

The `soul` package

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January 3, 2002

Abstract

This article describes the `soul` package¹, which provides `hyphenateable letterspacing` (`spacing out`), `underlining` and some derivatives such as `overstriking` and `highlighting`. Although the package is optimized for \LaTeX 2 ϵ , it also works with Plain \TeX and with other flavors of \TeX like, for instance, `ConTeXt`. By the way, the package name `soul` is only a combination of the two macro names `\so` (*space out*) and `\ul` (*underline*)—nothing poetic at all.

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1 Typesetting rules

There are several possibilities to emphasize parts of a paragraph, where not all are considered good style. While underlining is commonly rejected, experts dispute about whether letterspacing should be used or not, and in which cases. If you are not interested in such debates, you may well skip to the next section.

¹This file has version number 2.0, last revised 2002/01/03.

Theory ...

To understand the experts' arguments we have to know about the conception of *page greyness*. The sum of all characters on a page represents a certain amount of greyness, provided that the letters are printed black onto white paper.

JAN TSCHICHOLD [9], a well known and recognized typographer, accepts only forms of emphasizing, which do not disturb this greyness. This is only true of italic shape, caps, and caps-and-small-caps fonts, but not of ordinary letterspacing, underlining, bold face type and so on, all of which appear as either dark or light spots in the text area. In his opinion emphasized text shall not catch the eye when running over the text, but rather when actually reading the respective words.

Other, less restrictive typographers [10] call this kind of emphasizing 'integrated' or 'aesthetic', while they describe 'active' emphasizing apart from it, which actually *has* to catch the reader's eye. To the latter group belong commonly despised things like letterspacing, demibold face type and even underlined and colored text.

On the other hand, TSCHICHOLD suggests to space out caps and caps-and-small-caps fonts on title pages, headings and running headers from 1 pt up to 2 pt. Even in running text legibility of uppercase letters should be improved with slight letterspacing, since (the Roman) majuscules don't look right, if they are spaced like (the Carolingian) minuscules.²

... and Practice

However, in the last centuries letterspacing was excessively used, underlining at least sometimes, because the old *Fraktur* fonts could not use capitals or italic shape for emphasizing. This tradition is wideley continued until today. Furthermore italic shape is not an option in many languages with non-latin glyphs. Letterspacing has a strong tradition in eastern countries where cyrillic fonts are used.

The DUDEN [3], a well known German dictionary, explains how to space out properly: *Punctuation marks are spaced out like letters, except quotation marks and periods. Numbers are never spaced out. The German syllable -sche is not spaced out in cases like "der Virchow'sche Versuch"*³. *In the old German Fraktur fonts the ligatures ch, ck, sz (ß) and tz are not broken within spaced out text.*

While some books follow all these rules [5], others don't [6]. (In fact, most books in my personal library do *not* space out commas.)

2 Short introduction and common rules

The `soul` package provides five commands that are aimed at emphasizing text parts. Each of the commands takes one argument that can either be the text itself or the name of a macro that contains text (e.g. `\so\text`). See table 1 for a complete command survey.

<code>\so{letterspacing}</code>	l e t t e r s p a c i n g
<code>\caps{CAPITALS, Small Capitals}</code>	CAPITALS, SMALL CAPITALS
<code>\ul{underlining}</code>	<u>underlining</u>
<code>\st{overstriking}</code>	overstriking
<code>\hl{highlighting}</code>	<u>highlighting</u>

²This suggestion is followed throughout this article, although Prof. KNUTH already considered slight letterspacing with his `cmcsc` fonts.

³the VIRCHOW experiment

The `\hl` command does only highlight if the `color` package was loaded, otherwise it falls back to underlining. The highlighting color is by default yellow, underlines and overstriking lines are by default black. The colors can be changed using the following commands:

<code>\setulcolor{red}</code>	set underlining color
<code>\setstcolor{green}</code>	set overstriking color
<code>\sethlcolor{blue}</code>	set highlighting color

`\setulcolor{}` and `\setstcolor{}` (note the empty braces) turn coloring off. There are only few colors predefined by the `color` package, but you can easily add custom color definitions. See the `color` package documentation [2] for further information.

```
\usepackage{color,soul}
\definecolor{orange}{rgb}{1,.5,0}
\sethlcolor{orange}
...
\hl{this is highlighted in orange color}
```

2.1 Some things work ...

The following examples may look boring and redundant, because they describe nothing else than common L^AT_EX notation with a few exceptions, but this is only the half story: The `soul` package has to pre-process the argument before it can split it into characters and syllables, and all described constructs are only allowed because the package explicitly provides them.

§1 Quotes:

Example: `\so{‘‘quotes’’}`

The `soul` package recognizes the quotes ligatures ‘‘, ’’ and ,,,

§2 Accents:

Example: `\so{na\"i_ive}`

Accents can be used naturally. Support for the following accents is built-in: `\‘`, `\’`, `\^`, `\"`, `\~`, `\=`, `\.`, `\u`, `\v`, `\H`, `\t`, `\c`, `\d` and `\b`. Additionally, if the `german` package [7] is loaded you can also use the " accent commands and write `\so{na"ive}`. See section 5.1 for how to add further accents.

§3 Mathematics:

Example: `\so{foox^3\bar}`

Mathematic formulas are allowed, as long as they are surrounded by `$`. Note that the L^AT_EX equivalent `\(...\)` does not work.

§4 Hyphens and dashes:

Example: `\so{re-sent}`

Explicit hyphens as well as en-dashes (–), em-dashes (—) and the `\slash` command work as usual.

§5 Newlines:

Example: `\so{new\\line}`

The `\\` command fills the current line with white space and starts a new line. Unlike the original L^AT_EX command `soul`’s version does not handle optional parameters like in `\\[1ex]`.

§6 Breaking lines:

Example: `\so{foo\linebreak_bar}`

The `\linebreak` command breaks the line without filling it with white

space at the end. `soul`'s version does not handle optional parameters like in `\linebreak[1]`. `\break` can be used as a synonym.

§ 7 Unbreakable spaces:

Example: `\so{don't~break}`

The `~` command sets an unbreakable space.

§ 8 Grouping:

Example: `\so{Virchow{sche}}`

A pair of braces can be used to let a group of characters be seen as one item, so that `soul` does for instance not space it out. The contents must, however, not contain potential hyphenation points. (See § 9)

§ 9 Protecting:

Example: `\so{foo\mbox{little}\bar}`

An `\mbox` does also keep `soul` from breaking up the contents, but they may even contain breakable material. `\hbox` can be used as a synonym.

§ 10 Font switching commands:

Example: `\so{foo\texttt{bar}}`

All standard \TeX and \LaTeX font switching commands are allowed, as well as the `yfonts` package [8] font commands like `\textfrak` etc. Further commands have to be registered using the `\soulfont` command (see section 5.2).

§ 11 Breaking up ligatures:

Example: `\ul{Auf{}lage}`


Use `{}` or `\null` to break up ligatures like 'fi' in `\ul`, `\st` and `\hl` arguments. This won't work conveniently for `\so` and `\caps`, because they break up every unprotected (ungrouped/unboxed) ligature, anyway, and would then just add undesirable extra space around the additional item.

2.2 ... others don't

Although the new `soul` is much more robust and forgiving than versions prior to 2.0, there are still some things that are not allowed in arguments. This is due to the complex engine, which has to read and inspect every character before it can hand it over to \TeX 's paragraph builder.

§ 20 Grouping hyphenateable material:

Example: `\so{foo\{little}\bar}`

Grouped characters must not contain hyphenation points. Instead of `\so{foo {little}}` write `\so{foo \mbox{little}}`. You get a 'Reconstruction failed' error and a black square like  in the DVI file where you violated this rule.

§ 21 Discretionary hyphens:

Example: `\so{Zu\discretionary{k-}{c}ker}`

The argument must not contain discretionary hyphens. Thus you have to handle cases like the German word `Zu\discretionary{k-}{c}ker` by yourself.

§ 22 Material without `ectt10` representation:

Example: `\so{foo\TeX\bar}`

Every token that can't be typeset with just one character of the `cmtt10` font leads to a reconstruction error. This can be avoided by enclosing the token in braces, e.g. `\so{foo {\TeX} bar}`, or registering it as font, e.g. `\soulfont{\TeX}{0} \so{foo \TeX\ bar}`. It doesn't matter if it

	page	
<code>\so{letterspacing}</code>	6	letterspacing
<code>\caps{CAPITALS, Small Capitals}</code>	8	CAPITALS, SMALL CAPITALS
<code>\ul{underlining}</code>	10	underlining
<code>\st{striking out}</code>	10	striking out
<code>\hl{highlighting}</code>	10	highlighting
<code>\soulaccent{\cs}</code>	12	add accent <code>\cs</code> to accent list
<code>\soulfont{\cs}{0}</code>	12	add font switching command <code>\cs</code>
<code>\sloppyword{text}</code>	14	typeset text with stretchable spaces
<code>\sodef\cs{1em}{2em}{3em}</code>	7	define new spacing command <code>\cs</code>
<code>\resetso</code>	7	reset <code>\so</code> dimensions
<code>\capsdef{////}{1em}{2em}{3em}</code> *	8	define (default) <code>\caps</code> data entry
<code>\capssave\cs</code> *	9	save <code>\caps</code> database under name <code>\cs</code>
<code>\capsreset</code> *	8	clear caps database
<code>\setul{1ex}{2ex}</code>	10	set <code>\ul</code> dimensions
<code>\resetul</code>	10	reset <code>\ul</code> dimensions
<code>\setuldepth{y}</code>	10	set underline depth to depth of y
<code>\setuloverlap{y}</code>	11	set underline overlap width to y
<code>\setulcolor{y}</code> *	10	set underline color to y
<code>\setstcolor{y}</code> *	11	set overstriking color to y
<code>\sethlcolor{y}</code> *	11	set highlighting color to y

Table 1: List of all available commands. The number points to the page where the command is described. Those marked with a little asterisk are only available when the package is used together with \LaTeX , because they rely on the `color` package or on the *New Font Selection Scheme (NFSS)* used in \LaTeX .

isn't really a font at all. \TeX is actually a bad example, because it *is* already pre-registered as font switching command.

§ 23 Nested soul commands:

Example: `\ul{foo\so{bar}_baz}`

`soul` commands must not be nested. If you really need such, put the inner stuff in a box and use this box.

```
\newbox\anyboxname
\sbox\anyboxname{ \so{the worst} }
\ul{This is by far\mbox{\usebox\anyboxname}example!}
```

yields:

This is by far the worst example!

§ 24 Conditional statements:

Example: `\so{foo\iffalse_bar_fi_baz}`

`soul` arguments must not contain conditional statements like `\if`, `\else`, `\fi`, `\ifcase`, etc.

§ 25 Other weird stuff:

Example: `\so{foo_verb|_bar|_baz}`

They also must not contain \LaTeX environments, command definitions, and fancy stuff like `\vadjust`. As long as you are writing simple, ordinary ‘horizontal’ material, you are on the safe side.

2.3 Troubleshooting

Unfortunately, there’s just one helpful error message provided by the `soul` package, that actually describes the underlying problem. All other messages are generated directly by `TEX` and show the low-level commands that `TEX` wasn’t happy with. They’ll hardly point you to the violated rule as described in the above paragraphs. If you get such a mysterious error message for a line that contains a `soul` statement, then comment that statement out and see if the message still appears. ‘`Incomplete \ifcat`’ is such a non-obvious message. If the message doesn’t appear now, then check the argument for violations of the rules as listed in §§ 20–26.

2.3.1 ‘Reconstruction failed’

This message appears, if § 20 or § 22 were violated. It is caused by the fact that the reconstruction pass couldn’t collect tokens with an overall width of the syllable that was measured by the analyzer. This does either occur when you grouped hyphenateable text or used an unregistered command that influences the syllable width. Font switching commands belong to the latter group. See the cited paragraphs for how to fix these problems.

2.3.2 Missing characters

If you have redefined the internal font as described in section 5.3, you may notice that some characters are omitted without any error message being shown. This happens if you have chosen, let’s say, a font with only 128 characters like the `cmtt10` font, but are using characters that aren’t represented in this font, e.g. characters with codes greater than 127.

3 Letterspacing

3.1 How it works

`\so` The base macro for letterspacing is called `\so`. It typesets the given argument with *inter-letter space* between every two characters, *inner space* between words and *outer space* before and after the spaced out text. If we let “.” stand for *inter-letter space*, “*” for *inner spaces* and “•” for *outer spaces*, then the input on the left side of the following table will yield the schematic output on the right side:

1.	<code>XX\so{aaa_␣bbb_␣ccc}YY</code>	<code>XXa·a·a·b·b·b·c·c·cYY</code>
2.	<code>XX_␣\so{aaa_␣bbb_␣ccc}_␣YY</code>	<code>XX•a·a·a·b·b·b·c·c·c•YY</code>
3.	<code>XX_␣{\so{aaa_␣bbb_␣ccc}}_␣YY</code>	<code>XX•a·a·a·b·b·b·c·c·c•YY</code>
4.	<code>XX_␣\null{\so{aaa_␣bbb_␣ccc}}_␣}_␣YY</code>	<code>XX_␣a·a·a·b·b·b·c·c·c_␣YY</code>

Case 1 shows how letterspacing macros (`\so` and `\caps`) behave if they aren’t following or followed by a space: they omit outer space around the `soul` statement. Case 2 is what you’ll mostly need—letterspaced text amidst running text. Following and leading space get replaced by *outer space*. It doesn’t matter if there are opening braces before or closing braces afterwards. `soul` can see though both of them (case 3). Note that leading space has to be at least `5sp` wide to be accepted as space, because `LATEX` uses tiny spaces with `\hskip1sp` internally as marker. Case 4 shows how to enforce normal spaces instead of *outer spaces*: Preceding space can be hidden by any token or `\kern0pt`. Following space can also be hidden by any token, but note that a typical macro name like `\relax` or `\null` would also hide the space after.

The values are predefined for typesetting facsimiles mainly with *Fraktur* fonts. You can define your own spacing macros or overwrite the original `\so` meaning using the macro `\sodef`:

`\sodef<cmd>{}{<inter-letter space>}{<inner space>}{<outer space>}`

The space dimensions, all of which are mandatory, should be defined in terms of `em` letting them grow and shrink with the respective fonts.

`\sodef\an{}{.4em}{1em plus1em}{2em plus.1em minus.1em}`

`\resetso` After that you can type ‘`\an{example}`’ to get ‘e x a m p l e’. The `\resetso` command resets `\so` to the default values.

3.2 Some examples

<i>Ordinary text.</i>	<ul style="list-style-type: none"> ■ <code>\so{electrical_industry}</code> ■ <code>electrical industry</code> 	<ul style="list-style-type: none"> ■ <code>elec-</code> <code>tri-</code> <code>cal</code> <code>in-</code> <code>dus-</code> <code>try</code>
<i>Use <code>\-</code> to mark hyphenation points.</i>	<ul style="list-style-type: none"> ■ <code>\so{man\-\u\-\script}</code> ■ <code>manuscript</code> 	<ul style="list-style-type: none"> ■ <code>man-</code> <code>u-</code> <code>script</code>
<i>Accents are recognized.</i>	<ul style="list-style-type: none"> ■ <code>\so{le_th\'e^atre}</code> ■ <code>le théâtre</code> 	<ul style="list-style-type: none"> ■ <code>le</code> <code>théâtre</code>
<i><code>\mbox</code> and <code>\hbox</code> protect material that contains hyphenation points. The contents are treated as one, unbreakable entity.</i>	<ul style="list-style-type: none"> ■ <code>\so{just_an_\mbox{example}}</code> ■ <code>just an example</code> 	<ul style="list-style-type: none"> ■ <code>just</code> <code>an</code> <code>example</code>
<i>Punctuation marks are spaced out, if they are put into the group.</i>	<ul style="list-style-type: none"> ■ <code>\so{inside.}\&\so{outside}.</code> ■ <code>inside. & outside.</code> 	<ul style="list-style-type: none"> ■ <code>in-</code> <code>side.</code> <code>&</code> <code>out-</code> <code>side.</code>
<i>Spaceout skips may be removed by typing <code>\<</code>. It's, however, desirable to put the quotation marks out of the argument.</i>	<ul style="list-style-type: none"> ■ <code>\so{''\<Pennsylvania\<'}</code> ■ <code>"Pennsylvania"</code> 	<ul style="list-style-type: none"> ■ <code>"Penn-</code> <code>syl-</code> <code>va-</code> <code>nia"</code>
<i>Numbers should never be spaced out.</i>	<ul style="list-style-type: none"> ■ <code>\so{1\<3_December_1995}}</code> ■ <code>13 December 1995</code> 	<ul style="list-style-type: none"> ■ <code>13</code> <code>De-</code> <code>cem-</code> <code>ber</code> <code>1995</code>
<i>Explicit hyphens like <code>-</code>, <code>--</code> and <code>---</code> are recognized. <code>\slash</code> outputs a slash and enables $T_E X$ to break the line afterwards.</i>	<ul style="list-style-type: none"> ■ <code>\so{input\slash_output}</code> ■ <code>input/output</code> 	<ul style="list-style-type: none"> ■ <code>in-</code> <code>put/</code> <code>out-</code> <code>put</code>

<i>To keep $T_{\text{E}}X$ from breaking lines between the hyphen and ‘jet’ you have to protect the hyphen. This is no <code>soul</code> restriction but normal $T_{\text{E}}X$ behaviour.</i>	<div> <div>■ <code>\so{\dots\and\mbox{-}jet}</code></div> <div>■ ... and -jet</div> </div>	<div> <div>■ ... and -jet</div> </div>
<i>The <code>~</code> command inhibits line breaks.</i>	<div> <div>■ <code>\so{unbreakable~space}</code></div> <div>■ unbreakable space</div> </div>	<div> <div>■ unbreakable space</div> </div>
<i><code>\</code> works as usual. Additional arguments like <code>*</code> or vertical space are not accepted, though.</i>	<div> <div>■ <code>\so{broken\\line}</code></div> <div>■ broken line</div> </div>	<div> <div>■ broken line</div> </div>
<i><code>\break</code> breaks the line without filling it with white space.</i>	<div> <div>■ <code>\so{pretty\awful\break\test}</code></div> <div>■ pretty awful test</div> </div>	<div> <div>■ pretty awful test</div> </div>

3.3 Typesetting capitals-and-small-capitals fonts

`\caps` There is a special letterspacing command called `\caps`, which differs from `\so` in that it switches to caps-and-small-caps font shape, defines only slight spacing and is able to select spacing value sets from a database. This is a requirement for high-quality typesetting [9]. The following lines show the effect of `\caps` in comparison with the normal textfont and with small-capitals shape:

```

\normalfont DONAUDAMPFSCHIFFAHRITSGESELLSCHAFT
\scshape    DONAUDAMPFSCHIFFAHRITSGESELLSCHAFT
\caps       DONAUDAMPFSCHIFFAHRITSGESELLSCHAFT

```

`\capsdef` The `\caps` font database is by default empty, i. e.: it contains just a single default entry, which yields the result as shown in the above example. New font entries may be added on top of this list using the `\capsdef` command, which takes five arguments: The first argument describes the font with *encoding*, *family*, *series*, *shape*, and *size*, each optionally (e. g. `OT1/cmr/m/n/10` for this very font, or only `/pp1///12` for all *palatino* fonts at size 12 pt). The *size* entry may also contain a size range (5–10), where zero is assumed for an omitted lower boundary (–10) and a very, very big number for an omitted upper boundary (5–). The upper boundary is not included in the range, so, in the example below, all fonts with sizes greater or equal 5 pt and smaller than 15 pt are accepted ($5\text{ pt} \leq \textit{size} < 15\text{ pt}$). The second argument may contain font switching commands such as `\scshape`, it may as well be empty or contain debugging commands (e. g. `\message{*}`). The remaining three, mandatory arguments are the spaces as described in section 3.1.

```
\capsdef{T1/pp1/m/n/5-15}{\scshape}{.16em}{.4em}{.2em}
```

The `\caps` command goes through the data list from top to bottom and picks up the first matching set, so the order of definition is essential. The last added entry is examined first, while the pre-defined default entry will be examined last and match any font, if no entry was taken before.

To override the default values, just define a new default entry using the identifier `{////}`. This entry should be defined first, because no entry after it can be reached.

`\capsreset` The `\caps` database can be cleared with the `\capsreset` command. It will

`\capssave` only contain the default entry thereafter. The `\capssave` command saves the whole current database and assigns it to a macro name. This allows to predefine different groups of `\caps` sets:

```
\capsreset
\capsdef{/cmss///12}{12pt}{23pt}{34pt}
\capsdef{/cmss///}{10pt}{20pt}{30pt}
...
\capssave\widecaps

\capsreset
\capsdef{/cmss///}{.1pt}{.2pt}{.3pt}
...
\capssave\narrowcaps

{\widecaps
\title{\caps{Yet Another Silly Example}}
}
```

See the ‘`example.cfg`’ file for a fairly complete example. If you have defined a bunch of sets for different fonts and sizes, you may lose control over what fonts are used by the package. With the package option `capsdefault` selected, `\caps` prints its argument underlined, if no set was specified for a particular font and the default set had to be used.

3.4 Typesetting Fraktur

The old German fonts⁴ deserve some additional considerations. As stated in section 1, the ligatures `ch`, `ck`, `sz` (`\ss`), and `tz` have to remain unbroken in spaced out *Fraktur* text. This may look strange at first glance, but you’ll get used to it:

```
\textfrak{\so{S{ch}u{tz}vorri{ch}tung}}
```

You already know that grouping keeps the `soul` mechanism from separating such ligatures. This is quite important for `s:`, `a*`, and `"a`. As hyphenation is stronger than grouping, especially the `sz` may cause an error, if hyphenation happens to occur between the letters `s` and `z`. (T_EX hyphenates the German word `auszer` wrongly like `aus-zer` instead of like `au-szer`, because the German hyphenation patterns do, for good reason, not see `sz` as ‘`\ss`’.) In such cases you can protect tokens with the sequence e.g. `\mbox{sz}` or a properly defined command. The `\ss` command, which is defined by the `yfonts` package, and similar commands will suffice as well.

3.5 Dirty tricks

Narrow columns are hard to set, because they don’t allow much spacing flexibility, hence long words often cause overfull boxes. A macro—let us call it `\magstylepar`—could use `\so` to insert stretchability between the single characters. The following columns show some text typeset with such a funny definition at the left side and under *plain* conditions at the right side, both with a width of 6 pc.

⁴See the great old German fonts, which YANNIS HARALAMBOUS kindly provided, and the `oldgerm` and `yfonts` package as their L^AT_EX interfaces.

Some magazines	Some magazines
and newspapers	and newspapers pre-
prefer this kind	fer this kind of spac-
of spacing be-	ing because it re-
cause it reduces	duces hyphenation
hyphenation	problems to a min-
problems to a	imum. Unfortu-
minimum. Un-	nately, such para-
fortunately,	graphs aren't es-
such paragraphs	pecially beautiful.
aren't especially	
beautiful.	

4 Underlining

The underlining macros are my answer to Prof. KNUTH's exercise 18.26 from his `TeXbook` [4]. :-) All said about the macro `\ul` is also true of the striking out macro `\st` and the highlighting macro `\hl`, both of which are in fact derived from the former.

4.1 Settings

4.1.1 Underline depth and thickness

The predefined *underline depth* and *thickness* work well with most fonts. They can be changed using the macro `\setul`.

```
\setul{<underline depth>}{<underline thickness>}
```

Either dimension can be omitted, in which case there has to be an empty pair of braces. Both values should be defined in terms of `ex`, letting them grow and shrink with the respective fonts. The `\resetul` command restores the standard values.

Another way to set the *underline depth* is to use the macro `\setuldepth`. It sets the depth such that the underline's upper edge lies 1 pt beneath the given argument's deepest depth. If the argument is empty, all letters—i. e. all characters whose `\catcode` currently equals 11—are taken. Examples:

```
\setuldepth{ygp}
\setuldepth\strut
\setuldepth{}
```

4.1.2 Line color

The underlines are by default black. The color can be changed by using the `\setulcolor` command. It takes one argument that can be any of the color specifiers as described in the `color` package. This package has to be loaded explicitly.

```
\documentclass{article}
\usepackage{color,soul}
\definecolor{darkblue}{rgb}{0,0,0.5}
\setulcolor{darkblue}

\begin{document}
...
\ul{Cave: remove all the underlines!}
...
\end{document}
```

`\setstcolor` The colors for overstriking lines and highlighting are likewise set with `\setstcolor`
`\sethlcolor` (default: black) and `\sethlcolor` (default: yellow). If the `color` package wasn't loaded underlining and overstriking color are black, while highlighting is replaced by underlining.

4.1.3 The dvips problem

Underlining, ~~striking out~~ and highlighting build up their lines with many short line segments. If you used the 'dvips' program with default settings, you would get little gaps on some places, because the *maxdrift* value allows the single objects to drift this many pixels from their real positions.

There are two ways to avoid the problem, where the `soul` package chooses the second by default:

1. Set the *maxdrift* value to zero, e.g.: `dvips -e 0 file.dvi`. This is probably not a good idea, since the letters may then no longer be spaced equally on low resolution printers.
2. Let the lines stick out by a certain amount on each side so that they overlap. This overlap amount can be set using the `\setuloverlap`. It is set to 0.25 pt by default. `\setuloverlap{0pt}` turns overlapping off.

4.2 Some examples

<i>Ordinary text.</i>	<ul style="list-style-type: none"> ■ <code>\ul{electrical\industry}</code> ■ <u>electrical industry</u> 	<ul style="list-style-type: none"> ■ <u>elec-</u> <u>tri-</u> <u>cal</u> <u>in-</u> <u>dus-</u> <u>try</u>
<i>Use \- to mark hyphenation points.</i>	<ul style="list-style-type: none"> ■ <code>\ul{man\-u\-script}</code> ■ <u>manuscript</u> 	<ul style="list-style-type: none"> ■ <u>man-</u> <u>u-</u> <u>script</u>
<i>Accents are recognized.</i>	<ul style="list-style-type: none"> ■ <code>\ul{le\th'e\^atre}</code> ■ <u>le théâtre</u> 	<ul style="list-style-type: none"> ■ <u>le</u> <u>théâtre</u>
<i>\mbox and \hbox protect material that contains hyphenation points. The contents are treated as one, unbreakable entity.</i>	<ul style="list-style-type: none"> ■ <code>\ul{just\an\mbox{example}}</code> ■ <u>just an example</u> 	<ul style="list-style-type: none"> ■ <u>just</u> <u>an</u> <u>example</u>
<i>Explicit hyphens like -, -- and --- are recognized. \slash outputs a slash and enables T_EX to break the line afterwards.</i>	<ul style="list-style-type: none"> ■ <code>\ul{input\slash\output}</code> ■ <u>input/output</u> 	<ul style="list-style-type: none"> ■ <u>in-</u> <u>put/</u> <u>out-</u> <u>put</u>
<i>To keep T_EX from breaking lines between the hyphen and 'jet' you have to protect the hyphen. This is no soul restriction but normal T_EX behaviour.</i>	<ul style="list-style-type: none"> ■ <code>\ul{\dots\and\mbox{-}jet}</code> ■ <u>...and -jet</u> 	<ul style="list-style-type: none"> ■ <u>...and</u> <u>-jet</u>

<i>The <code>~</code> command inhibits line breaks.</i>	<ul style="list-style-type: none"> ■ <code>\ul{unbreakable~space}</code> ■ unbreakable space 	<ul style="list-style-type: none"> ■ unbreakable space
<i><code>\\</code> works as usual. Additional arguments like <code>*</code> or vertical space are not accepted, though.</i>	<ul style="list-style-type: none"> ■ <code>\ul{broken\\line}</code> ■ broken line 	<ul style="list-style-type: none"> ■ broken line
<i><code>\break</code> breaks the line without filling it with white space.</i>	<ul style="list-style-type: none"> ■ <code>\ul{pretty_awesome\break_test}</code> ■ pretty_awesome test 	<ul style="list-style-type: none"> ■ pretty_awesome test

5 Customization

5.1 Adding accents

The `soul` scanner generally sees every input token separately. It has to be taught that some tokens belong together. For accents this is done by registering them via the `\soulaccent` macro.

```
\soulaccent{⟨accent command⟩}
```

The standard accents, however, are already pre-registered: `\‘`, `\’`, `\^`, `\"`, `\~`, `\=`, `\.`, `\u`, `\v`, `\H`, `\t`, `\c`, `\d` and `\b`. If used together with the `german` package, `soul` automatically adds the `"` command. Let's assume you have defined `\%` to put some weird accent on the next character. Simply put the following line into your `soul.cfg` file (see section 5.4):

```
\soulaccent{\%}
```

5.2 Adding font commands

To convince `soul` not to feed font switching commands to the analyzer, but rather to execute them immediately, they have to be registered, too. The `\soulfont` macro takes the name of the font switching command and either 0 or 1 for the number of arguments:

```
\soulfont{⟨font command⟩}{⟨number of arguments⟩}
```

If `\bf` and `\emph` weren't already registered, you would write the following into your `soul.cfg` configuration file:

```
\soulfont{\bf}{0}      % {\bf foo}
\soulfont{\emph}{1}    % {\emph{bar}}
```

The standard commands of $\mathrm{T}_{\mathrm{E}}\mathrm{X}$ and $\mathrm{L}_{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$ as well as the `yfonts` commands are already pre-registered:

```
\em, \rm, \bf, \it, \tt, \sc, \sl, \sf, \emph, \textrm,
\textsf, \texttt, \textmd, \textbf, \textup, \textsl,
\textit, \textsc, \textnormal, \rmfamily, \sffamily,
\ttfamily, \mdseries, \upshape, \slshape, \itshape,
\scshape, \normalfont, \tiny, \scriptsize, \footnotesize,
\small, \normalsize, \large, \Large, \LARGE, \huge, \Huge,
\textfrak, \textswab, \textgoth, \frakfamily,
\swabfamily, \gothfamily
```

Some other macros are also registered as fonts, so the analyzer won't see them. This is necessary because they have no representation in the `cmtt10` font and would hence cause a reconstruction error. See § 22.

```
\S, \textregistered, \copyright, \TeX, \LaTeX
```

5.3 Changing the internal font

The `soul` package uses the `ectt10` font to analyze the syllables. This font is used, because it has 256 mono-spaced characters without any kerning. It belongs to JÖRG KNAPPEN'S EC-fonts, which should be part of every modern T_EX installation. If T_EX reports "I can't find file 'ectt10'" you don't seem to have this font installed. It is recommended that you install at least the file `ectt10.tfm` which has less than 1.4kB. Alternatively, you can let the `soul` package use the `cmtt10` font that is part of any installation, or some other mono-spaced font:

```
\font\SOUL@tt=cmtt10
```

Note, however, that `soul` does only handle characters, for which the internal font has a character with the same character code. As `cmtt10` contains only characters with codes 0 to 127, you can't typeset characters with codes 128 to 255. These 8-bit character codes are used by many fonts with non-ascii glyphs. So the `cmtt10` font will, for example, not work for T2A encoded cyrillic characters.

5.4 The configuration file

If you want to change the predefined settings or add new features, then create a file named '`soul.cfg`' and put it in a directory, where T_EX can find it. This configuration file will then be loaded at the end of the `soul.sty` file, so you may redefine any settings or commands therein, select package options and even introduce new ones. But if you intend to give your documents to others, don't forget to give them the required configuration files, too! That's how such a file could look like:

```
% define macros for logical markup
\sodef\person{\scshape}{0.125em}{0.4583em}{0.5833em}

\sodef\SOUL@@@versal{\upshape}{0.125em}{0.4583em}{0.5833em}
\DeclareRobustCommand*\versal[1]{%
  \MakeUppercase{\SOUL@@@versal{#1}}%
  \SOUL@socheck
}

% load the color package and set
% a different highlighting color
\RequirePackage{color}
\definecolor{lightblue}{rgb}{.90,.95,1}
\sethlcolor{lightblue}
\endinput
```

You can safely use the `\SOUL@@@` namespace for internal macros—it won't be used by the `soul` package in the future.

6 Miscellaneous

6.1 Using soul with other flavors of T_EX

This documentation describes how to use `soul` together with L^AT_EX 2_ε, for which it is optimized. It works, however, with all other flavors of T_EX, too. There are just some minor restrictions for Non-L^AT_EX use:

The `\caps` command doesn't use a database, it is only a dumb definition with fixed values. It switches to `\capsfont`, which—unless defined explicitly like in the following example—won't really change the used font at all. The commands `\capsreset` and `\capssave` do nothing.

```
\font\capsfont=cmcsc10
\caps{Tschichold}
```

None of the commands are made 'robust', so they have to be explicitly protected in fragile environments like in `\write` statements.

6.2 Using soul commands in logical markup

It's generally a bad idea to use font style commands like `\textsc` in running text. There should always be some reasoning behind changing the style, such as "names of persons shall be typeset in a caps-an-small-caps font". Then you declare in your text just that some words are the name of a person, while you define in the preamble or, even better, in a separate style file how to deal with persons:

```
\newcommand*\person{\textsc}
...
''I think it's a beautiful day to go to the zoo and feed
the ducks. To the lions.'' --\person{Brian Kantor}
```

It's quite simple to use `soul` commands that way:

```
\newcommand\comment*{\ul}           % or \let\comment=\ul
\sodef\person{\scshape}{0.125em}{0.4583em}{0.5833em}
```

Letterspacing commands like `\so` and `\caps` have to check whether they are followed by white space, in which case they replace that space by *outer space*. Note that `soul` does look through closing braces. Hence you can conveniently bury a `soul` command within another macro like in the following example. Use any other token to hide following space if necessary, e.g. the `\null` macro.

```
\DeclareRobustCommand\versal[1]{%
  \MakeUppercase{\SOUL@@@versal{#1}}%
}
\sodef\SOUL@@@versal{\upshape}{0.125em}{0.4583em}{0.5833em}
```

6.3 Typesetting long words in narrow columns

Narrow columns are best set `flushleft`, because not even the best hyphenation algorithm can guarantee acceptable line breaks without overly stretched spaces. However, in some rare cases one may be *forced* to typeset block aligned. When typesetting in languages like German, where there are really long words, the `\sloppyword` macro might help a little bit. It adds enough stretchability between the single characters to make the hyphenation algorithm happy, but is still not as ugly as the example in section 3.5 demonstrates. In the following example the left column was typeset as "Die `\sloppyword{Donau...novelle}` wird ...":

`\sloppyword`

Die Donaudampfschiff-
fahrtsgeellschaftska-
pitänswitwenpensions-
gesetznovelle wird mit
sofortiger Wirkung außer
Kraft gesetzt.

Die Donaudampfschiff-
fahrtsgeellschaftska-
pitänswitwenpensions-
gesetznovelle wird mit
sofortiger Wirkung außer
Kraft gesetzt.

6.4 Using soul commands in section headings

Letterspacing was often used for section titles in the past, mostly centered and with a closing period. The following example shows how to achieve this using the `titlesec` package [1]:

```
\newcommand*\periodafter[2]{#1{#2.}}
\titleformat{\section}[block]
  {\normalfont\centering}
  {\thesection.}
  {.66em}
  {\periodafter\so}
...
\section{VON DEN MAASSEN UND MAASSST\ "ABEN}
```

This yields the following output:

1. VON DEN MAASSEN UND MAASSSTÄBEN.

The `\periodafter` macro adds a period to the title, but not to the entry in the table of contents. It takes the name of a command as argument, that shall be applied to the title, like e.g. `\so`. Here's a more complicated and complete example:

```
\documentclass{article}
\usepackage[latin1]{inputenc}
\usepackage[T1]{fontenc}
\usepackage{german,soul}
\usepackage[indentfirst]{titlesec}

\newcommand*\sectitle[1]{%
  \MakeUppercase{\so{#1}.}\[.66ex]
  \rule{13mm}{.4pt}}
\newcommand*\periodafter[2]{#1{#2.}}

\titleformat{\section}[display]
  {\normalfont\centering}
  {\S. \thesection.}
  {2ex}
  {\sectitle}

\titleformat{\subsection}[block]
  {\normalfont\centering\bfseries}
  {\thesection.}
  {.66em}
  {\periodafter\relax}
```

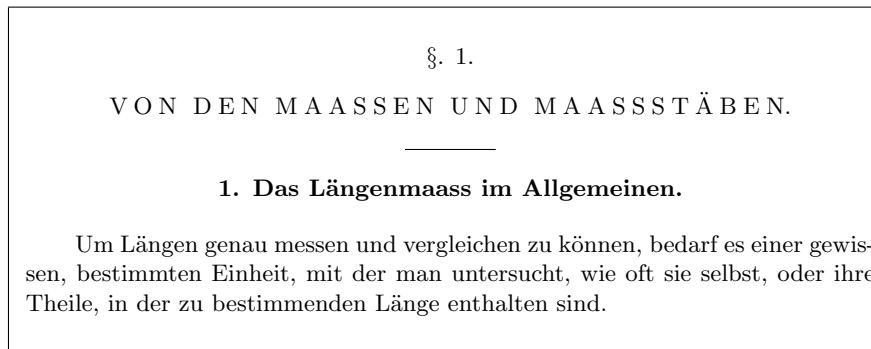
```

\begin{document}
\section{VON DEN MAASSEN UND MAASSSTÄBEN}
\subsection{Das Längenmaass im Allgemeinen}

Um Längen genau messen und vergleichen zu können,
bedarf es einer gewissen, bestimmten Einheit, mit der
man untersucht, wie oft sie selbst, oder ihre Theile,
in der zu bestimmenden Länge enthalten sind.
...
\end{document}

```

This example gives you roughly the following output, which is a faksimile from [5].



7 How the package works

7.1 The kernel

`Letterspacing`, `underlining`, `striking-out` and `highlighting` use the same kernel mechanism. It lets a *word scanner* run over the given argument, which inspects every token. If a token is a command registered via `\soulfont`, it is executed immediately. Other tokens are only counted and trigger some action when a certain amount is reached (quotes and dashes). Three subsequent ‘-’, for example, trigger `\SOUL@everyexhyphen{---}`. A third group leads to special actions, like `\mbox` that starts reading-in a whole group to protect its contents and let them be seen as one entity. All other tokens, mostly characters and digits, are collected in a word register and whenever a whole word is read-in, it is passed to the analyzer.

The analyzer typesets the word in a 1sp ($= \frac{1}{65536}$ pt) wide `\vbox`, hence encouraging \TeX to break lines at every possible hyphenation point. It uses the mono-spaced `\SOUL@tt` font (`ectt10`), so as to avoid any inter-character kerning. Now the `\vbox` is decomposed splitting off `\hbox` after `\hbox` from the bottom. All boxes, each of which contains one syllable, are pushed onto a stack, which is provided by \TeX ’s grouping mechanism. When returning from the recursion, box after box is fetched from the stack, its width measured and fed to the “reconstructor”.

This reconstruction macro (`\SOUL@dossyllable`) starts to read tokens from the just analyzed word until the given syllable width is obtained. This is repeated for each syllable. Every time the engine reaches a relevant state, the corresponding driver macro is executed and, if necessary, provided with some data. There is a macro that is executed for each token, one for each syllable, one for each space etc.

The engine itself doesn't know how to letterspace or to underline. It just tells the selected driver about the structure of the given argument. There's a default driver (`\SOUL@setup`) that does only set the interface macros to a reasonable default state, but doesn't really do anything. Further drivers can safely inherit these settings and only need to redefine what they want to change.

7.2 The interface

7.2.1 The registers

The package offers eight interface macros that can be used to define the required actions. Some of the macros receive data as macro parameter or in special *token* or *dimen* registers. Here is a list of all available registers:

<code>\SOUL@token</code>	This token register contains the current token. It has to be used as <code>\the\SOUL@token</code> . The macro <code>\SOUL@gettoken</code> reads the next token into <code>\SOUL@token</code> and can be used in any interface macro. If you don't want to lose the old meaning, you have to save it explicitly. <code>\SOUL@puttoken</code> pushes the token back into the queue, without changing <code>\SOUL@token</code> . You can only put one token back, otherwise you get an error message.
<code>\SOUL@lasttoken</code>	This token register contains the last token.
<code>\SOUL@syllable</code>	This token register contains all tokens that were already collected for the current syllable. When used in <code>\SOUL@everysyllable</code> , it contains the <i>whole</i> syllable.
<code>\SOUL@charkern</code>	This dimen register contains the kerning value between the current and the next character. Since most character pairs don't require a kerning value to be applied and the output in the logfile shouldn't be cluttered with <code>\kernOpt</code> it is recommended to write <code>\SOUL@setkern\SOUL@charkern</code> , which sets kerning for non-zero values only.
<code>\SOUL@hyphkern</code>	This dimen register contains the kerning value between the current character and the hyphen character or, when used in <code>\SOUL@everyexhyphen</code> , the kerning between the last character and the explicit hyphen.

7.2.2 The interface macros

The following list describes each of the interface macros and which registers they can rely on. The mark between label and description will be used in section 7.2.3 to show when the macros are executed. The addition `#1` means that the macro takes one argument.

<code>\SOUL@preamble</code>	<i>P</i> executed once at the beginning
<code>\SOUL@postamble</code>	<i>E</i> executed once at the end

<code>\SOUL@everytoken</code>	T	executed after scanning a token; It gets that token in <code>\SOUL@token</code> and has to care for inserting the kerning value between this and the next character (<code>\SOUL@charkern</code>). To look at the next character, execute <code>\SOUL@gettoken</code> , which replaces <code>\SOUL@token</code> by the next token. This token has to be put back into the queue using <code>\SOUL@puttoken</code> .
<code>\SOUL@everysyllable</code>	S	This macro is executed after scanning a whole syllable. It gets the syllable in <code>\SOUL@syllable</code> .
<code>\SOUL@everyhyphen</code>	—	This macro is executed at every implicit hyphenation point. It is responsible for setting the hyphen and will likely do this in a <code>\discretionary</code> statement. It has to care about the kerning values. The registers <code>\SOUL@lasttoken</code> , <code>\SOUL@syllable</code> , <code>\SOUL@charkern</code> and <code>\SOUL@hyphkern</code> contain useful information. Note that <code>\discretionary</code> inserts <code>\exhyphenpenalty</code> if the first part of the discretionary is empty, and <code>\hyphenpenalty</code> else.
<code>\SOUL@everyexhyphen#1</code>	=	This macro is executed at every explicit hyphenation point. The hyphen ‘character’ (one of hyphen, en-dash, em-dash or <code>\slash</code>) is passed as parameter <code>#1</code> . A minimal implementation would be <code>{#1\penalty\exhyphenpenalty}</code> . The kerning value between the last character and the hyphen is passed in <code>\SOUL@hyphkern</code> , that between the hyphen and the next character in <code>\SOUL@charkern</code> . The last syllable can be found in <code>\SOUL@syllable</code> , the last character in <code>\SOUL@lasttoken</code> .
<code>\SOUL@everyspace#1</code>	␣	This macro is executed between every two words. It is responsible for setting the space. The engine submits a <code>\penalty</code> setting as parameter <code>#1</code> that should be put in front of the space. The macro should at least do <code>{#1\space}</code> . Further information can be found in <code>\SOUL@lasttoken</code> and <code>\SOUL@syllable</code> . Note that the leading and trailing space of the <code>\so</code> driver implementation is not covered by <code>\SOUL@everyspace</code> , but provided by <code>\SOUL@preamble</code> and <code>\SOUL@postamble</code> .

7.2.3 Some examples

The above list’s middle column shows a mark that indicates in the following examples, when the respective macros are executed:

$\overset{P}{w} \overset{T}{o} \overset{T}{r} \overset{T}{d} \overset{TSE}{}$

`\SOUL@everytokenT` is executed for every token. `\SOUL@everysyllableS` is *additionally* executed for every syllable. You will mostly just want to use either of them.

$\overset{P}{o} \overset{T}{n} \overset{T}{e} \overset{TSE}{\text{␣}} \overset{T}{t} \overset{T}{w} \overset{TSE}{o}$

The macro `\SOUL@everyspace` is executed at every space within the `soul` argument. It has to take one argument, that can either be empty or contain a penalty, that should be applied to the space.

$P^T e^T x^{TS} - T^T a^T m^{TS} - p^T l^T e^{TSE}$ The macro `\SOUL@everyhyphen` is executed at every possible implicit hyphenation point.

$P^T b^T e^T t^T a^T - t^T e^T s^T t^T e^{TSE}$ Explicit hyphens trigger `\SOUL@everyexhyphen`.

It's only natural that these examples, too, were automatically typeset by the `soul` package using a special driver:

```
\DeclareRobustCommand*\an{%
  \def\SOUL@preamble{\$^{^P}}}%
  \def\SOUL@everyspace##1{##1\texttt{\char'\ }}%
  \def\SOUL@postamble{\$^{^E}}}%
  \def\SOUL@everyhyphen{\$^{^-}}}%
  \def\SOUL@everyexhyphen##1{##1\$^{^=}}}%
  \def\SOUL@everysyllable{\$^{^S}}}%
  \def\SOUL@everytoken{\the\SOUL@token\$^{^T}}}%
  \def\SOUL@everylowerthan{\$^{^L}}}%
\SOUL@}
```

7.3 A driver example

Let's define a `soul` driver that allows to typeset text with a hyphen at every potential hyphenation point. The name of the macro shall be `\sy` (for *syllables*). Since the `soul` mechanism is highly fragile, we use the \LaTeX command `\DeclareRobustCommand`, so that the `\sy` macro can be used even in section headings etc. The `\SOUL@setup` macro sets all interface macros to reasonable default definitions. This could of course be done manually, too. As we won't make use of `\SOUL@everytoken` and `\SOUL@postamble` and both default to `\relax`, anyway, we don't have to define them here.

```
\DeclareRobustCommand*\sy{%
  \SOUL@setup
```

We only set `\lefthyphenmin` and `\righthyphenmin` to zero at the beginning. All changes are restored automatically, so there's nothing to do at the end.

```
\def\SOUL@preamble{\lefthyphenmin=0 \righthyphenmin=0 }%
```

We only want simple spaces. Note that these are not provided by default! `\SOUL@everyspace` may get a penalty to be applied to that space, so we set it before.

```
\def\SOUL@everyspace##1{##1\space}%
```

There's nothing to do for `\SOUL@everytoken`, we rather let `\SOUL@everysyllable` handle a whole syllable at once. This has the advantage, that we don't have to deal with kerning values, because \TeX takes care of that.

```
\def\SOUL@everysyllable{\the\SOUL@syllable}
```

The \TeX primitive `\discretionary` takes three arguments: 1. pre-hyphen material 2. post-hyphen material, and 3. no-hyphenation material.

```
\def\SOUL@everyhyphen{%
  \discretionary{%
    \SOUL@setkern\SOUL@hyphkern
    \char\hyphenchar\font
  }-{}{%
    \hbox{\kern1pt$\cdot$}%
  }%
}%
```

Explicit hyphens like dashes and slashes shall be set normally. We just have to care for kerning.

```
\def\SOUL@everyexhyphen##1{%
  \SOUL@setkern\SOUL@hyphkern
  ##1%
  \discretionary{}{}{}{%
    \SOUL@setkern\SOUL@charkern
  }%
}
```

Now that the interface macros are defined, we can start the scanner.

```
\SOUL@
}
```

This lit-tle macro will hard-ly be good e-nough for lin-guists, al-though it us-es T_EX's ex-cel-lent hy-phen-ation al-go-rithm, but it is at least a nice al-ter-na-tive to the \showhyphens com-mand.

Acknowledgements

A big thank you goes to STEFAN ULRICH for his tips and bug reports during the development of versions 1.* and for his lessons on high quality typesetting. The \caps mechanism was very much influenced by his suggestions. Thanks to ALEXANDER SHIBAKOV and FRANK MITTELBAACH, who sent me a couple of bug reports and feature requests, and finally encouraged me to (almost) completely rewrite soul. ROWLAND MCDONNEL gave useful hints for how to improve the documentation, but I'm afraid he will still not be satisfied, and rightfully so. If only documentation writing weren't that boring. ; -)

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