The l3galley package
Galley code*

The LaTeX3 Project†

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1 Introduction

In LaTeX3 terminology a galley is a rectangular area which receives text and other material filling it from top. The vertically extend of a galley is normally not restricted: instead certain chunks are taken off the top of an already partially filled galley to form columns or similar areas on a page. This process is typically asynchronous but there are ways to control or change its behaviour.

Examples for galleys are "the main galley", where the continuous document data gets formatted into and from which columns and pages are constructed, and "vertical box galleys", such as the body of a minipage environment. The latter galleys are typically not split after formatting, though there can be exceptions.

2 Formatting layers

The present module is mainly concerned with the formatting of text in galleys. The mechanism by which this is achieved uses four (somewhat) distinct layers, some of which can be addressed using the templates provided here.

2.1 Layer one: external dimensions

The bottom layer of the system is the external dimensions of the galley. Normally only the horizontal dimension is fixed externally, while the vertical (filling) dimension is unspecified. The external dimensions are fixed when starting a new galley, and are therefore not modifiable within the galley.

There are no templates for setting this layer directly, although the external values are influenced by other parts of the system (for example when creating minipage environments).

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2.2 Layer two: internal dimensions

The second layer is the internal dimensions of the galley: the *measure* used for paragraph text and the position of the paragraph relative to the edges of the galley.

This layer is normally accessed by higher-level templates *via* the object type `measure`. Changes made using level two templates will often extend for large parts of a document (up to and including the entire document).

2.3 Layer three: paragraph shape

The third layer defines the paragraph shape within the measure as provided by the second layer. In the absence of any specification for that layer the paragraph shape used will be that of a rectangular area of the width of the current measure.

There are some restrictions imposed on the shape of a paragraph by the underlying TEX mechanisms. For example, cut out sections in paragraphs can be specified from the top of the paragraph but not from the bottom.

2.4 Layer four: formatting inside the paragraph

The forth layer deals with the paragraph formatting aspects such as hyphenation and justification within the paragraph (this is sometimes referred to as "`h&j`" or "`hj`"). This layer is somewhat distinct from the galley as such, but is handled in the same place as there is, internally, interaction between the different layers.

3 Code interfaces

3.1 Galley layers

`\l_galley_width_dim` The total width of a galley, set either by the page geometry code for the main vertical galley or when creating an independent galley, such as a minipage.

`\galley_level` `\galley_level:`

Sets up a vertical box to contain a new galley level. The box should be "colour safe", which is automatic for LATEX3 coffins but must be included manually (using `\color_-group_begin:` and `\color_group_end:`) in "raw" vertical boxes.

3.2 Measure

\galley_margins_set_absolute:nn	\galley_margins_set_absolute:nn {⟨*left margin*⟩} {⟨*right margin*⟩}
\galley_margins_set_relative:nn	\galley_margins_set_relative:nn {⟨*left margin*⟩} {⟨*right margin*⟩}

Sets the width of the measure to have the ⟨*left margin*⟩ and ⟨*right margin*⟩ specified by the arguments, both of which are ⟨*dimension expressions*⟩. The relative function will adjust the text width within any existing margins, whereas the absolute measure sets the margins based on the edges of the galley only. One or both of the ⟨*margins*⟩ may be negative, to specify and outdent.

3.3 Between paragraphs

\g_galley_restore_running_tl

When galley settings need to be reset at the end of a paragraph, the appropriate detail should be added to this token list. It is inserted immediately before the start of each paragraph, and can therefore be used to clear otherwise global settings. The token list itself is also cleared as part of this process.

\g_galley_no_break_next_bool

Indicates that no page break should be allowed between the current paragraph and the next paragraph.

\g_galley_omit_next_indent_bool

Indicates that the indent should be omitted from the start of the next paragraph started.

\l_galley_interpar_penalty_int

The ⟨*penalty*⟩ for a break between paragraphs. The ⟨*penalty*⟩ should be in the range $-10\,000$ to $10\,000$, where $-10\,000$ forces a page break, 0 has no effect at all and $10\,000$ forbids a page break. Note that setting \g_galley_no_break_next_bool to true will override any setting of \l_galley_interpar_penalty_int.

\l_galley_interpar_vspace_skip

Stretchable space to be inserted between paragraphs, set at the design or template level.

\galley_set_user_penalty:n   \galley_set_user_penalty:n {⟨*penalty*⟩}

Sets the ⟨*penalty*⟩ for a break between the current and next paragraph on a one-off basis. This function is intended for user-level adjustments to design, and takes precedent over both settings from \galley_set_penalty:n and from \galley_no_break_next:.

`\galley_set_user_vspace:n`
> `\galley_set_user_vspace:n {⟨space⟩}`
>
> Sets the ⟨*space*⟩ f to be inserted between the current and next paragraph on a one-off basis. This function is intended for user-level adjustments to design, and otherwise is analogous to `\galley_set_vspace:n`.

3.4 Paragraph shape

`\galley_parshape_multi_par:nnnN`
`\galley_parshape_multi_par:nVVN`
`\galley_parshape_single_par:nnnN`
`\galley_parshape_single_par:nVVN`
> `\galley_parshape_multi_par:nnnN {⟨unaltered lines⟩} {⟨left indents⟩}`
> `{⟨right indents⟩} ⟨resume flag⟩`
> `\galley_parshape_single_par:nnnN {⟨unaltered lines⟩} {⟨left indents⟩}`
> `{⟨right indents⟩} ⟨resume flag⟩`
>
> Sets the current paragraph shape to create an arbitrary paragraph shape. The paragraph shape is set such that there are ⟨*unaltered lines*⟩ which have width and indent as set by the measure. The "altered" lines are then defined by the comma-separated lists of ⟨*left indents*⟩ and ⟨*right indents*⟩. These are both indents from the edge of the measure, and may be negative, and should both contain the same number of items. If the ⟨*resume flag*⟩ is `true`, after the last altered line the paragraph shape returns to that of the measure. On the other hand, if the flag is `false` then the shape of the last line is retained for the rest of the paragraph. For example,
>
> ```
> \galley_parshape_set_multi_par:nnnN { 1 }
>   { 2 pt , 4 pt , 6 pt } { 2 pt , 4 pt , 6 pt } \c_true_bool
> ```
>
> would create a paragraph shape in which the first line is the full width of the measure, the second line is indented by 2 pt on each side, the third line by by 4 pt and the fourth line and subsequent lines by 6 pt from the edge of the measure on each side.
>
> The `single_par` version applies only to a single paragraph, while the `multi_par` function sets the paragraph shape on an ongoing basis within the scope of the current TeX group.

`\galley_parshape_fixed_lines:nnn`
`\galley_parshape_fixed_lines:nVV`
> `\galley_parshape_fixed_lines:nnn {⟨unaltered lines⟩} {⟨left indents⟩}`
> `{⟨right indents⟩}`
>
> Sets the paragraph shape to create an arbitrary paragraph shape which will apply to an exact number of lines. The paragraph shape is set such that there are ⟨*unaltered lines*⟩ which have width and indent as set by the measure. The "altered" lines are then defined by the comma-separated lists of ⟨*left indents*⟩ and ⟨*right indents*⟩. These are both indents from the edge of the measure, and may be negative, and should both contain the same number of items. The altered lines will apply to one or more paragraphs, such that the entire indent specification is honoured before the standard measure resumes.

3.5 Formatting inside the paragraph

The settings described here apply "inside" the paragraph, and so are active irrespective of any paragraph shape within the measure.

`\l_galley_line_left_skip` `\l_galley_line_right_skip`	Stretchable space added to the appropriate side each line in a paragraph.

`\l_galley_par_begin_skip` `\l_galley_par_end_skip`	Stretchable space added to the beginning of the first line and end of the last line of a paragraph, respectively.

`\l_galley_par_indent_dim`	Fixed space added to the start of each paragraph except for those where `\l_galley_-omit_next_indent_bool` is `true`.

`\l_galley_last_line_fit_int`

Determines how the inter-word stretch is set for the last line of a paragraph when

1. The value of `\l_galley_par_end_skip` contains an infinite (`fil`) component;

2. The values of `\l_galley_line_left_skip` and `\l_galley_line_right_skip` do *not* contain an infinite (`fil`) component.

Under these circumstances, `\l_galley_last_line_fit_int` is active, and applies as follows:

- Set to 0, the last line of the paragraph is set with the inter-word spacing at natural width;

- Set to a 1000 (or above), the inter-word spacing in the last line is stretched by the same factor as that applied to the penultimate line;

- Set to n between these extremes, the inter-word spacing in the last line is stretched by $n/1000$ times the factor used for the penultimate line.

`\galley_set_interword_spacing:N` `\galley_set_interword_spacing:N` ⟨*fixed spacing bool*⟩

Sets the inter-word spacing used based on the values supplied by the current font. If the ⟨*fixed spacing bool*⟩ flag is `true` then no stretch is permitted between words, otherwise the stretch specified by the font designer is used.

3.6 Display material

Material which is set in "display-style" require additional settings to control the relationship with the surrounding material.

`\galley_display_begin` `\galley_display_end`	`\galley_display_begin:` ... `\galley_display_end:`

Sets up a group to contain display-style material. Unlike an independent galley level, settings are inherited from the surroundings. However, the interaction of a display block with the paragraphs before and after it can be adjusted independent of the design of text.

3.7   Line breaking

`\l_galley_binop_penalty_int`

Penalty charged if an inline math formula is broken at a binary operator.

`\l_galley_double_hyphen_demerits_int`

Extra demerit charge of two (or more) lines in succession end in a hyphen.

`\l_galley_emergency_stretch_skip`

Additional stretch assumed for each line if no better line breaking can be found without it. This stretch is not actually added to lines, so its use may result in underfull box warnings.

`\l_galley_final_hyphen_demerits_int`

Extra demerit charge if the second last line is hyphenated.

`\l_galley_linebreak_badness_int`

Boundary that if exceeded will cause TeX to report an underfull line.

`\l_galley_linebreak_fuzz_dim`

Boundary below which overfull lines are not reported.

`\l_galley_linebreak_penalty_int`

Extra penalty charged per line in the paragraph. By making this penalty higher TeX will try harder to produce compact paragraphs.

`\l_galley_linebreak_pretolerance_int`

Maximum tolerance allowed for individual lines to break the paragraph without attempting hyphenation.

`\l_galley_linebreak_tolerance_int`

Maximum tolerance allowed for individual lines when breaking a paragraph while attempting hyphenation (if this limit can't be met `\l_galley_emergency_stretch_skip` comes into play).

`\l_galley_mismatch_demerits_int`

Extra demerit charge if two visually incompatible lines follow each other.

`\l_galley_relation_penalty_int`

Penalty charged if an inline math formula is broken at a relational symbol.

3.8   Paragraph breaking

`\l_galley_parbreak_badness_int`

Boundary that if exceeded will cause TeX to report an underfull vertical box.

`\l_galley_parbreak_fuzz_dim`

Boundary below which overfull vertical boxes are not reported.

`\l_galley_broken_penalty_int`

Penalty for page breaking after a hyphenated line.

`\l_galley_pre_display_penalty_int`

Penalty for breaking between immediately before display math material.

`\l_galley_post_display_penalty_int`

Penalty for breaking between immediately after display math material.

`\galley_set_club_penalties:n`
`\galley_set_club_penalties:(V|v)`
`\galley_set_display_club_penalties:n`
`\galley_set_display_club_penalties:(V|v)`
`\galley_set_display_widow_penalties:n`
`\galley_set_display_widow_penalties:(V|v)`
`\galley_set_widow_penalties:n`
`\galley_set_widow_penalties:(V|v)`

`\galley_set_club_penalties:n {⟨penalty list⟩}`

Set the penalties for breaking lines at the beginning and end of (partial) paragraphs. In each case, the ⟨*penalty list*⟩ is a comma-separated list of penalty values. The list applies as follows:

club   Penalties for breaking after the first, second, third, *etc.* line of the paragraph.

display_club   Penalties for breaking after the first, second, third, *etc.* line after a display math environment.

display_club   Penalties for breaking before the last, penultimate, antepenultimate, *etc.* line before a display math environment.

widow   Penalties for breaking before the last, penultimate, antepenultimate, *etc.* line of the paragraph.

In all cases, these penalties apply in addition to the general interline penalty or to any "special" line penalties.

`\galley_set_interline_penalty:n`   `\galley_set_interline_penalty:n {⟨penalty⟩}`

Sets the standard interline penalty applied between lines of a paragraph. This value is added to any (display) club or widow penalty in force.

`\galley_set_interline_penalties:n`   `\galley_set_interline_penalties:n {⟨penalty list⟩}`
`\galley_set_interline_penalties:V`

Sets "special" interline penalties to be used in place of the standard value, specified as a comma-separated ⟨*penalty list*⟩. The ⟨*penalties*⟩ apply to the first, second, third, *etc.* line of the paragraph.

`\galley_save_club_penalties:N`   `\galley_save_club_penalties:N {⟨comma list⟩}`
`\galley_save_display_club_penalties:N`
`\galley_save_display_widow_penalties:N`
`\galley_save_interline_penalties:N`
`\galley_save_widow_penalties:N`

These functions save the current value of the appropriate to the comma list specified, within the current TeX group.

`\galley_interline_penalty` ⋆   `\galley_interline_penalty:`

Expands to the current interline penalty as a ⟨*integer denotation*⟩.

4   Hooks and insertion points

`\g_galley_par_begin_hook_tl`

Token list inserted at the beginning of every paragraph in horizontal mode. This is inserted after any paragraph indent but before any other horizontal mode material.

`\g_galley_par_end_hook_tl`   Token list inserted at the end of every paragraph in horizontal mode.

`\g_galley_par_after_hook_tl`

Token list inserted after each paragraph. This is used for resetting galley parameters, and is therefore cleared after use.

`\g_galley_whatsit_next_tl`   Token list for whatsits to be inserted at the very beginning of the next paragraph started.

`\g_galley_whatsit_previous_tl`

Token list for whatsits to be inserted at the very end of the last paragraph started.

5 Additional effects

`\galley_end_par:n`   `\galley_end_par:n {⟨tokens⟩}`

Adds the ⟨*tokens*⟩ to the material collected for the last paragraph before finalising the last paragraph in the usual way. This function should therefore be the *first* non-expandable entry used when a function needs to add tokens to the preceding paragraph.

6 Internal variables

Some of the internal variables for the galley mechanism may be of interest to the programmer. These should all be treated as read-only values and accessed only through the defined interfaces described above.

`\l_galley_total_left_margin_dim`

The total margin between the left side of the galley and the left side of the text block. This may be negative if the measure is set to overlap the text beyond the edge of the galley.

`\l_galley_total_right_margin_dim`

The total margin between the right side of the galley and the right side of the text block. This may be negative if the measure is set to overlap the text beyond the edge of the galley.

`\l_galley_text_width_dim`   The width of a line of text within the galley, taking account of any margins added. This may be larger than `\l_galley_width_dim` if the margins are negative.

7 l3galley Implementation

At the implementation level, there are a number of challenges which have to be overcome in order to make the galley easy to use at the designer and user levels. Inserting material into the main vertical list is in many ways an irreversible operation. Inserting items as they appear in the source is therefore not desirable. Instead, inserting vertical-mode material needs to be delayed until the start of the "next" paragraph. This is particularly notable for invisible items such as whatsits and specials, which will otherwise cause changes in spacing. Delaying insertion enables user-supplied settings to override design settings in a reliable fashion. This can be achieved as the design-level material can be ignored if a user value is supplied. There is a need to allow proper nesting of galleys, which means that all of the above needs to be set up so that it can be saved and restored. All of these manipulations require altering the meaning of the `\par` token, which is particularly awkward as TEX inserts a token *called* `\par` rather than one with a particular meaning. This makes moving `\par` to somewhere "safe" extremely challenging.

Added to all of this complexity, there is a need to deal with "display-like" material. The most obvious example is the way lists are handled. These use `\par` tokens to achieve the correct appearance, but at the same time

```
Text
\begin{itemize}
  \item An item
\end{itemize}
More text
```

should form one visual paragraph while

```
Text
\begin{itemize}
  \item An item
\end{itemize}

More text
```

should be shown as two paragraphs. This requires an additional level of handling so that the `\par` token used to end the list in the first case does not start a new paragraph in a visual sense while the second does.

Another factor to bear in mind is that `\tex_everypar:D` may be executed inside a group. For example, a paragraph starting

```
{Text} here
```

will insert the tokens such that the current group level is 1 higher for "Text" than for "here". The result of this is that it's very important to watch how flags are set and reset. This can only be done reliably on a global level, which then has a knock-on effect on the rest of the implementation.

At a TeX level, settings can only apply to the current paragraph, but conceptually there is a need to allow for both single-paragraph and "running" settings. Whenever the code switches galley level both of these need to be correctly saved.

```
1  ⟨*initex | package⟩
```

```
2  ⟨*package⟩
3  \ProvidesExplPackage
4    {\ExplFileName}{\ExplFileDate}{\ExplFileVersion}{\ExplFileDescription}
5  \package_check_loaded_expl:
6  ⟨/package⟩
```

7.1 Support items

Functions or settings which are needed by the galley but perhaps also elsewhere.

`\galley_leave_vmode:`   The standard mode to leave vertical mode, starting a paragraph.

```
7  \cs_new_protected_nopar:Npn \galley_leave_vmode:
8    { \hbox_unpack:N \c_empty_box }
```

(*End definition for* `\galley_leave_vmode:`. *This function is documented on page* **??**.)

The default hyphenation character should be set and hyphenation should be enabled.

```
9   ⟨*initex⟩
10  \tex_defaulthyphenchar:D 45 \scan_stop:
11  ⟨/initex⟩
```

7.2 Galley settings

Settings for application by the galley respect the usual TeX grouping and so are all local variables.

`\l_galley_parshape_left_indent_clist`
`\l_galley_parshape_right_indent_clist`
`\l_galley_parshape_multipar_bool`
`\l_galley_parshape_resume_std_bool`
`\l_galley_parshape_fixed_lines_bool`

Setting up paragraph shape interacts with setting up the measure. The only way to keep things flexible is to have a rather "rich" set of data available.

```
12  \clist_new:N \l_galley_parshape_left_indent_clist
13  \clist_new:N \l_galley_parshape_right_indent_clist
14  \bool_new:N \l_galley_parshape_multipar_bool
15  \bool_new:N \l_galley_parshape_resume_std_bool
16  \bool_new:N \l_galley_parshape_fixed_lines_bool
17  \int_new:N \l_galley_parshape_std_lines_int
```

(*End definition for* `\l_galley_parshape_left_indent_clist` *and* `\l_galley_parshape_right_indent_clist`. *These functions are documented on page* **??**.)

`\l_galley_text_width_dim`

The width of the current measure: the "running" setting can be inherited from LaTeX 2ε.

```
18  ⟨*initex⟩
19  \dim_new:N \l_galley_text_width_dim
20  ⟨/initex⟩
21  ⟨*package⟩
22  \cs_new_eq:NN \l_galley_text_width_dim \linewidth
23  ⟨/package⟩
```

(*End definition for* `\l_galley_text_width_dim`. *This function is documented on page* *9*.)

`\l_galley_total_left_margin_dim`
`\l_galley_total_right_margin_dim`

Margins of the current text within the galley: these plus the galley width are one way to define the measure width. See also the text width, which is an alternative view (and should be in sync with this one!).

```
24  ⟨*initex⟩
25  \dim_new:N \l_galley_total_left_margin_dim
26  ⟨/initex⟩
27  ⟨*package⟩
28  \cs_new_eq:NN \l_galley_total_left_margin_dim \@totalleftmargin
29  ⟨/package⟩
30  \dim_new:N \l_galley_total_right_margin_dim
```

(*End definition for* `\l_galley_total_left_margin_dim` *and* `\l_galley_total_right_margin_dim`. *These functions are documented on page* *9*.)

`\l_galley_interpar_penalty_skip`
`\l_galley_interpar_vspace_skip`

Items between paragraphs at the design level.

```
31  \int_new:N \l_galley_interpar_penalty_int
32  \skip_new:N \l_galley_interpar_vspace_skip
```

`\l_galley_width_dim`   The external size of a galley is the stored in the T_EX primitive `\tex_hsize:D`, which is renamed. This will only ever be reset by the code constructing a new galley, for example the start of a minipage. This value will be set for the main galley by the page layout system.

```
33 \cs_new_eq:NN \l_galley_width_dim \tex_hsize:D
```

7.3 Galley data structures

In contrast to settings, the data structures used by the galley are all set globally. To allow different galley levels to exist, a local variant is defined for each one to save the value when starting a new level.

`\g_galley_begin_level_bool`
`\l_galley_begin_level_bool`   Indicates that the galley is at the very beginning of the level, and that no material has yet been set. As a result, the global version is set `true` to begin with.

```
34 \bool_new:N \g_galley_begin_level_bool
35 \bool_new:N \l_galley_begin_level_bool
```

`\g_galley_omit_next_indent_bool`
`\l_galley_omit_next_indent_bool`   A global flag is needed for suppressing indentation of the next paragraph. This does not need a "running" version since that should be handled using the `justification` object: the two concepts are related but not identical. The flag here is needed in cases such as the very first paragraph in a galley or immediately following a heading.

```
36 \bool_new:N \g_galley_omit_next_indent_bool
37 \bool_new:N \l_galley_omit_next_indent_bool
```

`\g_galley_parshape_set_bool`
`\l_galley_parshape_set_bool`   This is not a setting for paragraph shape, but rather a tracker for the galley system.

```
38 \bool_new:N \g_galley_parshape_set_bool
39 \bool_new:N \l_galley_parshape_set_bool
```

`\g_galley_nobreak_next_bool`
`\l_galley_nobreak_next_bool`   Dealing with the no-break flag is pretty much the same as the case for the indent: this applies on a single paragraph basis.

```
40 \bool_new:N \g_galley_nobreak_next_bool
41 \bool_new:N \l_galley_nobreak_next_bool
```

<g_galley_par_begin_hook_tl> Hooks for user-level code: these are not used by the galley itself.
<l_galley_par_begin_hook_tl>
<g_galley_par_end_hook_tl>
<l_galley_par_end_hook_tl>

```
42 \tl_new:N \g_galley_par_begin_hook_tl
43 \tl_new:N \l_galley_par_begin_hook_tl
44 \tl_new:N \g_galley_par_end_hook_tl
45 \tl_new:N \l_galley_par_end_hook_tl
```

(*End definition for* `\g_galley_par_begin_hook_tl` *and others. These functions are documented on page* **??**.)

<g_galley_par_after_hook_tl> This one is used by the galley: it happens "after" the current paragraph, and is used for reset purposes.
<l_galley_par_after_hook_tl>

```
46 \tl_new:N \g_galley_par_after_hook_tl
47 \tl_new:N \l_galley_par_after_hook_tl
```

(*End definition for* `\g_galley_par_after_hook_tl` *and* `\l_galley_par_after_hook_tl`. *These functions are documented on page* **??**.)

<g_galley_previous_par_lines_int> The number of lines in the previous typeset paragraph. This is reset at the start of
<l_galley_previous_par_lines_int> the paragraph and *added to* when each `\tex_par:D` primitive is used: LATEX uses the primitive in places that do not end a (conceptual) paragraph.

```
48 \int_new:N \g_galley_previous_par_lines_int
49 \int_new:N \l_galley_previous_par_lines_int
```

(*End definition for* `\g_galley_previous_par_lines_int` *and* `\l_galley_previous_par_lines_int`. *These functions are documented on page* **??**.)

<g_galley_restore_running_tl> When a parameter is altered from the "running" value to a different "current" one, there
<l_galley_restore_running_tl> needs to be a method to restore the "running" value. This is done by adding the necessary assignment to a token list, which can be executed when needed. At the same time, this information is itself part of the galley parameter structure, and so there has to be a local save version.

```
50 \tl_new:N \g_galley_restore_running_tl
51 \tl_new:N \l_galley_restore_running_tl
```

(*End definition for* `\g_galley_restore_running_tl` *and* `\l_galley_restore_running_tl`. *These functions are documented on page* **??**.)

<g_galley_whatsit_next_tl> Whatsits only apply on a per-paragraph basis and so there is no need to differentiate
<l_galley_whatsit_next_tl> between current and running values. However, there is a need to differentiate between
<g_galley_whatsit_previous_tl> whatsits that attach to the previous (completed) paragraph and those that attach to the
<l_galley_whatsit_previous_tl> next paragraph.

```
52 \tl_new:N \g_galley_whatsit_next_tl
53 \tl_new:N \l_galley_whatsit_next_tl
54 \tl_new:N \g_galley_whatsit_previous_tl
55 \tl_new:N \l_galley_whatsit_previous_tl
```

(*End definition for* `\g_galley_whatsit_next_tl` *and others. These functions are documented on page* **??**.)

<g_galley_interpar_penalty_user_tl> The user may want to over-ride the penalty for a break between paragraphs, for example
<l_galley_interpar_penalty_user_tl> to prevent a break when the overall design allows one. This is handled using an additional penalty.

```
56 \tl_new:N \g_galley_interpar_penalty_user_tl
57 \tl_new:N \l_galley_interpar_penalty_user_tl
```

(*End definition for* `\g_galley_interpar_penalty_user_tl` *and* `\l_galley_interpar_penalty_user_tl`*. These functions are documented on page* **??***.*)

`\g_galley_interpar_vspace_user_tl`
`\l_galley_interpar_vspace_user_tl`

Arbitrary vertical space can be inserted by the user on a one-off basis. This is used in place of any running space between paragraphs.

```
58 \tl_new:N \g_galley_interpar_vspace_user_tl
59 \tl_new:N \l_galley_interpar_vspace_user_tl
```

(*End definition for* `\g_galley_interpar_vspace_user_tl` *and* `\l_galley_interpar_vspace_user_tl`*. These functions are documented on page* **??***.*)

7.4 Independent galley levels

As well as the main vertical list, independent galleys are required for items such as minipages and marginal notes. Each of these galleys requires an independent set of global data structures. This is achieved by storing the data structures in *local* variables. The later are only used to save and restore the global value, and so TeX grouping will manage the values correctly. This implies that each galley level must form a group: galley levels are tided to vertical boxes and so this is a reasonable requirements.

`\galley_initialise_variables:`

At the start of a galley level, both the global and local variables will need to be reset to standard values. For example, the measure is set to the galley width and any paragraph shape is cleared.

```
60 \cs_new_protected_nopar:Npn \galley_initialise_variables:
61   {
62     \bool_gset_true:N \g_galley_begin_level_bool
63     \tl_gclear:N \g_galley_interpar_penalty_user_tl
64     \tl_gclear:N \g_galley_interpar_vspace_user_tl
65     \bool_gset_true:N \g_galley_omit_next_indent_bool
66     \bool_gset_false:N \g_galley_nobreak_next_bool
67     \tl_gclear:N \g_galley_par_begin_hook_tl
68     \tl_gclear:N \g_galley_par_end_hook_tl
69     \tl_gclear:N \g_galley_par_after_hook_tl
70     \bool_gset_false:N \g_galley_parshape_set_bool
71     \int_gzero:N \g_galley_previous_par_lines_int
72     \tl_gclear:N \g_galley_restore_running_tl
73     \tl_gclear:N \g_galley_whatsit_previous_tl
74     \tl_gclear:N \g_galley_whatsit_next_tl
75   }
76 \galley_initialise_variables:
```

(*End definition for* `\galley_initialise_variables:`*. This function is documented on page* **??***.*)

`\galley_initialise_settings:`

This sets the local values of the various galley settings.

```
77 \cs_new_protected_nopar:Npn \galley_initialise_settings:
78   {
79     \dim_set_eq:NN \l_galley_text_width_dim \l_galley_width_dim
80     \dim_zero:N \l_galley_left_margin_dim
81     \dim_zero:N \l_galley_right_margin_dim
82     \dim_zero:N \l_galley_total_left_margin_dim
```

```
83      \dim_zero:N \l_galley_total_right_margin_dim
84    }
```
(*End definition for* \galley_initialise_settings:*. This function is documented on page* **??**.)

\galley_save_parameters: Saving and restoring parameters is carried out by a series of copy functions.

\galley_restore_parameters:
```
85  \cs_new_protected_nopar:Npn \galley_save_parameters:
86    {
87      \bool_set_eq:NN \l_galley_begin_level_bool
88        \g_galley_begin_level_bool
89      \tl_set_eq:NN \l_galley_interpar_penalty_user_tl
90        \g_galley_interpar_penalty_user_tl
91      \tl_set_eq:NN \l_galley_interpar_vspace_user_tl
92        \g_galley_interpar_vspace_user_tl
93      \bool_set_eq:NN \l_galley_omit_next_indent_bool
94        \g_galley_omit_next_indent_bool
95      \bool_set_eq:NN \l_galley_nobreak_next_bool
96        \g_galley_nobreak_next_bool
97      \tl_set_eq:NN \l_galley_par_begin_hook_tl
98        \g_galley_par_begin_hook_tl
99      \tl_set_eq:NN \l_galley_par_end_hook_tl
100        \g_galley_par_end_hook_tl
101      \tl_set_eq:NN \l_galley_par_after_hook_tl
102        \g_galley_par_after_hook_tl
103      \bool_set_eq:NN \l_galley_parshape_set_bool
104        \g_galley_parshape_set_bool
105      \int_set_eq:NN \l_galley_previous_par_lines_int
106        \g_galley_previous_par_lines_int
107      \tl_set_eq:NN \l_galley_restore_running_tl
108        \g_galley_restore_running_tl
109      \tl_set_eq:NN \l_galley_whatsit_previous_tl
110        \g_galley_whatsit_previous_tl
111      \tl_set_eq:NN \l_galley_whatsit_next_tl
112        \g_galley_whatsit_next_tl
113    }
114  \cs_new_protected_nopar:Npn \galley_restore_parameters:
115    {
116      \bool_gset_eq:NN \g_galley_begin_level_bool
117        \l_galley_begin_level_bool
118      \tl_gset_eq:NN \g_galley_interpar_penalty_user_tl
119        \l_galley_interpar_penalty_user_tl
120      \tl_gset_eq:NN \g_galley_interpar_vspace_user_tl
121        \l_galley_interpar_vspace_user_tl
122      \bool_gset_eq:NN \g_galley_omit_next_indent_bool
123        \l_galley_omit_next_indent_bool
124      \bool_gset_eq:NN \g_galley_nobreak_next_bool
125        \l_galley_nobreak_next_bool
126      \tl_gset_eq:NN \g_galley_par_begin_hook_tl
127        \l_galley_par_begin_hook_tl
128      \tl_gset_eq:NN \g_galley_par_end_hook_tl
129        \l_galley_par_end_hook_tl
```

```
130    \tl_gset_eq:NN \g_galley_par_after_hook_tl
131      \l_galley_par_after_hook_tl
132    \bool_gset_eq:NN \g_galley_parshape_set_bool
133      \l_galley_parshape_set_bool
134    \int_gset_eq:NN \g_galley_previous_par_lines_int
135      \l_galley_previous_par_lines_int
136    \tl_gset_eq:NN \g_galley_restore_running_tl
137      \l_galley_restore_running_tl
138    \tl_gset_eq:NN \g_galley_whatsit_previous_tl
139      \l_galley_whatsit_previous_tl
140    \tl_gset_eq:NN \g_galley_whatsit_next_tl
141      \l_galley_whatsit_next_tl
142  }
```

(*End definition for* `\galley_save_parameters:` *and* `\galley_restore_parameters:`. *These functions are documented on page* **??**.)

`\galley_level:`
`\galley_level_end:`
Galley levels are created by saving all of the current global settings, starting a group then initialising both the local and global variables.

```
143 \cs_new_protected_nopar:Npn \galley_level:
144   {
145     \galley_save_parameters:
146     \group_begin:
147       \galley_initialise_variables:
148       \galley_initialise_settings:
149       \group_insert_after:N \galley_level_end:
150   }
```

At the end of the level, the global values are restored using the saved *local* versions, hence the position of the close-of-group instruction. As this code can be inserted automatically, at the point of use only the start of a galley level needs to be marked up: the end must come in a fixed location. All of this relies on the the "colour safe" group used inside a box.

```
151 \cs_new_protected_nopar:Npn \galley_level_end:
152   {
153       \par
154       \galley_restore_parameters:
155     \group_end:
156   }
```

(*End definition for* `\galley_level:`. *This function is documented on page* **??**.)

7.5 The \par token

`\s_par_omit`   Used to indicate that a paragraph should be omitted.

```
157 \scan_new:N \s_par_omit
```

(*End definition for* `\s_par_omit`. *This function is documented on page* **??**.)

`\galley_std_par:`
`\galley_std_par_aux_i:`
`\galley_std_par_aux_ii:`
`\galley_std_par_aux:N`
The idea here is to expand the next token in exactly the same way as TeX would do anyway. The f-type expansion will ignore any protection, but will stop at a scan marker. Thus the code can test for an "omit paragraph" marker.

```
158  \cs_new_protected_nopar:Npn \galley_std_par:
159    {
160      \s_par_omit
161      \exp_after:wN \galley_std_par_aux_i: \tex_romannumeral:D - `0
162    }
163  \cs_new_protected:Npn \galley_std_par_aux_i:
164    {
165      \peek_meaning:NTF \s_par_omit
166        { \galley_std_par_aux:N }
167        { \galley_std_par_aux_ii: }
168    }
169  \cs_new_protected:Npn \galley_std_par_aux:N #1
170    {
171      \str_if_eq:xxF {#1} { \s_par_omit }
172        {
173          \galley_std_par_aux_ii:
174          #1
175        }
176    }
```

No marker, so really insert a paragraph. In vertical mode,

```
177  \cs_new_protected_nopar:Npn \galley_std_par_aux_ii:
178    {
179      \mode_if_vertical:TF
180        { \tex_par:D }
```

In horizontal mode, the paragraph shape is set "just in time" before inserting `\tex_-par:D`. The `\tex_par:D` is inside a group to preserve some dynamic settings (for example `\etex_interlinepenalties`). Once the paragraph has been typeset, the number of lines is *added* to the running total. It's possible that the conceptual paragraph contains display-like material, and simply setting the number of lines equal to `\tex_prevgraf:D` would "loose" these.

```
181        {
182          \g_galley_par_end_hook_tl
183          \galley_set_measure_and_parshape:
184          \group_begin:
185            \tex_par:D
186          \group_end:
187          \int_gadd:Nn \g_galley_previous_par_lines_int \tex_prevgraf:D
188        }
189      \g_galley_par_after_hook_tl
190      \tl_gclear:N \g_galley_par_after_hook_tl
```

The non-breaking penalty is needed here as within the `\tex_everypar:D` hook there is an additional `\tex_par:D`. This leads to an extra `\tex_parskip:D`, which will leave an unwanted break-point here otherwise.

```
191      \tex_penalty:D \c_ten_thousand
192    }
```

   (*End definition for* `\galley_std_par:`. *This function is documented on page* **??**.)

\galley_end_par:n Inserts tokens such that they are appended to the end of the last paragraph, using the paragraph-omitting system.

```
193 \cs_new_protected:Npn \galley_end_par:n #1
194   {
195     \s_par_omit
196     \bool_if:nF \g_galley_begin_level_bool
197       {
198         #1
199         \galley_std_par:
200       }
201   }
```

(*End definition for* `\galley_end_par:n`. *This function is documented on page 9.*)

\par The meaning of the token `\par` itself starts off as a standard paragraph.

```
202 \cs_set_protected_nopar:Npn \par { \galley_std_par: }
```

(*End definition for* `\par`. *This function is documented on page* **??**.)

\@par LaTeX 2$_\varepsilon$ requires a "long term" version of `\par`, which is stored as `\@par`. Things are done a bit differently by LaTeX3 and so this will only be needed in package mode.

```
203 ⟨*package⟩
204 \tl_set:Nn \@par { \galley_std_par: }
205 ⟨/package⟩
```

(*End definition for* `\@par`. *This function is documented on page* **??**.)

7.6 Display levels

\galley_display_begin:
\galley_display_end:
\galley_display_penalty:N
\galley_display_vspace:N
\galley_display_par_setup:
\galley_display_par:

Display items within the galley are a bit like galley levels: they may have different paragraph settings to the main part of the galley. On the other hand, unlike independent galleys they should inherit the settings from the surrounding material. They may also start and end with special spacing values.

```
206 \cs_new_protected_nopar:Npn \galley_display_begin:
207   {
208     \group_begin:
209       \galley_save_parameters:
210       \mode_if_vertical:TF
211         {
212           \galley_display_penalty:N \l_galley_display_begin_par_penalty_tl
213           \galley_display_vspace:N  \l_galley_display_begin_par_vspace_tl
214         }
215         {
216           \galley_display_penalty:N \l_galley_display_begin_penalty_tl
217           \galley_display_vspace:N  \l_galley_display_begin_vspace_tl
218         }
219       \par
220   }
```

Two short-cuts for setting up any special penalty or vertical space. The idea is that the standard value is saved to the "restore" token list, before setting up the value to the special value needed in this one case.

```
221 \cs_new_protected_nopar:Npn \galley_display_penalty:N #1
222   {
223       \tl_if_empty:NF #1
224         {
225           \tl_gput_right:Nx \g_galley_restore_running_tl
226             {
227               \int_gset:Nn \exp_not:N \g_galley_penalty_int
228                 { \int_use:N \g_galley_penalty_int }
229             }
230           \int_gset:Nn \g_galley_penalty_int {#1}
231         }
232   }
233 \cs_new_protected_nopar:Npn \galley_display_vspace:N #1
234   {
235       \tl_if_empty:NF #1
236         {
237           \tl_gput_right:Nx \g_galley_restore_running_tl
238             {
239               \skip_gset:Nn \exp_not:N \g_galley_vspace_skip
240                 { \skip_use:N \g_galley_vspace_skip }
241             }
242           \skip_gset:Nn \g_galley_vspace_int {#1}
243         }
244   }
```

The \par token at the end of the display needs to go in at the same group level as the text, hence this function cannot be placed using \group_insert_after:N. Resetting the meaning of the \par token needs to be carried out after the group used for the environment. As LaTeX 2$_\varepsilon$ already adds one group, there are two "escapes" here: the format version needs only one escape.

```
245 \cs_new_protected_nopar:Npn \galley_display_end:
246   {
247       \par
248       \galley_restore_parameters:
249     \group_end:
250 ⟨*package⟩
251       \group_insert_after:N \group_insert_after:N
252 ⟨/package⟩
253     \group_insert_after:N \galley_display_par_setup:
254   }
```

The method used here is to assume that the next piece of horizontal mode material will follow on from the displayed output without an intervening \par token (probably a blank line). The meaning of the \par token is then altered so that a check can be made to see if this assumption was correct.

```
255 \cs_new_protected_nopar:Npn \galley_display_par_setup:
```

```
256    {
257      \bool_gset_false:N \g_galley_omit_next_indent_bool
258      \cs_set_eq:NN \par \galley_display_par:
259    }
```

The "special" meaning of the paragraph token starts by putting things back to normal: there should never need to be more than one special paragraph marker in one group. If TeX is in vertical mode, then there has been a paragraph token inserted, most likely by a blank line. Thus the next piece of material is a separate conceptual paragraph from the display. In that case, the assumption from above is undone and the indent is turned back on. On the other hand, for the case where TeX is in horizontal mode then a `\tex_par:D` primitive is required in the same way as in `\galley_standard_par:`.

```
260  \cs_new_protected_nopar:Npn \galley_display_par:
261    {
262      \cs_set_eq:NN \par \galley_std_par:
263      \mode_if_vertical:TF
264        {
265          \par
266          \bool_gset_false:N \g_galley_omit_next_indent_bool
267          \galley_display_penalty:N \l_galley_display_end_par_penalty_tl
268          \galley_display_vspace:N  \l_galley_display_end_par_vspace_tl
269        }
270        {
271          \galley_set_measure_and_parshape:
272          \group_begin:
273            \tex_par:D
274          \group_end:
275          \int_gadd:Nn \g_galley_previous_par_lines_int \tex_prevgraf:D
276          \galley_display_penalty:N \l_galley_display_end_penalty_tl
277          \galley_display_vspace:N  \l_galley_display_end_vspace_tl
278        }
279    }
```

(*End definition for* `\galley_display_begin:` *and* `\galley_display_end:`. *These functions are documented on page* **??**.)

7.7 Insertions using `\tex_everypar:D`

The key to the entire galley mechanism is hooking into the `\tex_everypar:D` token register. This requires that the original is moved out of the way, with appropriate hooks left attached for further modification by other modules and by the user. This is all done such that there is no danger of accidentally deactivating the galley mechanism.

`\everypar` When used on top of LaTeX 2ε the original primitive name needs to be available without the risk of completely overwriting the new mechanism. This is implemented as a token register in case low-level TeX is used. The TeX primitive is set here as otherwise the LaTeX 2ε `\@nodocument` is never removed from the register. This precaution is not be needed for a stand-alone format.

```
280  ⟨*initex⟩
281  \tex_everypar:D % TEMP
```

```
282    {
283      \bool_if:NTF \g_galley_begin_level_bool
284        { \galley_start_paragraph_first: }
285        { \galley_start_paragraph_std: }
286    }
```
⟨/initex⟩
⟨*package⟩
`\cs_undefine:N \everypar`
`\newtoks \everypar`
`\AtBeginDocument`
```
  {
    \tex_everypar:D
      {
        \bool_if:NTF \g_galley_begin_level_bool
          { \galley_start_paragraph_first: }
          { \galley_start_paragraph_std: }
        \tex_the:D \everypar
      }
  }
```
⟨/package⟩

(*End definition for* `\everypar`*. This function is documented on page* **??**.)

7.8   The galley mechanism

\g_galley_last_box A temporary box to hold the box inserted by TeX when a paragraph is inserted with an indent. The galley actually inserts the space (*i.e.* `\tex_parindent:D` is globally zero), but there is still an empty box to test for.

302 `\box_new:N \g_galley_last_box`

(*End definition for* `\g_galley_last_box`*. This function is documented on page* **??**.)

The "start of paragraph" routines are fired by `\tex_everypar:D`. This can take place within a group in a construction such as

```
... end of last par.

{\Large Start} of par
```

and so anything applied here must be done globally.

\galley_start_paragraph_std: The routine at the start of a paragraph starts by removing any (empty) indent box from the vertical list. As there may be vertical mode items still to insert, a `\tex_-par:D` primitive is used to get back into vertical mode before they are tidied up. To get back again to horizontal mode, `\tex_noindent:D` can be used. To avoid an infinite loop, `\tex_everypar:D` is locally cleared before doing that. Back in horizontal mode, the horizontal mode items can be tidied up before sorting out any items which have been set on a single-paragraph basis.

303 `\cs_new_protected_nopar:Npn \galley_start_paragraph_std:`
304   `{`
305   `\group_begin:`

```
306        \box_gset_to_last:N \g_galley_last_box
307        \tex_par:D
308        \galley_insert_vertical_items:
309        \tex_everypar:D { }
310        \tex_noindent:D
311      \group_end:
312      \int_gzero:N \g_galley_previous_par_lines_int
313      \galley_insert_horizontal_items:
314      \galley_restore_running_parameters:
315    }
```

(*End definition for* \galley_start_paragraph_std:. *This function is documented on page* **??**.)

\galley_start_paragraph_first: For the very first paragraph in a galley, the code needs to avoid adding any unnecessary vertical items at the top as it will interfere with vertical positioning in \tex_vtop:D.

```
316 \cs_new_protected_nopar:Npn \galley_start_paragraph_first:
317    {
318      \bool_gset_false:N \g_galley_begin_level_bool
319      \mode_if_horizontal:TF
320        {
321          \group_begin:
322            \box_gset_to_last:N \g_galley_last_box
323            \tex_par:D
324            \galley_insert_vspace:
325            \tex_everypar:D { }
326            \tex_noindent:D
327          \group_end:
328        }
329        { \galley_insert_vspace: }
330      \galley_insert_horizontal_items:
331      \galley_restore_running_parameters:
332    }
```

(*End definition for* \galley_start_paragraph_first:. *This function is documented on page* **??**.)

\galley_insert_vertical_items   The aim here is to insert the vertical items such that they attach to the correct place.
\galley_insert_vspace: This function is used as part of the \tex_everypar:D mechanism, meaning that the immediately-preceding item on the vertical list is the \tex_parskip:D, always zero-length but an implicit penalty. So any whatsits "attached" to the previous paragraph should stay glued on. After the whatsits, a penalty for breaking will be inserted. This will be the user penalty if supplied, or the running penalty unless the no-break flag is set. Finally, the inter-paragraph space is applied.

```
333 \cs_new_protected_nopar:Npn \galley_insert_vertical_items:
334    {
335      \g_galley_whatsit_previous_tl
336      \tl_gclear:N \g_galley_whatsit_previous_tl
337      \tl_if_empty:NTF \g_galley_interpar_penalty_user_tl
338        {
339          \bool_if:NTF \g_galley_nobreak_next_bool
340            { \tex_penalty:D \c_ten_thousand }
341            { \tex_penalty:D \l_galley_interpar_penalty_int }
```

```
342        }
343        {
344          \tex_penalty:D
345            \int_eval:w \g_galley_interpar_penalty_user_tl \int_eval_end:
346          \tl_gclear:N \g_galley_interpar_penalty_user_tl
347        }
348      \bool_gset_false:N \g_galley_nobreak_next_bool
349      \galley_insert_vspace:
350    }
```

Inserting vertical space is set up as a separate function as it comes up in a few places. The idea here is that any user-set space will override the design value, and only one space is ever inserted.

```
351  \cs_new_protected_nopar:Npn \galley_insert_vspace:
352    {
353      \tl_if_empty:NTF \g_galley_interpar_vspace_user_tl
354        { \skip_vertical:N \l_galley_interpar_vspace_skip }
355        {
356          \skip_vertical:n { \g_galley_interpar_vspace_user_tl }
357          \tl_gclear:N \g_galley_interpar_vspace_user_tl
358        }
359    }
```

(*End definition for* \galley_insert_vertical_items *and* \galley_insert_vspace:. *These functions are documented on page* **??**.)

\galley_insert_horizontal_items: Horizontal mode objects start with the whatsits for the next paragraph. An indent is then included if the removed box was not void.

```
360  \cs_new_protected_nopar:Npn \galley_insert_horizontal_items:
361    {
362      \g_galley_whatsit_next_tl
363      \tl_gclear:N \g_galley_whatsit_next_tl
364      \bool_if:NF \g_galley_omit_next_indent_bool
365        {
366          \box_if_empty:NF \g_galley_last_box
367            { \hbox_to_wd:nn \l_galley_par_indent_dim { } }
368        }
369      \skip_horizontal:N \l_galley_par_begin_skip
370      \g_galley_par_begin_hook_tl
371      \bool_gset_false:N \g_galley_omit_next_indent_bool
372    }
```

(*End definition for* \galley_insert_horizontal_items:. *This function is documented on page* **??**.)

\galley_restore_running_parameters: Restoring the ongoing parameters just means using the token list variable in which the appropriate assignments are stored. The list can then be cleared.

```
373  \cs_new_protected_nopar:Npn \galley_restore_running_parameters:
374    {
375      \g_galley_restore_running_tl
376      \tl_gclear:N \g_galley_restore_running_tl
377    }
```

(*End definition for* `\galley_restore_running_parameters:`*. This function is documented on page* **??**.)

7.9 Measure

`\galley_margins_set_absolute:nn`
`\galley_margins_set_relative:nn`

Setting the measure is just a question of adjusting margins, either in a relative or absolute sense.

```
378 \cs_new_protected_nopar:Npn \galley_margins_set_absolute:nn #1#2
379   {
380     \dim_set:Nn \l_galley_total_left_margin_dim  {#1}
381     \dim_set:Nn \l_galley_total_right_margin_dim {#2}
382     \dim_set:Nn \l_galley_text_width_dim
383       {
384           \l_galley_width_dim
385         - \l_galley_total_left_margin_dim
386         - \l_galley_total_right_margin_dim
387       }
388   }
389 \cs_new_protected_nopar:Npn \galley_margins_set_relative:nn #1#2
390   {
391     \dim_add:Nn \l_galley_total_left_margin_dim  {#1}
392     \dim_add:Nn \l_galley_total_right_margin_dim {#2}
393     \dim_set:Nn \l_galley_text_width_dim
394       {
395           \l_galley_width_dim
396         - \l_galley_total_left_margin_dim
397         - \l_galley_total_right_margin_dim
398       }
399   }
```

(*End definition for* `\galley_margins_set_absolute:nn` *and* `\galley_margins_set_relative:nn`*. These functions are documented on page* *3*.)

7.10 Paragraph shape

`\galley_parshape_fixed_lines:nnn`
`\galley_parshape_fixed_lines:nVV`
`\galley_parshape_multi_par:nnnN`
`\galley_parshape_multi_par:nVVN`
`\galley_parshape_single_par:nnnN`
`\galley_parshape_single_par:nVVN`

Setting the paragraph shape is easy as most of the real work is done later. So this is just a case of saving the various pieces of data to the correct locations.

```
400 \cs_new_protected_nopar:Npn \galley_parshape_fixed_lines:nnn #1#2#3
401   {
402     \bool_gset_true:N \g_galley_parshape_set_bool
403     \bool_set_true:N \l_galley_parshape_fixed_lines_bool
404     \int_set:Nn \l_galley_parshape_std_lines_int {#1}
405     \clist_set:Nn \l_galley_parshape_left_indent_clist {#2}
406     \clist_set:Nn \l_galley_parshape_right_indent_clist {#3}
407     \bool_set_true:N \l_galley_parshape_resume_std_bool
408   }
409 \cs_new_protected_nopar:Npn \galley_parshape_multi_par:nnnN #1#2#3#4
410   {
411     \bool_gset_true:N \g_galley_parshape_set_bool
412     \bool_set_true:N \l_galley_parshape_multipar_bool
```

```
413        \bool_set_false:N \l_galley_parshape_fixed_lines_bool
414        \int_set:Nn \l_galley_parshape_std_lines_int {#1}
415        \clist_set:Nn \l_galley_parshape_left_indent_clist {#2}
416        \clist_set:Nn \l_galley_parshape_right_indent_clist {#3}
417        \bool_set_eq:NN \l_galley_parshape_resume_std_bool #4
418      }
419    \cs_new_protected_nopar:Npn \galley_parshape_single_par:nnnN #1#2#3#4
420      {
421        \bool_gset_true:N \g_galley_parshape_set_bool
422        \bool_set_false:N \l_galley_parshape_multipar_bool
423        \bool_set_false:N \l_galley_parshape_fixed_lines_bool
424        \int_set:Nn \l_galley_parshape_std_lines_int {#1}
425        \clist_set:Nn \l_galley_parshape_left_indent_clist {#2}
426        \clist_set:Nn \l_galley_parshape_right_indent_clist {#3}
427        \bool_set_eq:NN \l_galley_parshape_resume_std_bool #4
428      }
429    \cs_generate_variant:Nn \galley_parshape_fixed_lines:nnn { nVV }
430    \cs_generate_variant:Nn \galley_parshape_multi_par:nnnN  { nVV }
431    \cs_generate_variant:Nn \galley_parshape_single_par:nnnN { nVV }
```

(*End definition for* \galley_parshape_fixed_lines:nnn *and others. These functions are documented on page* **??**.)

\galley_set_measure_and_parshape: To set the paragraph shape for the current paragraph, there is a check to see if the measure alone should be used. If not, then the shape may be built by paragraph or based on the number of lines required.

```
432    \cs_new_protected_nopar:Npn \galley_set_measure_and_parshape:
433      {
434        \bool_if:NTF \g_galley_parshape_set_bool
435          {
436            \bool_if:NTF \l_galley_parshape_fixed_lines_bool
437              {
438                \int_compare:nNnTF \g_galley_previous_par_lines_int > \c_zero
439                  { \galley_generate_parshape_lines: }
440                  { \galley_generate_parshape: }
441              }
442              {
443                \bool_gset_eq:NN \g_galley_parshape_set_bool
444                  \l_galley_parshape_multipar_bool
445                \galley_generate_parshape:
446              }
447          }
448          {
449            \tex_global:D \tex_parshape:D
450              \c_one
451              \dim_use:N \l_galley_total_left_margin_dim
452              \c_space_tl
453              \dim_use:N \l_galley_text_width_dim
454          }
455      }
```

(End definition for `\galley_set_measure_and_parshape:`. *This function is documented on page* ??.)

`\galley_generate_parshape:`
`\galley_set_parshape_map:nn`
`\galley_set_parshape_map:oo`
`\galley_set_parshape_map_aux:nw`

For a shape to apply on a paragraph basis, the two user-supplied comma lists are taken and converted into left-side offsets and line lengths. This is all dependent on the current measure.

```
456 \cs_new_protected_nopar:Npn \galley_generate_parshape:
457   {
458     \tex_global:D \tex_parshape:D
459       \int_eval:w
460         \l_galley_parshape_std_lines_int +
461         \int_min:nn
462           { \clist_length:N \l_galley_parshape_left_indent_clist }
463           { \clist_length:N \l_galley_parshape_right_indent_clist }
464         \bool_if:NT \l_galley_parshape_resume_std_bool { + 1 }
465       \int_eval_end:
466       \prg_replicate:nn \l_galley_parshape_std_lines_int
467         {
468           \dim_use:N \l_galley_total_left_margin_dim
469           \c_space_tl
470           \dim_use:N \l_galley_text_width_dim
471           \c_space_tl
472         }
473       \galley_set_parshape_map:oo
474         \l_galley_parshape_left_indent_clist
475         \l_galley_parshape_right_indent_clist
476       \bool_if:NT \l_galley_parshape_resume_std_bool
477         {
478           \c_space_tl
479           \dim_use:N \l_galley_total_left_margin_dim
480           \c_space_tl
481           \dim_use:N \l_galley_text_width_dim
482         }
483   }
484 \cs_new_nopar:Npn \galley_set_parshape_map:nn #1#2
485   { \galley_set_parshape_map_aux:nw  { } #1 , \q_mark #2 , \q_stop }
486 \cs_generate_variant:Nn \galley_set_parshape_map:nn { oo }
487 \cs_new_nopar:Npn \galley_set_parshape_map_aux:nw
488   #1#2 , #3 \q_mark #4 , #5 \q_stop
489   {
490     \bool_if:nTF { \tl_if_empty_p:n {#3} || \tl_if_empty_p:n {#4} }
491       {
492         #1
493         \dim_eval:n { \l_galley_total_left_margin_dim + ( #2 ) }
494         \c_space_tl
495         \dim_eval:n { \l_galley_text_width_dim - ( ( #2 ) + ( #4 ) ) }
496       }
497       {
498         \galley_set_parshape_map_aux:nw
499           {
```

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```
500          #1
501          \dim_eval:n { \l_galley_total_left_margin_dim + ( #2 ) }
502          \c_space_tl
503          \dim_eval:n { \l_galley_text_width_dim - ( ( #2 ) + ( #4 ) ) }
504          \c_space_tl
505        }
506          #3 \q_mark #5 \q_stop
507      }
508    }
```

(*End definition for* `\galley_generate_parshape:`. *This function is documented on page* **??**.)

\galley_generate_parshape_lines: The idea here is to construct a paragraph shape based on the remaining lines from the
\galley_generate_parshape_lines_aux:n   shape in the previous paragraph. If the previous paragraph was sufficiently long, then
life is "back to normal" and the standard shape is set. If a special shape is needed, this
is recovered from the paragraph shape using the ε-TeX primitives.

```
509 \cs_new_protected_nopar:Npn \galley_generate_parshape_lines:
510   {
511     \int_compare:nNnTF \tex_parshape:D > \g_galley_previous_par_lines_int
512       {
513         \tex_global:D \tex_parshape:D
514           \int_eval:w \tex_parshape:D - \g_galley_previous_par_lines_int
515             \int_eval_end:
516         \prg_stepwise_function:nnnN
517           { \g_galley_previous_par_lines_int + \c_one }
518           \c_one \tex_parshape:D \galley_generate_parshape_lines_aux:n
519       }
520       {
521         \bool_gset_false:N \g_galley_parshape_set_bool
522         \tex_global:D \tex_parshape:D
523           \c_one
524           \dim_use:N \l_galley_total_left_margin_dim
525           \c_space_tl
526           \dim_use:N \l_galley_text_width_dim
527       }
528   }
529 \cs_new_nopar:Npn \galley_generate_parshape_lines_aux:n #1
530   {
531     \etex_parshapeindent:D #1
532     ~
533     \etex_parshapelength:D #1
534   }
```

(*End definition for* `\galley_generate_parshape_lines:`. *This function is documented on page* **??**.)

7.11   Between paragraphs

\galley_set_user_penalty:n   User supplied penalties and spaces only apply for a single paragraph. In both cases, the
\galley_set_user_vspace:n   input values need to be checked for the correct form but are stored as token lists. The
x-type expansion deals with this nicely.

```
535 \cs_new_protected_nopar:Npn \galley_set_user_penalty:n #1
536   { \tl_gset:Nx \g_galley_interpar_penalty_user_tl { \int_eval:n {#1} } }
537 \cs_new_protected_nopar:Npn \galley_set_user_vspace:n #1
538   { \tl_gset:Nx \g_galley_interpar_vspace_user_tl { \skip_eval:n {#1} } }
```

(*End definition for* \galley_set_user_penalty:n *and* \galley_set_user_vspace:n*. These functions are documented on page* 4*.*)

\parskip   For the package, the \parskip primitive is moved out of the way as the code above is handling things.

```
539 ⟨*package⟩
540 \dim_set:Nn \parskip \c_zero_dim
541 \cs_undefine:N \parskip
542 \skip_new:N \parskip
543 ⟨/package⟩
```

(*End definition for* \parskip*. This function is documented on page* **??**.*)

7.12   Formatting inside the paragraph

Justification is more complex than is necessarily desirable as the various TEX parameters here interact in ways which mean that clear separation between different areas is not so easy.

\l_galley_line_left_skip   The variables for setting paragraph shape: essentially, these are the TEX set.
\l_galley_line_right_skip
\l_galley_par_begin_skip
\l_galley_par_end_skip
\l_galley_par_indent_dim

```
544 \cs_new_eq:NN \l_galley_line_left_skip  \tex_leftskip:D
545 \cs_new_eq:NN \l_galley_line_right_skip \tex_rightskip:D
546 \dim_new:N \l_galley_par_begin_skip
547 \cs_new_eq:NN \l_galley_par_end_skip    \tex_parfillskip:D
548 \cs_new_eq:NN \l_galley_par_indent_dim \tex_parindent:D
```

(*End definition for* \l_galley_line_left_skip *and others. These functions are documented on page* 5*.*)

\l_galley_last_line_fit_int   One from ε-TEX.

```
549 \cs_new_eq:NN \l_galley_last_line_fit_int \etex_lastlinefit:D
```

(*End definition for* \l_galley_last_line_fit_int*. This function is documented on page* 5*.*)

7.13   Inter-word spacing

Setting the spacing between words and between sentences is important for achieving the correct output from ragged and centred output. At the same time, as far as possible the aim is to retain the spacing specified by the font designer and not to use arbitrary values (*cf.* the approach in *The TEXbook*, p. 101).

\galley_set_interword_spacing:N   The approach taken to setting a fixed space is to use the information from the current font to set the spacing. This means that only \tex_spacefactor:D needs to be set, while \tex_xspacefactor:D is left alone. However, this is only necessary for fonts which have a stretch component to the inter-word spacing in the first place, *i.e.* monospaced fonts require no changes. The code therefore checks whether there is any stretch, and if there is

uses the fixed component to set `\tex_spaceskip:D`. If there is a stretch component (non-zero `\tex_fontdimen:D` 3), then the `\teX_spaceskip:D` is set to the fixed component from the font.

```
550 \cs_new_protected_nopar:Npn \galley_set_interword_spacing:N #1
551   {
552     \bool_if:NTF #1
553       { % TODO Hook for font changes required!
554         \dim_compare:nNnTF { \tex_fontdimen:D \c_three \tex_font:D }
555           = \c_zero_dim
556           { \tex_spaceskip:D \c_zero_dim }
557           { \tex_spaceskip:D \tex_fontdimen:D \c_two \tex_font:D }
558       }
559       { \tex_spaceskip:D \c_zero_dim }
560   }
```

(*End definition for* `\galley_set_interword_spacing:N`*. This function is documented on page 5.*)

7.14 Hyphenation

7.15 Line breaking

`\l_galley_binop_penalty_int`
`\l_galley_double_hyphen_demerits_int`
`\l_galley_emergency_stretch_skip`
`\l_galley_final_hyphen_demerits_int`
`\l_galley_linebreak_badness_int`
`\l_galley_linebreak_fuzz_dim`
`\l_galley_linebreak_penalty_int`
`\l_galley_linebreak_pretolerance_int`
`\l_galley_linebreak_tolerance_int`
`\l_galley_mismatch_demerits_int`
`\l_galley_relation_penalty_int`

All TEX primitives renamed.

```
561 \cs_new_eq:NN \l_galley_binop_penalty_int              \tex_binoppenalty:D
562 \cs_new_eq:NN \l_galley_double_hyphen_demerits_int     \tex_doublehyphendemerits:D
563 \cs_new_eq:NN \l_galley_emergency_stretch_skip         \tex_emergencystretch:D
564 \cs_new_eq:NN \l_galley_final_hyphen_demerits_int      \tex_finalhyphendemerits:D
565 \cs_new_eq:NN \l_galley_linebreak_badness_int          \tex_hbadness:D
566 \cs_new_eq:NN \l_galley_linebreak_fuzz_dim             \tex_hfuzz:D
567 \cs_new_eq:NN \l_galley_linebreak_penalty_int          \tex_linepenalty:D
568 \cs_new_eq:NN \l_galley_linebreak_pretolerance_int     \tex_pretolerance:D
569 \cs_new_eq:NN \l_galley_mismatch_demerits_int          \tex_adjdemerits:D
570 \cs_new_eq:NN \l_galley_relation_penalty_int           \tex_relpenalty:D
571 \cs_new_eq:NN \l_galley_linebreak_tolerance_int        \tex_tolerance:D
```

(*End definition for* `\l_galley_binop_penalty_int` *and others. These functions are documented on page 6.*)

7.16 Paragraph breaking

`\l_galley_broken_penalty_int`
`\l_galley_interline_penalty_int`
`\l_galley_parbreak_badness_int`
`\l_galley_parbreak_fuzz_dim`
`\l_galley_post_display_penalty_int`
`\l_galley_pre_display_penalty_int`

TEX primitives renamed cover *some* of this.

```
572 \cs_new_eq:NN \l_galley_broken_penalty_int             \tex_brokenpenalty:D
573 \cs_new_eq:NN \l_galley_interline_penalty_int          \tex_interlinepenalty:D
574 \cs_new_eq:NN \l_galley_parbreak_badness_int           \tex_vbadness:D
575 \cs_new_eq:NN \l_galley_parbreak_fuzz_dim              \tex_vfuzz:D
576 \cs_new_eq:NN \l_galley_post_display_penalty_int       \tex_postdisplaypenalty:D
577 \cs_new_eq:NN \l_galley_pre_display_penalty_int        \tex_predisplaypenalty:D
```

(*End definition for* `\l_galley_broken_penalty_int` *and others. These functions are documented on page 7.*)

These are used to keep a track of information which cannot be extracted out of the primitives due to the overlapping nature of the meanings.

`\l_galley_club_penalties_clist`
`\l_galley_line_penalties_clist`

```
578 \clist_new:N \l_galley_club_penalties_clist
579 \clist_new:N \l_galley_line_penalties_clist
```

(*End definition for* `\l_galley_club_penalties_clist` *and* `\l_galley_line_penalties_clist`. *These functions are documented on page* **??**.)

`\galley_set_display_widow_penalties:n`
`\galley_set_display_widow_penalties:V`
`\galley_set_display_widow_penalties:v`
`\galley_set_widow_penalties:n`
`\galley_set_widow_penalties:V`
`\galley_set_widow_penalties:v`
`\galley_set_aux:n`

By far the easiest penalties to deal with are those for widows. These work exactly as the names imply, with the display version only used immediately before display math, and the standard penalty used at the end of a paragraph. Thus there is only the need to convert the argument into the correct form, and add a 0 penalty at the end to nullify the effect of repeating the last value.

```
580 \cs_new_protected_nopar:Npn \galley_set_display_widow_penalties:n #1
581   {
582     \etex_displaywidowpenalties:D
583       \int_eval:w \clist_length:n {#1} + \c_one \int_eval_end:
584       \clist_map_function:nN {#1} \galley_set_aux:n
585       \c_zero
586   }
587 \cs_generate_variant:Nn \galley_set_display_widow_penalties:n { V , v }
588 \cs_new_protected_nopar:Npn \galley_set_widow_penalties:n #1
589   {
590     \etex_widowpenalties:D
591       \int_eval:w \clist_length:n {#1} + \c_one \int_eval_end:
592       \clist_map_function:nN {#1} \galley_set_aux:n
593       \c_zero
594   }
595 \cs_generate_variant:Nn \galley_set_widow_penalties:n { V , v }
596 \cs_new_nopar:Npn \galley_set_aux:n #1 { #1 ~ }
```

(*End definition for* `\galley_set_display_widow_penalties:n` *and others. These functions are documented on page* **??**.)

`\galley_set_club_penalties:n`
`\galley_set_club_penalties:V`
`\galley_set_club_penalties:v`
`\galley_set_interline_penalties:n`
`\galley_set_interline_penalties:V`
`\galley_set_interline_penalties:v`

Setting club or special line penalties is easy, as these are handled mainly by the interline set up function. The two concepts are essentially the same, but having two takes makes some special effects easier to carry out.

```
597 \cs_new_protected_nopar:Npn \galley_set_club_penalties:n #1
598   {
599     \clist_set:Nn \l_galley_club_penalties_clist {#1}
600     \galley_calc_interline_penalties:
601   }
602 \cs_generate_variant:Nn \galley_set_club_penalties:n { V , v }
603 \cs_new_protected_nopar:Npn \galley_set_interline_penalties:n #1
604   {
605     \clist_set:Nn \l_galley_line_penalties_clist {#1}
606     \galley_calc_interline_penalties:
607   }
608 \cs_generate_variant:Nn \galley_set_interline_penalties:n { V , v }
```

(*End definition for* `\galley_set_club_penalties:n` *and others. These functions are documented on page* **??**.)

`\galley_set_display_club_penalties:n`
`\galley_set_display_club_penalties:V`
`\galley_set_display_club_penalties:v`

Setting the display club penalties means first setting the primitive, then recalculating the interline array to allow for these new values.

```
609 \cs_new_protected_nopar:Npn \galley_set_display_club_penalties:n #1
610   {
611     \etex_clubpenalties:D
612       \int_eval:w \clist_length:n {#1} + \c_one \int_eval_end:
613       \clist_map_function:nN {#1} \galley_set_aux:n
614       \c_zero
615     \galley_calc_interline_penalties:
616   }
617 \cs_generate_variant:Nn \galley_set_display_club_penalties:n { V , v }
```

(*End definition for* `\galley_set_display_club_penalties:n`, `\galley_set_display_club_penalties:V`, *and* `\galley_set_display_club_penalties:v`. *These functions are documented on page* **??**.)

`\galley_set_interline_penalty:n`
`\galley_set_interline_penalty_aux:nn`
`\galley_set_interline_penalty_aux_i:n`
`\galley_set_interline_penalty_aux_ii:n`

Dealing with the general interline penalty is handled in one shot. The idea is that for lines with no special penalty, the old general penalty is removed and the new one is added. If there is currently no shape set, then after adding the general interline value the generic build system is invoked (in case the `\etex_interlinepenalties:D` has accidentally been cleared).

```
618 \cs_new_protected_nopar:Npn \galley_set_interline_penalty:n #1
619   {
620     \int_compare:nNnTF { \etex_interlinepenalties:D \c_zero } = \c_zero
621       {
622         \etex_interlinepenalties:D \c_one \int_eval:w #1 \int_eval_end:
623         \galley_calc_interline_penalties:
624       }
625       {
626         \cs_set_nopar:Npn \galley_set_interline_penalty_aux_ii:n ##1
627           {
628             \int_eval:w
629               \etex_interlinepenalties:D ##1
630               - \etex_interlinepenalties:D \etex_interlinepenalties:D \c_zero
631               + #1
632             \int_eval_end:
633           }
634         \exp_args:Nf \galley_set_interline_penalty_aux:nn
635           { \clist_length:N \l_galley_line_penalties_clist } {#1}
636       }
637   }
638 \cs_new_protected_nopar:Npn \galley_set_interline_penalty_aux:nn #1#2
639   {
640     \etex_interlinepenalties:D
641       \etex_interlinepenalties:D \c_zero
642       \prg_stepwise_function:nnnN \c_one \c_one {#1}
643         \galley_set_interline_penalty_aux_i:n
644       \prg_stepwise_function:nnnN { #1 + \c_one } \c_one
645         { \etex_interlinepenalties:D \c_zero - \c_one }
646         \galley_set_interline_penalty_aux_ii:n
647       \int_eval:w #2 \int_eval_end:
```

```
648       }
649   \cs_new_nopar:Npn \galley_set_interline_penalty_aux_i:n #1
650     { \etex_interlinepenalties:D \int_eval:w #1 \int_eval_end: }
651   \cs_new_nopar:Npn \galley_set_interline_penalty_aux_ii:n #1 { }
```
(*End definition for* `\galley_set_interline_penalty:n`. *This function is documented on page* **??**.)

\galley_calc_interline_penalties: The underlying interline penalty array has to deal with club penalties, display club penal-
\galley_calc_interline_penalties_aux:nn   ties and any special line penalties, and include the general interline penalty. These re-
\galley_calc_interline_penalties_aux_i:n   quirements lead to a rather complex requirement on how many lines to deal with. This
\galley_calc_interline_penalties_aux_ii:n   is needed twice, so an `f`-type expansion is used to make life a little less complex.

```
652   \cs_new_protected_nopar:Npn \galley_calc_interline_penalties:
653     {
654       \exp_args:Nff \galley_calc_interline_penalties_aux:nn
655         {
656           \int_eval:n
657             {
658               \int_max:nn
659                 {
660                     \clist_length:N \l_galley_club_penalties_clist
661                   + \c_one
662                 }
663                 {
664                   \int_max:nn
665                     {
666                         \clist_length:N \l_galley_line_penalties_clist
667                       + \c_one
668                     }
669                     { \etex_clubpenalties:D \c_zero }
670                 }
671             }
672         }
673         { \clist_length:N \l_galley_line_penalties_clist }
674     }
```
The idea is now to calculate the correct penalties. Two auxiliary functions are used: one
for any "special penalty" lines and a second for normal lines. At the end of the process,
the standard interline penalty is always included.

```
675   \cs_new_protected_nopar:Npn \galley_calc_interline_penalties_aux:nn
676     #1#2
677     {
678       \etex_interlinepenalties:D #1 ~
679         \prg_stepwise_function:nnnN \c_one \c_one {#2}
680           \galley_calc_interline_penalties_aux_i:n
681         \prg_stepwise_function:nnnN { #2 + \c_one } \c_one { #1 - \c_one }
682           \galley_calc_interline_penalties_aux_ii:n
683         \etex_interlinepenalties:D \etex_interlinepenalties:D \c_zero
684     }
685   \cs_new_nopar:Npn \galley_calc_interline_penalties_aux_i:n
686     #1
```

```
687   {
688     \int_eval:w
689       \clist_item:Nn \l_galley_line_penalties_clist { #1 - \c_one }
690     + 0 \clist_item:Nn \l_galley_club_penalties_clist
691       { #1 - \c_one }
692     - \etex_clubpenalties:D #1 ~
693     \int_eval_end:
694   }
695 \cs_new_nopar:Npn \galley_calc_interline_penalties_aux_ii:n
696   #1
697   {
698     \int_eval:w
699       \etex_interlinepenalties:D \etex_interlinepenalties:D \c_zero
700     + 0 \clist_item:Nn \l_galley_club_penalties_clist
701         { #1 - \c_one }
702     - \etex_clubpenalties:D #1 ~
703     \int_eval_end:
704   }
```

(*End definition for* `\galley_calc_interline_penalties:`. *This function is documented on page* **??**.)

\galley_save_club_penalties:N
\galley_save_interline_penalties:N
\galley_save_display_club_penalties:N
\galley_save_display_widow_penalties:N
\galley_save_widow_penalties:N
\galley_save_display_club_penalties_aux:n
\galley_save_display_widow_penalties_aux:n
\galley_save_widow_penalties_aux:n
\galley_interline_penalty:

Saving the array penalties varies in complexity depending on how they are stored internally. The first two are easy: these are simply copies.

```
705 \cs_new_protected_nopar:Npn \galley_save_club_penalties:N #1
706   { \clist_set_eq:NN #1 \l_galley_club_penalties_clist }
707 \cs_new_protected_nopar:Npn \galley_save_interline_penalties:N #1
708   { \clist_set_eq:NN #1 \l_galley_line_penalties_clist }
```

These all require appropriate mappings, using the fact that `\clist_set:Nx` will tidy up the excess comma.

```
709 \cs_new_protected_nopar:Npn \galley_save_display_club_penalties:N #1
710   {
711     \clist_set:Nx #1
712       {
713         \prg_stepwise_function:nnnN \c_one \c_one
714           { \etex_clubpenalties:D \c_zero - \c_one }
715           \galley_save_display_club_penalties:_aux:n
716       }
717   }
718 \cs_new_nopar:Npn \galley_save_display_club_penalties:_aux:n #1
719   { \int_use:N \etex_clubpenaltes:D \int_eval:w #1 \int_eval_end: , }
720 \cs_new_protected_nopar:Npn \galley_save_display_widow_penalties:N #1
721   {
722     \clist_set:Nx #1
723       {
724         \prg_stepwise_function:nnnN \c_one \c_one
725           { \etex_displaywidowpenalties:D \c_zero - \c_one }
726           \galley_save_display_widow_penalties:_aux:n
727       }
728   }
```

```
729 \cs_new_nopar:Npn \galley_save_display_widow_penalties:_aux:n #1
730   { \int_use:N \etex_displaywidowpenalties:D \int_eval:w #1 \int_eval_end: , }
731 \cs_new_protected_nopar:Npn \galley_save_widow_penalties:N #1
732   {
733     \clist_set:Nx #1
734       {
735         \prg_stepwise_function:nnnN \c_one \c_one
736           { \etex_widowpenalties:D \c_zero - \c_one }
737           \galley_save_widow_penalties:_aux:n
738       }
739   }
740 \cs_new_nopar:Npn \galley_save_widow_penalties:_aux:n #1
741   { \int_use:N \etex_widowpenalties:D \int_eval:w #1 \int_eval_end: , }
```

This one is not an array, but is stored in a primitive, so there is a simple conversion. The general interline penalty is always the last value in the primitive array.

```
742 \cs_new_protected_nopar:Npn \galley_interline_penalty:
743   { \int_use:N \etex_interlinepenalties:D \etex_interlinepenalties:D \c_zero }
```

(*End definition for* `\galley_save_club_penalties:N` *and others. These functions are documented on page* **??**.)

7.17 LaTeX 2$_\varepsilon$ functions

```
744 ⟨*package⟩
```

\nobreak
\noindent
\vspace

In package mode, some of LaTeX 2$_\varepsilon$'s functions are re-implemented using the galley system. Not all of the optional arguments currently work!

```
745 \cs_set_protected_nopar:Npn \nobreak
746   { \bool_gset_true:N \g_galley_no_break_next_bool }
```

The \noindent primitive will causes problems, as it is used by LaTeX 2$_\varepsilon$ documents to implicitly leave vertical mode as well as to prevent indentation. Rather than patch *every* place where we need leave vertical mode, at the moment we stick with the primitive as well as setting the galley flag.

```
747 \cs_set_protected_nopar:Npn \noindent
748   {
749     \tex_noindent:D
750     \bool_gset_false:N \g_galley_omit_next_indent_bool
751   }
752 \cs_set_protected_nopar:Npn \vspace #1
753   {
754     \@ifstar
755       { \galley_set_user_vspace:n {#1} }
756       { \galley_set_user_vspace:n {#1} }
757   }
```

(*End definition for* `\nobreak`. *This function is documented on page* **??**.)

7.18 LaTeX 2ε fixes

Purely for testing, some internal LaTeX 2ε functions are altered to work with the mechanism here. This material is not comprehensive: additions are made as-needed for test purposes.

`\@@par` The primitive is moved as otherwise the clever skipping code will fail.

```
758 \cs_set_eq:NN \@@par \galley_std_par:
```

(*End definition for* `\@@par`. *This function is documented on page* **??**.)

`\@afterheading` Set some flags and hope for the best!

```
759 \cs_set_protected_nopar:Npn \@afterheading
760   {
761     \bool_gset_true:N \g_galley_no_break_next_bool
762     \if@afterindent
763     \else
764       \bool_gset_true:N \galley_omit_next_indent_bool
765     \fi
766   }
```

(*End definition for* `\@afterheading`. *This function is documented on page* **??**.)

`\@hangfrom` The `\tex_handindent:D` primitive is no longer used, so the paragraph shape is set in a different way. As a result, the label is part of the same paragraph as the main body, hence the need to leave vertical mode.

```
767 \cs_set_protected:Npn \@hangfrom #1
768   {
769     \bool_gset_true:N \g_galley_omit_next_indent_bool
770     \leavevmode
771     \setbox \@tempboxa = \hbox { {#1} }
772     \galley_parshape_single_par:nnnN
773       \c_one
774       { \box_wd:N \@tempboxa }
775       \c_zero_dim
776       \c_false_bool
777     \bool_gset_true:N \g_galley_no_break_next_bool
778     \bool_gset_true:N \g_galley_omit_next_indent_bool
779     \box \@tempboxa
780   }
```

(*End definition for* `\@hangfrom`. *This function is documented on page* **??**.)

```
781 ⟨/package⟩
```

```
782 ⟨/initex | package⟩
```

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