

# L<sup>A</sup>T<sub>E</sub>X Style For Technical Information Reports of the Engineer Research and Development Center \*

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## Abstract

This package provides class for typesetting Technical Information Reports of the Engineer Research and Development Center, US Army Corps of Engineers.

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# 1 Introduction

Technical publications for Engineer Research and Development Center, US Army Corps of Engineers follow an elaborate style [1]. This style is accompanied by templates for a popular word processor software. In this class, commissioned by US Army Corps of Engineers, we try to recreate this style for L<sup>A</sup>T<sub>E</sub>X.

There are several kinds of documents described by [1]: Technical Report, Technical Note, Miscellaneous Paper, Contract Report, Letter Report, Monograph, Special Report, Brochure. In this class we follow the guidelines for Technical Reports (TR). However, it can be used for other kinds of documents as long as they do not differ much from Technical Reports.

## 2 User Guide

### 2.1 Installation

The class uses a number of L<sup>A</sup>T<sub>E</sub>X packages. Normally they should be present in any up-to-date distribution. If you do not have them, you can download them using the links below prior to using the class.

You will need `mathgifs` [2]: the L<sup>A</sup>T<sub>E</sub>X package providing the access to Microsoft Georgia and ITC Franklin Gothic. Of course you will need the fonts themselves. You will also need `graphics` bundle [3], packages `geometry` [4], `caption` [5], `ragged2e` [6], `longtable` [7], `dcolum` [8], `fancyhdr` [9], `natbib` [10] and `amsmath` [11].

The installation of the class follows the usual practice [12] for L<sup>A</sup>T<sub>E</sub>X packages:

1. Run `latex` on `erdc.ins`. This will produce the L<sup>A</sup>T<sub>E</sub>X class `erdc.cls`.
2. Put the files `erdc.cls`, `red_corps_castle2.eps` and `red_corps_castle2.pdf` to the place where L<sup>A</sup>T<sub>E</sub>X can find it (see [12] or the documentation for your T<sub>E</sub>X system).
3. Update the database of file names. Again, see [12] or the documentation for your T<sub>E</sub>X system for the system-specific details.
4. The file `erdc.pdf` provides the documentation for the package (this is the file you are probably reading now).

As an alternative to items 2 and 3 you can just put the file `erdc.cls` in the working directory where your `.tex` file is.

### 2.2 Invocation

To use the class, put in the preamble of your document

```
\documentclass[(options)]{erdc}
```

The class should work both with `latex` and `pdflatex` work flows. Accordingly it is supplied with US Army Corps of Engineers in both EPS and PDF formats.

	The class recognizes the standard L <sup>A</sup> T <sub>E</sub> X options, shared by the most document classes [13]. The default font size changing options ( <code>8pt</code> , <code>9pt</code> , ..., <code>12pt</code> ) have no effect other than producing a warning in the log since the font sizes of the class are fixed by the guidelines [1].
<i>options</i>	
<code>8pt</code>	
<code>9pt</code>	
<code>10pt</code>	
<code>11pt</code>	
<code>12pt</code>	
<b>2.3 Front Matter</b>	
<code>\frontmatter</code>	. The command <code>\frontmatter</code> starts the <i>Front Matter</i> of the document. This part includes title page, table of contents, list of figures, list of tables.
<code>\laboratory</code>	The cover page of the Technical Report should have the center name for Center-level reports or laboratory name for laboratory level reports. By default a technical report is assumed to be a Center-level one, and the center name (Engineering Research and Development Center) is printed in the cover page. The macro <code>\laboratory{&lt;Laboratory Name&gt;}</code> overrides this default, for example:  <code>\laboratory{Cold Regions Research and Engineering Laboratory}</code>
	A line break command <code>\\</code> can be used inside this command to achieve a desirable line break in the laboratory name if the automatic one is not right.
<code>\reportnum</code>	The command <code>\reportnum{&lt;Report Number&gt;}</code> is used to store the project number. For example,  <code>\reportnum{ERDC/CRREL SR-05-78}</code>
	The report number should include the laboratory abbreviation as its prefix.
<code>\program</code>	The command <code>\program{&lt;Program Title&gt;}</code> is used to store the title of the program. For example,  <code>\program{Military Engineering Technology}</code>
<code>\title</code>	The command <code>\title</code> is used to store project name: <code>\title{&lt;Title&gt;}</code> . For example:  <code>\title{A New Project}</code>
<code>\subtitle</code>	The command <code>\subtitle{&lt;Sub Title&gt;}</code> is used to store the project subtitle. For example,  <code>\subtitle{Model Investigation}</code>
<code>\date</code>	The macro <code>\date</code> stores the date of the document, for example  <code>\date{March 2009}</code>

`\author`        The macro `\author{⟨Authors⟩}` stores the names of authors that share the  
`\affiliation` same affiliation. The authors with the same affiliation should be listed in the  
`\and` same `\author` macro, separated by the keyword `\and`. Do not put commas and  
the word “and” between the authors’ names: L<sup>A</sup>T<sub>E</sub>X will take care of the proper  
punctuation. The macro `\affiliation{⟨Affiliation⟩}` stores the affiliation of the  
authors immediately preceding this command. If a report is prepared by several  
laboratories, or a laboratory and an outside contractor, then you should list the  
authors with the same affiliation, then show the affiliation, then repeat for the  
next affiliation. For example:

```
\author{A. U. Thor \and C. O. R. Respondent \and C. O. Author}
\affiliation{Construction Engineering Research Laboratory\
  U.S. Army Engineer Research and Development Center\
  2902 Newmark Drive\
  Champaign, IL 61826-9005}
\author{John M. Smith}
\affiliation{Coastal and Hydraulics Laboratory\
  U.S. Army Engineer Research and Development Center\
  3909 Halls Ferry Road\
  Vicksburg, MS 39180-6199}
```

Note that the guidelines [1] do not say how to typeset the authors that have several  
affiliations. Accordingly we do not deal with this case here.

`\coverart`       It is recommended to put some artwork on the cover of the title page. It is set  
up by the command `\coverart[⟨options⟩]{⟨file⟩}`. The syntax of the command  
is the same as the syntax of the command `\includegraphics` of the `graphicx`  
package [3]. The obligatory argument `{⟨file⟩}` is the name of the graphics file with  
the logo, and `[⟨options⟩]`, if present, may, for example, set the dimensions of the  
graphics. By default the graphics is scaled to cover the full width of the page.  
Note that our class uses the “extended” version `graphicx` of the package with its  
“key-value” syntax. For example,

```
\coverart[width=2in]{red_corps_castle2.eps}
```

The format of the graphics file depends on the T<sub>E</sub>X engine used. If you use  
`latex`→`dvips`→`pstopdf` route, then you need PostScript files (PS or EPS). If you  
use `pdflatex` engine, then you need graphics files in JPEG, PNG or PDF formats  
(see [12] for more information).

`\reporttype`     The type of the report is stored in the macro `\reporttype{⟨type⟩}`, for exam-  
ple:

```
\reporttype{Final Report}
```

`\distribution`    All reports should have a distribution statement. There are several standard  
distribution statements, approved by Department of Defense Directive 5230.24 [14].  
By default the reports have Statement A: *Approved for public release; distribution*

is unlimited. To change the default, use the macro `\distribution{<Distribution Statement>}`, for example

```
\distribution{Distribution authorized to U.S. Government Agencies
only; Test and Evaluation; November 2005. Other requests should be
referred to U.S. Army Engineer Research and Development Center}
```

`\preparedfor` By default the reports have the phrase *Prepared for U.S. Army Corps of Engineers, Washington, DC 20314-1000* on the title page. To change this designation, use the command `\preparedfor`, for example,

```
\preparedfor{U.S. Army Engineer Research and Development Center\
3909 Halls Ferry Road, Vicksburg, MS 39180-6199}
```

To delete this phrase altogether, use `\preparedfor{}`.

`\contractnum` Contract or work unit number is set by `\contractnum` command, for example

```
\contractnum{Work Unit 33143}
```

`\monitoredby` Contract reports are monitored by a controlling laboratory. Its name and address is set by this command, for example

```
\monitoredby{U.S. Army Engineer Research and Development Center\
3909 Halls Ferry Road, Vicksburg, MS 39180-6199}
```

`\additionalinfo` The command `\additionalinfo{<Additional Information>}` is used to store additional information for the title page, for example,

```
\additionalinfo{Supercedes TR-2345-12345}
```

`abstract` The abstract of the report is set using the environment `abstract`:

```
\begin{abstract}
This report disusses spins of electrons, protons and other
fermions.
\end{abstract}
```

`\disclaimer` By default all reports have the standard disclaimer. If its text should be changed for any reason, use the macro `\disclaimer{<New Disclaimer>}`, for example

```
\disclaimer{The contents of this report are not to be used for
advertising, publication, or promotional purposes. Citation of trade
names does not constitute an official endorsement or approval of the
use of such commercial products. All product names and trademarks
cited are the property of their respective owners. The findings of
this report are not to be construed as an official Department of the
```

Army position unless so designated by other authorized documents.

`\textbf{DESTROY THIS REPORT WHEN NO LONGER NEEDED. DO NOT RETURN IT TO THE ORIGINATOR.}}`

`\maketitle` The command `\maketitle` typesets the cover page, title page and abstract page of the report based on the data supplied by the macros above. It should therefore be issued *after* these macros.

`\tableofcontents` Table of contents is typeset with the usual L<sup>A</sup>T<sub>E</sub>X command [13] `\tableofcontents`.

`\listoffigures` This situation with the list of tables and the list of figures is slightly more involved.

`\listoftables` The guidelines [1] require the authors to combine the lists into the common list

`\listoffiguresandtables` called “Figures and Tables”, which is subdivided into Figures and Tables. The heading of this joint list is a chapter heading, while the headings of the sublists are on the section level. However, the guidelines say nothing about the situation where a report has only figures or only tables. Therefore we chose the following solution:

1. If you have *both* figures and tables, use `\listoffiguresandtables`. It will automatically typeset both lists according to the requirements [1]
2. If you have *only* figures or *only* tables, use either `\listoffigures` or `\listoftables` correspondingly. In this case the heading will be typeset on the chapter level.
3. If you have neither (probably a rare situation), do not use any of these commands.

`\chapter` In the front matter the command `\chapter` produces an *unnumbered* chapter, so the commands `\chapter{Preface}` and `\chapter*{Preface}` give the same result (see also Section 2.4 below).

## 2.4 Main Matter

`\mainmatter` The main matter starts with the macro `\mainmatter`. The text is divided into chapters, sections and subsections in the usual L<sup>A</sup>T<sub>E</sub>X manner. All familiar L<sup>A</sup>T<sub>E</sub>X commands and packages should work without problems. Note that unlike articles, reports have chapters as the highest subdivisions. The chapters are numbered, while sections and subsections are not.

`\chapter` One important difference between the standard L<sup>A</sup>T<sub>E</sub>X and our class is the following. In standard L<sup>A</sup>T<sub>E</sub>X the starred command `\chapter*` produces an unnumbered chapter, that does not go into the table of contents. In our class *all* chapters, numbered or not, go into the table of contents.

`\chapter*` Tables should have the caption *above* the tabular material rather than below it as in standard L<sup>A</sup>T<sub>E</sub>X. The class automatically sets the proper spacing for this arrangement, but it is the user’s responsibility to put the `\caption` command before the `tabular` environment, for example

```

\begin{table}
  \centering
  \caption{Yearly Dividends}
  \label{tab:dividends}
  \footnotesize\sffamily
  \begin{tabular}{|l|D{.}{.}{2.2}|}
    \hline\hline
    \textbf{Year} & \multicolumn{1}{|c|}{\textbf{Dividends, \%}}\backslash
    \hline\hline
    $1880$ & 2.50 \backslash
    \hline
    $1881$ & 12.1 \backslash
    \hline
    $1882$ & 2.6 \backslash
    \hline\hline
  \end{tabular}
\end{table}

```

Note that the guidelines [1] recommend excessive rules in the tables, with borders around the cells, as shown in the example above. This is usually frowned upon in the good typesetting practice.

The guidelines [1] recommend use footnotesize sans serif entries in the tables itself. The class does *not* do this automatically: the users should put `\footnotesize\sffamily` before `\begin{tabular}`, as shown in the example above.

The guidelines require the centering of numerical columns on decimal point. The class automatically loads `dcolumn` package, so to get aligned columns use the special column designator `D{.}{.}{ $\langle n.m \rangle$ }` where  $n$  and  $m$  are the numbers of decimal points before and after the dot correspondingly. It is possible to achieve other effects with this package like centering on the multiplication sign; see the documentation [8] for further information.

`\fbox` The guidelines [1] require the graphics to be surrounded by a hairline box. This is done by the standard `\fbox` command, for example

```

\begin{figure}
  \centering
  \fbox{\includegraphics[width=3in]{plot}}
  \caption{Plot of  $f(x)$ }
  \label{fig:plot}
\end{figure}

```

The guidelines [1] require equations to be individually centered. This probably precludes the use of `eqnarray` environment and such `amsmath` constructions as `align`, `aligned`, `alignedat` etc.

## 2.5 Back Matter

`\appendix` Back matter in ERDC reports consists of the bibliography, appendices and distri-

bution forms. The standard L<sup>A</sup>T<sub>E</sub>X command `\appendix` changes the numeration of chapters according to the rules [1]. It should be issued after the bibliography, but before the appendices.

The reports should contain Form 298 (see, for example, <http://www.ntis.gov/pdf/rdpform.pdf>). This form should be typeset separately.

## 3 Implementation

### 3.1 Identification

We start with the declaration who we are. Most `.dtx` files put driver code in a separate driver file `.drv`. We roll this code into the main file, and use the pseudo-guard `<gobble>` for it.

```
1 <class>\NeedsTeXFormat{LaTeX2e}
2 <*gobble>
3 \ProvidesFile{erdc.dtx}
4 </gobble>
5 <class>\ProvidesClass{erdc}
6 [2009/07/22 v1.1 Typesetting Technical Information Reports of
7 the Engineer Research and Development Center (ERDC),
8 US Army Corps of Engineers]
```

And the driver code:

```
9 <*gobble>
10 \documentclass{ltxdoc}
11 \usepackage{array}
12 \usepackage{url,amsfonts}
13 \usepackage[breaklinks,colorlinks,linkcolor=black,citecolor=black,
14             pagecolor=black,urlcolor=black,hyperindex=false]{hyperref}
15 \PageIndex
16 \CodelineIndex
17 \RecordChanges
18 \EnableCrossrefs
19 \begin{document}
20   \DocInput{erdc.dtx}
21 \end{document}
22 </gobble>
23 <*class>
```

### 3.2 Options

`\erdc@size@warning` The font-changing options are not used in our setup, so we just produce a warning:

```
24 \long\def\erdc@size@warning#1{%
25   \ClassWarning{erdc}{Size-changing option #1 will not be
26     honored}}%
27 \DeclareOption{8pt}{\erdc@size@warning{\CurrentOption}}%
28 \DeclareOption{9pt}{\erdc@size@warning{\CurrentOption}}%
29 \DeclareOption{10pt}{\erdc@size@warning{\CurrentOption}}%
30 \DeclareOption{11pt}{\erdc@size@warning{\CurrentOption}}%
31 \DeclareOption{12pt}{\erdc@size@warning{\CurrentOption}}%
```

All other options are just sent to the main class:

```
32 \DeclareOption*{\PassOptionsToClass{\CurrentOption}{report}}
33 \ProcessOptions\relax
```

### 3.3 Loading Class and Packages

We start with the base class and some packages

```
34 \LoadClass[12pt,twoside]{report}
35 \RequirePackage{graphicx,color,caption,longtable}
```

We use dcolumn for dot-centered columns:

```
36 \RequirePackage{dcolumn}
```

We use natbib [10] for bibliography formatting:

```
37 \RequirePackage{natbib}
38 \renewcommand{\bibfont}{\fontsize{10pt}{12pt}\selectfont}
39 \setlength{\bibhang}{0.5in}
40 \setlength{\bibsep}{12pt}
```

We load amsmath since we want to change the equation numbering scheme: amsmath redefines it.

```
41 \RequirePackage{amsmath}
```

We do not want the option document with ragged2e: this calls footmisc, while we want our own footnotes:

```
42 \RequirePackage[originalcommands]{ragged2e}
43 \setlength\RaggedRightParindent{\parindent}
44 \RaggedRight
```

### 3.4 Fonts

`\normalsize` The size is basically from [15], but with some changes according to our fonts:

```
45 \renewcommand\normalsize{%
46   \setfontsize\normalsize\xiip{16}%
47   \abovedisplayskip 16\p@ \@plus3\p@ \@minus7\p@
48   \abovedisplayshortskip \z@ \@plus3\p@
49   \belowdisplayshortskip 6.5\p@ \@plus3.5\p@ \@minus3\p@
50   \belowdisplayskip \abovedisplayskip
51   \let\@listi\@listI}
52 \normalsize
```

We use Georgia for the main font, matching Franklin Gothic for the sans serifed font, and Courier for the monospaced font:

```
53 \usepackage{mathgiff}
54 \usepackage{courier}
```

`\@laboratoryfont` Font to typeset the laboratory on the cover

```
55 \def\@laboratoryfont{%
56   \sffamily\bfseries\fontsize{22pt}{25pt}\selectfont}
```

`\@reportnumfont` Font to typeset the report number on the cover

```
57 \def\@reportnumfont{%
58   \sffamily\bfseries\fontsize{18pt}{22pt}\selectfont}
```

```

\@programfont Font to typeset the program on the cover
59 \def\@programfont{%
60 \sffamily\fontseries{k}\itshape\normalsize\selectfont}

\@titlefont Font to typeset the title on the cover and chapter numbers
61 \def\@titlefont{%
62 \sffamily\fontseries{h}\fontsize{20pt}{25pt}\selectfont}

\@distributionfont Font to typeset the distribution statement
63 \def\@distributionfont{%
64 \sffamily\fontseries{k}\fontsize{9pt}{11pt}\selectfont}

\@eqtagfont The font for the equations
65 \def\@eqtagfont{\sffamily\bfseries\footnotesize}

```

### 3.5 Page Dimensions and Paragraphing

The requirements are 1.25" (top), 0.7" (bottom), 1.5" (left), and 1.5" (right). However, we need to add for the headers.

```

66 \RequirePackage[letterpaper, top=1in, bottom=0.7in,
67 left=1.5in, right=1.5in]{geometry}

\parindent The paragraphs have no indentation...
68 \setlength{\parindent}{0pt}

\parskip ... and there is one baseline skip between paragraphs
69 \setlength{\parskip}{\baselineskip}

\labelwidth The width of label for enumerate and itemize environments
70 \setlength\labelwidth{1em}

\leftmargini We align lists with the body
71 \setlength\leftmargini\z@
72 \addtolength\leftmargini\labelwidth
73 \addtolength\leftmargini\labelsep

\itemize We want left-aligned bullets:
74 \def\itemize{%
75 \ifnum \@itemdepth >\thr@@\toodeep\else
76 \advance\@itemdepth\@ne
77 \edef\@itemitem{labelitem\romannumeral\the\@itemdepth}%
78 \expandafter
79 \list
80 \csname\@itemitem\endcsname
81 {\def\makelabel##1{##1}}%
82 \fi}

```

```

\enumerate We left-align numbers
83 \def\enumerate{%
84   \ifnum \@enumdepth >\thr@@\@toodeep\else
85     \advance\@enumdepth\@ne
86     \edef\@enumctr{enum\romannumeral\the\@enumdepth}%
87     \expandafter
88     \list
89     \csname label\@enumctr\endcsname
90     {\usecounter\@enumctr\def\makelabel##1{##1}}%
91     \fi}

```

```

\widowpenalty We forbid widows and clubs. To prevent too extended pages we use \raggedbottom:
\clubpenalty 92 \widowpenalty=10000
93 \clubpenalty=10000
94 \raggedbottom

```

### 3.6 Headers and Footers

We use fancyhdr:

```
95 \RequirePackage{fancyhdr}
```

```

\headrulewidth Decorative rules:
\footrulewidth 96 \renewcommand{\headrulewidth}{0.5pt}
97 \renewcommand{\footrulewidth}{0pt}

```

```

\fancyhfoffset Headers are wider than the text
98 \fancyhfoffset{35pt}

```

We do not have headers:

```

99 \pagestyle{fancy}
100 \lhead{\textsf{\textbf{\footnotesize\@reportnum}}}
101 \rhead{\textsf{\textbf{\footnotesize\thepage}}}
102 \chead{}

```

We do not have footers:

```

103 \lfoot{}
104 \cfoot{}
105 \rfoot{}

```

### 3.7 Main Subdivisions

```

\if@frontmatter The switch whether we are in the frontmatter
106 \newif\if@frontmatter
107 \@frontmatterfalse

```

```

\if@appendix The switch whether we are in the appendix
108 \newif\if@appendix
109 \@appendixfalse

```

```

\frontmatter Starting front matter
110 \def\frontmatter{%
111   \pagenumbering{roman}%
112   \@frontmattertrue
113   \@appendixfalse}

\mainmatter Starting main matter
114 \def\mainmatter{%
115   \cleardoublepage
116   \pagenumbering{arabic}%
117   \@frontmatterfalse
118   \@appendixfalse}

\appendix Start appendices
119 \def\appendix{%
120   \clearpage
121   \@frontmatterfalse
122   \@appendixtrue
123   \@addtoreset{table}{chapter}%
124   \@addtoreset{equation}{chapter}%
125   \@addtoreset{figure}{chapter}%
126   \setcounter{chapter}{0}%
127   \setcounter{section}{0}%
128   \gdef\@chapapp{\appendixname}%
129   \gdef\thechapter{\@Alph\c@chapter}%
130   \gdef\thefigure{\@Alph\c@chapter\@arabic\c@figure}%
131   \gdef\thetable{\@Alph\c@chapter\@arabic\c@table}%
132   \gdef\theequation{\@Alph\c@chapter\@arabic\c@equation}}

```

### 3.8 Cover and Title Pages

```

\laboratory This macro sets up the laboratory name:
133 \def\laboratory#1{\gdef\@laboratory{#1}}
134 \laboratory{Engineer Research and\Development Center}

\reportnum Report number:
135 \def\reportnum#1{\gdef\@reportnum{#1}}
136 \reportnum{ERDC TR-01-01}

\program Program:
137 \def\program#1{\gdef\@program{#1}}
138 \program{}

\subtitle Subtitle:
139 \newcommand{\subtitle}[1]{\gdef\@subtitle{#1}}
140 \def\@subtitle{}

```

The author and affiliation processing follows the ideas of [16]. We lift most of the code from there.

The general function to convert a list of items in the form

`A\and B\and C\and D`

to the form ‘A, B, C, and D’ is `\xandlist`:

`\xandlist{, }{ and }{, and }{A\and B\and C\and D}`

This is a completely expandable macro, with the return value being the converted list. There is also a ‘no-execute’ version whose fourth argument should be a macro; the text to be converted will be taken from that macro and after conversion will be put back as the macro’s new replacement text.

`\nxandlist{, }{ and }{, and }\result`

I don’t think I want to explain this except by recommending that you watch it in operation with `\tracingmacros` if you’re interested. [mjd,1994/10/19]

```

141 \newcommand{\xandlist}[4]{\@andlista{#1}{#2}{#3}#4\and\and}
142 \def\@andlista#1#2\and#3\and{\@andlistc{#2}\@ifnotempty{#3}{%
143 \@andlistb#1{#3}}
144 \def\@andlistb#1#2#3#4#5\and{%
145 \@ifempty{#5}{%
146 \@andlistc{#2#4}%
147 }{%
148 \@andlistc{#1#4}\@andlistb{#1}{#3}{#3}{#5}%
149 }}
150 \let\@andlistc\@iden
151 \newcommand{\nxandlist}[4]{%
152 \def\@andlistc##1{\toks@\@xp{\the\toks@##1}}%
153 \toks@\{\toks@\@emptytoks \@andlista{#1}{#2}{#3}}}%
154 \the\@xp\toks@#4\and\and
155 \edef#4{\the\toks@}%
156 \let\@andlistc\@iden}

```

`andify` The `\andify` function is provided as a convenient abbreviation for the most common case. See also `\author@andify` (for `amsart` and `amsproc` only), which gives better results in cases with a large number of authors. Provide a substitutable text string to simplify language-specific modifications.

```

157 \def\@and{and}
158 \newcommand{\andify}{%
159 \nxandlist{\unskip, }\unskip{ \@and~}{\unskip, \@and~}}

```

Override the funny default definition of `\and` from `LATEX`. This is not actually used by AMS classes, however.

```

160 \def\and{\unskip{ }\@and{ }\ignorespaces}

```

This requires some other AMS math macros:

```
161 \let\@xp\expandafter\relax
162 \let\@nx=\noexpand
163 \def\@oparg#1[#2]{\@ifnextchar[#{1}{#1[#2]}}
164 \long\def\@ifempty#1{\@xifempty#1@..\@nil}
165 \long\def\@xifempty#1#2@#3#4#5\@nil{%
166   \ifx#3#4\@xp\@firstoftwo\else\@xp\@secondoftwo\fi}
167 \long\def\@ifnotempty#1{\@ifempty{#1}}
168 \def\setboxz@h{\setbox\z@\hbox}
169 \def\@addpunct#1{%
170   \relax\ifhmode
171     \ifnum\spacefactor>\@m \else#1\fi
172   \fi}
173 \newtoks\@emptytoks

\authors The full authors lists
174 \def\authors{}

\addresses The list of authors and addresses
175 \def\addresses{}

\author This also follows AMS ideas
176 \def\author#1{%
177   \ifx\@empty\authors\gdef\authors{#1}\else
178     \g@addto@macro{\authors}{\and#1}\fi
179   \ifx\@empty\@addresses\gdef\addresses{\author{#1}}\else
180     \g@addto@macro{\addresses}{\par\author{#1}}\fi}

\affiliation And affiliation
181 \def\affiliation#1{%
182   \ifx\@empty\@addresses\gdef\addresses{#1\par}\else
183     \g@addto@macro{\addresses}{#1\par\vspace{\baselineskip}}\fi}

\today We use only month and year in \today:
184 \def\today{\ifcase\month\or
185   January\or February\or March\or April\or May\or June\or
186   July\or August\or September\or October\or November\or December\fi
187   \space \number\year}

\coverart The \logo command has the same format as \includegraphics. It actually sets
up \includegraphics in \maketitle.
188 \newcommand{\coverart}[2] []{%
189   \def\@tempa{#1}%
190   \ifx\@empty\@tempa
191     \gdef\@coverart{\includegraphics[width=435\p@]{#2}}\else
192     \gdef\@coverart{\includegraphics[#1]{#2}}\fi}
193 \def\@coverart{}}
```

```

\reporttype Type of the report
194 \def\reporttype#1{\gdef\@reporttype{#1}}
195 \reporttype{}

\distribution Distribution of the report
196 \def\distribution#1{\gdef\@distribution{#1}}
197 \distribution{Approved for public release; distribution is unlimited.}

\preparedfor The organization that ordered the report
198 \def\preparedfor#1{\gdef\@preparedfor{#1}}
199 \preparedfor{U.S. Army Corps of Engineers\ \ Washington, DC 20314-1000}

\contractnum Contract number
200 \def\contractnum#1{\gdef\@contractnum{#1}}
201 \contractnum{}

\monitoredby Controlling lab
202 \def\monitoredby#1{\gdef\@monitoredby{#1}}
203 \monitoredby{}

\additionalinfo Anything else on the title page
204 \def\additionalinfo#1{\gdef\@additionalinfo{#1}}
205 \additionalinfo{}

\abstract We save abstract till later. Again, this is uses code from [16].
206 \newbox\abstractbox
207 \renewenvironment{abstract}{%
208   \global\setbox\abstractbox=\vtop \bgroup
209   \normalfont
210   \list{}{\labelwidth\z@
211     \leftmargin\z@ \rightmargin\leftmargin
212     \listparindent\z@ \itemindent\z@
213     \parsep16\p@ \topsep\z@
214     \let\fullwidthdisplay\relax
215   }%
216   \item[\hskip\labelsep\bfseries Abstract:]%
217 }{%
218   \endlist\egroup}

\disclaimer And disclaimer
219 \long\def\disclaimer#1{\long\gdef\@disclaimer{#1}}
220 \disclaimer{The contents of this report are not to be used for
221 advertising, publication, or promotional purposes. Citation of trade
222 names does not constitute an official endorsement or approval of the
223 use of such commercial products. All product names and trademarks
224 cited are the property of their respective owners. The findings of
225 this report are not to be construed as an official Department of the
226 Army position unless so designated by other authorized documents.

```

227  
 228 **\textbf{DESTROY THIS REPORT WHEN NO LONGER NEEDED. DO NOT RETURN IT**  
 229 **TO THE ORIGINATOR.}}**

**@coverlist** The title page consists of boxes, which are extended beyond the margins. Here we define the margins

```
230 \newenvironment{@coverlist}{\begin{list}{}{%
231     \leftmargin40\p@\rightmargin-85\p@%
232     \topsep\z@\partopsep\z@\labelwidth\z@\labelsep\z@}\item{}}{%
233     \end{list}}
```

**@titlelist** Similar to **@coverlist**, but for title page

```
234 \newenvironment{@titlelist}{\begin{list}{}{%
235     \leftmargin-20\p@\rightmargin100\p@%
236     \topsep\z@\partopsep\z@\labelwidth\z@\labelsep\z@}\item{}}{%
237     \end{list}}
```

**\if@titleblock** Title block consists of Prepared for, Work Under and Monitored By statements. We need to decide whether to print it:

```
238 \newif\if@titleblock
```

**@titleblock** This is the macro for title block:

```
239 \newenvironment{@titleblock}{%
240     \list{}{\labelwidth80\p@\labelsep10\p@ \leftmargin70\p@
241     \rightmargin-150\p@
242     \let\make\label\@titleblocklabel}}{\endlist}
```

**\@titleblocklabel** Small labels:

```
243 \newcommand*{\@titleblocklabel}[1]{\hfill\small#1}
```

**\maketitle** The **\maketitle** macro performs all the work of typesetting the information above. First, we typeset the cover page

```
244 \def\maketitle{%
245     \thispagestyle{empty}%
246     \enlargethispage{0.34in}%
247     \vspace*{-0.95in}
248     \makebox[0cm][r]{%
249         \raisebox{-720\p@}[\z@][\z@]{%
250             \rotatebox{90}{\makebox[\z@][l]{%
251                 \colorbox{red}{\color{white}\parbox{720\p@}{%
252                     \rule{0\p@}{85\p@}%
253                     \hspace{28\p@}\raisebox{40\p@}{%
254                         \parbox[c]{350\p@}{\@laboratoryfont\@laboratory}%
255                         \hspace{10\p@}%
256                         \parbox[c]{300\p@}{\hfill\@reportnumfont\@reportnum}}}}}}}%
257         \hspace*{-14\p@}}%
258         \makebox[0cm][r]{\raisebox{-720\p@}[\z@][\z@]{\rule{8\p@}{726\p@}%
259             \hspace{-26.75\p@}}}%
260     \begin{@coverlist}%
```

```

261 \sffamily\fontseries{k}\selectfont%
262 \hfill\parbox{145\p@}{
263 \includegraphics[width=65\p@]{red_corps_castle2}\
264 {\bfseries
265 US Army Corps\
266 of Engineers\raisebox{-1\p@}{\scriptsize\textregistered}}\
267 Engineering Research and\
268 Development Center}\par
269 \vspace{0.5cm}%
270 {\@programfont\@program\par}%
271 \vspace{0.3cm}%
272 {\raggedright\@titlefont\@title\par
273 \vspace{0.3cm}%
274 \normalsize\bfseries\@subtitle\par}%
275 \vspace{0.3cm}%
276 \begin{minipage}[t]{300\p@}\raggedright
277 \xandlist{\unskip, }{\unskip} \@@and~{\unskip} \@@and~\authors
278 \authors\end{minipage}%
279 \begin{minipage}[t]{135\p@}\flushright\@date\end{minipage}\par
280 \vspace{0.3cm}%
281 \@coverart
282 \end{@coverlist}%
283 \vfill
284 \begin{@coverlist}%
285 \@distributionfont\@distribution
286 \end{@coverlist}%
287 \newpage\thispagestyle{empty}\hbox{} \newpage

```

Now title page

```

288 %
289 \thispagestyle{empty}%
290 \setcounter{page}{1}%
291 \vspace*{-1.5in}%
292 \vspace*{-\topmargin}%
293 \begin{@titlelist}%
294 \sffamily\fontseries{k}\selectfont
295 \begin{minipage}[t]{275\p@}%
296 \bfseries\@program
297 \end{minipage}%
298 \begin{minipage}[t]{175\p@}%
299 \bfseries\flushright\@reportnum\\\@date
300 \end{minipage}\rule[-0.5in]{\z@}{0.625in}\par
301 \begin{minipage}{\textwidth}
302 \vspace*{1cm}%
303 {\@titlefont\raggedright\@title\par}
304 \vspace*{3\p@}%
305 \bfseries\@subtitle\par
306 \end{minipage}\rule[-0.7in]{\z@}{1in}\par

```

Inside title page we use special processing for authors' names

```

307 \def\author##1{%

```

```

308     \def\@tempa{##1}%
309     \xandlist{\unskip, }{\unskip} \@@and~{\unskip} \@@and~\@tempa
310     {\upshape\normalsize\@tempa}\par\vspace{6\p@}}%
311     \begin{minipage}{\textwidth}
312     \textit{\footnotesize\addresses}\par
313     \end{minipage}\rule[-2.7in]{\z@}{3.7in}\par
314     \begin{minipage}{\textwidth}
315     \@reporttype\par\vspace*{3\p@}%
316     {\@distributionfont\@distribution}\par}%
317     \end{minipage}
318 \end{@titlelist}%
319 \vfill
320 \begin{@titlelist}%
321     \sffamily\normalsize\fontseries{k}\selectfont
322     \ifx\@additionalinfo\@empty\else\@additionalinfo\par\fi
323     \@titleblockfalse
324     \ifx\@empty\@preparedfor\relax\else\@titleblocktrue\fi
325     \ifx\@empty\@contractnum\relax\else\@titleblocktrue\fi
326     \ifx\@empty\@monitoredby\relax\else\@titleblocktrue\fi
327     \if@titleblock
328     \begin{@titleblock}%
329         \ifx\@empty\@preparedfor\else
330             \item[Prepared for]\@preparedfor
331         \fi
332         \ifx\@empty\@contractnum\else
333             \item[Under]\@contractnum
334         \fi
335         \ifx\@empty\@monitoredby\else
336             \item[Monitored by]\@monitoredby
337         \fi
338     \end{@titleblock}
339     \fi
340 \end{@titlelist}%
341 \clearpage

Now half title page. Again see [16]

342 \ifvoid\abstractbox
343 \else
344     \box\abstractbox
345     \prevdepth\z@
346 \fi
347 \vfill
348 \bgroup
349 \setlength{\fboxsep}{5\p@}%
350 \makebox[\textwidth]{\fbox{\parbox{6.5in}{%
351     \fontsize{8.5\p@}{9.5\p@}\selectfont
352     \parskip\baselineskip
353     \textbf{Disclaimer:} \@disclaimer}}}%
354 \egroup
355 \clearpage}

```

### 3.9 Sectioning

`\cl@chapter` We do *not* reset equation counters when stepping chapters, except in appendices:

```
356 \def\cl@chapter{}
```

However, we do reset section and subsection counters

```
357 \@addtoreset{section}{chapter}%
358 \@addtoreset{subsection}{chapter}%
359 \@addtoreset{subsection}{section}%
```

`\chapter` We redefine `\chapter` to suppress empty page style on chapter opening:

```
360 \renewcommand\chapter{%
361   \clearpage
362   \global\@topnum\z@
363   \@afterindentfalse
364   \secdef\@chapter\@schapter}
```

`\@chapter` Non-starred chapter:

```
365 \def\@chapter[#1]#2{%
366   \if@frontmatter
367     \addcontentsline{toc}{chapter}{#1}%
368     \@makechapterhead{#2}%
369   \else
370     \refstepcounter{chapter}%
371     \typeout{\@chapapp\space\thechapter.}%
372     \if@appendix
373       \addcontentsline{toc}{chapter}%
374         {\@chapapp\space\thechapter: #1}%
375       \@makechapterhead{\@chapapp\space\thechapter: #2}%
376     \else
377       \addcontentsline{toc}{chapter}%
378         {\protect\numberline{\thechapter}#1}%
379       \@makechapterhead{\makebox[35\p@]{\thechapter\hfill}#2}%
380     \fi
381   \fi
382   \@afterheading}
```

`\@schapter` Starred chapter:

```
383 \def\@schapter#1{%
384   \if@appendix
385     \addcontentsline{toc}{chapter}{\@chapapp: #1}%
386     \@makeschapterhead{\@chapapp: #1}%
387   \else
388     \addcontentsline{toc}{chapter}{#1}%
389     \@makeschapterhead{#1}%
390   \fi
391   \@afterheading}
```

`\@makechapterhead` This is the macro that actually prints the chapter:

```

392 \def\makechapterhead#1{%
393   \vspace*{5\p@}%
394   {\hskip-35\p@%
395     \parindent\z@\raggedright
396     \interlinepenalty\@M
397     \@titlefont #1\par\nobreak
398     \vspace*{10\p@}%
399   }}

```

`\makeschapterhead` This is like `\makechapterhead`, but does not create hanging indent:

```

400 \def\makeschapterhead#1{%
401   \vspace*{5\p@}%
402   {%
403     \parindent\z@\raggedright
404     \interlinepenalty\@M
405     \leftskip-35\p@\@titlefont #1\par\nobreak
406     \vspace*{10\p@}%
407   }}

```

`\theequation` We do not use chapter number in equations, except in appendices:

```

408 \renewcommand \theequation {\@arabic\c@equation}

```

`tocdepth` Only chapters, sections, subsections are in TOC:

```

409 \setcounter{tocdepth}{2}

```

`\section` Sections are in 14 pt bold.

```

410 \renewcommand\section{%
411   \addpenalty\@secpenalty\nobreak
412   \secdef\@section\@ssection}

```

`\@section` This is for numbered sections:

```

413 \def\@section[#1]#2{%
414   \ifnum1>\c@secnumdepth
415     \addcontentsline{toc}{section}{#1}%
416   \else
417     \refstepcounter{section}%
418     \addcontentsline{toc}{section}{\protect\numberline{\thesection}#1}%
419   \fi
420   {\hskip-35\p@\raggedright\interlinepenalty\@M
421     \large\sffamily\bfseries
422     \ifnum1>\c@secnumdepth\else\makebox[35\p@]{\thesection\hfill}\fi#2\nobreak\par}
423   \@afterheading
424   \nobreak\par}

```

`\@ssection` Unnumbered sections:

```

425 \def\@ssection#1{
426   \addcontentsline{toc}{section}{#1}%
427   {\raggedright\interlinepenalty\@M
428     \large\sffamily\bfseries\leftskip-35\p@#1\nobreak\par}

```

```

429   \@afterheading
430   \nobreak\par}

\subsection Subsections are also bold
431 \renewcommand\subsection{\par
432   \addpenalty\@secpenalty\nobreak
433   \secdef\@subsection\@ssubsection}

\@subsection Numbered subsections:
434 \def\@subsection[#1]#2{%
435   \ifnum2>\c@secnumdepth
436     \addcontentsline{toc}{subsection}{\itshape#1}%
437   \else
438     \refstepcounter{subsection}%
439     \addcontentsline{toc}{subsection}{\itshape\fontsize{9}{12}\selectfont
440       \protect\numberline{\thesubsection}%
441       #1}%
442   \fi
443   {\noindent\raggedright\interlinepenalty\@M
444     \normalsize\sffamily\bfseries
445     \ifnum2>\c@secnumdepth\else\thesubsection\hspace{1em}\fi#2}\nobreak\par}

\@ssubsection Unnumbered subsections
446 \def\@ssubsection#1{%
447   \addcontentsline{toc}{subsection}{\itshape\fontsize{9}{12}\selectfont#1}%
448   {\noindent\raggedright\interlinepenalty\@M
449     \normalsize\sffamily\bfseries#1}\nobreak\par}

```

### 3.10 Special Chapters and Sections

Since our unnumbered sections go to the TOC, we need to have special ones that do not.

```

\specialchapter A chapter that does not go into TOC...
450 \def\specialchapter#1{%
451   \clearpage
452   \global\@topnum\z@
453   \@afterindentfalse
454   \@makeschapterhead{#1}\par
455   \@afterheading}

```

### 3.11 Front Page Lists

Here we define tables of contents, lists of figures, tables and the combined lists.

```

\@dotsep Separation between dots in tables
456 \def\@dotsep{0.5}

```

`\l@chapter` Here we define chapter entry in TOC. Note the leaders to the end:

```
457 \renewcommand\l@chapter[2]{%
458   \def\numberline##1{\makebox[1.9em]{##1\hfill}}%
459   \addpenalty{-\@highpenalty}%
460   \vskip5\p@
461   \bgroup
462     \parindent\z@\rightskip\@pnumwidth
463     \parfillskip-\@pnumwidth
464     \leavevmode\bfseries
465     \leftskip1.9em%
466     \hskip-\leftskip
467     #1\nobreak\leaders\hbox{$\m@th\mkern\@dotsep
468       mu\hbox{.}\mkern\@dotsep
469       mu$}\hfill\nobreak{\hfil\,#2}\par
470     \vskip5\p@
471     \penalty\@highpenalty
472   \egroup}
```

`\@dottedtocline` We redefine the standard macro to allow page number font to be right and to continue leaders to the end:

```
473 \def\@dottedtocline#1#2#3#4#5{%
474   \bgroup
475   \def\numberline##1{\makebox[#3]{##1\hfill}}%
476   \ifnum #1>\c@tocdepth \else
477     \vskip \z@ \@plus.2\p@
478     {\leftskip #2\relax \rightskip \@tocrmarg \parfillskip -\rightskip
479     \parindent #2\relax\@afterindenttrue
480     \interlinepenalty\@M
481     \leavevmode
482     \@tempdima #3\relax
483     \advance\leftskip \@tempdima \null\nobreak\hskip -\leftskip
484     #4\nobreak
485     \leaders\hbox{$\m@th
486       \mkern \@dotsep mu\hbox{.}\mkern \@dotsep
487       mu$}\hfill
488     \nobreak
489     {\hfil \normalcolor \,#5}%
490     \par}%
491   \fi
492   \egroup}
```

`\@dottedtoclineLF` This is the version of `\@dottedtocline` used in LOT and LOF

```
493 \def\@dottedtoclineLF#1#2#3#4#5{%
494   \bgroup
495   \ifnum #1>\c@tocdepth \else
496     \vskip \z@ \@plus.2\p@
497     {\leftskip #2\relax \rightskip \@tocrmarg \parfillskip -\rightskip
498     \parindent #2\relax\@afterindenttrue
499     \interlinepenalty\@M
```

```

500     \leavevmode
501     \@tempdima #2\relax
502     \advance\leftskip \@tempdima \null\nobreak\hskip -\@tempdima
503     #4\nobreak
504     \leaders\hbox{$\m@th
505         \mkern \@dotsep mu\hbox{.}\mkern \@dotsep
506         mu$}\hfill
507     \nobreak
508     {\hfil \normalcolor \,#5}%
509     \par}%
510 \fi
511 \egroup}

\l@section Section formatting in TOC
512 \renewcommand*\l@section{\@dottedtocline{1}{2em}{2.5em}}

\l@subsection Subsection formatting in TOC
513 \renewcommand*\l@subsection{\@dottedtocline{2}{4.7em}{3em}}

\l@figure Figure in lot
514 \renewcommand*\l@figure{\@dottedtoclineLF{1}{0em}{2.3em}}

\l@table Table in lot
515 \let\l@table\l@figure

\contentsname Contents...
516 \renewcommand\contentsname{Table of Contents}

\tableofcontents TOC:
517 \renewcommand\tableofcontents{%
518   \specialchapter{\contentsname}%
519   \def\numberline##1{\hb@xt@{\pnumwidth{##1}\hfill}}%
520   {\parskip2.5\p@\footnotesize\sffamily\fontseries{k}\selectfont\raggedright
521     \@starttoc{toc}}

\listoffigures LOF:
522 \renewcommand\listoffigures{%
523   \chapter{\listfigurename}%
524   \def\numberline##1{Figure ##1. }%
525   {\parskip2.5\p@\footnotesize\sffamily\fontseries{k}\selectfont\raggedright
526     \@starttoc{lof}}

\listoftables LOT:
527 \renewcommand\listoftables{%
528   \chapter{\listtablename}%
529   \def\numberline##1{Table ##1. }%
530   {\parskip2.5\p@\footnotesize\sffamily\fontseries{k}\selectfont\raggedright
531     \@starttoc{lot}}

```

```

\listfiguretablename The name for the combined list
532 \def\listfiguretablename{Figures and Tables}

\listoffiguresandtables And the combined LOF and TOC
533 \newcommand\listoffiguresandtables{%
534   \chapter{\listfiguretablename}
535   {\sffamily\bfseries\normalsize Figures\par}%
536   \vspace*{10pt}%
537   \def\numberline##1{Figure ##1. }%
538   {\parskip2.5\p@\footnotesize\sffamily\fontseries{k}\selectfont\raggedright
539     \@starttoc{lof}}%
540   {\sffamily\bfseries\normalsize Tables\par}%
541   \vspace*{10pt}%
542   \def\numberline##1{Table ##1. }%
543   {\parskip2.5\p@\footnotesize\sffamily\fontseries{k}\selectfont\raggedright
544     \@starttoc{lot}}}

\bibname We use ‘References’ for bibliography
545 \renewcommand\bibname{References}

```

### 3.12 Figures and Tables

```

\@fptop We want the figures on figures-only page to be vertically top-aligned rather than
centered:
546 \setlength{\@fptop}{0pt}%

\thefigure We do not use chapter numbers in figures, except in appendix:
547 \renewcommand \thefigure {\@arabic\c@figure}

\thetable We do not use chapter numbers in tables either:
548 \renewcommand \thetable {\@arabic\c@table}

Setting up captions:
549 \captionsetup{justification=centering,font={footnotesize,sf,bf},
550 labelsep=period,aboveskip=3pt}
551 \captionsetup[table]{position=top}

\arraystretch Increase array stretch:
552 \def\arraystretch{1.3}

```

### 3.13 Equation Numbering

```

\maketag@@@ We change the amsmath definition:
553 \let\maketag@@@\maketag@@@
554 \def\maketag@@@#1{\hbox{\m@th\@eqtagfont#1}}

\eqref We also change \eqref, otherwise the references will be in the wrong font:
555 \renewcommand{\eqref}[1]{\textup{\tagform@{\ref{#1}}}}

```

`\tagform@` This is the original amsmath version:

```
556 \def\tagform@#1{\maketag@@@{\ignorespaces#1\unskip\@italiccorr}}
```

### **3.14 The final word**

557 `</class>`

### **3.15 Acknowledgements**

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- [15] Leslie Lamport, Frank Mittelbach, and Johannes Braams. *Standard Document Classes for L<sup>A</sup>T<sub>E</sub>X version 2e*, 1997. <http://ctan.tug.org/tex-archive/macros/latex/base>.
- [16] Michael Downes and Barbara Beeton. *The amsart, amsproc, and amsbook document classes*. American Mathematical Society, August 2004. <http://www.ctan.org/tex-archive/macros/latex/required/amslatex/classes>.

## Change History

v0.1	General: First fully functional version . . . . .	3	v0.4	<code>\@dottedtocline</code> : Deleted hanging indent . . . . .	24
v0.2	<code>\@laboratoryfont</code> : Introduced the macro . . . . .	11		Redefined . . . . .	24
	<code>\@programfont</code> : Introduced the macro . . . . .	12		<code>\@dottedtoclineLF</code> : Wrote macro . . . . .	24
	<code>\@reportnumfont</code> : Introduced the macro . . . . .	11		<code>\@section</code> : Made sections numbered . . . . .	22
	<code>\@titlefont</code> : Introduced the macro . . . . .	12		<code>\@ssection</code> : Wrote the macro . . . . .	22
	General: Added dcolumn . . . . .	11		<code>\@ssubsection</code> : Wrote the macro . . . . .	23
	Added ragged2e . . . . .	11		<code>\@subsection</code> : Made subsections numbered . . . . .	23
	Changed caption skips . . . . .	26		<code>\abstract</code> : Increased parsep . . . . .	17
	Changed fonts . . . . .	11		<code>\contentsname</code> : Changed defaults . . . . .	25
	<code>\chapter</code> : Changed font . . . . .	21		<code>\l@chapter</code> : Added leaders . . . . .	24
	<code>\coverart</code> : Changed the width of cover art . . . . .	16		<code>\l@figure</code> : Redefined . . . . .	25
	<code>@coverlist</code> : Made slightly thinner . . . . .	18		<code>\l@section</code> : Changed defaults . . . . .	25
	<code>\maketitle</code> : Changed fonts . . . . .	18		<code>\l@subsection</code> : Changed defaults . . . . .	25
	Made slightly thinner . . . . .	18		<code>\l@table</code> : Redefined . . . . .	25
	<code>\normalsize</code> : Changed line spacing . . . . .	11		<code>\maketitle</code> : Made the gap between red and black stripes on the cover exactly 4.5pt (added 2.75pt) . . . . .	18
v0.3				Moved boxes around . . . . .	18
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