A Guide to Preparing Documents with −ms

M. E. Lesk

Bell Laboratories

August 1978

This guide gives some simple examples of document preparation on Bell Labs computers, emphasizing the use of the *−ms* macro package. It enormously abbreviates information in

1. *Typing Documents on UNIX and GCOS,* by M. E. Lesk;
2. *Typesetting Mathematics – User's Guide,* by B. W. Kernighan and L. L. Cherry; and
3. *Tbl – A Program to Format Tables,* by M. E. Lesk.

These memos are all included in the *UNIX Programmer's Manual, Volume 2.* The new user should also have *A Tutorial Introduction to the UNIX Text Editor,* by B. W. Kernighan.

For more detailed information, read *Advanced Editing on UNIX* and *A Troff Tutorial,* by B. W. Kernighan, and (for experts) *Nroff/Troff Reference Manual* by J. F. Ossanna. Information on related commands is found (for UNIX users) in *UNIX for Beginners* by B. W. Kernighan and the *UNIX Programmer's Manual* by K. Thompson and D. M. Ritchie.

Contents

A TM 2
A released paper 3
An internal memo, and headings 4
Lists, displays, and footnotes 5
Indents, keeps, and double column 6
Equations and registers 7
Tables and usage 8

Throughout the examples, input is shown in
this Helvetica sans serif font
while the resulting output is shown in
this Times Roman font.

UNIX Document no. 1111

Commands for a TM

```
.TM 1978-5b3 99999 99999-11
.ND April 1, 1976
.TL
The Role of the Allen Wrench in Modern
Electronics
.AU "MH 2G-111" 2345
J. Q. Pencilpusher
.AU "MH 1K-222" 5432
X. Y. Hardwired
.AI
.MH
.OK
Tools
Design
.AB
This abstract should be short enough to
fit on a single page cover sheet.
It must attract the reader into sending for
the complete memorandum.
.AE
.CS 10 2 12 5 6 7
.NH
Introduction.
.PP
Now the first paragraph of actual text ...
...
Last line of text.
.SG MH-1234-JQP/XYH-unix
.NH
References ...
```

Commands not needed in a particular format are ignored.

Bell Laboratories Cover Sheet for TM

This information is for employees of Bell Laboratories. (GEI 13.9-3)

Title- The Role of the Allen Wrench in Modern Electronics

Date- April 1, 1976

TM- 1978-5b3

Other Keywords- Tools
Design

Author	Location	Ext.	
			Charging Case- 99999
J. Q. Pencilpusher	MH 2G-111	2345	Filing Case- 99999a
X. Y. Hardwired	MH 1K-222	5432	

ABSTRACT

This abstract should be short enough to fit on a single page cover sheet. It must attract the reader into sending for the complete memorandum.

Pages Text 10	Other 2	Total 12
No. Figures 5	No. Tables 6	No. Refs. 7

E-1932-U (6-73) SEE REVERSE SIDE FOR DISTRIBUTION LIST

A Released Paper with Mathematics

```
.EQ
delim $$
.EN
.RP
```

... (as for a TM)

```
.CS 10 2 12 5 6 7
.NH
Introduction
.PP
The solution to the torque handle equation
.EQ (1)
sum from 0 to inf F ( x sub i ) = G ( x )
.EN
is found with the transformation $ x = rho over
theta $ where $ rho = G prime (x) $ and $theta$
is derived ...
```

The Role of the Allen Wrench
in Modern Electronics

J. Q. Pencilpusher

X. Y. Hardwired

Bell Laboratories
Murray Hill, New Jersey 07974

ABSTRACT

This abstract should be short enough to fit on a single page cover sheet. It must attract the reader into sending for the complete memorandum.

April 1, 1976

The Role of the Allen Wrench
in Modern Electronics

J. Q. Pencilpusher

X. Y. Hardwired

Bell Laboratories
Murray Hill, New Jersey 07974

1. Introduction

The solution to the torque handle equation

$$\sum_{0}^{\infty} F(x_i) = G(x) \quad (1)$$

is found with the transformation $x = \frac{\rho}{\theta}$ where $\rho = G'(x)$ and θ is derived from well-known principles.

An Internal Memorandum

```
.IM
.ND January 24, 1956
.TL
The 1956 Consent Decree
.AU
Able, Baker &
Charley, Attys.
.PP
Plaintiff, United States of America, having filed
its complaint herein on January 14, 1949; the
defendants having appeared and filed their
answer to such complaint denying the
substantive allegations thereof; and the parties,
by their attorneys, ...
```

Bell Laboratories

Subject: The 1956 Consent Decree   date: January 24, 1956

from: Able, Baker & Charley, Attys.

Plaintiff, United States of America, having filed its complaint herein on January 14, 1949; the defendants having appeared and filed their answer to such complaint denying the substantive allegations thereof; and the parties, by their attorneys, having severally consented to the entry of this Final Judgment without trial or adjudication of any issues of fact or law herein and without this Final Judgment constituting any evidence or admission by any party in respect of any such issues;

Now, therefore before any testimony has been taken herein, and without trial or adjudication of any issue of fact or law herein, and upon the consent of all parties hereto, it is hereby

Ordered, adjudged and decreed as follows:

I. [Sherman Act]

This Court has jurisdiction of the subject matter herein and of all the parties hereto. The complaint states a claim upon which relief may be granted against each of the defendants under Sections 1, 2 and 3 of the Act of Congress of July 2, 1890, entitled ‘‘An act to protect trade and commerce against unlawful restraints and monopolies,’’ commonly known as the Sherman Act, as amended.

II. [Definitions]

For the purposes of this Final Judgment:

(a) ‘‘Western’’ shall mean the defendant Western Electric Company, Incorporated.

Other formats possible (specify before **.TL**) are: **.MR** (‘‘memo for record’’), **.MF** (‘‘memo for file’’), **.EG** (‘‘engineer’s notes’’) and **.TR** (Computing Science Tech. Report).

Headings

.NH **Introduction.** **.PP** **text text text**	**.SH** **Appendix I** **.PP** **text text text**
1. Introduction text text text	Appendix I text text text

A Simple List

.IP 1.
J. Pencilpusher and X. Hardwired,
.I
A New Kind of Set Screw,
.R
Proc. IEEE
.B 75
(1976), 23-255.
.IP 2.
H. Nails and R. Irons,
.I
Fasteners for Printed Circuit Boards,
.R
Proc. ASME
.B 23
(1974), 23-24.
.LP (terminates list)

1. J. Pencilpusher and X. Hardwired, *A New Kind of Set Screw,* Proc. IEEE **75** (1976), 23-255.
2. H. Nails and R. Irons, *Fasteners for Printed Circuit Boards,* Proc. ASME **23** (1974), 23-24.

Displays

text text text text text text
.DS
and now
for something
completely different
.DE
text text text text text text

hoboken harrison newark roseville avenue grove street east orange brick church orange highland avenue mountain station south orange maplewood millburn short hills summit new providence

> and now
> for something
> completely different

murray hill berkeley heights gillette stirling millington lyons basking ridge bernardsville far hills peapack gladstone

Options: **.DS L**: left-adjust; **.DS C**: line-by-line center; **.DS B**: make block, then center.

Footnotes

Among the most important occupants
of the workbench are the long-nosed pliers.
Without these basic tools*
.FS
*** As first shown by Tiger & Leopard**
(1975).
.FE
few assemblies could be completed. They may
lack the popular appeal of the sledgehammer

Among the most important occupants of the workbench are the long-nosed pliers. Without these basic tools* few assemblies could be completed. They may lack the popular

appeal

of the sledgehammer

* As first shown by Tiger & Leopard (1975).

Multiple Indents

This is ordinary text to point out
the margins of the page.
.IP 1.
First level item
.RS
.IP a)
Second level.
.IP b)
Continued here with another second
level item, but somewhat longer.
.RE
.IP 2.
Return to previous value of the
indenting at this point.
.IP 3.
Another
line.

This is ordinary text to point out the margins of the page.

1. First level item
    a) Second level.
    b) Continued here with another second level item, but somewhat longer.
2. Return to previous value of the indenting at this point.
3. Another line.

Keeps

Lines bracketed by the following commands are kept together, and will appear entirely on one page:

.KS	not moved	**.KF**	may float
.KE	through text	**.KE**	in text

Double Column

.TL
The Declaration of Independence
.2C
.PP
When in the course of human events, it becomes
necessary for one people to dissolve the political bonds
which have connected them with another, and to
assume among the powers of the earth the separate and
equal station to which the laws of Nature and of
Nature's God entitle them, a decent respect to the
opinions of

The Declaration of Independence

When in the course of human events, it becomes necessary for one people to dissolve the political bonds which have connected them with another, and to assume among the powers of the earth the separate and equal station to which the laws of Nature and of Nature's God entitle them, a decent respect to the opinions of

mankind

requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their creator with certain unalienable rights, that among these are life, liberty, and the pursuit of happiness. That to secure these rights, governments are instituted among men,

Equations

A displayed equation is marked
with an equation number at the right margin
by adding an argument to the EQ line:
.EQ (1.3)
x sup 2 over a sup 2 ˜=˜ sqrt {p z sup 2 +qz+r}
.EN

A displayed equation is marked with an equation number at the right margin by adding an argument to the EQ line:

$$\frac{x^2}{a^2} = \sqrt{pz^2+qz+r} \qquad (1.3)$$

.EQ I (2.2a)
bold V bar sub nu˜=˜left [pile {a above b above
c } right] + left [matrix { col { A(11) above .
above . } col { . above . above .} col {. above .
above A(33) }} right] cdot left [pile { alpha
above beta above gamma } right]
.EN

$$\bar{\mathbf{V}}_\nu = \left[\begin{matrix} a \\ b \\ c \end{matrix}\right] + \left[\begin{matrix} A(11) & . & . \\ . & . & . \\ . & . & A(33) \end{matrix}\right] \cdot \left[\begin{matrix} \alpha \\ \beta \\ \gamma \end{matrix}\right] \qquad (2.2a)$$

.EQ L
F hat (chi) ˜ mark = ˜ | del V | sup 2
.EN
.EQ L
lineup =˜ {left ({partial V} over {partial x} right) } sup
2 + { left ({partial V} over {partial y} right) } sup 2
˜˜˜˜˜˜ lambda -> inf
.EN

$$\hat{F}(\chi) = |\nabla V|^2$$

$$= \left(\frac{\partial V}{\partial x}\right)^2 + \left(\frac{\partial V}{\partial y}\right)^2 \qquad \lambda \to \infty$$

$ a dot $, $ b dotdot$, $ xi tilde times y vec$:

$\dot{a}$, $\ddot{b}$, $\tilde{\xi} \times \vec{y}$. (with delim $$ on, see panel 3).

See also the equations in the second table, panel 8.

Some Registers You Can Change

Line length
.nr LL 7i

Title length
.nr LT 7i

Point size
.nr PS 9

Vertical spacing
.nr VS 11

Column width
.nr CW 3i

Intercolumn spacing
.nr GW .5i

Margins – head and foot
.nr HM .75i
.nr FM .75i

Paragraph indent
.nr PI 2n

Paragraph spacing
.nr PD 0

Page offset
.nr PO 0.5i

Page heading
.ds CH Appendix (center)
.ds RH 7-25-76 (right)
.ds LH Private (left)

Page footer
.ds CF Draft
.ds LF
.ds RF similar

Page numbers
.nr % 3

Tables

```
.TS            ( ⓣ indicates a tab)
allbox;
c s s
c c c
n n n.
AT&T Common Stock
Year ⓣPrice ⓣDividend
1971 ⓣ41-54 ⓣ$2.60
2 ⓣ41-54 ⓣ2.70
3 ⓣ46-55 ⓣ2.87
4 ⓣ40-53 ⓣ3.24
5 ⓣ45-52 ⓣ3.40
6 ⓣ51-59 ⓣ.95*
.TE
* (first quarter only)
```

AT&T Common Stock		
Year	Price	Dividend
1971	41-54	$2.60
2	41-54	2.70
3	46-55	2.87
4	40-53	3.24
5	45-52	3.40
6	51-59	.95*

* (first quarter only)

The meanings of the key-letters describing the alignment of each entry are:

c	center	**n**	numerical
r	right-adjust	**a**	subcolumn
l	left-adjust	**s**	spanned

The global table options are **center, expand, box, doublebox, allbox, tab (***x***)** and **linesize (***n***).**

```
.TS            (with delim $$ on, see panel 3)
doublebox, center;
c c
l l.
Name ⓣDefinition
.sp
Gamma ⓣ$GAMMA (z) = int sub 0 sup inf \
   t sup {z-1} e sup -t dt$
Sine ⓣ$sin (x) = 1 over 2i ( e sup ix - e sup -ix )$
Error ⓣ$ roman erf (z) = 2 over sqrt pi \
  int sub 0 sup z e sup {-t sup 2} dt$
Bessel ⓣ$ J sub 0 (z) = 1 over pi \
  int sub 0 sup pi cos ( z sin theta ) d theta $
Zeta ⓣ$ zeta (s) = \
  sum from k=1 to inf k sup -s ~~( Re~s > 1)$
.TE
```

Name	Definition
Gamma	$\Gamma(z)=\int_0^\infty t^{z-1}e^{-t}\,dt$
Sine	$\sin(x)=\frac{1}{2i}(e^{ix}-e^{-ix})$
Error	$\mathrm{erf}(z)=\frac{2}{\sqrt{\pi}}\int_0^z e^{-t^2}dt$
Bessel	$J_0(z)=\frac{1}{\pi}\int_0^\pi \cos(z\sin\theta)\,d\theta$
Zeta	$\zeta(s)=\sum_{k=1}^{\infty} k^{-s}\quad(\mathrm{Re}\ s>1)$

Usage

Documents with just text:
troff -ms files
With equations only:
eqn files | troff -ms
With tables only:
tbl files | troff -ms
With both tables and equations:

tbl files | eqn | troff -ms

The above generates STARE output on GCOS: replace **−st** with **−ph** for typesetter output.