The Octavo Package

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Abstract

The Octavo package is a modification of the standard LATEX book class, written to help produce books of classical design, format and layout. The page sizes made available are the classical octavo sizes and the margins are calculated according to late Gothic precepts. An attempt is made to maintain the uniformity of the printing grid, and display is kept unobtrusive.

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1 Introduction

Donald Knuth developed TEX because of his growing dissatisfaction with the commercial typesetting of his books 'The Art of Computer Programming' [4]. The program grew into a typesetting system, with a great deal of attention and ingenuity devoted to the calculations of the placement of letters, words and paragraphs on the page. The preface of the *TEXbook* begins with the words 'This is a handbook about TEX, a new typesetting system intended for the creation of beautiful books ...' [3]. More people began to use TEX, and, with the advent of LATEX, ready-made class files became part of the system. The standard style and class files tended to show off the capabilities of the system, rather than conform to good design. Philip Taylor put it with some humour and considerable precision: 'Knuth, in his closing exhortation, wrote: "GO FORTH now and create *masterpieces of the publishing art*." Nowhere, so far as I can trace, did he write: "and let every one of them shriek 'TEX' from every page"...' [9].

Class files have been proposed and are available from CTAN which give the more fastidious user the means with which to moderate at least some of the excesses of these standard LATEX styles. The KOMA package is a good example [7], and so is the excellent Memoir class of Peter Wilson [15]. The manual of Memoir is an especially worthwhile read, as publications on design and style in bookmaking are not necessarily easy to obtain or consult.

Nevertheless, class files continue to allow the user substantial leeway in design and layout, a degree of freedom which has lead and continues to lead to TEX-shrieking pages.

2 Background

To *make* a book is an interesting and somewhat involved process [10]. The text is set in type and printed on paper. The printing is done on large sheets of paper, which may have to be cut before

they are folded into signatures. The printed sheets are gathered, folded into signatures, and passed on to a bookbinder who sews the signatures into the book proper. The bound books are finally cut and covered.

As is so often the case with old and venerable crafts, a florid terminology developed which facilitated contacts between the guilds of printers and binders, while at the same time inspiring some sort of grudging respect in the uninitiated, keeping them at bay.

2.1 The paper sheets

The sheets of paper, the broadsides, come in a limited number of more or less standard sizes. Labarre's 'Dictionary and encyclopedia of paper and paper-making' [5] is an absorbing mine of information, listing amongst many other fascinating details, the names used to designate particular sheets of paper. In the Anglo-Saxon world, sheets are known as Foolscap, Crown, Post, Demy, Medium, Royal, Super Royal and Imperial (table 1).

Of course, different countries adopted their own habits and standards. It is well known that typographic standards in France developed in a different, separate way. The Didot point and the Cicero (some 7% larger than their Anglo-Saxon point and pica equivalent), the 'modern' typefaces with their characteristic vertical shading and hairline serifs, continue to exert their influence on European typesetting. It is therefore not surprising that there are also French sheets of paper (table 2).

Western typesetting began with Johannes Gutenberg, and the Germanic tradition is fundamental to the printing of books. The development and interactions with the other European styles of typography is engrossing and complex (McLean sketches some aspects of this history [6]; some informative

Sheet	Broadside (in)	Octavo (mm)	Ratio
Foolscap	13½ x 17	108 x 171	1.588
Crown	15 x 20	127 x 191	1.500
Post	15¼ x 19	121 x 194	1.605
Large Post	16½ x 21	133 x 210	1.571
Demy	17½ x 22½	143 x 222	1.556
Medium	18 x 23	146 x 229	1.565
Royal	20 x 25	159 x 254	1.600
Super Royal	21 x 27	171 x 267	1.556
Imperial	22 x 30	191 x 279	1.467

Table 1: Classical English sheet sizes

Sheet	Broadside (mm)	Octavo (mm)	Ratio
Cloche	300 x 400	100 x 150	1.500
Tellière	340 x 440	110 x 170	1.545
Coquille	440 x 560	140 x 220	1.571
Carré	450 x 560	140 x 225	1.607
Couronne	460 x 720	180 x 230	1.277
Royal	480 x 630	157 x 240	1.529
Raisin	500 x 650	162 x 250	1.543
Jésus	560 x 760	190 x 280	1.474
Colombier	620 x 850	212 x 310	1.462
Soleil	580 x 800	200 x 290	1.450
Grand Aigle	700 x 1040	260 x 350	1.346

Table 2: Classical French sheet sizes

Sheet	Broadside (mm)	Octavo (mm)	Ratio
Propatria	340 x 430	108 x 170	1.574
Bienenkorb	360 x 450	112 x 180	1.607
Bischof	380 x 480	120 x 190	1.583
Register	420 x 530	132 x 210	1.591
Kl.Median	440 x 560	140 x 220	1.571
Regal	440 x 670	167 x 220	1.317
Lexicon	500 x 650	162 x 250	1.543
Regal	500 x 720	180 x 250	1.388
Super Royal	540 x 680	170 x 270	1.588
Imperial	570 x 780	195 x 285	1.462

Table 3: Classical German sheet sizes

Sheet	(in)	(mm)	Ratio
letter	$8\,^1/_2$ x 11	216 x 279	1.292
legal	$8\,^1/_2$ x 14	216 x 356	1.648
executive	$7\,^1/_4$ x $10\,^1/_2$	184 x 267	1.451
A4	$8\,^1/_4$ x $11\,^3/_4$	210 x 297	1.414
A5	$5\,^7/_8$ x $8\,^1/_4$	148 x 210	1.414
B5	7 x $9\,^7/_8$	176 x 250	1.420

Table 4: Modern sheet sizes

articles on the subject can be found in Klein [2]; and there is also a good discussion in Williamson [14]). It does not come as a surprise then to find that differences and divergences extend to the dimensions of the sheets of paper printed on (table 3).

Folding the sheets adds another set of terms: a single fold yields a folio, a double fold a quarto, a triple fold an octavo and so on (fig. 1). Hence, the combination of a sheet name and the number of folds denotes a particular and precise size of the book [5, 14].

Jan Tschichold devoted his life to typography, and to the design and production of books. Over the years, he wrote extensively about many of his (changing) views and discoveries. Later in life, he assembled his findings in an overview, discussing in a more coherent, concentrated fashion many of the questions which face anyone wishing to make a book [12]. Of particular interest is his analysis of size and proportions of page, text and margins [11].

Through his historical investigations, he made a very strong and convincing case against the 'modern' tendency of making squarish books. His elegant, eloquent and well illustrated discourse remains valid today and guides us away from the ugliness of the convenient but rather square A format (proportion $1{:}\sqrt{2}$) back to the more rectangular formats with proportions tending towards the Golden Ratio (1:1.618). It is certainly no accident that the octavo-folded sheets of paper traditionally used in the printing of books show proportions which fall very nicely within this range (as you can see in tables 1 to 3). The traditional sheets yield two proportion groups, i.e., broadsheet, quarto, sextodecimo form the first set, while folio, octavo, trigesimo-secundo make up the other set. A crown sheet, for example, will change from a 3:4 proportion to a 2:3 proportion and back. In contrast, the ISO A series has the (dubious) advantage of retaining its proportions no matter how often it is folded. The price for the convenience of the $1{:}\sqrt{2}$ proportion is the ugliness of its squarish look. Comparing the entries in table 4 with the other tables shows the prevalence of this 'square' nature in the modern standard sheets.
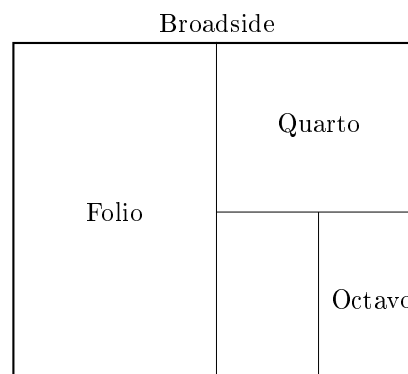

Figure 1: Folding terminology

text to page length	text area
6:9	44%
7:10	49%
8:11	53%
9:12	56%
10:13	59%

Table 5: Rosarivo's page division to text area

2.2 The spread

The size and the proportions of the typeblock, and their relations to the page, have greatly exercised the minds of the makers of books, and much ink has been spilled arguing in favour of and/or against any design. An excellent illustration of the plethora of designs is found in the second chapter of Wilson's manual of his memoir class [15]. He shows some 32 (!) different page designs which have been used in actual books, made between 1087 and 1995.

Tschichold realised that the first printers looked for the size and proportions of page and typeblock to the handwritten books. He reasoned that this would have led to the establishing of secret canons known only to the initiated of the workshops. He set out on the laborious task of trying to rediscover these canons through measuring many, many historical books. Tschichold succeeded, and published his findings in 1953. He found two methods, one prevalent in the Middle Ages, and a different, late Gothic one. It turned out that the latter canon had also been arrived at through a different construction by Van de Graaf [13] (fig. 2, on the left), adapting the method of the Picardian architect Villard de Honnecourt, who was active in the twelfth century. This method has been brought back to attention in modern times by Hans Kayser [1].
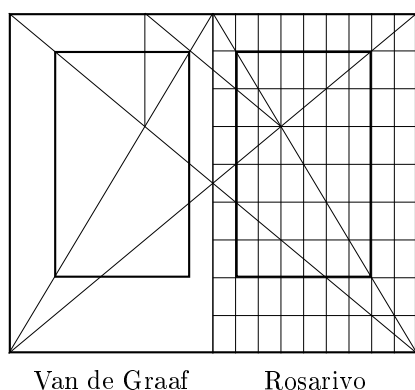

Figure 2: Methods of determining margins

Rosarivo confirmed this determination through his own, independent discovery of another method which, happily, yielded the same results [8]. Rosarivo's method is very easy to use and implement algorithmically: divide the height and width of the page into an equal number, assign one part to make up the inner and upper margins, and two parts to make up the outer and lower margins, with the remainder defining the area available for printing the body text (fig. 2, on the right).

The area occupied by the text block relative to the total area of the page follows directly from the number of divisions, as shown in table 5. It comes as something of a surprise to notice that only about half the area of a page is occupied with text. And yet, for centuries, the 6:9 division of page dimensions was very much the norm. Both Town and Williamson discuss the matter of margins at some length, and deplore the shrinking of white space with the advent of 'modern, economical' times [10, 14].

2.3 The typeblock

Determining the right amount of leading between lines of print is not a straightforward matter. It depends very much on the nature of the fount, its size, and the length of the line. Founts with very short extenders (of which Times is an example) require more leading than founts with normal or long extenders. The reader benefits considerably from more leading when the text is made up of long lines. But whatever leading is arrived at, it should remain fixed for the entire text, yielding a constant, regular grid of lines. At least, that has been the position of European printers. American printers took a different point of view, and preferred to maintain the unity of the printed block as a whole. Thus they have been prepared to upset the leading between or even within paragraphs in order to maintain the overall size of the printed area. Knuth developed TeX to deal especially with books containing mathematics, a notoriously difficult task for typesetters. The ingenuity required to deal algorithmically with this task is truly considerable, and compromises could hardly be avoided. The regularity of the printing grid was one victim of the solutions arrived at.

It should be clear by now that the standard book class included in LaTeX requires a fair amount of adjustment to reflect the design principles just highlighted. The Octavo package is an attempt to provide such a class file.

3 Rationale

For a great many decades, octavo-size books were the most prevalent of all, and it seemed apt to use

the name for an attempt to join and hopefully revive this tradition. The Octavo class is a modification of the standard LaTeX book class, with a similar, but limited, number of options and choices. These limitations are built in quite deliberately: it is the very point of this class to assist in the making of books following the particular design principles and guidelines which helped to produce beautiful books during the Renaissance.

The idea behind Octavo is to have a quiet, unobtrusive design which is not meant to shout at the reader, but rather gently helps her along. Three major features characterise Octavo:

- The page sizes are the classical octavo sizes.
- The margins are defined as the late Gothic ones.
- An attempt is made to maintain a uniform grid for the entire text.

Some of the lesser features are the following:

- All display is produced as quiet, unostentatious lines.
- Chapters and lower-order sections are left unnumbered.
- Figures, tables and equations are consecutively numbered throughout the document.
- Tables of contents, of figures, etc., do not use dotted lines.
- A title page is not made but can be requested.

More discussion of these points follows.

3.1 Page sizes

The definition of octavo-sized pages and the calculation of margins in harmony with the dimensions of the page is the necessary first step for the making of a beautiful book. It provides the canvas and the frame that will be with the reader for the entire length of the book. Their beauty, even if only subliminally noticed or appreciated, does contribute to the pleasure of holding and reading the book.

3.2 Margins

The margins are calculated by applying Rosarivo's method and dividing the page dimensions into ten, with seven parts for the text and three for the margins, which yields 49% area of the page with printed text. This is somewhat more generous usage of the page than the medieval tradition of a ninefold division with only 44% of the page covered by text, but such lavish margins would likely startle the modern reader. Headers and footers are placed outside this block, and thereby help to create a feeling of balance between occupied and white space on the page. Especially the consistent placing of the folio centered at the foot of all pages has such a beneficial effect.

3.3 Title page

A title page is an integral and very necessary part of any book. However, producing a satisfactory title page is not as straightforward a matter as it may seem at first. Even a superficial perusal of the many pages and examples devoted on the subject in the already cited works by Tschichold and Williamson will convince the reader that making a proper title page is not something to be done automatically [12, 14]. From a design perspective, it is neither feasible, nor desirable, to lay down hard and fast rules for the organisation or the placement of the various elements needed on a title page.

Apart from any design considerations, there are also some good practical reasons to make the title pages as a separate document. A great deal is gained by treating title pages as an integral part of the endpapers. When binding (good) books, endpapers fulfil both a functional and an æsthetic role [10]. The 'W', or 'zig-zag' endpaper in particular is a most useful and efficient kind of endpaper, and one which benefits considerably from the insertion of an extra folded sheet. This is the very place to put a title page sequence.

Ideally, a separate folio should be made, bearing on the first recto page the bastard title, on the verso possibly a frontispiece, or failing something suitable, left blank. The next recto bears title, author, publisher and the like, and the final verso provides space for the biblio or imprint. The equivalent should be done for the endpaper at the back of the book. It provides a good opportunity of bringing the colophon back into use: a folio bearing the colophon ought to be inserted in the back endpaper. By producing these pages separate from the main document, there is no interference with the page numbering, nor does it upset the way in which the signatures are assembled.

4 Implementation

4.1 Class options

The options available in Octavo are largely the same as those of the standard book class. However, their content and default settings are often different.

page size The predefined page sizes are, from smallest to largest: foolscap, crown, post, large-post, demy, medium, royal, superroyal and imperial. The default size is crown.

fount size The size options are the standard 10pt, 11pt and 12pt, with the default size set to 10pt. The choice of a fount size loads parameters and measures which depend on this size from one of the three class option files.

final/draft Similar to the book class: draft puts black marks where lines are overfull on the copy. The default is final.

(no)titlepage Contrary to the book class, the production of a title page is not encouraged: the default is therefore notitlepage. If you do wish to have a titlepage, you still have to issue the `\maketitle` command in your text.

open(right/any) New chapters normally start on a recto page, but some kinds of books, e.g., novels, may well be better off with chapters starting on either side. The default is openright.

(one/two)column The option to set text in two column is possibly useful in conjunction with the two or three largest page sizes (imperial, superroyal and royal). The default is onecolumn.

leqno,fleqno These two options deal with the setting of mathematical formulæ. leqno sets the equation number to the left of the formula, instead of the default right position. fleqno redefines the math display environment, setting equations flush with the left margin and indented by a `\mathindent` amount.

4.2 Printing grid

An attempt is made to maintain a uniform printing grid across the text. This means that ways and means had to be found to counteract the behaviour of some of the ingenious TeX algorithms. Rather than attempt what would amount to a rewriting of part of the TeX code, which really is too daunting a task, it seems possible to subvert the TeX algorithms and make it do our bidding after all with a judicious setting of parameters, lengths and sizes.

The first step taken is to set the textheight to an exact, natural number of `\baselineskip`. Next, `\parskip` is set to zero with no 'glue' extension, so that TeX will not be tempted to put extra leading between any paragraphs.

Dealing with the space surrounding headings in the text is somewhat more involved. The solution adopted is to use where at all possible multiples (and fractions) of the `\baselineskip`, and allow for some adjustments by specifying *negative* glue only. Inclusion of stretchable, positive glue may prompt TeX to stretch beyond the measure stated (under protest, but it will happen nevertheless), while TeX will never *shrink* glue beyond the measure given. A similar trick is applied to the space surrounding lists. In contrast, the definition of space surrounding floats does contain a modicum of stretchable glue, with the hope that TeX will fill in with a bit of white space around the float but leave the grid of printed text undisturbed.

Nevertheless, there will be times when the actual text, the parameters defined by Octavo, and TeX conspire to produce truly horrible results. Such misfortunes call for direct intervention, or, the user willing, suggestions of improving the definitions of the parameters proposed here for the Octavo class.

4.3 Quiet, unobtrusive design

Octavo yields quiet, gentle-looking texts thanks to a number of design choices. One highly effective decision was to avoid the use of bold founts altogether: none of the display uses it at all. Headers are set above the text in small capitals, following a suggestion by Williamson: it is both effective and discreet.

The headings used by chapters and sections are kept low-key as well, and are differentiated through the surrounding white space and their position away from the margin. Section headings are centered and set in small capitals, using the `\Large` fount size. Subsection headings are placed 1 em from the left margin and set in normal size small capitals. Sub-subsections are likewise placed 1 em away from the left margin, but have less white space above and below and are set in normal size italics.

An example of the layout produced by Octavo is probably more eloquent than this verbal description. Figure 3 is a reduced copy of a page spread made with Octavo, showing a chapter opening and various section titles, as well as the relation of the type block to the pages.
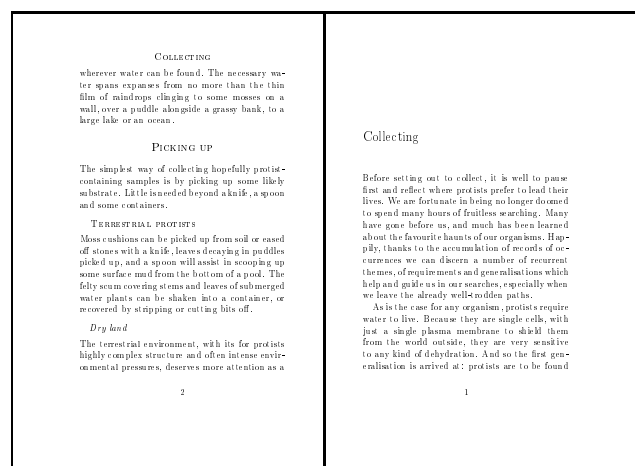

Figure 3: Example of Octavo output

Numbering is either simplified or has been done away with altogether. None of the headings bear numbers, as Octavo sets `\secnumdepth` to -2. This can be reset in the preamble of the text, if numbered

chapters and sections are absolutely required. Figures and tables are numbered consecutively throughout the book. The excellent capabilities of TeX to make and maintain cross-references leaves little in favour of maintaining a chapternumber.figurenumber type of scheme. With some trepidation, this numbering system is also applied to equations. There seems to be a substantial tradition of having a numbering system for equations which incorporates chapter and section numbers. As far as I can see, there is no particular need for such a system, once again bearing in mind the powerful cross-referencing capabilities of TeX, and it would also be inconsistent with the numbering system used for tables and figures.

A final, minor point is that tables of contents do not display the ugliness of dotted lines separating entries and page numbers. However, these can be brought back if required, by resetting `\@dotsep` to a smaller number.

5   Some hints on the making of books

Thanks to excellent works on bookbinding such as the book by Lawrence Town [10], the physical making of books lies well within reach of anyone caring to make the effort. With the availability of a number of additional programs from CTAN, it is a straightforward matter to organise and print out a text in signatures. Here are some of the means which have proven both useful and effective.

The four smallest paper sizes defined by Octavo, i.e., foolscap, crown, post and largepost, can be made to fit in pairs on an A4 sheet. Hence it is within reach of anyone with a run-of-the-mill printer to produce books in these formats. All that is required is a way in which to organise the pages into a sequence so that signatures can be made. This requires a few careful but simple adjustments.

The problem lies in the imposition of the pages on an A4 sheet. The four formats mentioned are all narrower than an A5 sheet, and hence extra space is left at the outer margins. This is not a problem with the odd-numbered pages, as their inner margin is made to coincide with the inner margin of the A5 sheet. However, even-numbered pages have their outer margin made to coincide with the outer margin of the A5 sheet, the latter of course being too wide. What is required is for the inner margins of the sheets to coincide. The simplest solution is to add the single line to the preamble of the document:

```
\addtolength{\evensidemargin}{offset}
```

(where `offset` is 148.5 mm − `\paperwidth` with A4 paper, and 139.7 mm − `\paperwidth` with letter paper) rather than try to reposition the even-numbered

pages with `dvidvi`, `dvips`, and the like. Once this is done, the production of signatures is straightforward.

Three steps are needed when using `dvips`:

1. `dvips -ta5` ⟨*file*⟩

2. `psbook -s16` ⟨*file*⟩`.ps` ⟨*file*⟩`.tmp`

3. `psnup -pa4 -Pa5 -l -2 -s1.0`
   ⟨*file*⟩`.tmp` ⟨*file*⟩`.ps`

while `dvihplj` or similar drivers can be instructed by setting a number of switches, e.g.,

```
prthpljh texfile +columns:2 +rows:1
    +section-size:4 +full-last-section
    +page-width:148.5mm +page-height:210mm
    +landscape-mode +double-sided:odd[even]
```

It may be necessary to instruct the printer to shift each page a little on the sheet to ensure perfect register, and a little experimenting is thus called for. These sets of commands and switches yield signatures made up of 16 pages on 4 sheets, just as one would expect from traditional printing on sheets which would be folded into an octavo format. Such an arrangement is very effective and handy when binding the book.

When sewing these signatures in library style, and particularly when opting for a hollow back, the amount of paper that tends to 'disappear' into the binding seldom exceeds 1 mm. It is therefore unnecessary to worry about shifting the pages varying amounts in function of their place in the signature.

6   Availability

Octavo is available from a CTAN near you, in the directory `/macros/latex/contrib/octavo`, under the LaTeX Project Public License. The distribution consists of `.dtx` and `.ins` files, which will generate the `octavo.cls`, `oct10.clo`, `oct11.clo` and `oct12.clo` files.

7   Acknowledgements

Octavo is a modification of `classes.dtx` written by Leslie Lamport (1992), Frank Mittelbach (1994–97) and Johannes Braams (1994–97). My own contribution is restricted to tweaking of some parameters and true credit is due to Lamport, Mittelbach and Braams for their monumental efforts.

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