

C.2014

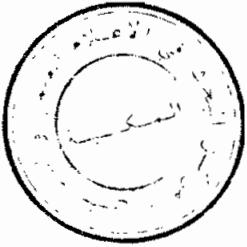
# *A Document Preparation System*



**USER'S GUIDE & REFERENCE MANUAL**

*Leslie Lamport*

1ST  
2014



# LATEX

*A Document Preparation System*

*Leslie Lamport*

Digital Equipment Corporation

Illustrations by Duane Bibby



**Addison-Wesley Publishing Company**

Reading, Massachusetts • Menlo Park, California  
Don Mills, Ontario • Wokingham, England • Amsterdam  
Sydney • Singapore • Tokyo • Mexico City • Bogotá • Santiago • San Juan

This documentation was prepared with L<sup>A</sup>T<sub>E</sub>X and reproduced by Addison-Wesley from camera-ready copy supplied by the author.

T<sub>E</sub>X is a trademark of the American Mathematical Society

This book describes L<sup>A</sup>T<sub>E</sub>X Version 2.09, released 19 April 1986. Any discrepancy between this description and the behavior of this or any later release of Version 2.09 is an error. There are only minor differences between this release and earlier releases of Version 2.09.

**Library of Congress Cataloging-in-Publication Data**

Lamport, Leslie.

L<sup>A</sup>T<sub>E</sub>X: A Document Preparation System.

Includes index.

1. L<sup>A</sup>T<sub>E</sub>X (Computer system) 2. Computerized typesetting. I. Title.

Z253.4.L38L35 1985 686.2'2544 85-19994

ISBN 0-201-15790-X

*Fifth Printing, September 1986*

Copyright © 1986 by Addison-Wesley Publishing Company, Inc.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher. Printed in the United States of America. Published simultaneously in Canada.

Addison-Wesley Publishing Company, Inc., makes no representations, express or implied, with respect to this documentation or the software it describes, including without limitations, any implied warranties of merchantability or fitness for a particular purpose, all of which are expressly disclaimed. Addison-Wesley, its distributors and dealers shall in no event be liable for any indirect, incidental or consequential damages. The exclusion of implied warranties is not permitted by some statutes. The above exclusion may therefore not apply to you. This warranty provides you with specific legal rights. There may be other rights that you have which may vary from state to state.

ISBN 0-201-15790-X  
J-AL-898

# Contents

<b>Preface</b>	<b>xiii</b>
<b>1 Getting Acquainted</b>	<b>1</b>
1.1 How to Avoid Reading This Book . . . . .	2
1.2 How to Read This Book . . . . .	2
1.3 The Game of the Name . . . . .	4
1.4 Turning Typing into Typography . . . . .	5
1.5 Turning Ideas into Input . . . . .	8
1.6 Trying It Out . . . . .	8
<b>2 Getting Started</b>	<b>11</b>
2.1 Preparing an Input File . . . . .	12
2.2 The Input . . . . .	13
2.2.1 Sentences and Paragraphs . . . . .	13
Quotation Marks . . . . .	13
Dashes . . . . .	14
Space After a Period . . . . .	14
Special Symbols . . . . .	15
Simple Text-Generating Commands . . . . .	15
Emphasizing Text . . . . .	16
Preventing Line Breaks . . . . .	18
Footnotes . . . . .	19
Formulas . . . . .	19
Ignorable Input . . . . .	20
2.2.2 The Document . . . . .	21
The Document Style . . . . .	21
The Title “Page” . . . . .	22
2.2.3 Sectioning . . . . .	22
2.2.4 Displayed Material . . . . .	24
Quotations . . . . .	26
Lists . . . . .	26
Poetry . . . . .	27

	Displayed Formulas . . . . .	28
2.3	Running L <sup>A</sup> T <sub>E</sub> X . . . . .	28
2.4	Helpful Hints . . . . .	32
2.5	Summary . . . . .	33
<b>3</b>	<b>Carrying On</b>	<b>37</b>
3.1	Changing the Type Style . . . . .	38
3.2	Symbols from Other Languages . . . . .	39
3.2.1	Accents . . . . .	40
3.2.2	Symbols . . . . .	40
3.3	Mathematical Formulas . . . . .	41
3.3.1	Some Common Structures . . . . .	41
	Subscripts and Superscripts . . . . .	41
	Fractions . . . . .	41
	Roots . . . . .	42
	Ellipsis . . . . .	42
3.3.2	Mathematical Symbols . . . . .	42
	Greek Letters . . . . .	43
	Calligraphic Letters . . . . .	43
	A Menagerie of Mathematical Symbols . . . . .	44
	Log-like Functions . . . . .	46
3.3.3	Arrays . . . . .	47
	The <code>array</code> Environment . . . . .	47
	Vertical Alignment . . . . .	47
	More Complex Arrays . . . . .	48
3.3.4	Delimiters . . . . .	48
3.3.5	Multiline Formulas . . . . .	49
3.3.6	Putting One Thing Above Another . . . . .	50
	Over- and Underlining . . . . .	51
	Accents . . . . .	51
	Stacking Symbols . . . . .	52
3.3.7	Spacing in Math Mode . . . . .	52
3.3.8	Changing Style in Math Mode . . . . .	53
	Type Style . . . . .	53
	Math Style . . . . .	54
3.3.9	When All Else Fails . . . . .	54
3.4	Defining Commands and Environments . . . . .	54
3.4.1	Defining Commands . . . . .	55
3.4.2	Defining Environments . . . . .	57
3.4.3	Theorems and Such . . . . .	58
3.5	Figures and Other Floating Bodies . . . . .	59
3.5.1	Figures and Tables . . . . .	59
3.5.2	Marginal Notes . . . . .	61

---

3.6 Lining It Up in Columns . . . . .	62
3.6.1 The <code>tabbing</code> Environment . . . . .	62
3.6.2 The <code>tabular</code> Environment . . . . .	63
3.7 Simulating Typed Text . . . . .	65
3.8 Letters . . . . .	66
<b>4 Moving Information Around</b>	<b>69</b>
4.1 The Table of Contents . . . . .	70
4.2 Cross-References . . . . .	71
4.3 Bibliography and Citation . . . . .	72
4.3.1 Doing It Yourself . . . . .	73
4.3.2 Using BIBTEX . . . . .	74
4.4 Splitting Your Input . . . . .	75
4.5 Making an Index or Glossary . . . . .	77
4.5.1 Producing an Index or Glossary . . . . .	77
4.5.2 Compiling the Entries . . . . .	78
4.6 Keyboard Input and Screen Output . . . . .	79
<b>5 Designing It Yourself</b>	<b>81</b>
5.1 Document and Page Styles . . . . .	82
5.1.1 Document Styles . . . . .	82
5.1.2 Page Styles . . . . .	83
5.1.3 The Title Page and Abstract . . . . .	84
5.1.4 Customizing the Document Style . . . . .	85
5.2 Line and Page Breaking . . . . .	87
5.2.1 Line Breaking . . . . .	87
5.2.2 Page Breaking . . . . .	90
5.3 Numbering . . . . .	91
5.4 Length, Spaces, and Boxes . . . . .	93
5.4.1 Length . . . . .	93
5.4.2 Spaces . . . . .	95
5.4.3 Boxes . . . . .	96
LR Boxes . . . . .	97
Parboxes . . . . .	98
Rule Boxes . . . . .	100
Raising and Lowering Boxes . . . . .	100
Saving Boxes . . . . .	101
5.5 Pictures . . . . .	101
5.5.1 The <code>picture</code> Environment . . . . .	102
5.5.2 Picture Objects . . . . .	103
Text . . . . .	104
Boxes . . . . .	104
Straight Lines . . . . .	105
Arrows . . . . .	106

Stacks . . . . .	107
Circles . . . . .	107
Ovals and Rounded Corners . . . . .	108
Framing . . . . .	108
5.5.3 Reusing Objects . . . . .	109
5.5.4 Repeated Patterns . . . . .	109
5.5.5 Some Hints on Drawing Pictures . . . . .	110
5.6 Centering and “Flushing” . . . . .	111
5.7 List-Making Environments . . . . .	112
5.7.1 The <i>list</i> Environment . . . . .	112
5.7.2 The <i>trivlist</i> Environment . . . . .	115
5.8 Fonts . . . . .	115
5.8.1 Changing Type Size . . . . .	115
5.8.2 Loading Fonts . . . . .	116
<b>6 Errors</b>	<b>117</b>
6.1 Finding the Error . . . . .	118
6.2 L <sup>A</sup> T <sub>E</sub> X’s Error Messages . . . . .	120
6.3 T <sub>E</sub> X’s Error Messages . . . . .	123
6.4 L <sup>A</sup> T <sub>E</sub> X Warnings . . . . .	128
6.5 T <sub>E</sub> X Warnings . . . . .	129
<b>A SLI<sub>E</sub>T<sub>E</sub>X</b>	<b>131</b>
A.1 How SLI <sub>E</sub> T <sub>E</sub> X Makes Colors . . . . .	132
A.2 The Root File . . . . .	133
A.3 The Slide File . . . . .	134
A.3.1 Slides . . . . .	134
A.3.2 Overlays . . . . .	136
A.3.3 Notes . . . . .	137
A.3.4 Page Styles for Slides . . . . .	137
A.4 Making Only Some Slides . . . . .	138
<b>B The Bibliography Database</b>	<b>139</b>
B.1 The Format of the <i>bib</i> File . . . . .	140
B.1.1 The Entry Format . . . . .	140
B.1.2 The Text of a Field . . . . .	141
Names . . . . .	141
Titles . . . . .	142
B.1.3 Abbreviations . . . . .	143
B.2 The Entries . . . . .	144
B.2.1 Entry Types . . . . .	144
B.2.2 Fields . . . . .	146

<b>C Reference Manual</b>	<b>149</b>
C.1 Commands and Environments . . . . .	150
C.1.1 Command Names and Arguments . . . . .	150
C.1.2 Environments . . . . .	151
C.1.3 Fragile Commands . . . . .	151
C.1.4 Declarations . . . . .	152
C.1.5 Invisible Commands and Environments . . . . .	152
C.1.6 The <code>\`</code> command . . . . .	153
C.2 Sentences and Paragraphs . . . . .	154
C.2.1 Making Sentences . . . . .	154
C.2.2 Making Paragraphs . . . . .	154
C.2.3 Footnotes . . . . .	156
C.2.4 Accents and Special Symbols . . . . .	157
C.3 Sectioning and Table of Contents . . . . .	157
C.3.1 Sectioning Commands . . . . .	157
C.3.2 The Appendix . . . . .	158
C.3.3 Table of Contents . . . . .	158
C.3.4 Style Parameters . . . . .	159
C.4 Document and Page Styles . . . . .	160
C.4.1 Document Styles . . . . .	160
C.4.2 Page Styles . . . . .	161
C.4.3 The Title Page and Abstract . . . . .	163
C.5 Displayed Paragraphs . . . . .	165
C.5.1 Quotations and Verse . . . . .	165
C.5.2 List-Making Environments . . . . .	165
C.5.3 The <code>list</code> and <code>trivlist</code> Environments . . . . .	166
C.5.4 Verbatim . . . . .	168
C.6 Mathematical Formulas . . . . .	169
C.6.1 Math Mode Environments . . . . .	169
C.6.2 Common Structures . . . . .	170
C.6.3 Mathematical Symbols . . . . .	171
C.6.4 Arrays . . . . .	171
C.6.5 Delimiters . . . . .	171
C.6.6 Putting One Thing Above Another . . . . .	171
C.6.7 Spacing . . . . .	172
C.6.8 Changing Style . . . . .	172
C.7 Definitions . . . . .	173
C.7.1 Defining Commands . . . . .	173
C.7.2 Defining Environments . . . . .	173
C.7.3 Theorem-like Environments . . . . .	174
C.7.4 Numbering . . . . .	174
C.8 Figures and Other Floating Bodies . . . . .	176
C.8.1 Figures and Tables . . . . .	176

C.8.2 Marginal Notes . . . . .	178
C.9 Lining It Up in Columns . . . . .	179
C.9.1 The <code>tabbing</code> Environment . . . . .	179
C.9.2 The <code>array</code> and <code>tabular</code> Environments . . . . .	182
C.10 Moving Information Around . . . . .	185
C.10.1 Files . . . . .	185
C.10.2 Cross-References . . . . .	186
C.10.3 Bibliography and Citation . . . . .	187
C.10.4 Splitting the Input . . . . .	188
C.10.5 Index and Glossary . . . . .	189
Producing an Index . . . . .	189
Compiling the Entries . . . . .	189
C.10.6 Terminal Input and Output . . . . .	189
C.11 Line and Page Breaking . . . . .	190
C.11.1 Line Breaking . . . . .	190
C.11.2 Page Breaking . . . . .	191
C.12 Lengths, Spaces, and Boxes . . . . .	192
C.12.1 Length . . . . .	192
C.12.2 Space . . . . .	193
C.12.3 Boxes . . . . .	194
C.13 The <code>picture</code> Environment . . . . .	196
C.13.1 Picture-Mode Commands . . . . .	196
C.13.2 Picture Objects . . . . .	197
C.13.3 Picture Declarations . . . . .	199
C.14 Font Selection . . . . .	199
C.14.1 Changing the Type Style . . . . .	199
C.14.2 Changing the Type Size . . . . .	200
C.14.3 Loading Fonts . . . . .	200
C.14.4 Fonts in Math Mode . . . . .	200
<b>D Using Plain TeX Commands</b>	<b>203</b>
<b>Bibliography</b>	<b>207</b>
<b>Index</b>	<b>209</b>

# List of Tables

3.1	Accents . . . . .	40
3.2	Foreign Symbols . . . . .	40
3.3	Greek Letters . . . . .	43
3.4	Binary Operation Symbols. . . . .	44
3.5	Relation Symbols . . . . .	44
3.6	Arrow Symbols . . . . .	45
3.7	Miscellaneous Symbols . . . . .	45
3.8	Variable-sized Symbols. . . . .	45
3.9	Log-like Functions. . . . .	46
3.10	Delimiters. . . . .	48
3.11	Math Mode Accents. . . . .	51