The \texttt{resizegather} package

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2010/03/01 v1.2

Abstract

Equations that are too large are resized to fit the available space. The environment \texttt{gather} of package \texttt{amsmath} is supported. Also the environments \texttt{equation} and \texttt{displaymath} are redefined using \texttt{gather} and its starred version.

Contents

1 Documentation 1
  1.1 Options .................................. 2
  1.2 Options for packages \texttt{amsmath or graphics} .......... 2

2 Implementation 3

3 Test 8
  3.1 Catcode checks for loading .............................. 8

4 Installation 9
  4.1 Download .................................. 9
  4.2 Bundle installation .............................. 10
  4.3 Package installation ............................. 10
  4.4 Refresh file name databases .......................... 10
  4.5 Some details for the interested ........................ 10

5 Catalogue 11

6 Acknowledgement 11

7 History 11
  [2009/12/04 v1.0] .................................. 11
  [2009/12/05 v1.1] ................................. 12
  [2010/03/01 v1.2] ................................. 12

8 Index 12

1 Documentation

Sometimes an equation is just a little to large to fit in the line. And breaking the equation across lines might be worse than downscaling the equation. This package implements this for the environments \texttt{gather} and \texttt{gather*} of package \texttt{amsmath}. That package already measures the equations and simplifies the implementation of \texttt{resizegather} that only needs to hook into \texttt{amsmath}'s code to add the resizing feature.

Resized equations are recorded in the \texttt{.log} file for small exceeds (default setting is smaller than five percent). Otherwise a warning is given.
Also environments `equation` and `displaymath` are supported by redefining them using `gather` and `gather*`. \\
\[ \text{and} \] \] are not supported, because these macros are not in environment form that is required for `amsmath`. The environment body is collected first to be able to process the body twice for measuring first. \\
Also the environments using alignments are not supported. If a single equation line would be resized, the alignment would get lost. And resizing all equations of the alignment does not seem appropriate either.

### 1.1 Options

**warningthreshold**: Print a warning if the original equation line exceeds its available width by the given fraction. Default is 0.05: A warning is given if the equation is too large by five percent. Otherwise the exceed is recorded in the `.log` file only.

The next options are boolean options. They are enabled by value `true` or if no value is given. They are switched off by value `false`.

**enable**: The resize feature is active (default).

**disable**: The complementary option for `enable`, added for convenience: `disable` (or `disable=true`) is the same as `enable=false`.

**equations**: \LaTeX environments `equation` and `displaymath` environments are redefined. These equations are now using environment `gather` and `gather*`. This is the default.

The following table shows additional options if you want to have finer control for the redefined environments:

<table>
<thead>
<tr>
<th>Option</th>
<th>Environments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><code>equation</code></td>
</tr>
<tr>
<td></td>
<td><code>displaymath</code></td>
</tr>
<tr>
<td>equations</td>
<td><code>gather</code></td>
</tr>
<tr>
<td></td>
<td><code>gather*</code></td>
</tr>
<tr>
<td>equation</td>
<td><code>gather</code></td>
</tr>
<tr>
<td></td>
<td><code>unchanged</code></td>
</tr>
<tr>
<td>displaymath</td>
<td><code>unchanged</code></td>
</tr>
<tr>
<td></td>
<td><code>gather*</code></td>
</tr>
</tbody>
</table>

If such an option is switched off, the original meaning of the affected environments is restored.

Options are evaluated in the following order:

1. Configuration file `resizegather.cfg` using `\resizegathersetup` if the file exists.
2. Package options given for `\usepackage`.
3. Later calls of `\resizegathersetup`.

\[\text{\texttt{\resizegathersetup\{\textit{option list}\}}\}]\]

The options are key value options. Boolean options are enabled by default (without value) or by using the explicit value `true`. Value `false` disable the option.

### 1.2 Options for packages `amsmath` or `graphics`

The package loads the package `amsmath` because is internally measures the equations first. Thus this package hooks into this code in order to resize the equations if they are too large. The resizing itself is done by `\resizebox` of package `graphics`. If you need special options for these packages, just load them first or use global options when appropriate. Example:

\[
\text{\usepackage[dvipdfm]{graphicx})\% or graphics} \\
\text{\usepackage[fleqn]{amsmath}} \\
\text{\usepackage{resizegather}}
\]
2 Implementation

Reload check, especially if the package is not used with \LaTeXX.

\begin{verbatim}
\catcode13=5 \catcode\@=10 \relax
\endcodechar=13 %
\catcode35=6 \catcode39=12 \catcode44=12 \catcode45=12 \catcode46=12 \catcode48=12 \catcode49=12 \catcode58=11 \catcode123=1 %
\catcode125=2 %
\expandafter\let\expandafter\x\csname ver@resizegather.sty\endcsname
\ifx\x\relax % plain-\TeX, first loading
\else
\def\empty{}% 
\ifx\\empty % LaTeX, first loading,
% variable is initialized, but \ProvidesPackage not yet seen
\else
\expandafter\ifx\csname PackageInfo\endcsname\relax
\def\x#1#2{% 
\immediate\write-1{Package #1 Info: #2.}%
}%
\else
\def\x#1#2[#3]{
\PackageInfo{#1}{#2, stopped}}%
\fi
\x{resizegather}{The package is already loaded}%
\aftergroup\endinput
\fi
\fi
\endgroup%
\endcodechar=13 %
\catcode\@=10 \relax
\endcodechar=13 %
\catcode35=6 %
\catcode39=12 %
\catcode40=12 %
\catcode41=12 %
\catcode44=12 %
\catcode45=12 %
\catcode46=12 %
\catcode47=12 %
\catcode58=11 %
\catcode91=12 %
\catcode93=12 %
\catcode123=1 %
\catcode125=2 %
\expandafter\ifx\csname ProvidesPackage\endcsname\relax
\def\x#1#2#3[#4]{
\endgroup
\immediate\write-1{Package: #3 #4}%
\xdef#1{#4}%
}\else
\def\x#1#2[#3]{
#2[#3]%
\ifx#1\@undefined
\else
\endgroup
\fi
\fi
\endinput
\end{verbatim}

Package identification:

\begin{verbatim}
\catcode13=5 \catcode\@=10 \relax
\endcodechar=13 %
\catcode35=6 \catcode39=12 \catcode44=12 \catcode45=12 \catcode46=12 \catcode48=12 \catcode49=12 \catcode58=11 \catcode123=1 %
\catcode125=2 %
\expandafter\ifx\csname ProvidesPackage\endcsname\relax
\def\x#1#2#3[#4]{\endgroup
\immediate\write-1{Package: #3 #4}%
\xdef#1{#4}%
}\else
\def\x#1#2#3[#4]{
#2[#3]%
\ifx#1\@undefined
\else
\endgroup
\fi
\fi
\endinput
\end{verbatim}

\end{verbatim}

Package identification:
\RequirePackage{kvoptions}[2009/12/04]
\SetupKeyvalOptions{%
  family=resizegather,%
  prefix=ResizeGather@,%
}%
\@for\ResizeGather@option:=%
centertags,%
tbtags,%
sumlimits,%
osumlimits,%
intlimits,%
ointlimits,%
nonamlimits,%
leqno,%
reqno,%
fleqn%
do{%
  \edef\ResizeGather@temp{%
    \noexpand\DeclareVoidOption{\ResizeGather@option}{%%
      \noexpand\PassOptionsToPackage{amsmath}{\ResizeGather@option}%
    }%
    \noexpand\AtEndOfPackage{%
      \noexpand\DisableKeyvalOption[%
        action=error,%
        package=resizegather,%
      ]{resizegather}{\ResizeGather@option}%
    }%
  }%
}
\@for\ResizeGather@option:=%
draft,%
final,%
hiderotate,%
hidescale,%
hiresbb,%
demo,%
dvips,xdvi,dvipdf,dvipdfm,dvipdtx,pdftex,dvipson,%
dviwindo,emtex,dviwin,pctexps,pctexwin,pctexhp,pctex32,%
trueutex,tcdvi,vtex,oztex,textures,xetex%
do{%
  \edef\ResizeGather@temp{%
    \noexpand\DeclareVoidOption{\ResizeGather@option}{%%
      \noexpand\PassOptionsToPackage{graphics}{\ResizeGather@option}%
    }%
    \noexpand\AtEndOfPackage{%
      \noexpand\DisableKeyvalOption[%
        action=error,%
        package=resizegather,%
      ]{resizegather}{\ResizeGather@option}%
    }%
  }%
}
\DeclareBoolOption[true]{enable}
\DeclareComplementaryOption{disable}{enable}
\DeclareStringOption[.05]{warningthreshold}
\newif\ifResizeGather@NeedInit
\DeclareBoolOption[true]{equations}
\DeclareBoolOption[true]{equation}
\DeclareBoolOption[true]{displaymath}
\AddToKeyvalOption*{equations}{%
  \ResizeGather@NeedInittrue
  \ifResizeGather@equations
    \ResizeGather@equationtrue
    \ResizeGather@displaymathtrue
  \else
    \ResizeGather@equationfalse
    \ResizeGather@displaymathfalse
  \fi
%
\AddToKeyvalOption*{equation}{%
  \ResizeGather@NeedInittrue
%
\AddToKeyvalOption*{displaymath}{%
  \ResizeGather@NeedInittrue
}

\setkeys{resizegather}{#1}%
\ifResizeGather@NeedInit
  \ResizeGather@init
\fi

\let\ResizeGather@init\relax
\InputIfFileExists{resizegather.cfg}{}{}%
\ProcessKeyvalOptions*{relax}
\RequirePackage{amsmath}
\RequirePackage{graphics}
\def\ResizeGather@redefine#1#2#3#4#5{%
  \csname ifResizeGather@#1\endcsname
  \@ifundefined{ResizeGather@org@#2}{%}
    \expandafter\let\csname ResizeGather@org@#2\expandafter\endcsname
    \csname #2\endcsname
  }{
\@ifundefined{ResizeGather@org@#3}{%}
    \expandafter\let\csname ResizeGather@org@#3\expandafter\endcsname
    \csname #3\endcsname
  }{
\expandafter\edef\csname #2\endcsname{%
  \expandafter\edef\csname #3\endcsname{%
  \expandafter\edef\csname #4\endcsname{%
  \expandafter\edef\csname #5\endcsname{%
\else
  \expandafter\edef\csname ResizeGather@org@#2\endcsname{%
\expandafter\edef\csname ResizeGather@org@#3\endcsname{%
\expandafter\edef\csname ResizeGather@org@#4\endcsname{%
\expandafter\edef\csname ResizeGather@org@#5\endcsname{%
\expandafter\edef\csname ResizeGather@org@#6\endcsname{%

\ResizeGather@init
\def\ResizeGather@init{% 
  \ResizeGather@r redefine{equation}{equation}{endequation}% 
  {gather}{endgather}% 
  \ResizeGather@r redefine{displaymath}{displaymath}{enddisplaymath}% 
  {gather*}{endgather*}% 
}% 
\ResizeGather@init

\ResizeGather@ResizeGather
\def\ResizeGather@ResizeGather{% 
  \ifResizeGather@enable 
  \dimen@\displaywidth 
  \if@fleqn 
  \advance\dimen@-\@mathmargin 
  \fi 
  \ifdim\wdz@>\dimen@ 
  \begingroup 
  \advance\dimen@-\wdz@ 
  \dimen@-\dimen@ 
  \ifdim\ResizeGather@warningthreshold\wdz@>\dimen@ 
  \expandafter\PackageInfo 
  \else 
  \expandafter\PackageWarning 
  \fi 
  \{\text{resizegather}\% 
  \text{Equation line \textbackslash row@space is too large \%} 
  \text{by \textbackslash dimen@MessageBreak} 
  \text{in environment \textbackslash currentenv@\%} 
  \}\% 
  \endgroup 
  \setboxz@h to\dimen@{\% 
  \resizebox{\dimen@}{!}{\boxz@}\% 
  \hss 
  \}% 
  \fi 
  \fi 
}\calc@shift@gather
\expandafter\def\expandafter\calc@shift@gather\expandafter{\%
  \expandafter\ResizeGather@ResizeGather
  \calc@shift@gather
  \}%
\ResizeGather@org@gmeasure@
\let\ResizeGather@org@gmeasure@\gmeasure@
\gmeasure@
\def\gmeasure@#1{% 
  \ResizeGather@org@gmeasure@{#1}% 
  \ifResizeGather@enable 
  \ifdim\totwidth@>\displaywidth 
  \totwidth@=\displaywidth 
  \fi 
  \fi 
  \}%
\ResizeGather@AtEnd%
3 Test

3.1 Catcode checks for loading

\catcode`\{=1 %
\catcode`\}=2 %
\catcode`\#=6 %
\catcode`@=11 %
\expandafter\ifx\csname count@\endcsname\relax
\countdef\count@=255 %
\fi
\expandafter\ifx\csname @gobble\endcsname\relax
\long\def\@gobble#1{}% 
\fi
\expandafter\ifx\csname @firstofone\endcsname\relax
\long\def\@firstofone#1{#1}%
\fi
\expandafter\ifx\csname loop\endcsname\relax
\else
\expandafter\@gobble
\fi
{%
\def\loop#1\repeat{% 
\def\body{#1} 
\iterate 
\}%
\def\iterate{% 
\body 
\let\next\iterate 
\else 
\let\next\relax 
\fi 
\next 
}%
\let\repeat=\fi 
}%
\def\RestoreCatcodes{} 
\count@=0 % 
\loop 
\edef\RestoreCatcodes{% 
\RestoreCatcodes
\catcode\the\count@=\the\catcode\count@\relax 
}%
\ifnum\count@<255 %
\advance\count@ 1 %
\repeat 
\def\RangeCatcodeInvalid#1#2{% 
\count@=#1\relax 
\loop 
\catcode\count@=15 %
\ifnum\count@<#2\relax 
\advance\count@ 1 %
\repeat 
}%
\def\RangeCatcodeCheck#1#2#3{% 
\count@=#1\relax 
\loop 
\ifnum#3=\catcode\count@ 
\else 
\ifnum#3=\catcode\count@ 
\fi
\message{Character \the\count@\space}
with wrong catcode \the\catcode\count@\space
instead of \number#3%
}
\ifnum\count@<#2\relax
\advance\count@ 1 %
\repeat

\def\space{ }
\expandafter\ifx\csname LoadCommand\endcsname\relax
\def\LoadCommand{\input resizegather.sty\relax}%
\fi
\def\Test{\RangeCatcodeInvalid{0}{47}%
\RangeCatcodeInvalid{58}{64}%
\RangeCatcodeInvalid{91}{96}%
\RangeCatcodeInvalid{123}{255}%
\catcode`\@=12 %
\catcode`\\=0 %
\catcode`\%=14 %
\LoadCommand
\RangeCatcodeCheck{0}{36}{15}%
\RangeCatcodeCheck{37}{37}{14}%
\RangeCatcodeCheck{38}{47}{15}%
\RangeCatcodeCheck{48}{57}{12}%
\RangeCatcodeCheck{58}{63}{15}%
\RangeCatcodeCheck{64}{64}{12}%
\RangeCatcodeCheck{65}{90}{11}%
\RangeCatcodeCheck{91}{91}{15}%
\RangeCatcodeCheck{92}{92}{0}%
\RangeCatcodeCheck{93}{96}{15}%
\RangeCatcodeCheck{97}{122}{11}%
\RangeCatcodeCheck{123}{255}{15}%
\RestoreCatcodes
}
\Test
\csname @@end\endcsname
\end
⟨/𭗍𭖾𭗌𭗍𭟣⟩

4 Installation

4.1 Download

Package. This package is available on CTAN:\footnote{ftp://ftp.ctan.org/tex-archive/}

\begin{itemize}
\item \texttt{CTAN:macros/latex/contrib/oberdiek/resizegather.dtx} The source file.
\item \texttt{CTAN:macros/latex/contrib/oberdiek/resizegather.pdf} Documentation.
\end{itemize}

Bundle. All the packages of the bundle ‘oberdiek’ are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

\texttt{CTAN:install/macros/latex/contrib/oberdiek.tds.zip}

\textit{TDS} refers to the standard “A Directory Structure for \TeX Files” (\texttt{CTAN:tds/tds.pdf}). Directories with \texttt{texmf} in their name are usually organized this way.
4.2 Bundle installation

**Unpacking.** Unpack the `oberdiek.tds.zip` in the TDS tree (also known as `texmf` tree) of your choice. Example (Linux):

```
unzip oberdiek.tds.zip -d ~/texmf
```

**Script installation.** Check the directory `TDS:scripts/oberdiek/` for scripts that need further installation steps. Package `attachfile2` comes with the Perl script `pdfatfi.pl` that should be installed in such a way that it can be called as `pdfatfi`. Example (Linux):

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

4.3 Package installation

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

```
tex resizegather.dtx
```

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

- `resizegather.sty` → `tex/latex/oberdiek/resizegather.sty`
- `resizegather.pdf` → `doc/latex/oberdiek/resizegather.pdf`
- `test/resizegather-test1.tex` → `doc/latex/oberdiek/test/resizegather-test1.tex`
- `resizegather.dtx` → `source/latex/oberdiek/resizegather.dtx`

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`.

4.4 Refresh file name databases

If your TeX distribution (teTeX, miktex, ...) relies on file name databases, you must refresh these. For example, tecteX users run `texhash` or `mktexlsr`.

4.5 Some details for the interested

**Attached source.** The PDF documentation on CTAN also includes the `.dtx` source file. It can be extracted by AcrobatReader 6 or higher. Another option is `pdftk`, e.g. unpack the file into the current directory:

```
pdftk resizegather.pdf unpack_files output .
```

**Unpacking with \LaTeX.** The `.dtx` chooses its action depending on the format:

- **plain TeX:** Run `docstrip` and extract the files.
- **\LaTeX:** Generate the documentation.

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

```
latax \let\install=y\input{resizegather.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 the configuration file ltxdoc.cfg. For instance, put this 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 pdflatex:

```
\PassOptionsToClass{a4paper}{article}
pdflatex resizegather.dtx
makeindex -s gind.ist resizegather.idx
pdflatex resizegather.dtx
makeindex -s gind.ist resizegather.idx
pdflatex resizegather.dtx
```

5 Catalogue

The following XML file can be used as source for the \TeX Catalogue. The elements caption and description are imported from the original XML file from the Catalogue. The name of the XML file in the Catalogue is \texttt{resizegather.xml}.

```
<entry datestamp='$Date$' modifier='$Author$' id='resizegather'>
  <name>resizegather</name>
  <caption>Automatically resize overly large equations.</caption>
  <authorref id='auth:oberdiek'/>
  <copyright owner='Heiko Oberdiek' year='2009,2010'/>
  <license type='lppl1.3'/>
  <version number='1.2'/>
  <description>
    Equations that are too large are resized to fit the available space. The environment \texttt{\amsmath\xref{amsmath}\amsmath} is supported. Also the environments \texttt{\amsmath\xref{amsmath}\amsmath\equation\xref{amsmath}\amsmath\Gather\xref{amsmath}\amsmath\displaymath\xref{amsmath}\amsmath\Gather\xref{amsmath}\amsmath\displaymath} are redefined using \texttt{\amsmath\xref{amsmath}\amsmath\Gather\xref{amsmath}\amsmath\displaymath} and its starred version.
  </description>
  <documentation details='Package documentation'
    href='ctan:/macros/latex/contrib/oberdiek/resizegather.pdf'/>
  <ctan file='true' path='/macros/latex/contrib/oberdiek/resizegather.dtx'/>
  <miktex location='oberdiek'/>
  <texlive location='oberdiek'/>
  <install path='/macros/latex/contrib/oberdiek/oberdiek.tds.zip'/>
</entry>
```

6 Acknowledgement

Dieter Jurzitza: He wanted the resizing feature at the \TeX table in Karlsruhe of December 2009. Thus this package is a kind of Christmas present.

7 History

[2009/12/04 v1.0]

- The first version.
Options enable and disable added.

TDS location moved from ‘generic’ to ‘latex’.

## 8 Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

### Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>291</td>
</tr>
<tr>
<td>%</td>
<td>367</td>
</tr>
<tr>
<td>@</td>
<td>292, 295</td>
</tr>
<tr>
<td>@currentvir</td>
<td>263</td>
</tr>
<tr>
<td>@firstofone</td>
<td>300, 303</td>
</tr>
<tr>
<td>@for</td>
<td>129, 154</td>
</tr>
<tr>
<td>@gobble</td>
<td>297, 305</td>
</tr>
<tr>
<td>@ifundefined</td>
<td>215, 219, 230</td>
</tr>
<tr>
<td>@mathmargin</td>
<td>249</td>
</tr>
<tr>
<td>@undefined</td>
<td>58</td>
</tr>
<tr>
<td>\</td>
<td>366</td>
</tr>
<tr>
<td>{}</td>
<td>289</td>
</tr>
<tr>
<td>{</td>
<td>290</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\AddToKeyvalOption</td>
<td>185, 195, 198</td>
</tr>
<tr>
<td>\advance</td>
<td>249, 253, 330, 338, 353</td>
</tr>
<tr>
<td>\aftergroup</td>
<td>29</td>
</tr>
<tr>
<td>\AtEndOfPackage</td>
<td>145, 169</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\body</td>
<td>309, 313</td>
</tr>
<tr>
<td>\boxz@</td>
<td>267</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\calc@shift@gather</td>
<td>273</td>
</tr>
<tr>
<td>\catcode</td>
<td>2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 33, 34, 36, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 60, 70, 72, 73, 74, 78, 79, 80, 81, 82, 83, 84, 87, 88, 90, 91, 92, 93, 96, 97, 99, 298, 299, 298, 297, 292, 327, 336, 344, 348, 365, 366, 367</td>
</tr>
<tr>
<td>\count@</td>
<td>294, 323, 327, 329, 330, 334, 336, 337, 338, 342, 344, 347, 348, 352, 353</td>
</tr>
<tr>
<td>\countdef</td>
<td>294</td>
</tr>
<tr>
<td>\csname</td>
<td>14, 21, 50, 66, 76, 214, 216, 217, 220, 221, 223, 224, 226, 227, 231, 232, 233, 234, 293, 296, 299, 302, 357, 384</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\DeclareBoolOption</td>
<td>178, 182, 183, 184</td>
</tr>
<tr>
<td>\DeclareComplementaryOption</td>
<td>179</td>
</tr>
<tr>
<td>\DeclareStringOption</td>
<td>180</td>
</tr>
<tr>
<td>\DeclareVoidOption</td>
<td>142, 166</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
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