabic\verb|}| was used.)\
617

618 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\\\

619 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\\\

620 \verb|\pageref{pagesLTS.fnsymbol}|!)\\\

621

622 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\\\

623

624 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }\\\

625 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,\\\

626 because an \verb|\addtocounter{page}{|\pagesLTSexamplealph\verb|}| was used.)\\\

627

628 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }\\\

629 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\\\

630

631 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\\\

632

633 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\\\

634 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done\\\

635 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\\\

636 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\\\

637

638 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }\\\

639 (=total number of pages)\\\

640

641 \lipsum[1-4]

642

643 \newpage

644

645 Without option \texttt{alphMult=ab} of the \textsf{pageslts} (and the help of the\\\

646 \textsf{alphalph} package), after page \textquotedblleft z\textquotedblright} there\\\

647 would just appear a

648 \begin{quote}

649 \begin{verbatim}

650 LaTeX Error: Counter too large

651 See the LaTeX manual or LaTeX Companion for explanation.

652 You've lost some text. Try typing <return> to proceed.

653 If that doesn't work, type X <return> to quit.

654 \end{verbatim}

655 \end{quote}

656 Now the page numbers are continued aa, ab, ac,\ldots\ (aa, bb, cc,\ldots\ is\\\

657 also possible, see the \textsf{pageslts} documentation.)\\\

658 To demonstrate this, we add a\\\

659 \verb|\addtocounter{page}{|\pagesLTSexamplealph\verb|}|\\\

660 in the source code here.

661

662 \addtocounter{page}{\pagesLTSexamplealph}

663

```

664 \bigskip
665
666 \lipsum[1-18]
667
668 \newpage
669
670 \pagenumbering{Roman}
671
672 \section{Roman - third time!\label{Roman3}}
673
674 The page number would start with \textquotedblleft I\textquotedblright{} again
675 -- but for the \textsf{pageslts} package (with option \texttt{pagecontinue=true},
676 or with option just \texttt{pagecontinue}, or even just
677 \nolinebreak{with\textbf{out}} option \texttt{pagecontinue=false}).
678 This package remembered the
679 \arabic{pagesLTS.double.Roman}-1,
680 i.\,e.\~\the\numexpr\value{pagesLTS.double.Roman}-1\relax, pages
681 already done in Roman output, and therefore continues with page
682 \textquotedblleft \thepage \textquotedblright .\
683 If you want to start with \textquotedblleft I\textquotedblright{} all
684 over again, you will have (at least) two pages with the same name,
685 but nevertheless you can do this by using option
686 \texttt{pagecontinue=false} instead of \texttt{pagecontinue=true}
687 (not demonstrated here).\
688
689 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
690 \lastpageref{pagesLTS.0}\
691
692 \noindent The page (\verb|\thepage|): \thepage \
693
694 \noindent Current page (\verb|\theCurrentPage|),
695 i.\,e.\ counted continuously from the first page): \theCurrentPage \
696
697 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
698 i.\,e.\ counted continuously from the first page of the
699 current page numbering scheme): \theCurrentPageLocal \
700
701 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
702 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\
703
704 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
705 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\
706 \lastpages{Roman}{1}~pages in the first Roman sector
707 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\
708 \lastpages{Roman}{2}~pages in the second Roman sector
709 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\

```

710 \lastpages{Roman}{3}~pages in the third Roman sector
711 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\

712

713 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
714 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
715 because an \verb|\addtocounter{page}{\pagesLTSexampleArabic\verb|}| was used.)\

716

717 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\

718 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\

719 \verb|\pageref{pagesLTS.fnsymbol}|!)\

720

721 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\

722

723 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
724 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
725 because an \verb|\addtocounter{page}{\pagesLTSexamplealph\verb|}| was used.)\

726

727 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
728 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\

729

730 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\

731

732 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\

733 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
734 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\

735 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\

736

737 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
738 (=total number of pages)\

739

740 \lipsum[1-3]

741

742 \newpage

743

744 \lastpageref{pagesLTS.Roman}
745 (\verb|\lastpageref{pagesLTS.Roman}|)

746 \textbf{does} refers to this page, because the option
747 \texttt{pagecontinue=true} was chosen. Also\

748 \verb|\lastpageref{pagesLTS.Roman.3}| can be used: \lastpageref{pagesLTS.Roman.3}.\

749

750 \bigskip

751

752 There are \lastpages{Roman}{3}~pages (\verb|\lastpages{Roman}{3}|) in this
753 third Roman sector.\

754

755 \newpage

```

756
757 \pagenumbering{Alph}
758
759 \section{Alph}
760
761 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
762 \lastpageref{pagesLTS.0}\\
763
764 \noindent The page (\verb|\thepage|): \thepage \\
765
766 \noindent Current page (\verb|\theCurrentPage|),
767 i.\,e.\ counted continuously from the first page): \theCurrentPage \\
768
769 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
770 i.\,e.\ counted continuously from the first page of the
771 current page numbering scheme): \theCurrentPageLocal \\
772
773 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
774 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\\
775
776 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
777 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\\
778 \lastpages{Roman}{1}~pages in the first Roman sector
779 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\\
780 \lastpages{Roman}{2}~pages in the second Roman sector
781 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\\
782 \lastpages{Roman}{3}~pages in the third Roman sector
783 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\ \\
784
785 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
786 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
787 because an \verb|\addtocounter{page}{|\pagesLTSexampleArabic\verb|}| was used.)\\
788
789 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\\
790 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\\
791 \verb|\pageref{pagesLTS.fnsymbol}|!)\\
792
793 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\\
794
795 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
796 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
797 because an \verb|\addtocounter{page}{|\pagesLTSexamplealph\verb|}| was used.)\\
798
799 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
800 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\\
801

```

```

802 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\\
803
804 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\\
805 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
806 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\\
807 \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\\
808
809 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
810 (=total number of pages)\\
811
812 \lipsum[1-3]
813
814 \bigskip
815
816 Without option \texttt{alphMulti=AB} of the \textsf{pageslts}
817 (and the help of the \textsf{alphalph} package), after page
818 \textquotedblleft Z\textquotedblright there would just appear~a
819 \begin{quote}
820 \begin{verbatim}
821 LaTeX Error: Counter too large
822 See the LaTeX manual or LaTeX Companion for explanation.
823 You've lost some text. Try typing <return> to proceed.
824 If that doesn't work, type X <return> to quit.
825 \end{verbatim}
826 \end{quote}
827 Now the page numbers are continued AA, AB, AC,\ldots\ (AA, BB, CC,\ldots\ is
828 also possible, see the \textsf{pageslts} documentation).\\
829 This is not demonstrated here, but see section~\ref{alph}.
830
831 \newpage
832
833 \section{The End}
834
835 \noindent First page (\verb|\lastpageref{pagesLTS.0}|):
836 \lastpageref{pagesLTS.0}\\
837
838 \noindent The page (\verb|\thepage|): \thepage \\
839
840 \noindent Current page (\verb|\theCurrentPage|),
841 i.\,e.\ counted continuously from the first page): \theCurrentPage \\
842
843 \noindent CurrentPageLocal (\verb|\theCurrentPageLocal|),
844 i.\,e.\ counted continuously from the first page of the
845 current page numbering scheme): \theCurrentPageLocal \\
846

```



```

847 \noindent Last roman page (pagesLTS.roman): \lastpageref{pagesLTS.roman}{\hskip4em }
848 (There are \lastpageref{pagesLTS.roman.local} pages with roman numbers.)\
849
850 \noindent Last Roman page (pagesLTS.Roman): \lastpageref{pagesLTS.Roman}{\hskip3em }
851 (There are \lastpageref{pagesLTS.Roman.local}~pages with Roman numbers:\
852 \lastpages{Roman}{1}~pages in the first Roman sector
853 (\pageref{Roman}{\hskip3em }-\lastpageref{pagesLTS.Roman.1}{\hskip3em }),\
854 \lastpages{Roman}{2}~pages in the second Roman sector
855 (\pageref{Roman2}{\hskip3em }-\lastpageref{pagesLTS.Roman.2}{\hskip3em }), and\
856 \lastpages{Roman}{3}~pages in the third Roman sector
857 (\pageref{Roman3}{\hskip3em }-\lastpageref{pagesLTS.Roman.3}{\hskip3em }).\
858
859 \noindent Last arabic page (pagesLTS.arabic): \lastpageref{pagesLTS.arabic}{\hskip5em }
860 (There are only \lastpageref{pagesLTS.arabic.local} pages with arabic numbers,
861 because an \verb|\addtocounter{page}{\pagesLTSexampleArabic\verb|}| was used.)\
862
863 \noindent Last fnsymbol page (pagesLTS.fnsymbol): \lastpageref{pagesLTS.fnsymbol}\
864 (better \verb|\lastpageref{pagesLTS.fnsymbol}| than just\
865 \verb|\pageref{pagesLTS.fnsymbol}|!)\
866
867 (There are \lastpageref{pagesLTS.fnsymbol.local} pages with fnsymbol numbers.)\
868
869 \noindent Last alph page (pagesLTS.alph): \lastpageref{pagesLTS.alph}{\hskip4em }
870 (There are only \lastpageref{pagesLTS.alph.local} pages with alph numbers,
871 because an \verb|\addtocounter{page}{\pagesLTSexamplealph\verb|}| was used.)\
872
873 \noindent Last Alph page (pagesLTS.Alph): \lastpageref{pagesLTS.Alph}{\hskip4em }
874 (There are \lastpageref{pagesLTS.Alph.local} pages with Alph numbers.)\
875
876 \noindent Last page's \textit{name} (LastPage): \lastpageref{LastPage}\
877
878 \noindent Very last page's \textit{name} (VeryLastPage): \lastpageref{VeryLastPage}\
879 (\texttt{LastPage} and \texttt{VeryLastPage} are now identical, because both are now done
880 \verb|\AddToHook{enddocument/afterlastpage}| instead of formerly\
881 \verb|\AtEndDocument| and \verb|\AtEndDocument| and \verb|\AfterLastShipout|, which were different.)\
882
883 \noindent Last page's \textit{number} (LastPages): \lastpageref{LastPages}{\hskip3em }
884 (=total number of pages)
885 \end{document}
886 \example

```

6 The implementation

(This and the source code of the example file are the reasons for printing the documentation in landscape format instead of portrait.)

We start off by checking that we are loading into L^AT_EX 2_ε, format version at least 2024-06-01, and announcing the name and version of this package.

```
887 (*package)
888 \NeedsTeXFormat{LaTeX2e}[2024-06-01]
889 \ProvidesPackage{pageslts}[2024-11-20 v2.0a Refers to special pages' numbers/names (HMM)]
890
```

A short description of the pageslts package:

```
891 %% Allows for things like\
892 %% |Page \thepage\ (\theCurrentPage; local: \theCurrentPageLocal) of %
893 %% \lastpageref{pagesLTS.roman}(\lastpageref{pagesLTS.roman.local}) + %
894 %% \lastpageref{pagesLTS.Roman}(\lastpageref{pagesLTS.Roman.local}) + %
895 %% \lastpageref{pagesLTS.arabic}(\lastpageref{pagesLTS.arabic.local}) + %
896 %% \lastpageref{pagesLTS.fnsymbol}(\lastpageref{pagesLTS.fnsymbol.local}) + %
897 %% \lastpageref{pagesLTS.alph}(\lastpageref{pagesLTS.alph.local}) + %
898 %% \lastpageref{pagesLTS.Alph}(\lastpageref{pagesLTS.Alph.local}) = %
899 %% \lastpageref{LastPages} pages.\
900 %% to get\
901 %% 'Page d (57; local: 4) of ii(2) + XX(20) + *(1) + 30(30) + e(5) + C(3) = 61 pages.'.
902
```

The undobl package (see subsection 7.1) is needed to overwrite labels, when the same page numbering scheme is used twice (or even more often).

```
903 \RequirePackage{undobl}[2023-02-14]
```

For the handling of the options we use the kvoptions package (see subsection 7.1):

```
904 \RequirePackage{kvoptions}[2022-06-15]
905
906 \SetupKeyvalOptions{family = pagesLTS,prefix = pagesLTS@}
907 \DeclareStringOption[ab]{alphMult}
908 \DeclareStringOption[AB]{AlphMulti}
909 \DeclareBoolOption[true]{romanMult}
910 \DeclareBoolOption[true]{RomanMulti}
911 \DeclareBoolOption[true]{fnsymbolmult}
912 \DeclareBoolOption[true]{pagecontinue}
913
914 \ProcessKeyvalOptions*
915
```

This package really does not work with an old L^AT_EX format without hooks, or without ε -T_EX, or with a pagesLTS package, or with version 2.0 from 1992 of the endfloats package, or hyperref from 2015 and so on. Assuming that nobody would combine those old things with a modern L^AT_EX format, we request a recent format and do not check for the rest.

```

916 \@ifl@t@r\fmtversion{2024-06-01}{-}{-}{
917   \PackageError{pageslts}{LaTeX format 2024-06-01 or newer needed}{%
918     Needed LaTeX format version: 2024-06-01 or newer.\MessageBreak%
919     Found\space\space LaTeX format version: \fmtversion.\MessageBreak%
920     Please update your TeX distribution!\MessageBreak%
921     Loading of pageslts package is aborted.}
922   \expandafter\endinput}
923

```

For comparisons, zero, one, two and three are defined (`\z@`, `\@one` and so on do not work for this) and for the page numbering scheme handling some definitions are made.

```

924 \def\pagesLTS@zero{0}
925 \def\pagesLTS@one{1}
926 \def\pagesLTS@two{2}
927 \def\pagesLTS@three{3}
928 \def\pagesLTS@ab{ab}
929 \def\pagesLTS@bb{bb}
930 \def\pagesLTS@ABi{AB}
931 \def\pagesLTS@BBi{BB}
932

```

The traditional behaviour is a reset of the page number to one, each time the page numbering scheme changes. The option `pagecontinue` changes this to a continuation with the number/name following the last page number/name of the same page numbering scheme. The user is informed accordingly.

```

933 \ifpagesLTS@pagecontinue
934   \PackageNoteNoLine{pageslts}{Option pagecontinue enabled (maybe by default):\MessageBreak%
935     The pageslts package will continue the page numbering,\MessageBreak%
936     when the same page numbering scheme is used twice.\MessageBreak%
937     If you do not want this, call pageslts with option\MessageBreak%
938     pagecontinue=false (or use \string\setcounter{page}=1)}
939 \else
940   \PackageNoteNoLine{pageslts}{Option pagecontinue is false:\MessageBreak%
941     The pageslts package was used, but the option\MessageBreak%
942     pagecontinue was set to false.\MessageBreak%
943     If you want the page numbers to be continued,\MessageBreak%
944     when the same page numbering scheme is used twice,\MessageBreak%
945     please call pageslts with option pagecontinue=true,\MessageBreak%
946     otherwise the page number is reset to one each time\MessageBreak%
947     the page numbering scheme is changed}
948 \fi
949

```

The page number printed in `alph` or in `Alph` page numbering scheme had to be > 0 and < 27 . Now the `alphalph` package allows to extend the numbering scheme (not only for pages). Because some users prefer `aa`, `ab`, `ac`, `ad`,... and some `aa`, `bb`, `cc`, `dd`,..., both schemes can be chosen via the options. The `fnsymbol` page numbering scheme was restricted to values > 0 and < 10 . The `alphalph` package allows to extend this page numbering scheme, too. Option `fnsymbolmult` can be chosen with the `pageslts` package. If no extension is wished (or another extension is wished and implemented manually), `pageslts` can be called with options set to 0 (zero) and false: `alphMult=0`, `AlphMulti=0`, `fnsymbolmult=false`.

```

950 \ifx\pagesLTS@alphMult\pagesLTS@ab%
951 \else
952   \ifx\pagesLTS@alphMult\pagesLTS@bb%
953   \else
954     \ifx\pagesLTS@alphMult\pagesLTS@zero%
955       \PackageNoteNoLine{pageslts}{%
956         Option alphMult=0 found:\MessageBreak%
957         The pageslts package was used, but the option\MessageBreak%
958         alphMult was set to 0 (zero).\MessageBreak%
959         If you want the page numbers to be extended\MessageBreak%
960         after z, you have to organize this yourself now.\MessageBreak%
961         For automatic continuation, please use the\MessageBreak%
962         alphalph package and call pageslts\MessageBreak%
963         with option alphMult=ab (for aa, ab, ac, ad,...) or\MessageBreak%
964         with option alphMult=bb (for aa, bb, cc, dd,...)}
965     \else
966       \PackageError{pageslts}{Unknown option value}{%
967         The pageslts package was used with option\MessageBreak%
968         alphMult=\meaning\pagesLTS@alphMult .\MessageBreak%
969         Only values 'ab', 'bb', and '0' (zero) are valid.\MessageBreak%
970         Now the default 'ab' is being set.}
971       \setkeys{pagesLTS}{alphMult=ab}
972     \fi
973   \fi
974 \fi
975
976 \ifx\pagesLTS@AlphMulti\pagesLTS@ABi%
977 \else
978   \ifx\pagesLTS@AlphMulti\pagesLTS@BBi%
979   \else
980     \ifx\pagesLTS@AlphMulti\pagesLTS@zero%
981       \PackageNoteNoLine{pageslts}{%
982         Option AlphMulti=0 found:\MessageBreak%
983         The pageslts package was used, but the option\MessageBreak%
984         AlphMulti was set to 0 (zero).\MessageBreak%
985         If you want the page numbers to be extended\MessageBreak%
986         after Z, you have to organize this yourself now.\MessageBreak%
987         For automatic continuation, please use the\MessageBreak%
988         alphalph package and call pageslts\MessageBreak%

```

```

989     with option AlphMulti=AB (for AA, AB, AC, AD,...) or\MessageBreak%
990     with option AlphMulti=BB (for AA, BB, CC, DD,...)}
991   \else
992     \PackageError{pageslts}{Unknown option value}{%
993       The pageslts package was used with option\MessageBreak%
994       AlphMulti=\meaning\pagesLTS@AlphMulti .\MessageBreak%
995       Only values 'AB', 'BB', and '0' (zero) are valid.\MessageBreak%
996       The default 'AB' is set.}
997     \setkeys{pagesLTS}{AlphMulti=AB}
998   \fi
999 \fi
1000 \fi
1001

```

If `alph` or `Alph` or `fnsymbol` page numbers shall be continued, the `alphalph` package is required.

```

1002 \ifx\pagesLTS@alphMult\pagesLTS@zero\else\RequirePackage{alphalph}[2019/12/09]\fi
1003 \ifx\pagesLTS@AlphMulti\pagesLTS@zero\else\RequirePackage{alphalph}[2019/12/09]\fi
1004 \ifpagesLTS@fnsymbolmult\RequirePackage{alphalph}[2019/12/09]\fi
1005

```

For the roman page numbering scheme, it is just the choice of an extension by `pageslts` or not.

```

1006 \ifpagesLTS@romanMult
1007   \PackageNoteNoLine{pageslts}{Option romanMult enabled (maybe by default):\MessageBreak%
1008     The pageslts package will extend the page numbering\MessageBreak%
1009     of the roman scheme below i with\MessageBreak%
1010     0, -i, -ii, -iii, -iv,...\MessageBreak%
1011     If you do not want this, call pageslts with option\MessageBreak%
1012     romanMult=false}
1013 \else
1014   \PackageNoteNoLine{pageslts}{Option romanMult is set to false:\MessageBreak%
1015     The pageslts package was used, but the option\MessageBreak%
1016     romanMult was set to false.\MessageBreak%
1017     If you want the page numbering of the roman scheme\MessageBreak%
1018     to be extended below i,\MessageBreak%
1019     please call pageslts with option romanMult=true,\MessageBreak%
1020     otherwise zero and negative page numbers of the\MessageBreak%
1021     roman scheme will need to be defined otherwise}
1022 \fi
1023

```

Same for the Roman page numbering scheme.

```

1024 \ifpagesLTS@RomanMulti
1025   \PackageNoteNoLine{pageslts}{Option RomanMulti enabled (maybe by default):\MessageBreak%
1026     The pageslts package will extend the page numbering\MessageBreak%
1027     of the Roman scheme below I with\MessageBreak%
1028     0, -I, -II, -III, -IV,...\MessageBreak%
1029     If you do not want this, call pageslts with option\MessageBreak%

```

```

1030   RomanMulti=false}
1031 \else
1032   \PackageNoteNoLine{pageslts}{Option RomanMulti is set to false:\MessageBreak%
1033   The pageslts package was used, but the option\MessageBreak%
1034   RomanMulti was set to false.\MessageBreak%
1035   If you want the page numbering of the Roman scheme\MessageBreak%
1036   to be extended below i,\MessageBreak%
1037   please call pageslts with option RomanMulti=true,\MessageBreak%
1038   otherwise zero and negative page numbers of the\MessageBreak%
1039   Roman scheme will need to be defined otherwise}
1040 \fi
1041

```

For the footnotesymbol page numbering scheme, it is also just the choice of a extension by pageslts or not.

```

1042 \ifpagesLTS@fnsymbolmult
1043   \PackageNoteNoLine{pageslts}{Option fnsymbolmult enabled (maybe by default):\MessageBreak%
1044   The pageslts package will extend the page numbering\MessageBreak%
1045   of the footnotesymbol scheme using the alphalph\MessageBreak%
1046   package.\MessageBreak%
1047   If you do not want this, call pageslts with option\MessageBreak%
1048   fnsymbolmult=false}
1049 \else
1050   \PackageNoteNoLine{pageslts}{%
1051   Option fnsymbolmult is set to false:\MessageBreak%
1052   The pageslts package was used, but the option\MessageBreak%
1053   fnsymbolmult was set to false.\MessageBreak%
1054   If you want the page numbering of the footnotesymbol\MessageBreak%
1055   scheme to be extended using the alphalph package,\MessageBreak%
1056   please call pageslts with option fnsymbolmult=true,\MessageBreak%
1057   otherwise page numbers of the footnotesymbol scheme\MessageBreak%
1058   greater than nine will need to be defined otherwise}
1059 \fi
1060

```

Now defining some variables, place-holders, and abbreviations:

```

1061 \def\pagesLTS@pnc{0}
1062 \def\pagesLTS@called{0}
1063 \def\pagesLTS@fns{fnsymbol}
1064 \def\pagesLTS@alph{alph}
1065 \def\pagesLTS@Alph{Alph}
1066 \def\pagesLTS@rerun{0}
1067 \def\pagesLTS@eso{0}
1068 \def\pagesLTS@esov{0}
1069 \def\lastpageref{\lastpagereftxt}
1070 \def\pagesLTS@undolable{none}
1071 \def\pncmissing{0}

```

```

1072 \def\pagesLTS@messageNPN{%
1073 The pageslts package was used, but\MessageBreak%
1074 \string\pagenumbering \MessageBreak%
1075 was not called at the beginning of the document\MessageBreak%
1076 (maybe earlier or later).\MessageBreak%
1077 Please use \string\pagenumbering \MessageBreak%
1078 (with an argument like arabic, roman, Roman,\MessageBreak%
1079 fnsymbol, alph, or Alph) at the beginning\MessageBreak%
1080 of your document! Otherwise your document\MessageBreak%
1081 will probably compile, but the pageslts\MessageBreak%
1082 package might not be able to get all labels\MessageBreak%
1083 for the references to the respective pages\MessageBreak%
1084 right.\MessageBreak%
1085 }
1086

```

`\pagenumbering` To keep the original meaning of `\pagenumbering`:

```

1087 \NewCommandCopy{\OrigPagenumbering}{\pagenumbering}
1088

```

Defining some new counters (and doing related things):

```

1089 \newcounter{CurrentPage}
1090 \setcounter{CurrentPage}{1}
1091 \def\theCurrentPageLocal{\arabic{pagesLTS.current.local.\pagesLTS@pnc}}

```

The counter `pagesLTS.pagenr` is for saving into the `.aux` file the total page number of the last page.

```

1092 \newcounter{pagesLTS.pagenr}
1093 \setcounter{pagesLTS.pagenr}{1}

```

While generally `\pagesLTS@providcounter{pagesLTS.current.local.\pagesLTS@pnc}` is used, for the beginning of the document `pagesLTS.current.local.0` is predefined. (A `\pagesLTS@providcounter{pagesLTS.current.local.\pagesLTS@pnc}` could be used for this, too, but we know that `pagesLTS.current.local.0` was not defined, so we can just do the definition here.) And the first local page gets the number one.

```

1094 \newcounter{pagesLTS.current.local.0}
1095 \setcounter{pagesLTS.current.local.0}{1}

```

And the same again for `pagesLTS.pnc.0`.

```

1096 \newcounter{pagesLTS.pnc.0}

```

Also a scratch counter is defined, `\pagesLTSlastpage` and `\pagesLTSlastpageHy` are predefined (e.g. for computations in the first compilation run), and the obsolete `\pagesLTS.lastpage` points to the new `\pagesLTSlastpage`.

```

1097 \newcounter{pagesLTS.tmpcounter}
1098 \def\pagesLTSlastpage{1}
1099 \def\pagesLTSlastpageHy{1}
1100 \def\pagesLTS.lastpage{\pagesLTSlastpage}
1101

```

`\xroman` When `\roman{...}` is used with a value < 1 , L^AT_EX just ignores this (see subsection 3.5). Here we provide a command `\xroman{...}` (expanded roman), which gives the usual `\roman` numbers (i, ii, iii, iv,...) for positive values, $-|...|$ (i.e. -i, -ii, -iii, -iv,...) for negative values, and 0 for all other values (which should be zero).

```
1102 \newcommand{\xroman}[1]{%
1103   \ifnum\value{#1}>0%
1104     \roman{#1}%
1105   \else%
1106     \ifnum\value{#1}<0%
```

`\arabic{#1}` gives the arabic number of argument `#1`, which is negative here (for example -7), “-” puts another minus sign in front of it (for example $--7$), `\number` removes all unnecessary preceding zeros, plus and minus signs (for example 7), `\romannumeral` turns it into a roman number (for example vii), and “-” puts the minus sign back in front of it (for example -vii).

```
1107     -\romannumeral\number-\arabic{#1}%
1108   \else%
1109     0%
1110   \fi%
1111 \fi%
1112 }
1113
```

`\XRoman` `\XRoman` does the same for uppercase `\Roman` numbers. `-\uppercase{\romannumeral\number-\arabic{#1}}` cannot be used, because the result in the example is `-\uppercase{vii}` and not `-VII`.⁴ Therefore we have a look at L^AT_EX’s own `\@Roman\FOOcounter`, `\def\@Roman#1{\expandafter\@slowromancap\romannumeral #1@}`, and use `\@slowromancap`, which is a fully expandable macro, to do the trick for this:

```
“\def\@slowromancap#1{\ifx @#1% then terminate
\else
\if i#1I\else\if v#1V\else\if x#1X\else\if l#1L\else\if
c#1C\else\if d#1D\else \if m#1M\else#1\fi\fi\fi\fi\fi\fi\fi
\expandafter\@slowromancap
\fi
}” (2021/11/08 Version v1.1n LATEX Kernel File 21: ltcunts.dtx Counters and Lengths).
```

```
1114 \newcommand{\XRoman}[1]{%
1115   \ifnum\value{#1}>0%
1116     \Roman{#1}%
1117   \else%
1118     \ifnum\value{#1}<0%
1119       -\expandafter\@slowromancap\romannumeral\number-\arabic{#1}@%
1120     \else%
1121       0%
1122     \fi%
1123 \fi%
1124 }
1125
```

⁴This does not matter for the print out, but for the display of the logical page numbers as well as the `.aux` file.

`\pagesLTS@providecounter` We provide a way to create counters like

```
pagesLTS.pnc. page - pagesLTS.pnc.<page numbering scheme>, e.g. pagesLTS.pnc.Roman,
  numbering scheme
pagesLTS.double. page - pagesLTS.double.<page numbering scheme>, e.g. pagesLTS.double.Roman,
  numbering scheme
PageCurrentLocal. page - PageCurrentLocal.<page numbering scheme>, e.g. PageCurrentLocal.Roman,
  numbering scheme
```

for all page numbering schemes, even those not supported by the current original `\pagenumbering` (2020/12/05 Version v1.1a LaTeX Kernel File 33 ltpageno.dtx Page Numbering), which is

```
\countdef\c@page=0 \c@page=1
\def\cl@page{}
\def\pagenumbering#1{%
  \global\c@page \one \gdef\thepage{\csname @#1\endcsname
  \c@page}}
```

```
1126 \newcommand{\pagesLTS@providecounter}[1]{\@ifundefined{c@#1}{\newcounter{#1}}{}}
```

The command `\pagesLTS@ifcounter` is obsolete, but if a document was compiled using an older version of the `pageslts` package, the command will still be in the `.aux` file. (Following code will be removed in some further version.)

```
1127 \NewCommandCopy{\pagesLTS@ifcounter}{\pagesLTS@providecounter}
1128 \AddToHook{begindocument}{%
```

This hook is executed after the `.aux` file has been read, so there should be no following `\pagesLTS@ifcounter`.

```
1129 \AddToHookWithArguments{cmd/pagesLTS@ifcounter/before}{%
1130   \PackageError{pageslts}{Old command \string\pagesLTS@ifcounter\space used}{Replace by \string\pagesLTS@providecounter.}%
1131   }%
1132 }
1133
```

`\lastpages` We provide a command to give the number of pages in a sector of a split page numbering scheme (see page 9, `pagesLTS.<page numbering scheme>.<number>.local.cnt`):

```
1134 \newcommand{\lastpages}[2]{%
1135   \pagesLTS@providecounter{pagesLTS.#1.#2.local.cnt}%
1136   \arabic{pagesLTS.#1.#2.local.cnt}%
1137 }
1138
```

`\pagesLTS@writelabel` At last defining the writing of a label:

```
1139 \newcommand{\pagesLTS@writelabel}[1]{%
1140   \addtocounter{page}{+1}%
```

`\addtocounter{page}{+1}` because `\pagesLTS@putlabel` includes an `\addtocounter{page}{-1}`, which is not necessary here. Into the `.aux` file something like

```
\newlabel{pagesLTS.Roman}{-}{VIII}{-}{page.VIII}{-}
```

is written, thus `\lastpageref{pagesLTS.Roman}` prints VIII and links to `page.VIII`.

```
1141 \pagesLTS@putlabel{pagesLTS.#1}{\thepage}{1}%
```

`\addtocounter{page}{-1}` is skipped, because another `\pagesLTS@putlabel` follows.

```
1142 \ifx\pagesLTS@pnc\pagesLTS@zero%
```

i. e. if the current page numbering scheme is “0”, i. e. before the first `\pagenumbering{...}` command, do nothing,

```
1143 \else%
```

otherwise write into the `.aux` file something like

```
\newlabel{pagesLTS.arabic.local}{6}{page.9},
```

thus `\lastpageref{pagesLTS.arabic.local}` prints 6 and links to page.9.

`\addtocounter{page}{+1}` is skipped, because we skipped the `\addtocounter{page}{-1}` above.

```
1144 \pagesLTS@putlabel{pagesLTS.#1.local}{\theCurrentPageLocal}{1}%
```

`\addtocounter{page}{-1}` immediately after the `\pagesLTS@putlabel` is skipped, because we do that outside of the `\ifx \else \fi`.

```
1145 \fi%
```

```
1146 \addtocounter{page}{-1}%
```

```
1147 }
```

```
1148
```

`\erroralphalph` `\erroralphalph` extends the “numbers” of counters to zero and negative values for representations usually not supporting this:

`\alphalph`, `\AlphAlph`, and `\fnsymbolmult` of the `alphalph` package.

`\alph`, `\Alph`, and `\fnsymbol` would not support “numbers” below one.

`\arabic` already supports negative numbers and zero.

`\roman` and `\Roman` support neither negative numbers nor zero, but are expanded in this package (`\xroman` and `\XRoman`), see page 40.

```
1149
```

```
1150 %% The following code is from Heiko Oberdiek [2010/04/18], %%
```

```
1151 %% expanding his alphalph package as of 2010/04/18, v2.3. (Thanks!) %%
```

```
1152 \newcommand*{\erroralphalph}[2]{%
```

```
1153 \ifnum\value{#2}>0%
```

```
1154 #1{\value{#2}}%
```

```
1155 \else%
```

```
1156 \ifnum\value{#2}<0%
```

```
1157 -#1{\expandafter\@gobble\the\value{#2}}%
```

```
1158 \else%
```

```
1159 0%
```

```
1160 \fi%
```

```
1161 \fi%
```

```
1162 }
```

```
1163 %% End of code from Heiko Oberdiek %%
```

```
1164 %% Check and Error/Warning messages have been moved to hook "shipout/foreground" %%
```

```
1165 %% because messages inside e.g. the \pageref command can cause trouble. %%
```

```
1166
```

`\expandPagenumbering` Here the `\erroralphalph` command is called with the appropriate arguments for each page numbering scheme.

```
1167
1168 \newcommand{\expandPagenumbering}[1]{%
1169   \let\OrigthePage\thePage%
1170   \def\pagesLTS@tmpC{arabic}%
1171   \ifx\pagesLTS@pnc\pagesLTS@tmpC%
```

`\arabic` already supports negative numbers and zero ($-MAX \dots MAX$, where $MAX = 2\,147\,483\,647$).

```
1172   \else%
1173     \def\pagesLTS@tmpC{roman}%
1174     \ifx\pagesLTS@pnc\pagesLTS@tmpC%
1175       \ifpagesLTS@romanMult%
```

`\erroralphalph{\roman}{page}` cannot be used, because `-\roman{\expandafter@gobble\the\value{page}}` does not work. If option `romanMult` is not false, `\xroman` (see page 40) expands the usable roman page numbers to values below 1 (i, I, respectively), see subsection 2.1.3.

```
1176     \renewcommand*{\thePage}{\xroman{page}}%
1177     \fi%
1178   \else%
1179     \def\pagesLTS@tmpC{Roman}%
1180     \ifx\pagesLTS@pnc\pagesLTS@tmpC%
1181       \ifpagesLTS@RomanMulti%
```

The same for `\Roman` page numbering, expanded by `\XRoman` (see page 40).

```
1182     \renewcommand*{\thePage}{\XRoman{page}}%
1183     \fi%
1184   \else%
1185     \ifx\pagesLTS@pnc\pagesLTS@alph%
```

`\alph` and `\Alph` page numberings are expanded to negative and zero values, and to values greater than “z” or “Z” with the `alphalph` package. – If `\pagesLTS@alphMult` was zero, nothing is done.

```
1186     \ifx\pagesLTS@alphMult\pagesLTS@ab%
1187       \renewcommand*{\thePage}{\erroralphalph{\alphalph}{page}}%
1188     \else%
1189       \ifx\pagesLTS@alphMult\pagesLTS@bb%
1190         \renewcommand*{\thePage}{\erroralphalph{\alphMult}{page}}%
1191       \fi%
1192     \fi%
1193   \else%
1194     \ifx\pagesLTS@pnc\pagesLTS@Alph%
1195       \ifx\pagesLTS@AlphMulti\pagesLTS@ABi%
1196         \renewcommand*{\thePage}{\erroralphalph{\AlphAlph}{page}}%
1197       \else%
1198         \ifx\pagesLTS@AlphMulti\pagesLTS@BBi%
1199           \renewcommand*{\thePage}{\erroralphalph{\AlphMult}{page}}%
1200         \fi%
```

```

1201         \fi%
1202         \else%
1203         \ifx\pagesLTS@pnc\pagesLTS@fns%

```

Same for \fnsymbol page numbers.

```

1204         \ifpagesLTS@fnsymbolmult%
1205         \renewcommand*{\thepage}{\erroralpha\alph{\fnsymbolmult}{page}}%
1206         \fi%
1207         \else%

```

If the used page numbering scheme has not been recognized by the pageslts package so far, we can do nothing, and problems might result.

```

1208         \PackageError{pageslts}{unknown page numbering scheme}{%
1209         The pageslts package encountered the unknown\MessageBreak%
1210         page numbering scheme\MessageBreak%
1211         \meaning#1. \MessageBreak%
1212         If this is no typing mistake, it might work\MessageBreak%
1213         - or it might not work.\MessageBreak%
1214         \@ehc%
1215         }%
1216         \fi%
1217         \fi%
1218         \fi%
1219         \fi%
1220         \fi%
1221         \fi%
1222         \let\pagesLTS@tmpC\undefined%
1223     }
1224

```

\pagenumbering Now for the **new** version of the \pagenumbering command:

```

1225 \renewcommand{\pagenumbering}[1]{%

```

If the current page numbering scheme, \pagesLTS@pnc, or the requested page numbering scheme, #1, is \pagesLTS@fns, i. e. fnsymbol, the counterpagesLTS.fnsymbol.local is needed. If it does not exist yet, it is created here.

```

1226     \edef\pagesLTS@tmpA{#1}%
1227     \ifx\pagesLTS@pnc\pagesLTS@fns%
1228         \pagesLTS@providecounter{pagesLTS.fnsymbol.local}%
1229     \fi%
1230     \ifx\pagesLTS@tmpA\pagesLTS@fns%
1231         \pagesLTS@providecounter{pagesLTS.fnsymbol.local}%
1232     \fi%

```

If the current page numbering scheme, \pagesLTS@pnc, and the requested page numbering scheme, #1, is the same one, nothing further is done, otherwise the real action begins.

```

1233     \ifx\pagesLTS@pnc\pagesLTS@tmpA%
1234     \else%

```

The next code is executed, when we are at a page after the first one. This distinction is done for two reasons: On the one hand, `\pagenumbering` could be called *before* `\begin{document}` (where the current page should not be greater than one), and on the other hand we go one page back to aim all references to that page. Obviously at the first page there is no going backward.

```
1235 \ifnum \value{CurrentPage}>1%
1236 \addtocounter{page}{-1}%
1237 \addtocounter{pagesLTS.current.local.\pagesLTS@pnc}{-1}%
```

For the case that the page numbering scheme is or will be split, like e.g. the Roman one in the `pageslts-example.tex`, a counter like `pagesLTS.Roman.1.local.count` (or `pagesLTS.Roman.2.local.count`, `pagesLTS.Roman.3.local.count`,...) is introduced and set to the number of the local page.

```
1238 \newcounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}%
1239 \setcounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}{%
1240 \value{pagesLTS.current.local.\pagesLTS@pnc}}%
```

If the page numbering scheme is `fnsymbol`, and if it *was* used before, from said counter the number of pages of the preceding uses of the same page numbering scheme, `pagesLTS.\pagesLTS@pnc.done`, is subtracted (same as for the other schemes, see below).

```
1241 \ifx\pagesLTS@pnc\pagesLTS@fns%
1242 \ifnum \value{pagesLTS.pnc.\pagesLTS@pnc}>1%
1243 \setcounter{pagesLTS.tmpcounter}{\numexpr\value{pagesLTS.pnc.\pagesLTS@pnc}-1\relax}%
1244 \addtocounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}{%
1245 -\value{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.tmpcounter}.local.count}}%
1246 \fi%
```

If the page numbering scheme is *not* `fnsymbol`, a numbered label is written:

```
1247 \else%
1248 \pagesLTS@writelabel{\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}}%
```

If the page numbering scheme was *not* used before,

```
1249 \ifnum \value{pagesLTS.pnc.\pagesLTS@pnc}<2%
```

an unnumbered label is also written:

```
1250 \pagesLTS@writelabel{\pagesLTS@pnc}%
```

If the page numbering scheme *was* used before, from said counter the number of pages of the preceding uses of the same page numbering scheme, `pagesLTS.\pagesLTS@pnc.done`, is subtracted.

```
1251 \else%
1252 \setcounter{pagesLTS.tmpcounter}{\numexpr\value{pagesLTS.pnc.\pagesLTS@pnc}-1\relax}%
1253 \pagesLTS@providecounter{pagesLTS.\pagesLTS@pnc.done}%
1254 \addtocounter{pagesLTS.\pagesLTS@pnc.done}{%
1255 \value{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.tmpcounter}.local.count}}%
1256 \addtocounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}{%
1257 -\value{pagesLTS.\pagesLTS@pnc.done}}%
1258 \fi%
```

The values are written to the .aux file (if writing is allowed: `\if@filesw`), because they must be available at the beginning of the document:

```
1259     \if@filesw%
1260         \immediate\write\@auxout{\string
1261             \pagesLTS@providecounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.cnt}}%
1262     \fi%
1263     \edef\pagesLTS@tmpB{\arabic{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}}%
1264     \if@filesw%
1265         \immediate\write\@auxout{\string
1266             \setcounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.cnt}{\pagesLTS@tmpB}}%
1267     \fi%
1268     \fi%
```

For further code for the case of `fnsymbol` please see below (`\lastpagereftext`, page 48).

The last page number is saved, in case the same page numbering scheme is continued later.

```
1269     \pagesLTS@providecounter{pagesLTS.double.\pagesLTS@pnc}%
1270     \setcounter{pagesLTS.double.\pagesLTS@pnc}{\value{page}}%
```

We went back one page, so we must go forward again:

```
1271     \addtocounter{pagesLTS.current.local.\pagesLTS@pnc}{+1}%
1272     \addtocounter{page}{+1}%
```

The page numbering scheme `\pagesLTS@pnc` is now set to the new one, given by the user as argument with the `\pagenumbering{...}` command:

```
1273     \xdef\pagesLTS@pnc{#1}%
```

The new page numbering scheme is now started for real:

```
1274     \OrigPagenumbering{#1}%
```

If a page numbering scheme not known by the original `\pagenumbering{...}` command is used, an error will arise here - but maybe without error message.

If page numbering scheme `\alph`, `\Alph`, or `\fnsymbol` is used, `pageslts` extends the page numbers according to the given options, using the `alphalph` package. `\arabic` does not need any expansion. `\roman` and `\Roman` at least receive a definition for zero.

```
1275     \expandPagenumbering{#1}%
```

Counters like `pagesLTS.pnc.Roman` are introduced:

```
1276     \pagesLTS@providecounter{pagesLTS.pnc.\pagesLTS@pnc}%
```

The saved number of times, this page numbering scheme was used, is increased by one:

```
1277     \addtocounter{pagesLTS.pnc.\pagesLTS@pnc}{1}%
```

Now defining the counter `pagesLTS.double.\pagesLTS@pnc`, if it did not exist already, adding 1, because this is the first page of it (or another one, if the scheme is continued):

```
1278     \pagesLTS@providecounter{pagesLTS.double.\pagesLTS@pnc}%
1279     \addtocounter{pagesLTS.double.\pagesLTS@pnc}{1}%
```

The page number is continued, if the option `pagecontinue=false` is **not** set, otherwise it is reset to one. Note that neither the local nor the current counter are reset, as they contain the real *values* and not the *names* of the pages.

```

1280     \ifpagesLTS@pagecontinue%
1281         \setcounter{page}{\value{pagesLTS.double.\pagesLTS@pnc}}%
1282     \else%
1283         \setcounter{page}{1}%
1284     \fi%
```

If it does not exist already, the counter `pagesLTS.current.local.\pagesLTS@pnc` (e. g. `pagesLTS.current.local.Roman`) is created.

```

1285     \pagesLTS@providecounter{pagesLTS.current.local.\pagesLTS@pnc}%
```

If `pagesLTS.double.\pagesLTS@pnc` of the current page numbering scheme is equal to one, this is the first page of this page numbering scheme. Then `pagesLTS.current.local.\pagesLTS@pnc` (which was zero) is set to one.

```

1286     \ifnum \value{pagesLTS.double.\pagesLTS@pnc}=1%
1287         \setcounter{pagesLTS.current.local.\pagesLTS@pnc}{1}%
1288     \fi%
```

Otherwise, i. e. if `\value{CurrentPage}` is not >1 , i. e. before the first page has shipped out:

```

1289     \else%% before the first page has shipped out
```

The current page numbering scheme is defined by the argument of `\pagenumbering{...}`, which the user gave:

```

1290     \xdef\pagesLTS@pnc{#1}%
```

and the page numbering scheme set by the original page numbering command (2020/12/05 Version v1.1a LaTeX Kernel File 33 lt-pageno.dtx Page Numbering), which resets the page number to one, but at the first page continuation does not make sense). Well, nearly the original page numbering command: `\OrigPagenumbering{\pagesLTS@pnc}` does not work, so we “expand” the `\OrigPagenumbering` command:

```

1291     \global\c@page \@ne\relax%
1292     \global\def\thepage{\csname \expandafter @\pagesLTS@pnc \endcsname \c@page}%
```

If a page numbering scheme is used, which is not known by L^AT_EX, an error might arise here – but maybe without error message.

If page numbering scheme `\alph`, `\Alph`, or `\fnsymbol` is used, `pageslts` extends the page numbers according to the given options, using the `alphalph` package. `\arabic` does not need any expansion. `\roman` and `\Roman` at least receive a definition for zero.

```

1293     \expandPagenumbering{#1}%
```

We are at the first page, so the page counters are set to one:

```

1294     \pagesLTS@providecounter{pagesLTS.pnc.\pagesLTS@pnc}%
1295     \setcounter{pagesLTS.pnc.\pagesLTS@pnc}{1}%
1296     \pagesLTS@providecounter{pagesLTS.double.\pagesLTS@pnc}%
1297     \setcounter{pagesLTS.double.\pagesLTS@pnc}{1}%
1298     \pagesLTS@providecounter{pagesLTS.current.local.\pagesLTS@pnc}%
1299     \setcounter{pagesLTS.current.local.\pagesLTS@pnc}{1}%
1300     \fi%
```

Whether `\pagenumbering{...}` is called in the preamble, in the `begindocument` hooks, right after `\begin{document}`, or somewhere in the document, we want to remember *whether* it was called at all:

```
1301 \gdef\pagesLTS@called{1}%
1302 \fi%
```

We do not need the temporary definitions any more.

```
1303 \let\pagesLTS@tmpA\undefined%
1304 \let\pagesLTS@tmpB\undefined%
1305 }
1306
```

`\lastpageref*` If `hyperref` is used, but (some) references to some last page shall not be hyperlinked, a command `\lastpageref*` (analogous to `\pageref*`) is needed. Therefore we define (analogous to `\HyPsd@pageref` from the `hyperref` package

```
1307 %% analogous to \HyPsd@pageref from the hyperref package:
1308 \def\lastpagereftxt#1{\pagesLTS@@pageref#1*END}
1309
```

Macro `\pagesLTSpageref` checks, whether a star is present (analogous to `\HyPsd@@pageref` again from the `hyperref` package):

```
1310 \def\pagesLTS@@pageref#1*#2\END{%
1311 \ifx\#2\% no star
1312 \pagesLTS@@pageref{#1}%
1313 \else% star
1314 \expandafter\pagesLTS@@pagerefstar%
1315 \fi%
1316 }
1317
1318 \def\pagesLTS@@pageref#1{\lastpagereftext{#1}}
1319 \def\pagesLTS@@pagerefstar#1{\lastpagereftextstar{#1}}
1320
```

`\lastpagereftext` When `\lastpageref` is used somewhere inside the `txt` (text), i. e. not at the last page, it is defined as `\lastpagereftxt` (see above). When the page numbering scheme is `fnsymbol`, and the `hyperref` package has been loaded, a `hyperref` instead of a label is used for the reference to `pagesLTS.fnsymbol.local.\arabic{pagesLTS.fnsymbol.local}`. (And if the `pagesLTS.fnsymbol.local` counter did not exist yet, it is created here.)

```
1321 \newcommand{\lastpagereftext}[1]{%
1322 \def\pagesLTS@tmpA{#1}%
1323 \def\pagesLTS@tmpB{pagesLTS.fnsymbol.local}%
1324 \ifx\pagesLTS@tmpA\pagesLTS@tmpB%
1325 \pagesLTS@providecounter{pagesLTS.fnsymbol.local}%
1326 \IfPackageLoadedTF{hyperref}{%
1327 \href{\#pagesLTS.fnsymbol.local.\arabic{pagesLTS.fnsymbol.local}}{%
1328 {\arabic{pagesLTS.fnsymbol.local}}%

```


When the page numbering scheme is `fnsymbol`, but the `hyperref` package has *not* been loaded, just the arabic number of the `pagesLTS.fnsymbol.local` counter is given (because there will be no hyperlink anyway).

```
1329   }{\arabic{pagesLTS.fnsymbol.local}}%
```

Otherwise just the common `\pageref` is applied:

```
1330   \else%
1331     \pageref{#1}%
1332   \fi%
```

We do not need the temporary definitions any more.

```
1333   \let\pagesLTS@tmpA\undefined%
1334   \let\pagesLTS@tmpB\undefined%
1335   }
1336
```

`\lastpagereftextstar` And the same for the starred version, where no hyperlink is generated:

```
1337 \newcommand{\lastpagereftextstar}[1]{%
1338   \def\pagesLTS@tmpA{#1}%
1339   \def\pagesLTS@tmpB{pagesLTS.fnsymbol.local}%
1340   \ifx\pagesLTS@tmpA\pagesLTS@tmpB%
1341     \pagesLTS@providcounter{pagesLTS.fnsymbol.local}%
1342     \arabic{pagesLTS.fnsymbol.local}%
1343   \else%
```

There is no `\pageref*` without `hyperref`.

```
1344     \IfPackageLoadedTF{hyperref}{\pageref*{#1}}{\pageref{#1}}%
1345   \fi%
1346   \let\pagesLTS@tmpA\undefined%
1347   \let\pagesLTS@tmpB\undefined%
1348   }
1349
```

`\overrideLTSlabel` `\overridelabel` from the `undolabl` package just `\undonewlabels` a label and places a new `\label{#1}`, but we need to place a `\pagesLTS@putlabel{#1}{#2}`, therefore we need another command instead of (but somewhat similar to) `\overridelabel`:

```
1350 \newcommand\overrideLTSlabel[2]{%
1351   \@bsphack%
1352   \ifnum \value{pagesLTS.pnc.\pagesLTS@pnc}>1%
1353     \edef\pagesLTS@tmpC{#1}%
1354     \edef\pagesLTS@tmpD{pagesLTS.\pagesLTS@pnc.local}%
1355     \ifx\pagesLTS@tmpC\pagesLTS@tmpD%
1356       \immediate\write\@auxout{\string\undonewlabel{#1}}\@overriddenmessage s{#1}%
1357     \fi%
1358   \fi%
1359   \pagesLTS@putlabel{#1}{#2}{0}%
1360   \@esphack%
1361   }
1362
```

`\pagesLTS@EveryShipout` Because we cannot make references to pages with `fnsymbol` page “numbers” manually with `hyperref`, we use `\phantomsections` and refer to one of those. But because we do not know how many `\phantomsections` and `\section*`s are introduced by the user (or other packages; cf. L^AT_EX bug 2298: knowing level of `section*`, <https://www.latex-project.org/cgi-bin/ltxbugs2html?pr=latex/2298&introduction=yes&state=open>), we cannot refer to the last one as we did with the pages.

Therefore each page with `fnsymbol` page “number” receives a `\phantomsection` and a label, which includes a number increased by one for each page. This is done for `pagesLTS.fnsymbol.local.\arabic{pagesLTS.fnsymbol.cont}` as well as `pagesLTS.fnsymbol`, `pagesLTS.\pagesLTS@pnc`, and `pagesLTS.\pagesLTS@pnc.local`.

In case an older label already existed, it is overwritten by an `\overridelabel` command.

```

1363 \newcommand{\pagesLTS@EveryShipout}{%
1364   \begingroup%
1365     \ifx\pagesLTS@pnc\pagesLTS@fns%
1366       \pagesLTS@providecounter{pagesLTS.fnsymbol.cont}%
1367       \addtocounter{pagesLTS.fnsymbol.cont}{1}%
1368       \IfPackageLoadedT{hyperref}{\phantomsection%
1369         \hypertarget{pagesLTS.fnsymbol.local.\arabic{pagesLTS.fnsymbol.cont}}{}}%
1370       }%
1371       \ifnum \pagesLTS@esov=\pagesLTS@zero%
1372         \label{pagesLTS.fnsymbol}%
1373       \else%
1374         \overridelabel{pagesLTS.fnsymbol}%
1375       \fi%
1376     \else%
1377       \IfPackageLoadedT{hyperref}{\phantomsection}%
1378       \if@files*%
1379         \overridelabel{pagesLTS.\pagesLTS@pnc}%

```

We need to go forward one page (and later backward again), because `\overrideLTSlabel` calls a `\pagesLTS@putlabel`, and that one uses `\addtocounter{page}{-1}... \addtocounter{page}{+1}`, which is not needed here.

```

1380       \addtocounter{page}{+1}%
1381       \overrideLTSlabel{pagesLTS.\pagesLTS@pnc.local}{\theCurrentPageLocal}%
1382       \addtocounter{page}{-1}%
1383     \fi%
1384   \fi%
1385 \endgroup%
1386 }
1387

```

`\AddToHook{shipout/foreground}` At the end of each shipout, the following commands are executed:

```

1388 \AddToHook{shipout/foreground}{%
1389   \ifnum\value{page}>0%
1390   \else%
1391     \ifnum\value{page}=0%
1392       \PackageWarning{pageslts}{%
1393         Counter ‘page’ is zero!\MessageBreak%

```

```

1394     If the page numbering scheme is not arabic\MessageBreak%
1395     and further not extended\MessageBreak%
1396     (see Page counter overflow in the pageslts\MessageBreak%
1397     documentation), without other measures\MessageBreak%
1398     this will lead to a counter overflow.\MessageBreak%
1399   }%
1400 \else%
1401   \ifnum\value{page}<0%
1402     \PackageWarning{pageslts}{%
1403       Counter 'page' is negative: '\the\value{page}'!\MessageBreak%
1404       If the page numbering scheme is not arabic\MessageBreak%
1405       and further not extended\MessageBreak%
1406       (see Page counter overflow in the pageslts\MessageBreak%
1407       documentation), without other measures\MessageBreak%
1408       this will lead to a counter overflow.\MessageBreak%
1409     }%
1410 \else%
1411   \PackageError{pageslts}{Counter page has no recognized value}{%
1412     Counter 'page' does not have a recognized value:\MessageBreak%
1413     '\the\value{page}'\MessageBreak%
1414     \@ehd\MessageBreak%
1415   }%
1416 \fi%
1417 \fi%
1418 \fi%

```

If the `CurrentPage` is equal to one, this is the first shipout.

```
1419 \ifnum \value{CurrentPage}=1%
```

We check whether some page numbering scheme was defined by `\pagenumbering{...}` (as it should be!):

```
1420 \ifx\pagesLTS@called\pagesLTS@zero%
```

If it was not defined (i.e. `\pagesLTS@called` is zero), the user should be informed, that a `\pagenumbering{...}` is missing behind `\begin{document}`. Of course, it is possible that some package did some pages of output using the `begin/end` hook. In that case, one `\pagenumbering{...}` before `\begin{document}` and one `\pagenumbering{...}` (with the same argument, of course!) behind `\begin{document}` could help somewhat. When `\PackageError` was used here, the error message was not written to the screen and the `.log`-file, but into the document. Therefore we just make a note to give the error message later (`\AddToHook{enddocument/afterlastpage}`). At that time unfortunately most of the document has already been compiled (or did not compile due to this error), but I do not know how to change that.

```
1421 \gdef\pncmissing{1}%
```

We save the current value of the page,

```
1422 \setcounter{pagesLTS.tmpcounter}{\value{page}}%
```

determine the current page numbering scheme,

```

1423 %% Code from Andres L\{o}h, Universiteit Utrecht (NL) %%
1424     \def\extract#1{\expandafter\extract@ #1\END}%
1425     \def\extract@#1\csname @#2\endcsname#3\END{#2}%
1426     \edef\pagesLTS@tmpQ{\extract\thepage}%
1427 %% End of code from Andres L\{o}h                %%

```

set the current page numbering scheme to 0 (because before the beginning of the document it should be 0),

```

1428     \def\pagesLTS@pnc{0}%

```

and then issue a `\pagenumbering` command with the determined page numbering scheme as argument:

```

1429     \pagenumbering{\pagesLTS@tmpQ}%

```

This resets the page to one (if option `pagecontinue=false` was chosen), but because we do not start a new page numbering scheme here but manifest a page numbering scheme, which the user forgot to define, the page number should not have been reset to one. (This is the first page, but maybe the user wants it to have page number 2024?) Therefore we revert this here and set the page number to its value, which was saved before the `\pagenumbering` command.

```

1430     \setcounter{page}{\value{pagesLTS.tmpcounter}}%
1431     \fi%

```

We are at the first page, so we put the label here.

```

1432     \pagesLTS@writelabel{0}%
1433     \fi%

```

If the current page numbering scheme `\pagesLTS@pnc` is `\pagesLTS@fns` (which is defined as `fnsymbol`), the label is set by `\pagesLTS@EveryShipout` (see just above), and `\pagesLTS@esov` is set to the (real) number (not the name) of this page numbering scheme, `\arabic{pagesLTS.fnsymbol.cont}`.

When no more pages with `fnsymbol` page “number” are shipped out, the value remains fixed and we have our reference to the last page of the `fnsymbol` page numbering range. (At least we will have that reference after some more work, see below).

```

1434     \ifx\pagesLTS@pnc\pagesLTS@fns%
1435         \pagesLTS@EveryShipout%
1436         \xdef\pagesLTS@esov{\arabic{pagesLTS.fnsymbol.cont}}%

```

When another page numbering scheme was reused (in the example file `Roman`), we also need to apply `\pagesLTS@EveryShipout`, because otherwise we would get multiply defined labels.

```

1437     \else%
1438         \ifnum \value{pagesLTS.pnc}.\pagesLTS@pnc>1%
1439             \pagesLTS@EveryShipout%
1440             \fi%
1441     \fi%

```

The `CurrentPage` as well as the `pagesLTS.current.local.\pagesLTS@pnc` are advanced by one (because one page was shipped out and the next is about to begin).

```

1442     \addtocounter{CurrentPage}{1}%
1443     \addtocounter{pagesLTS.current.local.\pagesLTS@pnc}{1}%
1444 }
1445

```

We use some code from the lastpage package:

`\protected@iwrite` We need an `\immediate\protected@write`. Just `\immediate\write` had led to errors, for example when packages like babel-greek re-defined `\roman`.

```
1446 %% Code provided by Prof. Enrico Gregorio at https://tex.stackexchange.com/a/542425
1447 \long\def\protected@iwrite#1#2#3{%
1448   \begingroup%
1449   #2%
1450   \let\protect\@unexpandable@protect%
1451   \edef\reserved@a{\immediate\write#1{#3}}%
1452   \reserved@a%
1453   \endgroup%
1454   \if@nobreak\ifvmode\nobreak\fi\fi%
1455 }
1456
```

`\pagesLTS@makeHy` Just once we need the page from `\@currentHpage` without any “page.” (`\pagesLTS@makeHy` is identical to `\lastpage@makeHy` except of the used namings):

```
1457 \newcommand{\pagesLTS@makeHy}{%
1458   \gdef\pagesLTS@Hy{}%
1459   \IfPackageLoadedT{hyperref}{%
1460     \ifHy@pageanchor%
```

`\gdef\pagesLTS@Hy{}`, but that was already done at the beginning of this command.

```
1461     \xdef\pagesLTS@Hptest{Doc-Start}%
1462     \ifx\pagesLTS@Hptest\@currentHpage\relax%
1463       \gdef\pagesLTS@Hy{\@currentHpage}%
1464     \else%
1465       \edef\pagesLTS@Hptest{\@currentHpage}%
1466       \ifx\pagesLTS@Hptest\empty\relax%
```

then `\gdef\pagesLTS@Hy{}`, but that was already done at the beginning of this command.

```
1467     \else%
```

`\@currentHpage` should be `page.<some number>`, `\pagesLTS@rmpage` removes the “page.”.

Next compilation run, `\pagesLTSlastpageHy` gets defined via the aux file. If we arrived at this place, but the definition is still empty, then `\@currentHpage` has some unexpected content.

```
1468     \gdef\pagesLTS@Hy{\pagesLTS@rmpage{\@currentHpage}}%
1469     \ifx\pagesLTSlastpageHy\empty\relax%
1470       \PackageWarningNoLine{pageslts}{%
1471         \string\@currentHpage\space is\MessageBreak%
1472         \meaning\@currentHpage\MessageBreak%
1473         not beginning with "page.",\MessageBreak%
1474         \string\pagesLTSlastpageHy\space is now let empty.}%
1475     \fi%
1476   \fi%
1477 \fi%
```

```

1478   \fi%
1479   }%
1480 }%
1481

```

`\pagesLTS@rmpage` `\pagesLTS@rmpage` removes the “page.”.

```

1482 %% Code provided by David Carlisle at https://tex.stackexchange.com/a/721877
1483 \def\pagesLTS@rmpage#1{%
1484   \expandafter\xpagesLTS@rmpage\expanded{#1}\xpagesLTS@rmpage page.%
1485   \xpagesLTS@rmpage\xxpagesLTS@rmpage{#1}}
1486 \def\xpagesLTS@rmpage #1page.#2\xpagesLTS@rmpage#3\xxpagesLTS@rmpage#4{%
1487   \if$\detokenize{#1}$#2%\else#4
1488   \fi}
1489

```

`\else#4` means, that it did not start with `page.`, and whatever it is, we cannot use this `#4` for `\pagesLTS@Hy`.

`\pagesLTS@putlabel` Since the page has been put out, we are on the page after that page. We therefore subtract one from the page counter.

```

1490 \newcommand{\pagesLTS@putlabel}[3]{%
1491   \addtocounter{page}{-1}%

```

When the `showkeys` package has been loaded in `draft` mode, in the margin for each label a box is displayed with the name of the label. `showkeys` accomplishes this by redefining `\label`, but `pageslts` does not use `\label`, but writes directly to the `\jobname.aux`-file, and this is generally done after the according page has shipped out, therefore no box can be placed on the preceding page. At least `pageslts` gives a warning, that `showkeys` cannot present the respective label.

```

1492 \IfPackageLoadedT{showkeys}{%
1493   \IfPackageLoadedWithOptionsF{showkeys}{final}{%
1494     \ifnum\value{pagesLTS.pagenr}<1%
1495       \PackageWarningNoLine{pageslts}{%
1496         Package showkeys without option final loaded,\MessageBreak%
1497         but label #1 on page \thepage\space(about \theCurrentPage)\MessageBreak%
1498         cannot be shown, because pageslts does not use \string\label,\MessageBreak%
1499         but writes directly to the \jobname.aux file}%
1500     \else%
1501       \PackageWarningNoLine{pageslts}{%
1502         Package showkeys without option final loaded,\MessageBreak%
1503         but label #1 on page \thepage\space(about \theCurrentPage\space of \arabic{pagesLTS.pagenr})\MessageBreak%
1504         cannot be shown, because pageslts does not use \string\label,\MessageBreak%
1505         but writes directly to the \jobname.aux file}%
1506     \fi%
1507   }%
1508 }%
1509 \IfPackageLoadedTF{hyperref}{%

```

Here the labels are set, if the `hyperref` package was loaded. Simply using `\label` would not work, because labels wait for the output routines to work, and there may not be any more invocations of the output routines. To force the write out we need to do an `\immediate write (\protected@iwrite)`.

```
1510 \ifHy@pageanchor\else%
```

If the hyperref package is used, but pageanchors are disabled, the hyperlinking will not work.

```
1511 \PackageWarningNoLine{pagesLTS}{%
1512   The \string\lastpageref{#1} link does not work\MessageBreak%
1513   using hyperref with disabled option 'pageanchor'.\MessageBreak%
1514   Better enable 'pageanchor' or use\MessageBreak%
1515   \string\lastpageref*{...} (not generating a link)%
1516 }%
1517 \fi%
```

If use of the .aux-file is allowed, the label for LastPage is written into that file, the page reference depending on the options, which where set for the hyperref package.

```
1518 \if@filesw%
1519 \begingroup%
1520 \protected@iwrite@auxout{}{\string\newlabel{#1}{%
1521   {\@currentlabel}{#2}{\@currentlabelname}%
1522   {\IfPackageLoadedTF{hyperref}{\ifHy@pageanchor\@currentHpage\fi%
1523     }{\@currentHref}}%
1524   {\@kernel@reserved@label@data}}%
1525 }%
1526 \endgroup%
1527 \fi%
1528 }{%
```

If the hyperref package is not used, there will be no hyperlinks, and the label is written in the way of the lastpage package. But we must remember to undo the label first, if it already exists.

```
1529 \if@filesw%
1530 \ifnum \value{pagesLTS.pnc.\pagesLTS@pnc}<2%
1531 \protected@iwrite@auxout{}{\string\newlabel{#1}{%
1532   {\@currentlabel}{#2}{\@currentlabelname}%
1533   {\@currentHref}{\@kernel@reserved@label@data}}%
1534 }%
1535 \else%
1536 \edef\pagesLTS@tmpC{#1}%
1537 \edef\pagesLTS@tmpD{pagesLTS.\pagesLTS@pnc.local}%
1538 \ifx\pagesLTS@tmpC\pagesLTS@tmpD%
1539 \edef\pagesLTS@tmpC{#3}%
1540 \ifx\pagesLTS@tmpC\pagesLTS@one%
```

Only when the third argument of \pagesLTS@putlabel is 1, we do need to undo the label. Otherwise there is no label to undo, and the undolabl package would give an error.

```
1541 \immediate\write@auxout{\string\undonewlabel{#1}}%
1542 \fi%
1543 \fi%
```

```

1544     \protected@iwrite\@auxout{}\string\newlabel{#1}{%
1545         {\@currentlabel}{#2}{\@currentlabelname}%
1546         {\@currenthref}{\@kernel@reserved@label@data}}%
1547     }%
1548     \fi%
1549     \fi%
1550 }%

```

After the writeout we restore the page number again, since there might be other things still to be done.

```

1551     \addtocounter{page}{+1}%
1552 }
1553

```

`\pagesLTS@putlabels` `\pagesLTS@putlabels` writes labels and calls `\pagesLTS@putlabel{LastPages}{\theCurrentPage}{1}`.

```

1554 \newcommand{\pagesLTS@putlabels}{%
1555     \addtocounter{page}{-1}%
1556     \addtocounter{CurrentPage}{-1}%
1557     \addtocounter{pagesLTS.current.local.\pagesLTS@pnc}{-1}%

```

If `\pagenumbering{...}` has not been used, `\pagesLTS@pnc` is still zero (0, `\pagesLTS@zero`), and the according warning message is given.

```

1558     \ifx\pagesLTS@pnc\pagesLTS@zero%
1559     \PackageWarningNoLine{pagesLTS}{No page numbering scheme found:\MessageBreak%
1560         \pagesLTS@messageNPN}%

```

otherwise the numbered label is written, and if the page numbering scheme was not used before, also the unnumbered label is written.

```

1561     \else%
1562     \pagesLTS@writelabel{\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}}%
1563     \ifnum \value{pagesLTS.pnc.\pagesLTS@pnc}<2%
1564         \ifx\pagesLTS@pnc\pagesLTS@fns%
1565         \else%
1566         \pagesLTS@writelabel{\pagesLTS@pnc}%
1567         \fi%
1568     \fi%
1569     \fi%

```

Before the label for the `LastPages` can be put, we must advance one page again, because `\pagesLTS@putlabel` itself goes back one page (and at its end forward again).

```

1570     \addtocounter{page}{+1}%
1571     \pagesLTS@putlabel{LastPages}{\theCurrentPage}{1}%

```


Here should follow a
`\addtocounter{page}{-1}`,
but we have to remember to increase the page counters again, which were decreased at the start of this `\pagesLTS@putlabels` command,
and that would include
`\addtocounter{page}{+1}`,
therefore these two lines cancel each other and therefore they just can be skipped. But the other counters have to be increased again:

```
1572 \addtocounter{CurrentPage}{+1}%
1573 \addtocounter{pagesLTS.current.local.\pagesLTS@pnc}{1}%
1574 }
1575
```

AddToHookbegindocument/end

```
1576 \AddToHook{begindocument/end}{%
```

Checking, whether `lastpage` and `pageslts` have both been loaded.

```
1577 \IfPackageLoadedT{lastpage}{%
1578 \PackageInfo{pageslts}{Packages lastpage and pageslts used}{%
1579 Are you sure that you want to load both packages?\MessageBreak%
1580 Typ <return> to continue or X <return> to quit.}%
1581 }%
```

It is checked whether the `hyperref` package, if loaded, is recent enough:

```
1582 \IfPackageLoadedTF{hyperref}{%
1583 \IfPackageAtLeastTF{hyperref}{2024-10-30}{}%
1584 \PackageError{pageslts}{hyperref package version too old}{%
1585 required version: 2024-10-30 v7.01k or newer, found version:\MessageBreak%
1586 \csname ver@hyperref.sty\endcsname.}%
1587 }{\PackageNoteNoLine{pageslts}{Package hyperref not loaded.\MessageBreak%
1588 pageslts would support hyperref.\MessageBreak%
1589 The page references will NOT be hyperlinked}%
1590 }%
```

Further it is checked whether the `alphalph` package has been loaded. If that is the case, the commands are defined accordingly.

```
1591 \IfPackageLoadedT{alphalph}{%
1592 \newalphalph{\AlphMult}[mult]{\@Alph}{26}%
1593 \newalphalph{\alphMult}[mult]{\@alph}{26}%
1594 \newalphalph{\fnsymbolmult}[mult]{\@fnsymbol}{5}%
1595 }%
```

It is checked whether writing to files is allowed. The `pageslts` package cannot be used without that! Some packages (e. g. `tikz` and `selectp`) sometimes prevent the output to the `aux` file. In that case a warning or an error message is issued. This is no problem as long as there is/was another compilation run where the labels can/could be processed via the `aux` file.

```
1596 \if@filesw%
1597 \else%
```

```

1598 \IfPackageLoadedTF{tikz}{%
1599   \PackageWarning{pageslts}%
1600     {It was not allowed to write to an\MessageBreak%
1601       .aux file. This package does not work without access\MessageBreak%
1602       to an .aux file.\MessageBreak%
1603       It is OK if the .aux file was already updated\MessageBreak%
1604       by a previous compiler run\MessageBreak%
1605       and would not have changed anyway.\MessageBreak%
1606     }%
1607   }{\PackageError{pageslts}{No writing to auxiliary file allowed}%
1608     {It was not allowed to write to an .aux file.\MessageBreak%
1609       This package does not work without access to an .aux file.\MessageBreak%
1610       Press Ctrl+Z to exit.\MessageBreak%
1611       But it is OK if the .aux file was already updated\MessageBreak%
1612       by previous compiler runs\MessageBreak%
1613       and would not have changed anyway.\MessageBreak%
1614       (In that case just press Enter or Return\MessageBreak%
1615       to continue the compilation.)\MessageBreak%
1616     }%
1617   }%
1618 \fi%
1619 }
1620

```

If a version of the undolabl package before 2010/07/15 v1.0d has been used – your fault, we do not check for this anymore. We do check whether showkeys has been loaded (before pageslts!) in a mode to show the labels:

```

1621 \def\pagesLTS@skld{0}
1622 \IfPackageLoadedT{showkeys}{%
1623   \IfPackageLoadedWithOptionsF{showkeys}{final}{%
1624     \def\pagesLTS@skld{1}%
1625   }%
1626 }%
1627

```

`\AddToHook{enddocument/afterlastpage}` it is checked whether the showkeys package was loaded after the check performed before, in which case an error message is issued.

```

1628 \AddToHook{enddocument/afterlastpage}{%
1629   \IfPackageLoadedT{showkeys}{%
1630     \IfPackageLoadedWithOptionsF{showkeys}{final}{%
1631       \ifx\pagesLTS@skld\pagesLTS@one\relax%
1632     \else%
1633       \PackageError{pageslts}{Package showkeys loaded after pageslts}{%
1634         The showkeys package with option "final" has been loaded\MessageBreak%
1635         after the pageslts package.\MessageBreak%
1636         Please first load showkeys and then pageslts}%
1637     }%
1638   }%
1639 }%

```

```

1638     }%
1639 }%

```

We also give the error message about the missing (i.e. not found) page numbering scheme, which could not be given in hook `shipout/foreground`.

```

1640 \ifx\pncmissing\pagesLTS@one\relax%
1641   \PackageError{pageslts}{pagenumbering scheme missing}{\pagesLTS@messageNPN}%
1642 \fi%

```

Then we put in an `info` to show, in what order things (which were called) are done.

```

1643 \PackageInfo{pageslts}{enddocument/afterlastpage (AED): pageslts setting LastPage}%

```

After this we remember the page number (if `fnsymbol`), and after that we place the `LastPage` label.

```

1644 \ifx\pagesLTS@pnc\pagesLTS@fns%
1645   \def\pagesLTS@tmpA{\arabic{pagesLTS.fnsymbol.local}}%
1646   \ifnum \pagesLTS@eso=\pagesLTS@tmpA%
1647     \gdef\pagesLTS@rerun{0}%
1648   \else%
1649     \gdef\pagesLTS@rerun{1}%
1650   \fi%
1651   \if@filesw%
1652     \immediate\write\@auxout{\string\gdef\string\pagesLTS@eso{\pagesLTS@tmpA}}%
1653   \fi%
1654 \fi%
1655 \pagesLTS@putlabel{LastPage}{\thepage}{1}%

```

We do not need the temporary definition any more.

```

1656 \let\pagesLTS@tmpA\undefined%

```

The number of pages with the `fnsymbol` page numbering scheme, `\pagesLTS@esov`, is saved via the `.aux` file (if it is not zero):

```

1657 \if@filesw%
1658   \ifx\pagesLTS@esov\pagesLTS@zero\relax%
1659   \else%
1660     \immediate\write\@auxout{\string\pagesLTS@providecounter{pagesLTS.fnsymbol.local}}%
1661     \immediate\write\@auxout{\string\setcounter{pagesLTS.fnsymbol.local}{\pagesLTS@esov}}%
1662   \fi%
1663 \fi%

```

At the call of a `\pagenumbering{...}` command, everything for a split page numbering scheme is organized. For the last page numbering scheme, there is no `\pagenumbering{...}` command at the end, so we need to handle this here:

```

1664 \pagesLTS@providecounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}%
1665 \setcounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}{%
1666   \value{pagesLTS.current.local.\pagesLTS@pnc}}%

```

And we are one page after the last one (hook `enddocument/afterlastpage!`), so we go back one page.

```

1667 \addtocounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}{-1}%

```

```

1668 \ifnum \value{pagesLTS.pnc.\pagesLTS@pnc}>1%
1669 \setcounter{pagesLTS.tmpcounter}{\value{pagesLTS.pnc.\pagesLTS@pnc}}%
1670 \@tempcnta=\value{pagesLTS.tmpcounter}\relax%
1671 \loop%
1672 \ifnum\@tempcnta>1\relax%
1673 \addtocounter{pagesLTS.tmpcounter}{-1}%
1674 \addtocounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}{%
1675 -\value{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.tmpcounter}.local.count}}%
1676 \@tempcnta=\value{pagesLTS.tmpcounter}\relax%
1677 \repeat%
1678 \fi%
1679 \if@files%
1680 \immediate\write\@auxout{\string
1681 \pagesLTS@providcounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.cnt}}%
1682 \edef\pagesLTS@tmpA{\arabic{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.count}}%
1683 \immediate\write\@auxout{\string
1684 \setcounter{pagesLTS.\pagesLTS@pnc.\arabic{pagesLTS.pnc.\pagesLTS@pnc}.local.cnt}{\pagesLTS@tmpA}}%
1685 \let\pagesLTS@tmpA\undefined%
1686 \fi%

```

We need to save (via the .aux file) the page name `\thepage` and the page number `\arabic{CurrentPage}` of the last page, in case the last page has fnsymbol page numbering scheme.

```

1687 \addtocounter{page}{-1}%
1688 \def\pagesLTS@tmpA{\thepage}%
1689 \if@files%
1690 \protected@iwrite\@auxout{\string\gdef\string\pagesLTSlastpage{\pagesLTS@tmpA}}%
1691 \pagesLTS@makeHy|%
1692 \protected@iwrite\@auxout{\string\gdef\string\pagesLTSlastpageHy{\pagesLTS@Hy}}%
1693 \fi%
1694 \addtocounter{page}{+1}%
1695 \addtocounter{CurrentPage}{-1}%
1696 \edef\pagesLTS@tmpB{\arabic{CurrentPage}}%
1697 \if@files%
1698 \immediate\write\@auxout{\string\setcounter{pagesLTS.pagenr}{\pagesLTS@tmpB}}%
1699 \fi%
1700 \addtocounter{CurrentPage}{+1}%

```

The `VeryLastPage` label is set here. Before the introduction of the hook mechanism in the kernel, `\lastpageref{VeryLastPage}` could point to a later page than `\lastpageref{LastPage}`. `LastPage` and `VeryLastPage` should now be identical, but for backward compatibility we keep both.

```

1701 \PackageInfo{pageslts}{enddocument/afterlastpage (AED): pageslts setting VeryLastPage}%
1702 \pagesLTS@putlabel{VeryLastPage}{\thepage}{1}%

```

The `LastPages` label is set here, and `\lastpageref{LastPages}` gives the total number of pages and points to the last page.

```

1703 \PackageInfo{pageslts}{enddocument/afterlastpage (AED): pageslts setting LastPages}%
1704 \pagesLTS@putlabels%

```

```

1705 \ifodd\pagesLTS@tmpB%
1706 \PackageNoteNoLine{pageslts}{Total number of pages is odd}%
1707 \else%
1708 \PackageNoteNoLine{pageslts}{Total number of pages is even}%
1709 \fi%
1710 }
1711

```

`\frontmatter` `\frontmatter` often contains `\pagenumbering`, but for some unknown reason there are problems when another `\pagenumbering` with different page numbering scheme has been used before on the same page. (This would not make any sense anyway, because one page can only have one page numbering scheme.) This problem does not occur when two `\pagenumbering` commands are used inside normal text. Thus we need to check whether `\frontmatter` has been defined, whether it changes the page numbering scheme, and whether the page numbering scheme before `\frontmatter` was initiated at the same page. With the hook mechanism it does not matter whether the command to be patched is defined.

```

1712 \AddToHook{cmd/frontmatter/before}{%
1713 \xdef\pagesLTS@FMBpncn{\pagesLTS@pnc}%
1714 \xdef\pagesLTS@FMBpncp{\arabic{pagesLTS.current.local.\pagesLTS@pnc}}%
1715 }
1716

```

At the beginning of the `\frontmatter` (FMB), we remember the current (c) page numbering (pn) scheme: its name (n) and page number (p). `\pagesLTS@FMBpncp` would be 1 if the according `\pagenumbering` command was used on the same page at the `\frontmatter`. At the end of the `\frontmatter` the named checks are performed and in case of the named problem an error message is given.

```

1717 \AddToHook{cmd/frontmatter/after}{%
1718 \xdef\pagesLTS@FMEpncn{\pagesLTS@pnc}%
1719 \ifx\pagesLTS@FMBpncn\pagesLTS@FMEpncn%
1720 \else%
1721 \ifx\pagesLTS@FMBpncn\pagesLTS@zero%
1722 \else%
1723 \ifx\pagesLTS@FMBpncp\pagesLTS@one%
1724 \PackageError{pageslts}{\string\pagenumbering\space before \string\frontmatter}{%
1725 Do not use \string\pagenumbering{\pagesLTS@FMBpncn} before \string\frontmatter\MessageBreak%
1726 on the same page!\MessageBreak%
1727 \string\frontmatter\space (re)defines the page numbering scheme to \pagesLTS@FMEpncn ,\MessageBreak%
1728 thus earlier use of \string\pagenumbering{\pagesLTS@FMBpncn} on the same page is useless anyway.}%
1729 \fi%
1730 \fi%
1731 \fi%
1732 }
1733

```

`\AddToHookenddocument/info` The hook `enddocument/info` is even later:

“This hook is meant to receive code that write final information messages to the terminal. It follows immediately after the previous hook”

(Frank Mittelbach (2024-06-26): L^AT_EX's hook management, lthooks-code.pdf, p. 27) `enddocument/afteraux`. Here it is used for a rerun hint.

For example if the page numbering scheme of the last page of the `pageslts-example.tex` file is changed to `fnsymbol` and two runs of `pdfLATEX` are done, `pdfLATEX` will be happy and will not complain about changed labels. But indeed, a third run is necessary and indicated by the warning message below.

```
1734 \AddToHook{enddocument/info}{%
1735   \ifx\pagesLTS@rerun\pagesLTS@one%
1736     \PackageWarningNoLine{pageslts}{Label(s) may have changed.\MessageBreak%
1737       Rerun to get cross-references right}%
1738   \fi%
1739 }
1740
1741 \endpackage)
```

7 Installation

7.1 Downloads

Everything is available at <https://CTAN.org>, but may need additional packages themselves.

`pageslts.dtx` For unpacking the `pageslts.dtx` file and constructing the documentation it is required:

- T_EXFormat L^AT_EX 2_ε 2024-06-01: <https://CTAN.org>
- document class ltxdoc, 2024/02/08, v2.1j, <https://ctan.org/pkg/ltxdoc>
- package holtxdoc, 2019/12/09, v0.30, <https://ctan.org/pkg/holtxdoc>
- package hypdoc, 2023-10-26, v1.19, <https://ctan.org/pkg/hypdoc>
- package geometry, 2020/01/02, v5.9, <https://ctan.org/pkg/geometry>
- package ulem, 2019-11-18, no version number given, <https://ctan.org/pkg/ulem>

`pageslts.sty` The `pageslts.sty` for L^AT_EX 2_ε (i. e. all documents using the `pageslts` package) requires:

- T_EX Format L^AT_EX 2_ε 2024-06-01, <https://CTAN.org>
- package undolabl, 2023-02-14, v1.0m, <https://ctan.org/pkg/undolabl>
- package kvoptions, 2022-06-15, v3.15, <https://ctan.org/pkg/kvoptions>
- if any of the options `alphMult`, `AlphMulti`, or `fnsymbolmult` is used: package `alphalph`, 2019/12/09, v2.6, <https://ctan.org/pkg/alphalph>

`pageslts-example.tex` The `pageslts-example.tex` requires the same files as all documents using the `pageslts` package, and additionally:

- class `article`, 2024/02/08, v1.4n, from `classes.dtx`: <https://ctan.org/pkg/classes>
- package `alphalph`, 2019/12/09, v2.6, <https://ctan.org/pkg/alphalph>
- package `lipsum`, 2021-09-20, v2.7, <https://ctan.org/pkg/lipsum>
- package `showkeys`, 2024/05/23, v3.21, <https://ctan.org/pkg/showkeys>
- package `hyperref`, 2024-10-30, v7.01k, <https://ctan.org/pkg/hyperref>
- package `pageslts`, 2024-11-20, v2.0a, <https://ctan.org/pkg/pageslts>

(Well, it is the example file for this package, and because you are reading the documentation for the `pageslts` package, it can be assumed that you already have some version of it – is it the current one?)

Münch A hyperlinked list of my (other) packages can be found at <https://ctan.org/author/muench-hm>.

7.2 Package, unpacking TDS

Package. This package is available on <https://CTAN.org>.

<https://mirror.ctan.org/macros/latex/contrib/pageslts/pageslts.dtx>

The source file.

<https://mirror.ctan.org/macros/latex/contrib/pageslts/pageslts.pdf>

The documentation.

<https://mirror.ctan.org/macros/latex/contrib/pageslts/pageslts-example.pdf>

The compiled example file, as it should look like.

<https://mirror.ctan.org/macros/latex/contrib/pageslts/README>

The README file.

There is also a `pageslts.tds.zip` available:

<https://mirror.ctan.org/install/macros/latex/contrib/pageslts.tds.zip>

Everything in TDS compliant, compiled format.

which additionally contains

| | |
|-----------------------------------|--|
| <code>pageslts.ins</code> | The installation file. |
| <code>pageslts.drv</code> | The driver to generate the documentation. |
| <code>pageslts.sty</code> | The style file. |
| <code>pageslts-example.tex</code> | The example file. |

For required other packages please see the preceding subsection.

Unpacking. The `.dtx` file is a self-extracting `docstrip` archive. The files are extracted by running the `..dtx` through plain \TeX :

```
tex pageslts.dtx
```

About generating the documentation see paragraph 7.4 below.

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

| | |
|-----------------------------------|---|
| <code>pageslts.sty</code> | → <code>tex/latex/pageslts.sty</code> |
| <code>pageslts.pdf</code> | → <code>doc/latex/pageslts.pdf</code> |
| <code>pageslts-example.tex</code> | → <code>doc/latex/pageslts-example.tex</code> |
| <code>pageslts-example.pdf</code> | → <code>doc/latex/pageslts-example.pdf</code> |
| <code>pageslts.dtx</code> | → <code>source/latex/pageslts.dtx</code> |

If you have a `docstrip.cfg` that configures and enables `docstrip`'s TDS installing feature, then some files can already be in the right place, see the documentation of `docstrip`.

7.3 Refresh file name databases

If your T_EX distribution (T_EX Live, MiK_T_EX, ...) relies on file name databases, you must refresh these. For example, T_EX Live users run `texhash` or `mktexlsr`.

7.4 Some details for the interested

Unpacking with L^AT_EX. The `.dtx` chooses its action depending on the format:

plain T_EX: Run `docstrip` and extract the files.

L^AT_EX: Generate the documentation.

If you insist on using L^AT_EX for `docstrip` (really, `docstrip` does not need L^AT_EX), then inform the autodetect routine about your intention:

```
latex \let\install=y\input{pageslts.dtx}
```

Do not forget to quote the argument according to the demands of your shell.

Generating the documentation. You can use both the `.dtx` or the `.drv` to generate the documentation. The process can be configured by a configuration file `ltxdoc.cfg`. For instance, put the following line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfL^AT_EX:

```
pdflatex pageslts.dtx
makeindex -s gind.ist pageslts.idx
pdflatex pageslts.dtx
makeindex -s gind.ist pageslts.idx
pdflatex pageslts.dtx
```

7.5 Compiling the example

The example file, `pageslts-example.tex`, can be compiled via

```
latex pageslts-example.tex
```

or (recommended)

```
pdflatex pageslts-example.tex
```

and will need *at least* (!) three compiler runs to get all references right.

8 Acknowledgements

I (H.-MARTIN MÜNCH) would like to thank JEFFREY P. GOLDBERG ([jeffrey+news at goldmark dot org](mailto:jeffrey+news@goldmark.org)) for inventing the `lastpage` package. This `pageslts` package first started as a revision of the `lastpage` package, but a replacement was deemed necessary to accomplish what this package does. Further I would like to thank HEIKO OBERDIEK for providing the `\erroralphalph` command as well as a lot (!) of useful packages (from which I also got everything I know about creating a file in `dtx` format, OK, say it: copying), ULRICH DIEZ for his code for the `undolabl` package, which allows overwriting of labels, and ANDRES LÖH for the code to determine the current page numbering scheme. For bug reports I thank MICHAEL HERMAN, KWIKWI, JOSHUA ELLIS, and DR. CLEA F. REES. For telling me how to fix a bug (and for all his shared wisdom at <https://tex.stackexchange.com>) thanks go to PROF. ENRICO GREGORIO.

9 History

[1994/06/17, `lastpage`]

- `lastpage` v0.99a: First shot by JEFFREY P. GOLDBERG.

[1994/06/25, `lastpage`]

- `lastpage` v0.1b: Last version number created by JEFFREY P. GOLDBERG.

[1994/07/20, `lastpage`]

- `lastpage` v0.1b (again): Documentation updated by JEFFREY P. GOLDBERG.
The main source code of the `lastpage` package 1994/07/20 v0.1b was:

```
\NeedsTeXFormat{LaTeX2e}[1994/06/01]
\ProvidesPackage{lastpage}[1994/07/20 v0.1b
  LaTeX2e package for refs to last page number (JPG)]
\def\lastpage@putlabel{\addtocounter{page}{-1}%
  \immediate\write\@auxout{\string
  \newlabel{LastPage}{\thepage}}%
  \addtocounter{page}{1}}
\AtEndDocument{%
  \message{AED: lastpage setting LastPage}%
  \clearpage\lastpage@putlabel}%
\endinput
```

and then `hyperref` and `revtex` even redefine `\lastpage@putlabel`.

[2010/02/18, `lastpage`]

- `lastpage` v1.1: Proposed `LastPages` label by H.-Martin Münch on [news:comp.text.tex](https://groups.google.com/group/comp.text.tex/msg/4407493da9c747f0?dmode=source), see e. g. <https://groups.google.com/group/comp.text.tex/msg/4407493da9c747f0?dmode=source>; now available in this `pageslts` package.

[2010/05/15 v1.0 pagesLTS]

- pagesLTS Complete rewriting of the package, so as to work with **more than one page numbering scheme**; using `\AtVeryEnd` for `VeryLastPage`; upgrade from `fancyheadings` to `fancyhdr` package, then removed the need for a `fancyhdr` package at all.
- Rewriting of the package, so as to work with the `fnsymbol` page numbering scheme (even on the last page).
- Introduction of `kvoptions` into this package.
- Check for incompatible `endfloat` package.
- `lastpage209.sty` for L^AT_EX 209 .
- Replacement of `\filedate`, `-version`, `-name`,... because of L^AT_EX bug 2705:
Synopsis: Possible problem with `\fileversion` and `\filedate`
<https://www.latex-project.org/cgi-bin/ltxbugs2html?category=LaTeX&responsible=anyone&state=anything&keyword=lastpage&pr=latex%2F2705&search=>
- `alphalph` support included.
- Page numbering extension `\erroralph` by HEIKO OBERDIEK included.
- (Page-) Numbering extension for `roman` and `Roman` numbers included.
- Incompatible, old `lastpage` package “killed”.
- Example `pagesLTS-example.tex` added.
- Alternatives listing (section 4).
- Listing of T_EX sources (subsection 7.1).
- Complete rewriting of the documentation.
- Everything in DTX framework.
- New package name: `pagesLTS` for Last, Total, and page numbering Schemes pages.

[2010/06/01 v1.1(a) pagesLTS]

- Abstract changed: Negative `roman` and `Roman` page numbers are now possible.
- Several typing mistakes have been corrected - both in the `style` file as well as in this documentation.

[2010/06/03 v1.1b pagesLTS]

- Corrected a bug in `\XXRoman`, where `\roman` instead of `\Roman` had been used.
- New `papermas` package mentioned.

[2010/06/24 v1.1c pagesLTS]

- holtxdoc warning in drv updated.
- Removed CRLF line endings from the dtx file.
- Corrected the location of the package at CTAN. (In this version TDS was still missing due to a packaging error.)
- Corrected Message format in pagesLTS.ins.

[2010/07/15 v1.1d pagesLTS]

- Added the `\@ifclassloaded{revtex4}` code for `\lastpage@putlabel` (changed to `\pagesLTS@putlabelhyper`) from the hyperref package as comment.
- In the documentation added the explanation of the occurrence of multiply definitions of the LastPage label with lastpage, pagesLTS, hyperref package (in that order).
- Updated to (then) new version of undolabl package [2010/07/15] v1.0d, which uses `\undonewlabel` with only one instead of two arguments.
- Added a warning message, if hyperref and pdfpages were both used.

[2010/07/29 v1.1e pagesLTS]

- Removed lastpage209.sty, because it is now contained in the lastpage.dtx file, $v \geq 1.2a$.
- Removed the `\@ifclassloaded{revtex4}` code for `\lastpage@putlabel`.
- Handling of lastpage package adapted to updated version 1.2(a).
- Corrected error in lastpage code [1994/07/20 v0.1b].
- Version handling for undolabl package updated.
- Included a `\Checksum`.

[2010/08/08 v1.1f pagesLTS]

- Version 1.1e had a bug: AlphAlph was replaced by alphalph (because that package is named like this), but this was done also in commands and definitions - now reverted.

[2010/08/12 v1.1g pagesLTS]

- Now the rerun warning is given *after* e.g. the `\listfiles`, increasing the chance of the user to read it.

[2010/08/23 v1.1h pagesLTS]

- Renamed `\XXRoman` to `\XRoman`.
- Reduced the number of needed counters.
- Removed wrong % from the driver file.
- Changed the `\unit` definition (got rid of an old `\rm`).
- Without use of the `hyperref` package, labels of type `pagesLTS.<page numbering scheme>.local` became multiply defined. Now an `\undolabl` was inserted.

[2010/08/25 v1.1i pagesLTS]

- Bug fix: `tcilatex` defines the `\hyperref` command, therefore for `hyperref` package detection this had to be changed to `\Hy@Warning`.

[2010/09/12 v1.1j pagesLTS]

- Bug fix: \LaTeX issued a “Label(s) may have changed. Rerun to get cross-references right.”-warning, even if labels had not changed but were overwritten.
- Starred version of `\lastpageref` for suppressing hyperlinks introduced.
- A lot of details.

[2010/09/22 v1.1k pagesLTS]

- When no `fnsymbol` pagenumbersing scheme is used, the respective counters are not defined, saving three counters.
- Moved the package from `.../latex/muench/pagesLTS/...` to `.../latex/pagesLTS/...`

[2010/09/27 v1.1l pagesLTS]

- Bug fix: `\PackageError{pagesLTS}{pagenumbersing missing}{\pagesLTS@messageNPN }` had to be moved to the outside of `\EveryShipout`, because it wrote its message into the document instead to the screen and the `.log`-file.
- Updated to version 2010/04/24 v0.19 of the `holtxdoc` package.

[2011/02/01 v1.1m pagesLTS]

- Added a new warning subsection about `hyperref` and repeated page numbers.
- Bug fix: Missing % after `-\romannumeral\number-\arabic{#1}` added.
- The (then) new version v2.4i of the `endfloat` package was then even older than 15 years.

- Put a warning in the documentation as well as in the `log`-file and at the screen during compilation about the `showkeys` package. (The labels of the `pagesLTS` package cannot be shown by the `showkeys` package.)
- Bug fix: In some situations a rerun warning was given even if no rerun was necessary.
- The option `alphMult` is now set to `ab` by default.
- The option `AlphMulti` is now set to `AB` by default.

[2011/03/16 v1.1n pagesLTS]

- Bug fix: Handling of option `pagecontinue=false` changed. When `pagecontinue=false` was used, but also a `alphMult`, `AlphMulti`, `fnsymbolmult`, `romanMult` or `RomanMulti` option other than 0 or `false`, respectively, was used, the page numbering *was* continued/extended. Now a warning is issued in case of such option clash and `pagecontinue=false` is heeded, disabling all continuation.
- Bug fix: `\ProvidesPackage{pagesLTS}` contained an older date (2010/09/27 of v1.1l instead of 2011/02/01 of v1.1m).
- Bug fix: The `ulem` package is needed to generate the documentation from the `pagesLTS.dtx` file, but was not listed as necessary package.
- Bug fix: One reference to an outdated version of `undolabl` package, replaced by the (then) recent version.
- Some minor details.

[2011/03/17 v1.1o pagesLTS]

- Documentation and ReadMe bug fix: This `pagesLTS` package is located at <https://ctan.org/pkg/pageslts> instead of `.../pagesLTS/`.
- There is a new (possible) alternative package, `totcount`, see section 4.
- Bug fix: There was a reference to `lastpage` 1994/07/20, v0.1b, instead of the current version.

[2011/08/08 v1.2a]

- **Renamed the package from `pagesLTS` to `pageslts` (keeping family, prefix, internal commands,... as `pagesLTS`).** Added checking against double loading as `pagesLTS` and `pageslts`.
- The `holtxdoc` package was fixed (recent: 2011/02/04, v0.21), therefore the warning in `drv` could be removed.
- `\AtEndAfterFileList` from the (then) new version of the `atveryend` package, 2011/04/23, v1.7, by HEIKO OBERDIEK, is now used for the rerun hint instead of appending to `\@dofilelist`.
- Now defining 2: `\def\pagesLTS@two{2}` and 3: `\def\pagesLTS@three{3}`.
- Replaced `\texttt{\textbackslash...}` by `|\...|` in the `dtx` and by `\verb|\...|` in the example (where possible).

- When the `alphalph` package is needed, it is loaded via `\RequirePackage` instead of crashing with an error message.
- A lot of details (also in the documentation).

[2013/01/28 v1.2b]

- Updated to T_EX live 2012 (for compiling the documentation and example) and installed the available updates. Therefore I can no longer test whether `pageslts` works with earlier versions of L^AT_EX.
- Replaced `\let` by `\LetLtxMacro`.
- The `nameref` package redefines `\label` to have five arguments instead of two, therefore `\newlabel{LastPage}{-}{\thepage}{-}{-}` instead of `\newlabel{LastPage}{-}{\thepage}` must be used. (Bug reported at <https://tex.stackexchange.com/q/95541/6865>, thanks to Michał Herman!) Fixed. [Later in the kernel *all* labels got defined to have five arguments.]
- Updates to a lot of details, also in the documentation.

[2014/01/19 v1.2c]

- Bug: missing loop, fix: inserted.
- Bug: when option `pagecontinue=false` was set, the extension of the page numbering schemes was disabled by mistake, fixed.
- Now using `\ltx@ifpackageloaded` from the `ltxcmds` package for checking (even after `\AtBeginDocument`) whether a package has been loaded.
- Bug: incompatibility with `lineno` because of a mistake in the redefined `\pagenumbering`, fixed. (Bug reported by KWIKWI, thanks!)
- Bug: When `\pagenumbering` preceded `\frontmatter` on the same page but with different argument than the `\pagenumbering`, which was inside `\frontmatter`, then some labelling got mixed up. (Also this bug reported by KWIKWI, thanks!) While this is not fixed automatically, now an appropriate error message is given. (Two different page numbering schemes on the same page make no sense anyway.)

[2015/08/02 v1.2d]

- Updated to T_EX Live 2015 (for compiling the documentation and example) and installed the available updates. Therefore I can no longer test whether `pageslts` works with earlier versions of L^AT_EX.
- A `ifundefinedorrelax` similar to the one from `scrbase.sty` of the KOMA script bundle as 2013/12/19 v3.12 is used now, without the need for ε -T_EX.
- New versions of Adobe Reader and of some packages have become available.
- Changed the message (type) to be displayed if writing to files is disallowed (as pointed out by JOSHUA ELLIS, thanks!).
- Updates to several details, also in the documentation.

[2015/08/17 v1.2e]

- Bug fix, see <https://tex.stackexchange.com/q/261445/6865>, thank you to PROF. ENRICO GREGORIO for providing the fix and to DR. CLEA F. REES for bringing this to my attention.

[2015/12/21 v1.2f]

- Replaced `\next` with `\@pageslts@currname`.
- Bug fix, see <https://tex.stackexchange.com/q/140235/6865>. If the bug had been actually reported (instead of waiting until I see the question), I would have fixed it earlier, of course.
- Changed minor details like fixing urls in the manual.

[2024-11-20 v2.0a]

- Kernel-updates broke the package, the package was repaired and updated to the new kernel-code; ports from `lastpage`.
- Removed `\unit`.
- Removed `\XXRoman` (deprecated at least since 2015).
- Removed code from/need for packages `prelim2e`, `ltxcmds`, `atveryend`, `etoolbox`, `everyshi`, `letltxmacro`, and `rerunfilecheck`.
- Removed checks for available ε -TeX, `endfloats` package from 1992, `pagesLTS` package from 2011, `hyperref` from 2015 etc.
- Renamed `\pagesLTS@ifcounter` to `\pagesLTS@providecounter`.
- Renamed `\pagesLTS.lastpage` to `\pagesLTSlastpage`.

When you find a mistake or have a suggestion for an improvement of this package, please send an e-mail to the maintainer, thanks!
(Please see BUG REPORTS in the README.)

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