

# Using common PostScript fonts with L<sup>A</sup>T<sub>E</sub>X

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This document refers to  
PSNFSS version 8.2

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## 1 What is PSNFSS ?

The PSNFSS collection includes a set of files that provide a complete working setup of the  $\text{\LaTeX}$  font selection scheme (NFSS2) for use with common PostScript fonts. The basic distribution, which should be part of any useful  $\text{\LaTeX}$  installation, covers the so-called ‘Base 35’ fonts (which are built into any Level 2 PostScript printing device and the Ghostscript interpreter) and the free Utopia, Charter and Pazo fonts.

## 2 Package overview

The easiest way to make use of the above-mentioned typefaces is to completely replace one or more of the font families used by  $\text{\LaTeX}$  as ‘roman’, ‘sans serif’ and ‘typewriter’ family and for math. This is accomplished by the packages listed in table 1. Its first row lists the default (Computer Modern) font families. An empty column indicates that a package does not change the particular font family.

The PSNFSS distribution includes also a package `pifont`, which serves for accessing symbol fonts (aka ‘Pi fonts’), such as Symbol and Zapf Dingbats, see section 8.

Table 1: Packages for using common PostScript fonts

package	roman	sans serif	typewriter	math
(none)	CM Roman	CM Sans Serif	CM Typewriter	$\approx$ CM Roman
<code>mathptmx</code>	Times			$\approx$ Times
<code>mathpazo</code>	Palatino			$\approx$ Palatino
<code>mathppl</code>	Palatino			$\approx$ Palatino
<code>helvet</code>		Helvetica		
<code>avant</code>		Avant Garde		
<code>courier</code>			Courier	
<code>chancery</code>	Zapf Chancery			
<code>bookman</code>	Bookman	Avant Garde	Courier	
<code>newcent</code>	New Century Schoolbook	Avant Garde	Courier	
<code>utopia</code>	Utopia			
<code>charter</code>	Charter			

## 3 Special considerations

### 3.1 Inter-line spacing

With certain font families, the leading of the standard  $\text{\LaTeX}$  document classes may be too small. This results from the larger x-height of these fonts, as compared with Computer Modern. Since it is a question of document design and line width, the packages of the PSNFSS bundle do *not* take care of this. Issuing the command

$$\backslash linespread \{ \langle factor \rangle \}$$

in the preamble will globally enlarge the leading by the given factor.

### 3.2 Using sans serif fonts

The packages `helvet` and `avant` do not change the default text font family from ‘`roman`’. If required, the additional command

```
\renewcommand{\familydefault}{\sfdefault}
```

will make the sans serif font family (Helvetica or Avant Garde) be used as the default one.

### 3.3 Output font encoding

None of the packages listed in table 1 changes the output font encoding from its default setting OT1. It is, however, recommended to use PostScript fonts in the extended T1 and TS1 (text symbols) encodings through the commands:

```
\usepackage[T1]{fontenc}
\usepackage{textcomp}
```

When using PostScript fonts, there is no reason at all to stay with the obsolete OT1 encoding, which does not provide access to all available glyphs. Note, however, that common PostScript fonts do *not* provide *all* of the TS1 (text companion) symbols!

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In case your  $\TeX$  system does not provide the T1 encoded versions of the default CM fonts (aka EC), it must be prevented from trying to load these before finally switching to the desired PostScript font family. This is accomplished by the following sequence of commands:

1. loading the required PSNFSS package(s)
2. redefine `\familydefault` (if required—see above)
3. `\normalfont`
4. switching the encoding as shown above

## 4 The package `helvet`

Helvetica is actually somewhat larger than other typefaces of the same nominal size. As a result, mixing, e.g., Times and Helvetica within running text may look bad. This can be fixed by loading the `helvet` package with the option `[scaled= $\langle scale \rangle$ ]`, e.g.:

```
\usepackage[scaled=.92]{helvet}
```

This will load the font family `phv` (Helvetica) for sans-serif, scaled down to 92% of its ‘natural’ size, which is suitable for use with Adobe Times. The  $\langle scale \rangle$  can be omitted:

```
\usepackage[scaled]{helvet}
```

A default scaling of 0.95 will be assumed then, which makes the height of the Helvetica capitals comply with most other typeface families.

## 5 The package `mathptmx`

Loading this package changes the default roman font family to Adobe Times, and the virtual ‘`mathptmx`’ fonts will be used for math.

These virtual fonts are made up basically from Times Italic, with the missing math symbols coming from CM, RSFS (for `\mathcal`) and Adobe Symbol. All these fonts are available in Type1 format, so that one can create documents which do not require any bitmap fonts.

## 5.1 Package options

[slantedGreek]

When the package is loaded with this option, uppercase Greek letters in math will be typeset as slanted.

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## 5.2 New commands

$\backslash\mathrm{upDelta}$   
 $\backslash\mathrm{upOmega}$

Regardless of the `slantedGreek` option, these commands will always print an upright  $\Delta$  and  $\Omega$ .

## 5.3 Font size of the ‘large’ math symbols

With `mathptmx`, the ‘large’ math symbols are automatically scaled to fit the base font size. In contrast to standard  $\mathrm{\LaTeX}$  you need not load the package `exscale` for this purpose!

## 5.4 Known bugs and deficiencies

- There are no bold math fonts, and `\boldmath` is not supported.
- The following symbols are either missing or unusable:  
`\emptyset`, `\jmath`, `\coprod`, `\amalg`.

# 6 The package mathpazo

Loading this package changes the default roman font family to Adobe Palatino, and the virtual ‘mathpazo’ fonts will be used for math.

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These virtual fonts are made up basically from Palatino Italic, with the missing math symbols coming from the CM fonts and Pazo math fonts. They are provided in Type 1 format, so one can create documents which do not require any bitmap fonts.

## 6.1 Package options

[slantedGreek]

When the package is loaded with the `[slantedGreek]` option, uppercase Greek letters in math will be typeset as slanted.

[noBBppl]

This option disables the use of the Pazo fonts as a partial  $\mathtt{bb}$  alphabet – see below. This option is to be specified, if you want to use a different ‘blackboard bold’ font.

[sc]  
[osf]

By default, the package `mathpazo` uses the typeface family `ppl` as the roman text font family. The option `[sc]` selects `pplx` instead, i.e. Palatino with true smallcaps. Correspondingly, the option `[osf]` selects `pplj`, i.e. Palatino with smallcaps and default oldstyle figures. (Of course, oldstyle figures will only be used in text mode, not in formulas.) Note that the option `[sc]` was not yet available with version 1.x of the package.

With version 1.x of the package, equation numbers were always typeset using lining figures, unless another option `[osfeqnnum]` was specified in addition to `[osf]`. Now the style of the equation numbering always follows the other numbers in text, and the option `[osfeqnnum]` is simply ignored.

**Caution:** The Palatino Type 1 fonts with smallcaps and oldstyle figures are solely commercial, and they are **not** part of the Base 35 fonts. The `fd`, `tfm` and `vf` files of the `pplx` and `pplj` families are **not** part of the PSNFSS distribution; they can, for instance, be obtained from <http://home.vr-web.de/was/fonts>.

## 6.2 New commands

`\upDelta`  
`\upOmega`

Regardless of the `slantedGreek` option, these commands will always print an upright  $\Delta$  and  $\Omega$ .

`\mathbold`  
`\mathbb`

`\mathbold` is a math alphabet for typesetting variables (incl. Greek) in a ***bold italic*** style. Do not mix this up with `\mathbf`, which selects a **bold upright** text font for use in math!

`\mathbb` is a partial ‘blackboard bold’ alphabet, whose characters are taken from the Pazo fonts. Only the letters C, I, N, Q, R, and Z are available. If you want to use a different, external, doublestroke alphabet, this command must be disabled by specifying the option `[noBBppl]`, see above.

`\ppleuro`

The command `\ppleuro` typesets the Euro symbol in a way that suits Palatino using the appropriate glyphs from the Pazo Math font family. It is compatible with both the `eurofont` and `europs` packages, and one can continue to use either one of these packages, using the `\euro` command from the `eurofont` package or the `\EUR` command from the `europs` package.

### 6.3 Font size of the ‘large’ math symbols

With mathpazo, the ‘large’ math symbols are automatically scaled to fit the base font size. In contrast to standard L<sup>A</sup>T<sub>E</sub>X you need not load the package `exscale` for this purpose!

## 7 The package mathpple

mathpple is a predecessor to mathpazo, using also a set of virtual math fonts to go with Palatino. However, the Greek alphabet is taken from the ‘Euler’ fonts (which get slanted), instead of the Pazo fonts. The behavior of the packages is almost identical, but you should take care of the following flaws:

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- mathpple does not provide a blackboard bold alphabet.
- The options `sc` and `osf` do not exist.
- `\ppleuro` does not exist.
- `\coprod` symbol is missing.
- There are no boldface variants of `\partial` and `\infty`.
- `\jmath` is taken from the CM math italic font.

In general, the newer mathpazo package can be considered as superior, but you may still use mathpple, if you prefer the shape of its Greek math alphabet.

## 8 The package pifont

Using symbol fonts is supported through the pifont package, providing commands for using the Zapf Dingbats font, as well as an interface to other families.<sup>1</sup>

### 8.1 Commands for using Zapf Dingbats

`\ding{<number>}`

A given character can be chosen via the `\ding` command. Its parameter is an integer that specifies the character to be typeset. For example, `\ding{38}` gives ☞; see table 2 on page 8.

`\begin{dinglist}{<number>}`  
`\begin{dingautolist}{<number>}`

The `dinglist` environment is a special itemized list. The argument specifies the number of the character to be used as the beginning of each item. For example,

```
\begin{dinglist}{43}
  \item The first item in the list
  \item The second item in the list
  \item The third item in the list
\end{dinglist}
```

prints

---

<sup>1</sup>This section was adopted, with minor changes, from [1], chapter 11.9.3 and 11.9.4.

- ☞ The first item in the list
- ☞ The second item in the list
- ☞ The third item in the list

There also exists an environment `dingautolist`, which allows you to build an enumerated list with a set of Zapf Dingbats characters. In this case, the argument specifies the number of the first character in the list. Subsequent items will be numbered with the character following the previous one. E.g.,

```
\begin{dingautolist}{192}
  \item The first item
  \item The second item
  \item The third item
\end{dingautolist}
```

prints

- ① The first item
- ② The second item
- ③ The third item

```
\dingfill {⟨number⟩}
\dingline {⟨number⟩}
```

`\dingfill` acts like the other filling commands in  $\text{\TeX}$ , but fills the space with a chosen symbol  like that.

`\dingline` generates a freestanding line filled with the given symbol, with a little space on the left and right:



## 8.2 Generic commands

The `pifont` package has a general mechanism for coping with Pi fonts. It provides the following generic commands with, in each case, the first argument  $\langle family \rangle$  specifying the name of the Pi font family in question (such as `psy` for the Symbol font, and `pzd` for the Zapf Dingbats font, see table 3 on page 9). If indicated, a second argument  $\langle number \rangle$  specifies the decimal position of a symbol in that font.

```
\Pifont {⟨family⟩}
```

This switches to the font family  $\langle family \rangle$  and the encoding U.

```
\Pisymbol {⟨family⟩} {⟨number⟩}
```

This command typesets the specified symbol (compare this with the `\ding` command).

```
\begin{Pilist} {⟨family⟩} {⟨number⟩}
\begin{Piautolist} {⟨family⟩} {⟨number⟩}
```

In the `Pilist` environment the specified symbol is used in front of each item in an itemized list (compare with the `dinglist` environment).

Table 2: The characters in the PostScript font Zapf Dingbats

32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71
72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87
88	89	90	91	92	93	94	95
96	97	98	99	100	101	102	103
104	105	106	107	108	109	110	111
112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	
	161	162	163	164	165	166	167
168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183
184	185	186	187	188	189	190	191
192	193	194	195	196	197	198	199
200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215
216	217	218	219	220	221	222	223
224	225	226	227	228	229	230	231
232	233	234	235	236	237	238	239
	241	242	243	244	245	246	247
248	249	250	251	252	253	254	

`Piautolist` is an environment where a series of symbols starting with the one at the decimal position  $\langle number \rangle$  in font family  $\langle family \rangle$  is used to number the items in an enumerated list (compare with the `dingautolist` environment).

$\backslash\text{Pifill} \{ \langle family \rangle \} \{ \langle number \rangle \}$ $\backslash\text{Piline} \{ \langle family \rangle \} \{ \langle number \rangle \}$
--

$\backslash\text{Pifill}$  acts like the other filling commands in  $\text{T}_{\text{E}}\text{X}$ , but fills the space with a chosen symbol (compare with  $\backslash\text{dingfill}$ ).

$\backslash\text{Piline}$  typesets a line consisting of several copies of the specified symbol, with some space at the left and right (compare with  $\backslash\text{dingline}$ ).

## 9 NFSS classification

Table 3 on the following page lists all text and symbol font shapes and the related PostScript fonts that are supported through the basic PSNFSS distribution. Available encodings are OT1, T1, TS1 and 8r, except for Symbol and Zapf Dingbats, which are implemented with encoding U. See [3] for how to access a given font shape directly.

Note, that none of the font families provides true small capitals, so the shape ‘sc’ refers to so-called ‘faked’ small capitals, whose typographical quality is—at least—questionable.

The math font families loaded by the `mathptm`, `mathptmx`, `mathpazo` and `mathppl` packages are not listed here. See the documented source file `psfonts.dtx` for information on this topic.

Table 3: Font shapes supported by the basic PSNFSS distribution

family	series	shape(s)	PostScript font names
<i>Times</i>			
ptm	m	n, sl, it, sc	Times-Roman, Times-Italic
ptm	b	n, sl, it, sc	Times-Bold, Times-BoldItalic
<i>Palatino</i>			
ppl	m	n, sl, it, sc	Palatino-Roman, Palatino-Italic
ppl	b	n, sl, it, sc	Palatino-Bold, Palatino-BoldItalic
<i>New Century Schoolbook</i>			
pnc	m	n, sl, it, sc	NewCenturySchlbk-Roman, NewCenturySchlbk-Italic
pnc	b	n, sl, it, sc	NewCenturySchlbk-Bold, NewCenturySchlbk-BoldItalic
<i>Bookman</i>			
pbk	m	n, sl, it, sc	Bookman-Light, Bookman-LightItalic
pbk	b	n, sl, it, sc	Bookman-Demi, Bookman-DemiItalic
<i>Helvetica</i>			
phv	m	n, sl, sc	Helvetica, Helvetica-Oblique
phv	b	n, sl, sc	Helvetica-Bold, Helvetica-BoldOblique
phv	mc	n, sl, sc	Helvetica-Narrow, Helvetica-Narrow-Oblique
phv	bc	n, sl, sc	Helvetica-Narrow-Bold, Helvetica-Narrow-BoldOblique
<i>Avant Garde</i>			
pag	m	n, sl, sc	AvantGarde-Book, AvantGarde-BookOblique
pag	b	n, sl, sc	AvantGarde-Demi, AvantGarde-DemiOblique
<i>Courier</i>			
pcr	m	n, sl, sc	Courier, CourierOblique
pcr	b	n, sl, sc	Courier-Bold, Courier-BoldOblique
<i>Zapf Chancery</i>			
pzc	m	it	ZapfChancery-MediumItalic
<i>Utopia</i>			
put	m	n, sl, it, sc	Utopia-Regular, Utopia-Italic
put	b	n, sl, it, sc	Utopia-Bold, Utopia-BoldItalic
<i>Charter</i>			
bch	m	n, sl, it, sc	CharterBT-Roman, CharterBT-Italic
bch	b	n, sl, it, sc	CharterBT-Bold, CharterBT-BoldItalic
<i>Symbol</i>			
psy	m	n	Symbol
<i>Zapf Dingbats</i>			
pzd	m	n	ZapfDingbats

## 10 Obsolete packages

The macro packages listed in table 4 are obsolete; they are provided for compatibility with existing documents only.

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Table 4: Obsolete packages in the PSNFSS collection

package	roman	sans serif	typewriter	math
times	Times	Helvetica	Courier	
palatino	Palatino	Helvetica	Courier	
mathptm	Times			≈ Times

### 10.1 The packages `times` and `palatino`

These packages do not scale the Helvetica fonts appropriately to match Times and Palatino—see section 4. Use `mathptmx` or `mathpazo` in conjunction with `helvet` and `courier` instead!

In case you want to load Times or Palatino *without* the related math fonts of the PSNFSS bundle, you can still use the basic NFSS commands. For instance,

```
\renewcommand{\rmdefault}{ptm}
```

will change the default roman font family to `ptm`, i.e. Times.

### 10.2 The package `mathptm`

The package `mathptm` is a predecessor of `mathptmx`. In contrast to the latter and to  $\text{\LaTeX}$ 's standard behavior, lowercase Greek in math is typeset upright. Zapf Chancery is used as the calligraphic math alphabet, which causes some problems with proper spacing. `mathptm` needs the font `cmex9`, which may not be available in Type 1 format.

## 11 Typeface samples

The following samples show the regular font of each typeface family supported by PSNFSS. The particular font size and baselineskip is indicated below the font name. Note that Helvetica is scaled to 92 % of the nominal size.

Times 10/12pt	The sun was just rising as Dr. Robert entered his wife's room. An orange glow, and against it the jagged silhouette of the mountains. Then suddenly a dazzling sickle of incandescence between two peaks. The sickle became a half circle and the first long shadows, the first shafts of golden light crossed the garden outside the window. And when one looked up again at the mountains there was the whole unbearable glory of the risen sun.
Palatino 10/12.4pt	The sun was just rising as Dr. Robert entered his wife's room. An orange glow, and against it the jagged silhouette of the mountains. Then suddenly a dazzling sickle of incandescence between two peaks. The sickle became a half circle and the first long shadows, the first shafts of golden light crossed the garden outside the window. And when one looked up again at the mountains there was the whole unbearable glory of the risen sun.

Bookman 9.6/11.5pt	The sun was just rising as Dr. Robert entered his wife's room. An orange glow, and against it the jagged silhouette of the mountains. Then suddenly a dazzling sickle of incandescence between two peaks. The sickle became a half circle and the first long shadows, the first shafts of golden light crossed the garden outside the window. And when one looked up again at the mountains there was the whole unbearable glory of the risen sun.
Charter 10/12.4pt	The sun was just rising as Dr. Robert entered his wife's room. An orange glow, and against it the jagged silhouette of the mountains. Then suddenly a dazzling sickle of incandescence between two peaks. The sickle became a half circle and the first long shadows, the first shafts of golden light crossed the garden outside the window. And when one looked up again at the mountains there was the whole unbearable glory of the risen sun.
New Century Schoolbook 9.6/12pt	The sun was just rising as Dr. Robert entered his wife's room. An orange glow, and against it the jagged silhouette of the mountains. Then suddenly a dazzling sickle of incandescence between two peaks. The sickle became a half circle and the first long shadows, the first shafts of golden light crossed the garden outside the window. And when one looked up again at the mountains there was the whole unbearable glory of the risen sun.
Utopia 9.6/12pt	The sun was just rising as Dr. Robert entered his wife's room. An orange glow, and against it the jagged silhouette of the mountains. Then suddenly a dazzling sickle of incandescence between two peaks. The sickle became a half circle and the first long shadows, the first shafts of golden light crossed the garden outside the window. And when one looked up again at the mountains there was the whole unbearable glory of the risen sun.
Helvetica 10/12pt	The sun was just rising as Dr. Robert entered his wife's room. An orange glow, and against it the jagged silhouette of the mountains. Then suddenly a dazzling sickle of incandescence between two peaks. The sickle became a half circle and the first long shadows, the first shafts of golden light crossed the garden outside the window. And when one looked up again at the mountains there was the whole unbearable glory of the risen sun.
Avant Garde 9.6pt	Don't use Avant Garde for typesetting larger portions of text!
Courier 10/12pt	A monospaced typeface, suitable for typesetting filenames, URLs etc.
Zapf Chancery 14.4pt	<i>To Hermann Zapf – whose strokes are the best.</i>

## Credits

The PSNFSS system was originally developed by Sebastian Rahtz.

The virtual mathptm and mathptmx fonts and the related packages were created by Alan Jeffrey, Sebastian Rathz and Ulrik Vieth.

The mathpple package and its virtual fonts are based on earlier work by Aloysius Helminck.

The Pazo math fonts and the related virtual fonts were created by Diego Puga.

## References

- [1] Michel Goossens, Frank Mittelbach, and Alexander Samarin: *The LaTeX Companion*. Addison Wesley, 1994.
- [2] Michel Goossens, Sebastian Rahtz, and Frank Mittelbach: *The LaTeX Graphics Companion*. Addison Wesley Longman, 1997.
- [3] L<sup>A</sup>T<sub>E</sub>X3 Project Team (Ed.): *LaTeX2e font selection*. CTAN: macros/latex/doc/html/fntguide/fntguide.html (Part of the L<sup>A</sup>T<sub>E</sub>X online documentation)