COLUMNS
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Hans Hagen

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Introduction

This manual introduces *column sets*, one of the output routines of ConTEXt. Although column sets are mainly meant for typesetting journals in a semi–automated way, you can also use them for books. We assume that the user is familiar with ConTEXt and only discuss the commands that are related to column sets.

This mechanism performs okay but it needs to be used with care: an occasional manual intervention is needed to get optimal results. After all, we're operating in the area where normally click and point desktop publishing is used.

For the moment you need to load the new code with: `\usemodule[newcolumnsets]`

Hans Hagen
PRAGMA ADE
Hasselt, 2003–2016

Basics

As soon as enough content is collected to build a page, TEX will invoke the output routine. This is not a fixed piece of code, but a collection of macro calls. The default output routine is a meant for typesetting a single column, as in this document. A multi–column output routine is available as well. This routine mixes well with the single column one, and is activated by:

```
\startcolumns
some text ...
\stopcolumns
```

In MkIV a new mixed column mechanism has been introduced that will be developped further and eventually replace the old multi column handler. In MkII there is also a columnset mechanism that can be used to construct complex multi column pages. In MkIV this gets replaced by grid columns. All these multi column mechanisms have in common that the output routine is more complex because now a page is in fact a collection of pages wrapped onto one. Each column is (from TEX's perspective) similar to a one narrow column page. Here we focus on columnsets (page grids).

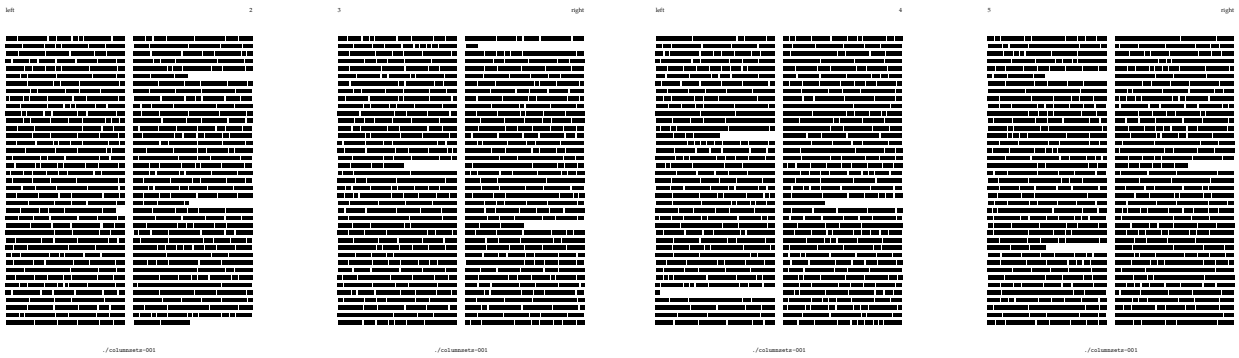
There are some limitations to what you can do with this kind of multi columns, which is why we have a third routine at out disposal: *column sets*. This routine can be used for rather complex layouts with graphics all over the place, and text spanning columns or even spreads. There are of course some shortcomings, which we will discuss later.

In the examples that follow we use the following style to set up the layout. The number in the margin serves a reference to the file where this snippet of TEX is stored.

000
```
\startenvironment columnsets-000

\useMPlibrary[dum]

\setupbodyfont
  [palatino]

\setuplayout
  [grid=yes]

\setuplayout
  [backspace=20mm,
   cutspace=15mm,
   width=middle,
   height=middle]

\setupsystem
  [random=1234]
```

```
\setuppagenumbering
  [alternative=doublesided,
   location=]

\setupheadertexts
  [pagenumber][right]
  [left][pagenumber]

\setupfootertexts
  [\inputfilename]

\setupfooter
  [style=\tttf]

\setuptolerance
  [verytolerant,stretch]

\definecolor[color-1][.5(red,green)]
\definecolor[color-2][.5(green,blue)]
\definecolor[color-3][.5(blue,red)]
\definecolor[color-4][.5(white,black)]
\definecolor[color-5][.5(white,color-4)]

\startuniqueMPgraphic{frame}
  fill OverlayBox withcolor \MPcolor{color-1} ;
\stopuniqueMPgraphic

\startuniqueMPgraphic{contrast}
  fill OverlayBox withcolor \MPcolor{color-3} ;
\stopuniqueMPgraphic

\defineoverlay[frame]   [\uniqueMPgraphic{frame}]
\defineoverlay[contrast][\uniqueMPgraphic{contrast}]

\stopenvironment
```

Before we will demonstrate more complex layouts, we will introduce a few features. In the next series of examples we use fake text. You can enlarge the pages in your viewer if you want to see more detail.

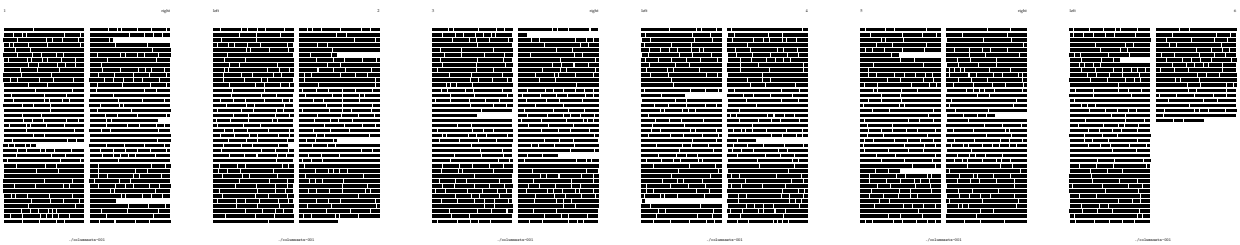


2 3 4 5

These pages were typeset with the following code:

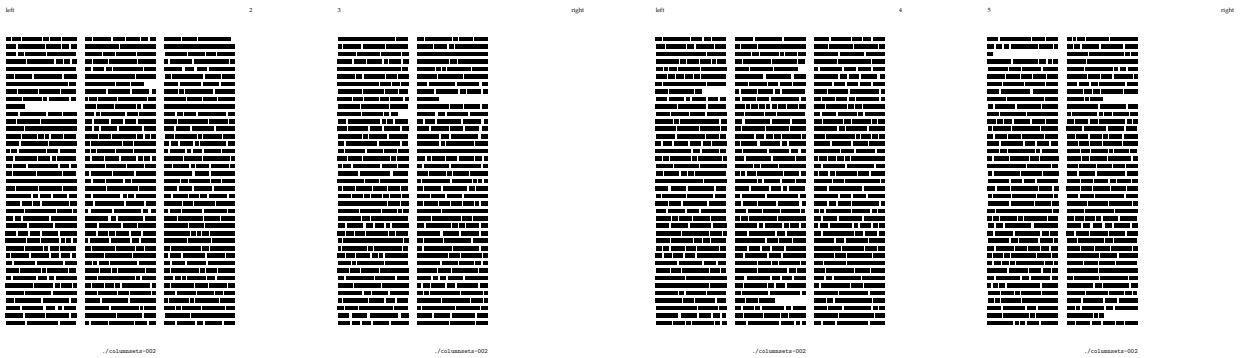
```
001  \definecolumnset[example][n=2]
     \starttext
     \startcolumnset[example]
       \dorecurse{20}{\fakewords{100}{200}\par}
     \stopcolumnset
     \stoptext
```

We will showmost examples on a spread, so we don't show a first page. On a spread like above we number columns from 1 to 4, which in practice means that in this case columns starting on right page start with column 3!



1 2 3 4 5 6

The number of columns is not fixed to two. You can even have a different number of columns on left and right pages.

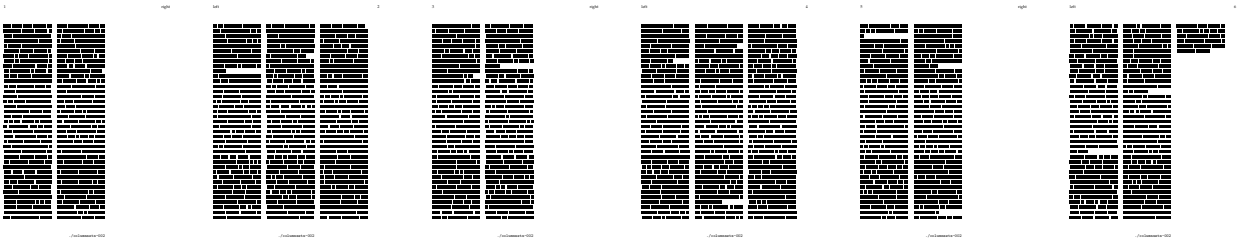


2 3 4 5

This time the input is:

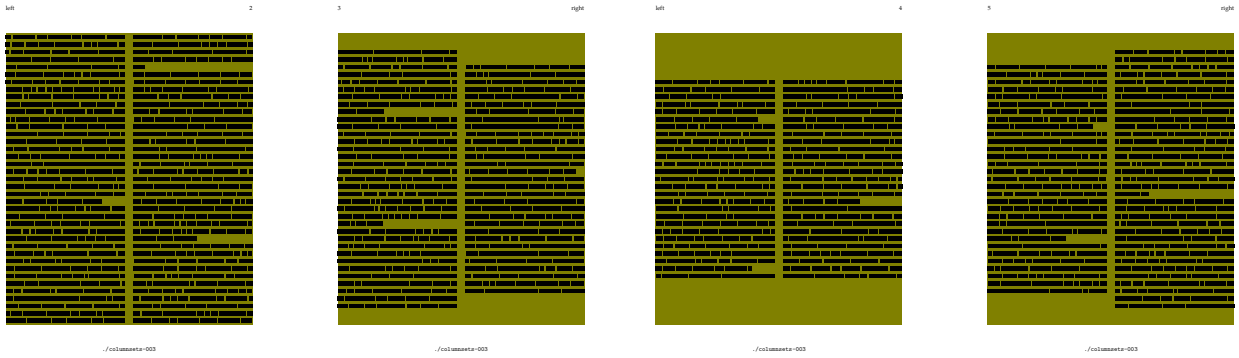
```
002 \definecolumnset[example][nleft=3,nright=2,width=5cm]

    \starttext

    \startcolumnset[example]

      \dorecurse{15}{\fakewords{100}{200}\par}

    \stopcolumnset

    \stoptext
```

Again, we started on a right page but showed the spreads. You can see it from the positioning of the header texts.



1 2 3 4 5 6

In order to get the balancing you want, you can manually influence the height of a column.

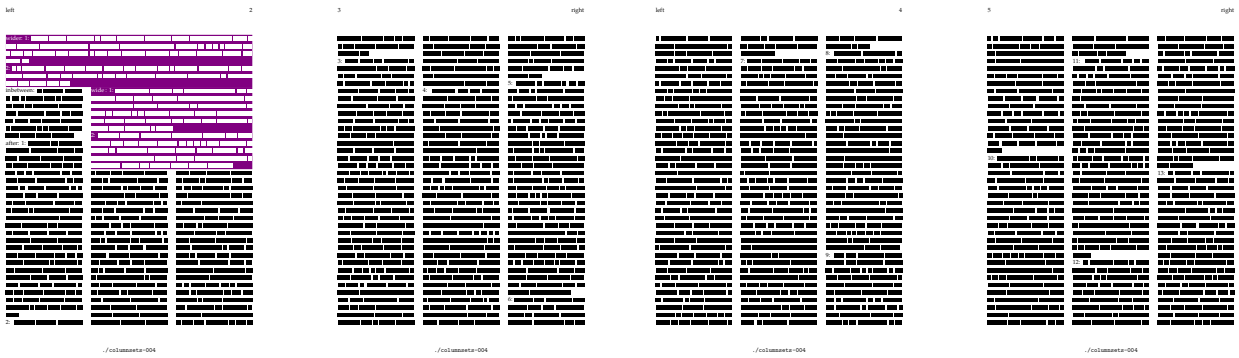


2 3 4 5

When you set the number of column lines to a positive value, that will be the number of lines. A negative value will be subtracted from the maximum number of lines.

```
003  \definecolumnset[example][n=2,page=left]

     \setupbackgrounds[text][background=color,backgroundcolor=color-1]

     \setupcolumnsetstart[example][1][1][2]
     \setupcolumnsetstart[example][1][2][4]
     \setupcolumnsetstart[example][2][1][6]
     \setupcolumnsetstart[example][2][2][6]
     \setupcolumnsetstart[example][3][1][4]
     \setupcolumnsetstart[example][3][2][2]

     \setupcolumnsetlines[example][1][1][-2]
     \setupcolumnsetlines[example][1][2][-4]
     \setupcolumnsetlines[example][2][1][-6]
     \setupcolumnsetlines[example][2][2][-6]
     \setupcolumnsetlines[example][3][1][-4]
     \setupcolumnsetlines[example][3][2][-2]
     \setupcolumnsetlines[example][4][1][4]
     \setupcolumnsetlines[example][4][2][10]

     \starttext

     \startcolumnset[example]

       \dorecurse{20}{\fakewords{100}{200}\par}

     \stopcolumnset

     \stoptext
```

In articles you may want to let the introduction span multiple columns. A column span is defined independent of a column set and shows up as follows:

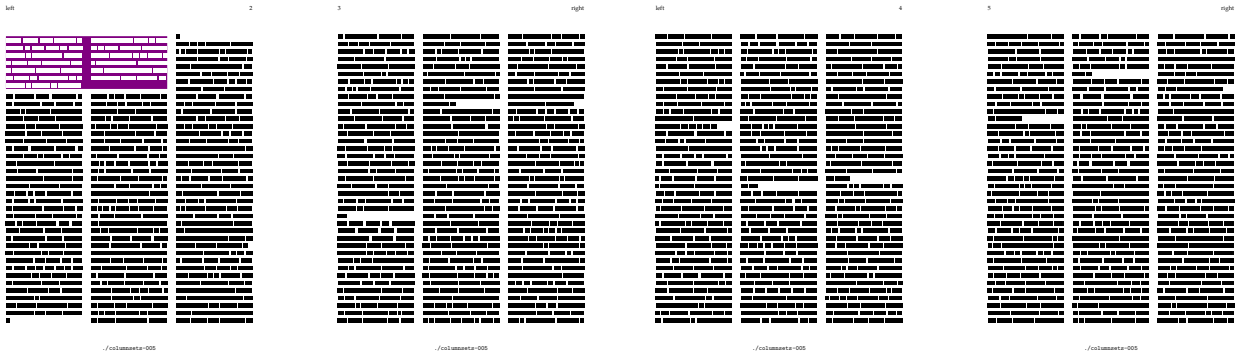


2 3 4 5

Here we've given the span a background so that it stands out.

```
004 \definecolumnset[example][n=3,page=left]

    \definecolor[fakerulecolor]

    \definecolumnsetspan[wide] [n=2,background=contrast,color=white]
    \definecolumnsetspan[wider][n=4,background=contrast,color=white]

    \starttext

    \startcolumnset[example]

      \startcolumnsetspan[wider]
        wider: \dorecurse{2}{#1: \fakewords{25}{50}\par}
      \stopcolumnsetspan

      inbetween: \fakewords{25}{50}\par

      \startcolumnsetspan[wide]
        wide : \dorecurse{2}{#1: \fakewords{25}{50}\par}
      \stopcolumnsetspan

      after: \dorecurse{15}{#1: \fakewords{100}{200}\par}

    \stopcolumnset

    \stoptext
```

A column span can be positioned like any graphic. Later we will discuss the placement options in more detail, for the moment all you need to know is that `btlr` tells ConTEXt to place the graphic in the left bottom of the the text area.

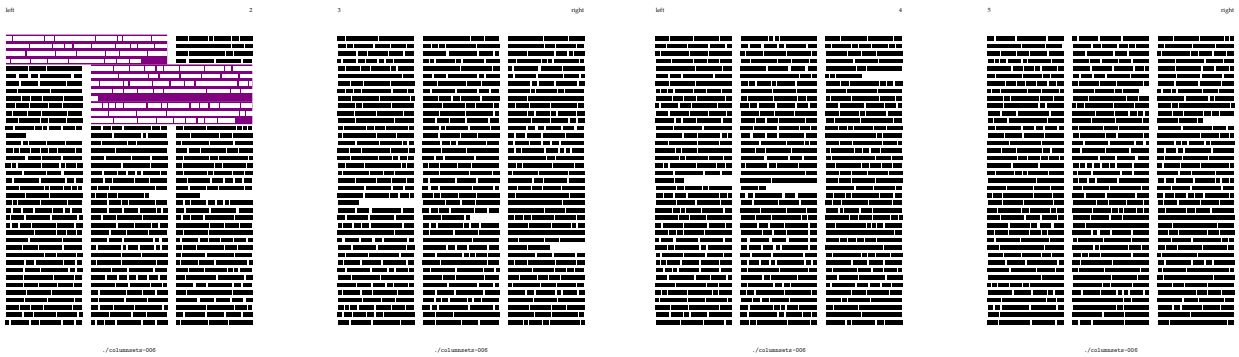


2 3 4 5

Here we pass the `default` placement as parameter to the span, but you can also set it at definition time. We use a brute force simple column splitter to fake columns inside the span.

```
005 \definecolumnset[example][n=3,page=left]

\definecolumnsetspan[wide][n=2,background=contrast,color=white]

\definecolor[fakerulecolor]

\starttext

\startcolumnset[example]

  \startcolumnsetspan[wide][default=btlr]

    \startsimplecolumns
      \dorecurse{2}{\fakewords{25}{40}\par}
    \stopsimplecolumns

  \stopcolumnsetspan

  \dorecurse{15}{\fakewords{100}{200}\par}

\stopcolumnset

\stoptext
```

You are not limited to one column span. In this sense a span is like a graphic: as long as there is room, it will be placed where you want it to be placed. The main difference between a span and a graphic is that a span expects text and tries to align the baselines with the rest of the text. In many ways a column span behaves like a framed text.



2 3 4 5

This time we flushed one of the spans from bottom to top, starting at the right edge: `btrl`.

```
006 \definecolumnset[example][n=3,page=left]

    \definecolor[fakerulecolor]

    \definecolumnsetspan[wide][n=2,background=contrast,color=white]

    \starttext

    \startcolumnset[example]

      \startcolumnsetspan[wide]
        \fakewords{25}{50}
      \stopcolumnsetspan

      \fakewords{25}{50}

      \startcolumnsetspan[wide]
        \fakewords{25}{50}
      \stopcolumnsetspan

      \startcolumnsetspan[wide][default=btrl]
        \fakewords{25}{50}
      \stopcolumnsetspan

      \dorecurse{15}{\fakewords{100}{200}\par}

    \stopcolumnset

    \stoptext
```

Column spans are treated like graphics, which means that they will float if needed. In the process, the width is limited to the available space, which in some cases may lead to a smaller span than you may expect. Think of a column span, calculated (and prepared) in the last column and ending up on the next page in the first column, where a broader span would have been possible.

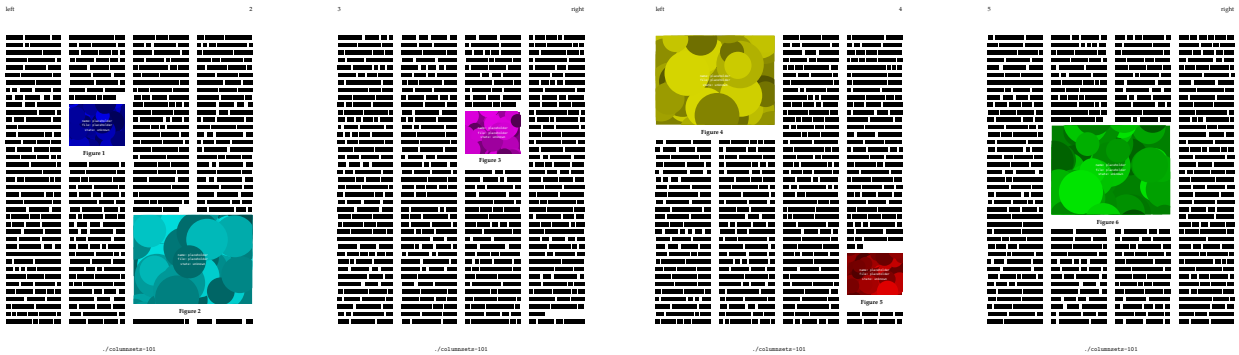
2 3 4 5

```
007  \definecolumnset[example][n=3,page=left]

     \definecolor[fakerulecolor]

     \definecolumnsetspan[wide][n=2,background=contrast,color=white]

     \starttext

     \startbuffer

       \startcolumnsetspan[wide]
         \fakewords{25}{50}
       \stopcolumnsetspan

       \fakewords{25}{50}

       \startcolumnsetspan[wide]
         \fakewords{25}{50}
       \stopcolumnsetspan

       \startcolumnsetspan[wide][default=btrl]
         \fakewords{25}{50}
       \stopcolumnsetspan

       \dorecurse{3}{\fakewords{100}{200}\par}

     \stopbuffer

     \startcolumnset[example]

       \dorecurse{4}{\getbuffer}

       \dorecurse{5}{\fakewords{100}{200}\par}
```

```
\stopcolumnset

\stoptext
```

Graphics

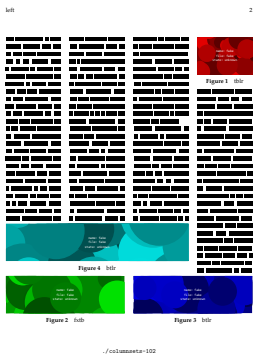
Most documents have graphics, and therefore column sets can contain them. The main thing that you have to keep in mind when placing graphics, is that column sets are based on grids. Therefore spacing around graphics is also grid based.



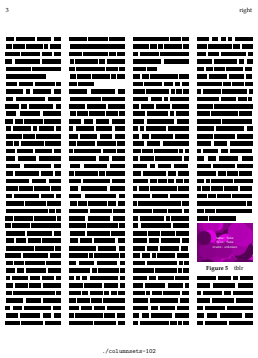
2 3 4 5

```
\definecolumnset[example][n=4,page=left]

\starttext

\startbuffer
\fakewords{100}{200}
\placefigure
  {}
  {\externalfigure[placeholder][width=\columnsetspanwidth{1}]}
\fakewords{100}{200}
\placefigure
  {}
  {\externalfigure[placeholder][width=\columnsetspanwidth{2}]}
\fakewords{100}{200}
\stopbuffer

\startcolumnset[example]

  \dorecurse {5}{\getbuffer}
  \dorecurse{10}{\fakewords{100}{200}\par}

\stopcolumnset

\stoptext
```

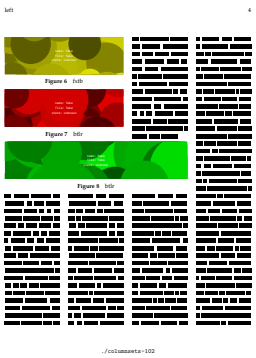
You can tell ConTEXt where it should place the graphic, but this will only be honored when there is still place.



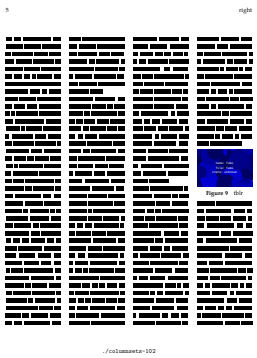
columnsets-102 / 2



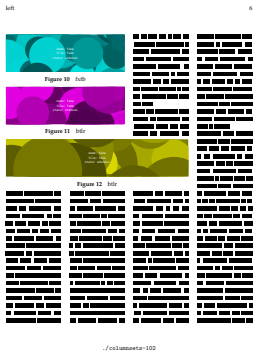
columnsets-102 / 3



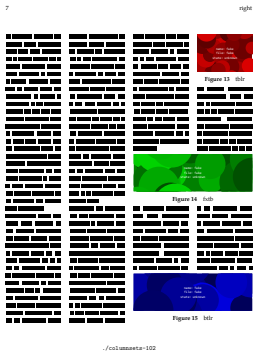
columnsets-102 / 4



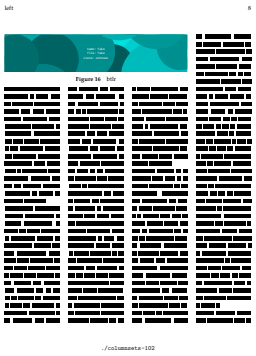
columnsets-102 / 5



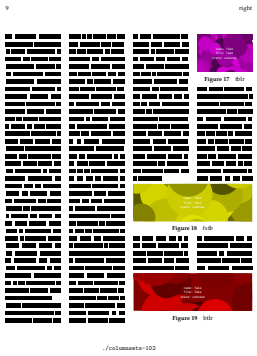
columnsets-102 / 6



columnsets-102 / 7



columnsets-102 / 8



columnsets-102 / 9

The prefered location is passed as a four character directive:

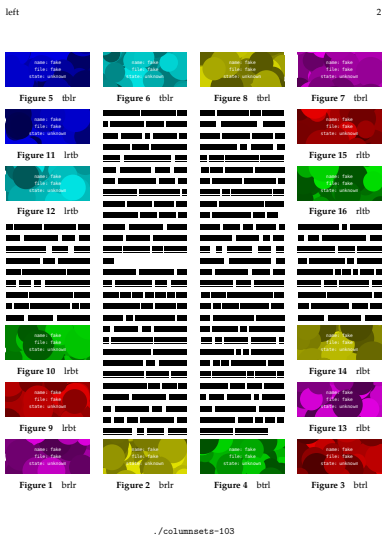
```
\definecolumnset[example][n=4,page=left]

\starttext

\startbuffer
\placefigure [tbrl]
  {tblr}
  {\externalfigure[fake][width=\columnsetspanwidth{1},lines=5]}
\placefigure [fxtb:6*4]
  {fxtb}
  {\externalfigure[fake][width=\columnsetspanwidth{2},lines=5]}
\placefigure [btlr]
  {btlr}
  {\externalfigure[fake][width=\columnsetspanwidth{2},lines=5]}
\placefigure [btlr]
```

```
  {btlr}
  {\externalfigure[fake][width=\columnsetspanwidth{3},lines=5]}

\dorecurse {5} {
  \fakewords{100}{200}\par
}
\stopbuffer

\startcolumnset[example]

  \dorecurse{6}{\getbuffer}

\stopcolumnset

\stoptext
```

The following directives are available:

`btlr`	flush from bottom to top and left to right
`btrl`	flush from bottom to top and right to left
`tblr`	flush from top to bottom and left to right
`tbrl`	flush from top to bottom and right to left
`lrbt`	flush from left to right and bottom to top
`lrtb`	flush from left to right and top to bottom
`rlbt`	flush from right to left and bottom to top
`rltb`	flush from right to left and top to bottom
`here`	try to place the graphic here
`fixd`	force the graphic here and don't float
`fxtb:c*r`	place the graphic at (c,r) or lower if needed
`fxbt:c*r`	place the graphic at (c,r) or higher if needed
`tops`	place the graphic at the top of the page
`bots`	place the graphic at the bottom of the page
`page`	place the graphic at a separate page

In the next example we show the directional locations:



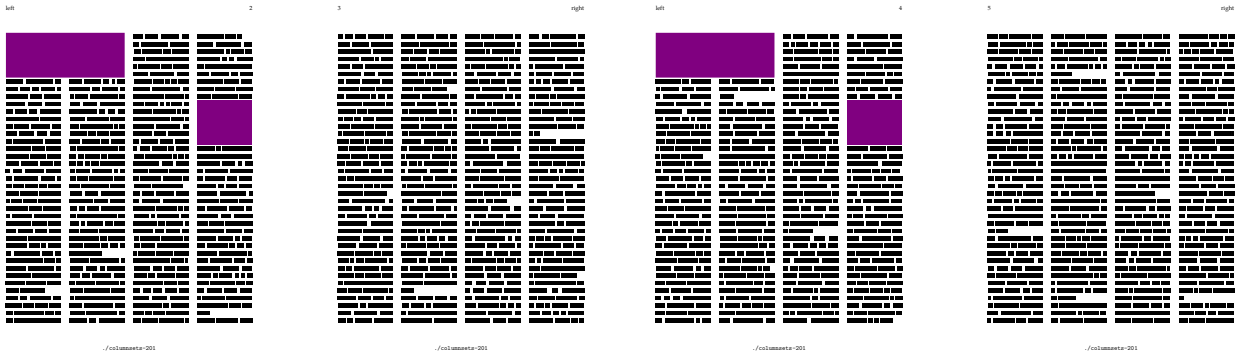
2

```
103  \definecolumnset[example][n=4,page=left]

     \starttext

     \startcolumnset[example]

     \useexternalfigure[fake][fake][width=\textwidth,lines=3]

     \placefigure[btlr]{brlr}{\externalfigure[fake]}
     \placefigure[btlr]{brlr}{\externalfigure[fake]}
```

```
\placefigure[btrl]{btrl}{\externalfigure[fake]}
\placefigure[btrl]{btrl}{\externalfigure[fake]}
\placefigure[tblr]{tblr}{\externalfigure[fake]}
\placefigure[tblr]{tblr}{\externalfigure[fake]}
\placefigure[tbrl]{tbrl}{\externalfigure[fake]}
\placefigure[tbrl]{tbrl}{\externalfigure[fake]}

\placefigure[lrbt]{lrbt}{\externalfigure[fake]}
\placefigure[lrbt]{lrbt}{\externalfigure[fake]}
\placefigure[lrtb]{lrtb}{\externalfigure[fake]}
\placefigure[lrtb]{lrtb}{\externalfigure[fake]}
\placefigure[rlbt]{rlbt}{\externalfigure[fake]}
\placefigure[rlbt]{rlbt}{\externalfigure[fake]}
\placefigure[rltb]{rltb}{\externalfigure[fake]}
\placefigure[rltb]{rltb}{\externalfigure[fake]}

\dorecurse{10}{\fakewords{50}{100}\par}

\stopcolumnset

\stoptext
```

Areas

So far we have seen texts and graphics that span multiple columns using span commands and floats placement commands. We have also seen that you can define a different number of columns for left and right pages. Now that we have arrives at column areas you will see how we can span information over not only a page but also over pages in a spread.

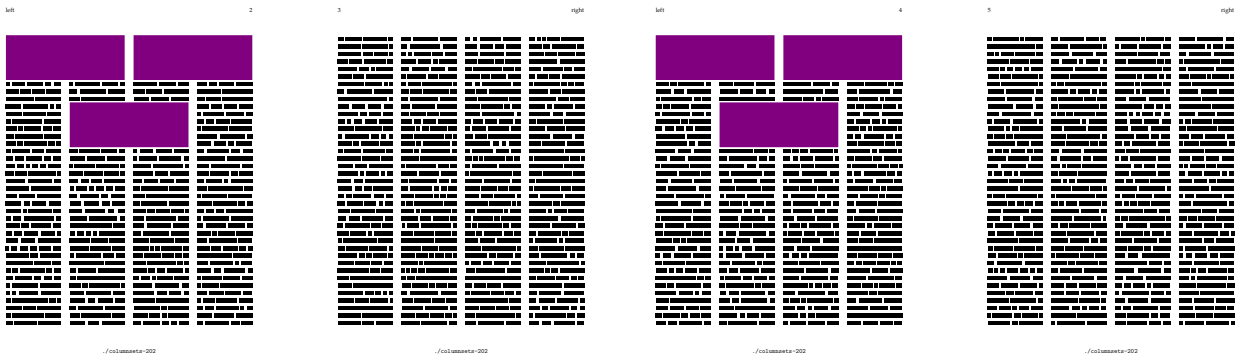


2 3 4 5

Being a framed text, by default an area is aligned at the baseline. You can lower an area by setting the `location` to `depth`.

```
201  \definecolumnset[example][n=4,page=left]

     \definecolumnsetarea
       [one]
       [type=both,
        x=1,y=1,nx=2,ny=6,
        background=contrast,
        state=repeat]

     \definecolumnsetarea
       [two]
       [type=both,
        x=4,y=10,nx=1,ny=6,
        background=contrast,
        state=repeat]

     \starttext

     \startcolumnset[example]

       \dorecurse{40}{\fakewords{50}{100}\par}

     \stopcolumnset

     \stoptext
```

You can position areas on the left, right or next page or on both pages. When you set `state` to `repeat`, an area is repeated, otherwise it is only placed once.

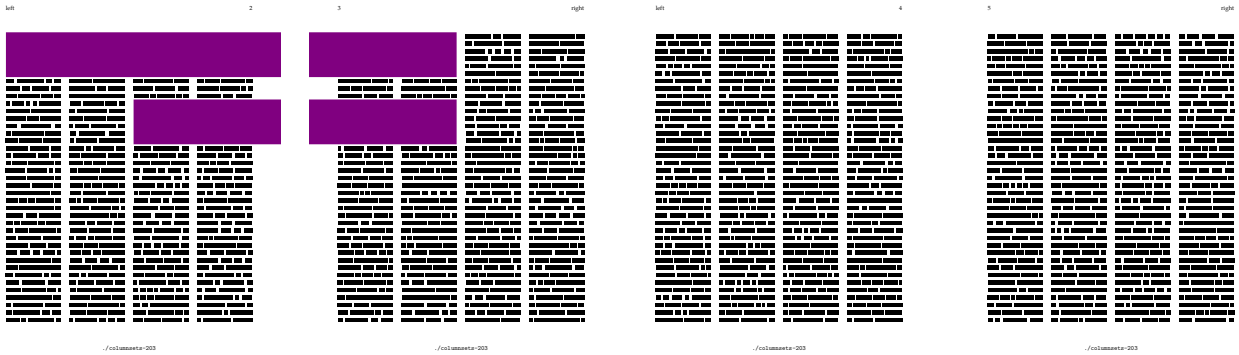


2 3 4 5

Here we just repeat the areas. Normally this only make sense when the content is worth repeating.

```
202  \definecolumnset[example][n=4,page=left]

\definecolumnsetarea
  [one][left]
  [x=1,y=1,nx=2,ny=6,
   background=contrast,state=repeat]

\definecolumnsetarea
  [two][right]
  [x=3,y=1,nx=2,ny=6,
   background=contrast,state=repeat]

\definecolumnsetarea
  [three][both]
  [x=2,y=10,nx=2,ny=6,
   background=contrast,state=repeat]

\starttext

\startcolumnset[example]

  \dorecurse{30}{\fakewords{50}{100}}

\stopcolumnset

\stoptext
```

Areas can span a spread, as is demonstrated in the next example.



2 3 4 5

```
203  \definecolumnset[example][n=4,page=left]

     \definecolumnsetarea
       [one]% [left]
       [x=1,y=1,nx=6,ny=6,
        background=contrast,state=start]

     \definecolumnsetarea
       [two]%[left]
       [x=3,y=10,nx=4,ny=6,
        background=contrast,state=start]

     \stopsetups

     \starttext

     \startcolumnset[example]

       \dorecurse{25}{\fakewords{50}{100}}

     \stopcolumnset

     \stoptext
```

An application of a spread area is a title. In the next example we show two spread pages.

2 3 4 5

Watch how we explicitly go to a left page.

```
\definecolumnset[example][n=4,page=left]

\definecolumnsetarea
  [title]
  [x=1,y=1,nx=8,ny=8,
   background=contrast,
   color=white,
   align={lohi,right},
   state=start]

\setupcolumnsetareatext
  [title]
  [\setups{the title}]

\startsetups[the title]

  \GapText
    {\dimexpr\makeupwidth+\backspace\relax}
    {6pt}
    {RegularBold*default} {sa 4}
    {A Title Spanni\+ng 2 Pages}

\stopsetups

\starttext

\startcolumnset[example]

  \dorecurse{30}{\fakewords{50}{100}\par}

\stopcolumnset

\stoptext
```

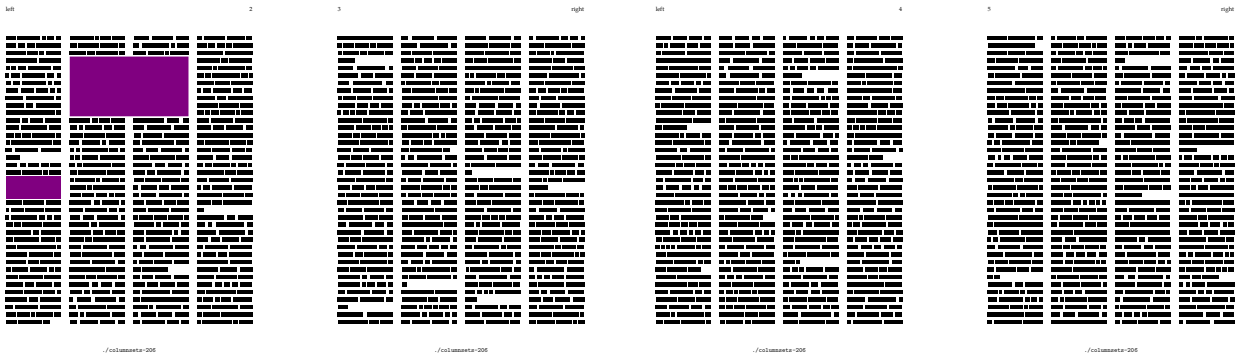
The \GapText macro is an experimental fun macro and is used to make sure that we don't end up with a clipped character.

left page right page

This is a typical example of the kind of optimizations that are needed when you make documents of styles with text that spans a spread. In the next clip we visualize the gap.

left page right page

At some moment you may want to set up an area in advance as we have done in the following example.



2 3 4 5

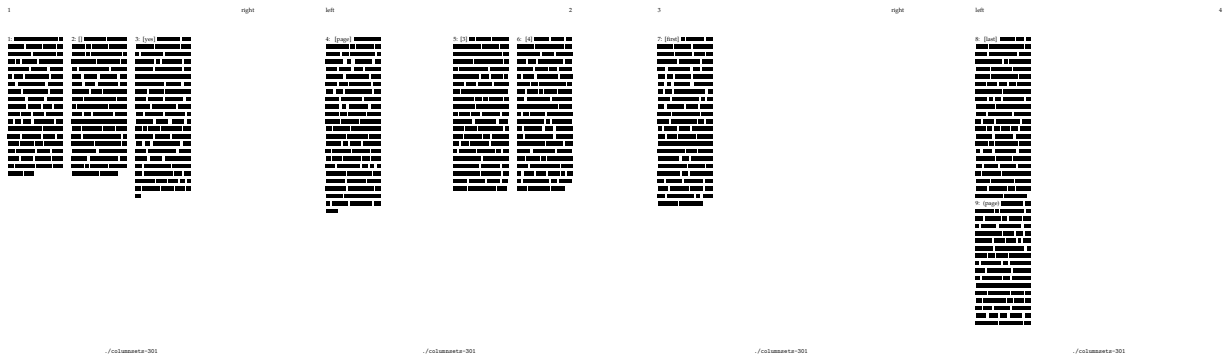
The page key is used to specify the page in the column set that the area should go into. Column set pages start numbering at 1. The fixed stands for left or right, whatever comes first.

```
206 \definecolumnset[example][n=4,page=left]

    \definecolumnsetarea
```

```
  [first]
  [x=2,y=4,nx=2,ny=8,
   background=contrast,
   state=start]

\definecolumnsetarea
  [second]
  [x=1,y=20,nx=1,ny=3,
   background=contrast,
   state=start]

\starttext

\startcolumnset[example]

  \dorecurse{50}{\fakewords{50}{100}\par}

\stopcolumnset

\stoptext
```

Columns

You can use \page to go to a new page in a column set. Likewise you can use \column to force a column break.



1 2 3 4

This example demonstrates that you can supply \column with explicit directives.

```
301  \definecolumnset[example][n=4]

     \starttext

     \startcolumnset[example]

        1:          \fakewords{50}{75} \column
        2: []       \fakewords{50}{75} \column[yes]
        3: [yes]    \fakewords{50}{75} \column[page]
                                       \column[page] % redundant
        4: [page]   \fakewords{50}{75} \column[3]
        5: [3]      \fakewords{50}{75} \column[4]
        6: [4]      \fakewords{50}{75} \column[first]
        7: [first]  \fakewords{50}{75} \column[last]
        8: [last]   \fakewords{50}{75} \page
        9: (page)   \fakewords{50}{75} \page
                                       \page % redundant
       10: (page)   \fakewords{50}{75} \column[3*5]
       11: [3*5]    \fakewords{50}{75}

     \stopcolumnset

     \stoptext
```

You can use \column[page] as an alternative for \page.

Details

This chapter will cover a couple of cosmetic details of column sets. *Some features need to be improved, especially in combination with areas, graphics and alike. We will also provide side floats etc.*

2 3 4 5

You can set the distance between columns for each pair of columns. *Todo: left and right page distances and margins.*

```
401  \definecolumnset[example][n=4,page=left]

     \setupbackgrounds[text][text][background=contrast]

     \definecolor[fakerulecolor][white]

     \setupcolumnset[example:2][distance=36pt]
     \setupcolumnset[example:3][distance=72pt]
     \setupcolumnset[example:4][distance=24pt]
     \setupcolumnset[example:5][distance=48pt]

     \starttext

     \startcolumnset[example]

       \dorecurse{25}{\fakewords{100}{150}\par}

     \stopcolumnset

     \stoptext
```

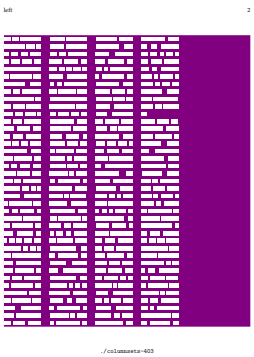
When you can the distance of the first column as well. This creates a margin.

2 3 4 5

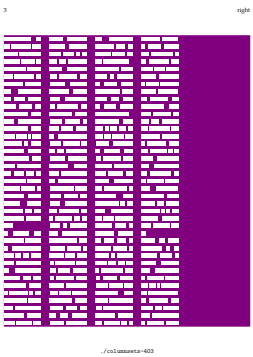
This time we used equal distances:

```
402  \definecolumnset[example][n=4,page=left]

     \setupbackgrounds[text][text][background=contrast]

     \setupcolumnset[example]  [distance=24pt]
     \setupcolumnset[example:1][distance=96pt]

     \definecolor[fakerulecolor][white]

     \starttext

     \startcolumnset[example]

       \dorecurse{25}{\fakewords{100}{150}\par}

     \stopcolumnset

     \stoptext
```

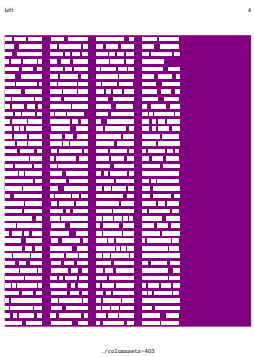
The width of columns is normally calculated automatically, but you can also set the width explicitly:



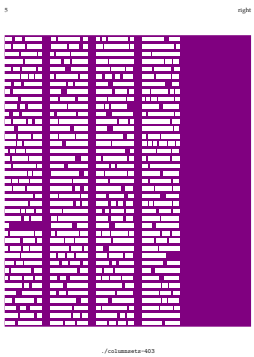
2



3



4

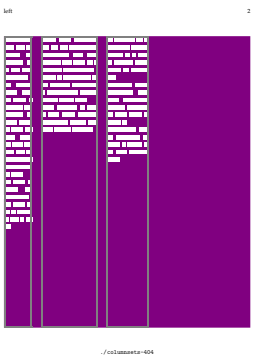


5

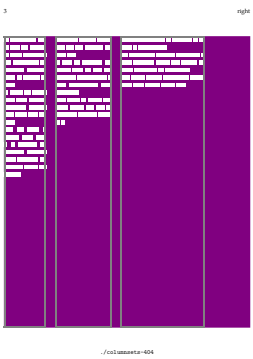
In code:

```
403  \definecolumnset[example][n=4,page=left]
     \setupbackgrounds[text][text][background=contrast]
     \definecolor[fakerulecolor][white]
     \setupcolumnset[example][width=.15\makeupwidth]
     \starttext
     \startcolumnset[example]
       \dorecurse{25}{\fakewords{100}{150}\par}
     \stopcolumnset
     \stoptext
```

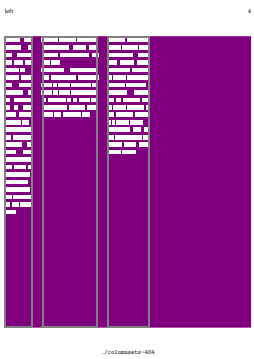
For special effects, you can set the width per column. In that case you need to be aware of the fact that TEX works its way through the document per paragraph. Changing the width halfway a paragraph is possible but will affect the whole paragraph. Therefore, this feature works best when you also goto the next column explicitly.



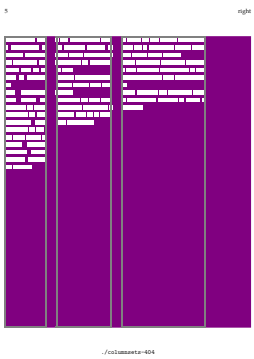
2



3



4



5

In code:

```
404  \definecolumnset[example][n=3,page=left]

     \setupbackgrounds[text][text][background=contrast]

     \setupcolumnset[frame=on,framecolor=color-4,rulethickness=1mm]

     \definecolor[fakerulecolor][white]

     \setupcolumnset[example:1][width=2cm]
     \setupcolumnset[example:2][width=4cm]
     \setupcolumnset[example:3][width=3cm]

     \setupcolumnset[example:4][width=3cm]
     \setupcolumnset[example:5][width=4cm]
     \setupcolumnset[example:6][width=6cm]

     \starttext

     \startcolumnset[example]

     \dorecurse{15}{
       \dorecurse{3}{\fakewords{10}{15}\par}
       \column[yes]
     }

     \stopcolumnset

     \stoptext
```

If you really want to change the width in the middle of a paragraph, you can do a trial run and include a breakpoint at the palce where you want it to occur:

2 3 4 5

In the second spread you see how the narrow hsize carries on in the wider column. A `\column` command will synchronize the hsize.

```
405  \definecolumnset[example][n=4,page=left]

     \setupbackgrounds[text][text][background=contrast]

     \setupcolumnset[frame=on,framecolor=color-4,rulethickness=1mm]

     \definecolor[fakerulecolor][white]

     \setupcolumnset[example:1][width=.3\makeupwidth]

     \starttext

     \startcolumnset[example]

       \fakewords{150}{150}
       \column
       \fakewords{25}{50}

       \dorecurse{25}{\fakewords{50}{75}\par}

     \stopcolumnset

     \stoptext
```

'LUHFWLRQV

7KH GLUHFWLRQ RI êXVKLQJ FROXPQV GLUHFWLRQ SURSHUW\ GHPR
VWUDWHG EHORZ

?GHILQHFROXPQVHW>H[DPSOH@>Q SDJH OHIW GLUHFWLRQ UHY

?VHWXSEDFNJURXQGV>WH[W@>WH[W@>EDFNJURXQG FRQWUDVW@

?GHILQHFRORU>IDNHUXOHFRORU@>FRORU @

?VWDUWWH[W

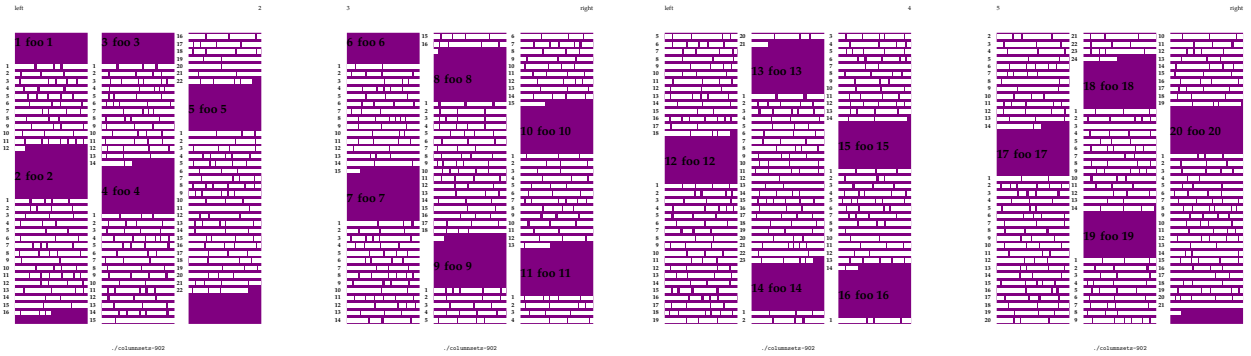
?VWDUWFROXPQVHW>H[DPSOH@

?GRUHFXUVH^ `^
?GRQWOHDYHKPRGH
?VQDSWRJULG?KER[
^?VFDOH>KHLJKW ?OLQHKHLJKW@^?FRORU>ZKLWH@^ ```
?VSDFH
?IDNHZRUGV^ `^ `
?VLPXODWHZRUGV>Q P PLQ PD[FRORU FRORU OLQH
?SDU
`

?VWRSFROXPQVHW

?VWRSWH[W

```
\stopcolumnset

\stoptext
```



2 3 4 5

In a three column setup the numbers end up in the left margins.Make sure you make the distance large enough.

```
902 \definecolumnset[example][n=3,page=left,distance=1cm]

\setupcolumnset
  [example]
  [background=contrast]

\definecolor[fakerulecolor][white] \faketriggertrue

\setuphead
  [section]
  [style=\bfd]

\setuplinenumbering
  [style=bold,
   distance=0pt,
   align=inner]

\starttext

\startcolumnset[example]

  \dorecurse{30}{
    \startsection[title=foo #1]
      \startlinenumbering
        \fakewords{50}{100}\par
      \stoplinenumbering
    \stopsection
  }

\stopcolumnset

\stoptext
```