teTeX Manual

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Abstract

teTeX is a distribution of TeX and related programs: pdfTeX, e-TeX, Omega, Aleph, LaTeX, ConTeXt, METAFONT, METAPOST, `dvips`, `xdvi`, `dvipdfm`, `dvipng`, BibTeX, `makeindex` etc.

teTeX aims to make using and maintaining a TeX system as easy as possible. The programs are built around the Web2c distribution by Karl Berry and Olaf Weber. A common part of many programs is `kpathsea`, a library that provides efficient access by name to files stored hierarchically.

This document describes how to use and set up the teTeX system. It does not attempt to be a comprehensive guide, instead it tries to give an overview about what software and documentation is contained in the distribution.

Contents

1 The Components of teTeX

This document cannot describe all the programs which are part of teTeX in detail, but it tries to give you an overview. This section describes the packages which form the main components of teTeX.

1.1 Web2c

Web2c is a TeX implementation, originally for Unix, but also running under Windows, Macintosh, DOS, Amiga, and other operating systems. It includes TeX itself and the following programs:

- METAFONT: a font compiler intended to produce typefaces of high quality [1].
- METAPOST: a program similar to METAFONT, modified to output Postscript code instead of bitmaps. Documentation for METAPOST is available via the command: `texdoc mpman`.
- BibTeX: a preprocessor to make bibliographies for LaTeX. For documentation, see `texdoc btxdoc` and Appendix B of [2].
- utilities for converting between different font metric and bitmap formats: `gftopk`, `gftodvi`, `gftype`, `pktogf`, `pktype`, `pltotf`, `tftopl`, `vftovp`, `vptovf`.
- DVI utilities: `dvicopy, dvitomp, dvitype`.
- other tools: `patgen`, `pooltype`, `tangle`, `weave`, `ctangle`, `cweave`.

The main documentation for Web2c is the "Web2c manual" and the "kpathsea manual". These can be accessed via `texdoc web2c` and `texdoc kpathsea` respectively.

1.2 TeX extensions: pdfTeX, e-TeX, Omega, Aleph, encTeX

Besides the standard TeX program, the following extensions to TeX are included in teTeX:

pdfTeX This can optionally write Acrobat PDF format instead of DVI. The user manual can be accessed by the command `texdoc pdftex-a`. The LaTeX hyperref package (`texdoc manual`) has an option "pdftex", which turns on all the program features. In DVI mode, pdfTeX works like the usual TeX with the exception of the availability of additional typographic features.

In PDF mode, pdfTeX supports graphics inclusion for the following graphic formats:

- PNG (portable network graphics)
- PDF (portable document format),
- JPG (jpeg)

- MPS (metapost output)

It does not support EPS (encapsulated postscript), but if you have recent versions of `ghostscript` (version 5.10 or later) and `perl` (version 5 or later) installed, you can use the tool `epstopdf` to convert EPS graphics into PDF. When including a PDF file, pdfTEX is able to access parts of a multi-page file: a complete page or a clipped part of a page. This feature extends pdfTEX beyond its typesetting capabilities into a versatile tool for handling arbitrary generated PDF files.

e-TEX adds a small but powerful set of new primitives, and an extension for right to left typesetting. In default mode, e-TEX is 100 % compatible with ordinary TEX. See `texdoc etex-man` for details.

Omega (Ω) Omega works internally with 16-bit Unicode characters; this allows it to work directly with almost all the world's scripts simultaneously. It also supports dynamically loaded "Ω Translation Processes" (OTPs), which allow the user to define complex transformations to be performed on arbitrary streams of input. Documentation: `texdoc doc-1.12`.

Aleph is a TEX engine that combines the good features of eTEX and Omega. The LATEX based format of Aleph is called Lamed.

1.3 DVI drivers: dvips, dvilj, xdvi, dvipdfm, dvipng

For printing and previewing DVI files, you need to use one of the DVI drivers that are available:

dvips This driver converts DVI files into Postscript. Postscript is a page description language that many laser printers directly support. With the help of the utility `ghostscript`, it is possible to view Postscript documents on screen and to print Postscript documents on non-Postscript printers. This version of `dvips` supports hypertex and partial font downloading. In this release, the search path for config files have been changed: the current directory is no longer searched by default. Additionally, secure mode has been turned on by default. For details, consult the documentation: `texdoc dvips`.

dvilj This is a family of drivers to support HP LaserJet (and compatible) printers: `dvilj, dvilj2p, dvilj4, dvilj4l, dvilj6`. These drivers are faster than the `dvips` + `ghostscript` alternative (which can also be used to print DVI files on HP LaserJet printers), but they lack a few features like support for virtual fonts, rotated or scaled graphics, etc.

xdvi This is a previewer for DVI files under the X Window System. It has support for Postscript specials through Display Postscript, NeWS and `ghostscript`. Hypertex support was also added for this version of `xdvi`. A link can be followed by clicking with Button-1 or Button-2 (open link in a new window) on it. With the help of source specials, xdvi can interact with most editors in some way. For details, visit the project page.

dvipdfm This program can convert dvi files into pdf format, while supporting a rich set of features (via TeX's \special scheme): hyperlinks, bookmarks, thumbnails, image inclusion etc. For details consult the documentation `texdoc dvipdfm` and the web page.

dvipng makes PNG and/or GIF graphics from DVI files as obtained from TeX and its relatives. For details, consult the documentation: `texdoc dvipng`.

1.4 Makeindex

`makeindex` is a general purpose hierarchical index generator; it accepts one or more input files (often produced by a text formatter such as TeX or `troff`), sorts the entries, and produces an output file which can be formatted. The formats of the input and output files are specified in a style file; by default, input is assumed to be an `idx` file, as generated by LaTeX. Documentation: `texdoc makeindex`

1.5 Texinfo

`texinfo` is a documentation system. It produces online or printed output from a single source. It uses TeX to typeset documents for printing (`texdoc texinfo`).

1.6 UNIX Scripts / Tools

If you are using teTeX under UNIX, you can use the following scripts. More documentation for a specific tool can either be obtained from its UNIX manual page or by running the program with the option `-help`.

texdoc allows you to easily access documentation included with teTeX. You only have to remember the file name of the document that you want to access, without the directory part. If you do not specify a file name extension (such as `.dvi`) `texdoc` will try a few default extensions. After searching the file, `texdoc` starts an appropriate viewer. The command `texdoc -help` gives you a list of available command line options. While `texdoc` is a fast and efficient tool if you exactly know what you are searching for, it is of limited use if you don't know the exact name of the documentation file.

texdoctk This `perl/tk` based tool allows you to browse through the available documentation by some topics and to search for keywords. It uses a simple database file for its configuration (named `texdoctk.dat`), which you can customize and extend easily.

texconfig allows you to carry out the most common configuration tasks in teTeX. The program can be used in command mode or in interactive mode. For the interactive mode (which is invoked by calling `texconfig` without arguments), a curses based utility is used for user interaction (menus, check boxes, . . .). The command `texconfig help` shows you a list of available command line options (command mode).

`texconfig` can be used to set up TeX format files and their hyphenation patterns, to set up printers (for `dvips`) and for a few other things. It manipulates configuration files to store the configuration changes.

If the use of `texconfig` causes a change in some configuration file, `texconfig` will try to save that file into the texmf tree that is specified by the `TEXMFCONFIG` variable. Variable (cached) runtime data (such as format files generated by `fmtutil`, map files generated by `updmap`) will be stored in the texmf tree specified by the `TEXMFVAR` variable.

updmap Some tools in teTeX support Postscript Type 1 fonts: `dvips`, `pdfTeX`, `xdvi`, `dvipdfm` and `gsftopk`, `ps2pk`. The last two in this list just convert outline fonts into a bitmap format which is helpful for applications that don't directly support outline fonts. In an ideal world, all of these programs would share a common configuration file to set up their outline fonts. The reality is different, however, and each tool needs its own configuration. The `updmap` utility was developed to generate these configuration files from a central repository. Adding font definitions for all supported applications from a map file `foo.map` can be as easy as `updmap --enable Map foo.map`. For details, please consult the manual page of `updmap`.

dvired This script can be used to print documents formatted for A4 paper 2-up (i.e. two logical pages to one physical page of paper) by scaling the pages to 70.7 % of their original size. `dvired` can just be used in the same way as `dvips` (same command line options).

dvi2fax This script converts DVI files into FAX G3 format. It uses `ghostscript` (see: `http://www.cs.wisc.edu/~ghost/`) which is not part of teTeX. The DVI file is first converted to Postscript (204 × 196 dpi or 204 × 98 dpi) and then to FAX G3 using `ghostscript` (`faxg3` device).

allcm, allec, allneeded teTeX's DVI drivers generate missing bitmap fonts on demand (the first time they are needed). If you start with a fresh installation, you don't have any bitmap fonts and the delay caused by font generation might be too annoying for you. In that case, the three scripts `allcm, allec and allneeded` can help you. `allcm` and `allec` create a few DVI files (using LaTeX) which use lots of fonts at various sizes and run these DVI files through `dvips`. This triggers the generation of the most commonly used Computer Modern (`allcm`) and European Computer Modern (`allec`) fonts respectively. You might already have DVI files and want to generate just the bitmap fonts needed by these documents. This can be done by the `allneeded` script. This script will search a given set of directories for DVI files and run them through `dvips`. All these scripts just trigger font generation. LaTeX and DVI files generated by `allcm/allec` are removed when the program terminates. Postscript output that is generated by `dvips` is sent to `/dev/null`.

These programs accept the command line option "`-r`" (must be the first option) to generate files for the magnification 707/1000 which is used by `dvired`. `allneeded` passes options which correspond to existing file or directory names to `find` (for locating DVI files). All other options given to any of these three utilities are passed to `dvips`. So, by passing `-D` *`NNN`* `-mfmode` *`some-mode`* or `-P` *`some-printer`*, you can generate fonts for a specific resolution (*`NNN`*) and mode (*`some-mode`*) or for a specific printer (*`printer`*).

2 Concepts and configuration

2.1 The TeX Directory Structure (TDS)

teTeX's support tree with fonts, macros, documentation and other files (from now on called the "texmf tree") follows a certain structure: the TeX Directory Structure (TDS). This is a standard developed by a TeX Working Group of TUG. The TDS is defined in a way so that can be used by different implementations of TeX on different platforms. Today, several TeX distributions follow this standard: teTeX, TeX Live, fpTeX and miktex, only to mention some. You need to understand this structure if you want to build your own texmf tree (e.g., with all your local additions) or add files into an existing texmf tree. The list of all texmf trees (optionally using some notation called "brace expansion" and `!!` modifiers; the kpathsea manual explains this in detail) can be obtained by:

```
kpsewhich -expand-var='$TEXMF'
```

Table 1 gives a short overview of the TDS. It shows the proper location inside the TDS tree for several kind of files. The complete documentation for TDS can be accessed by `texdoc tds`. If you want to see some examples, just look at the main texmf tree of teTeX. It has several thousand files.

TeX macros	tex/⟨*format*⟩/⟨*package*⟩/
font files	fonts/⟨*type*⟩/⟨*supplier*⟩/⟨*typeface*⟩/
METAFONT files	metafont/⟨*package*⟩/
documentation	doc/⟨*package*⟩/
sources	source/⟨*package*⟩/
BibTeX files	bibtex/{bst,bib}/⟨*package*⟩/

Table 1: TDS: an overview

The replaceable parts in this table mean:

⟨*format*⟩ The name of the TeX format, e.g., `latex` or `amstex`.

⟨*package*⟩ The name of the package to which the file belongs, e.g., `babel` or `seminar`.

⟨***type***⟩ The name of the type of a font file, e.g., `pk` (packed bitmap), `tfm` (tex font metric), `afm` (adobe font metric), `vf` (virtual font), or `source` (METAFONT source).

⟨***supplier***⟩ The name of the font supplier (to whom the font file belongs), e.g., `adobe` or `urw`.

⟨***typeface***⟩ The name of the typeface name (for this font file), e.g., `times` or `cm` (for Computer Modern).

It is important to know that the default search paths in teTeX rely on this directory structure. So, if you add a file to the wrong directory tree, e.g., a TeX macro somewhere in the `fonts` subtree, that file will not be found correctly.

2.2 Overview of the predefined texmf trees

As described in the previous section, each texmf tree follows a well defined directory structure. This section lists all predefined texmf trees and their intended purpose. The command `texconfig conf` shows you the values of the variables below, so that you can easily find out how they map to directory names in your installation.

TEXMFCONFIG The tree specified by this variable will be used by teTeX's utilities `texconfig`, `updmap` and `fmtutil` to store modified configuration data.

TEXMFVAR The tree specified by this variable will by used by the utilities `texconfig`, `updmap` and `fmtutil` to store (cached) runtime data such as format files and generated map files.

TEXMFHOME The expansion of this variable typically depends on `$HOME`, so this dynamically adjusts for each user to an individual directory. The idea is to allow users to store their own versions of macros, fonts etc. in this tree.

TEXMFSYSCONFIG The tree specified by this variable will be used by the utilities `texconfig-sys`, `updmap-sys` and `fmtutil-sys` to store modified configuration data.

TEXMSYSFVAR The tree specified by this variable will by used by `texconfig-sys`, `updmap-sys` and `fmtutil-sys` to store (cached) runtime data such as format files and generated map files.

TEXMFMAIN This variable specifies the texmf tree where some vital parts of the system are installed, such as helper scripts (e.g. `web2c/mktexdir`), pool files and other support files.

TEXMFLOCAL This variable names a directory tree which should be used for systemwide installation of additional or updated macro packages, fonts etc.

TEXMFDIST This variable names the directory tree which holds the macros, fonts etc. as originally distributed.

2.3 The file name database (ls-R)

texmf trees can get very large and to speed up searching in such a tree, a file name database is used. A file name database exists in the root of each texmf tree and has the name `ls-R`. It should list each file in the texmf tree. The command `texhash` can be used to build an up-to-date file name database for each texmf tree. It should be used after files have been added to a texmf tree. However, you don't need to run `texhash` for files added by the automatic font generation or the `texconfig` utility.

2.4 Runtime configuration (texmf.cnf file)

Search paths and other definitions (e.g., the static sizes of some arrays in TeX or other programs) can be set up in configuration files named `texmf.cnf`. By changing the definitions in these configuration files (teTeX's main `texmf.cnf` is `web2c/texmf.cnf` in the main texmf tree), the behavior of programs can be changed without recompiling them. Chapters 3 and 4 of the kpathsea manual (`texdoc kpathsea`) describe the path searching configuration in detail. Section 2.5 of the Web2c manual (`texdoc web2c`) describes some interesting runtime parameters that you might want to change.

Some changes to the array sizes require you to rebuild the dump files that the program uses. Run the command `texconfig init` to rebuild all dump files after you have changed one of the array sizes.

This implementation of TeX can read and write files (as can every implementation of TeX) and it can also call external commands (via the `\write18` stream). Some variables in the `texmf.cnf` file control access to these features. The possibility to call external commands can be turned on or off (default is off). Access to file beginning "`.`" is disallowed in restricted mode (default for reading files). In paranoid mode, file access is even more restricted and you cannot access files outside the current directory tree (default for writing files). If the first line of a document starts with `%&`, it can be used to pass the name of the format file and/or a TCX file. Parsing the first line, is an extension that can be turned on or off (default is off) in the `texmf.cnf` file.

2.5 Using Postscript type 1 fonts

For every font you use with TeX, a TFM (TeX font metric) file is needed. Type 1 fonts usually do not have the same encoding that is used by TeX, so additional metrics that do some re-encoding (virtual font files) are often needed. For a lot of font families, these font metric files and additional map files that you need (see below) can be found on CTAN servers in the directory `fonts`. If support for your fonts cannot be found there, you can use the `fontinst` utility (documentation: `texdoc fontinst`) to create these.

Postscript type 1 fonts can be used by `dvips`, `dvipdfm`, `xdvi`, `gsftopk`, `ps2pk` and pdfTeX. All of these programs require that you set up map files for these fonts. To ease the process of adding map file entries to the configuration files that are used by these tools, you should follow the following steps:

- if your fonts already come with a map file, put that file into the `fonts/map/dvips/misc` directory in the main texmf tree.
- otherwise, you will need to create a map file yourself, using the syntax as described in the dvips manual (`texdoc dvips`); make sure to set up these fonts as "download fonts", not as "built in" fonts.
- run the command `texhash` and then make the map file known to `updmap` by running the command `updmap --enable Map file.map` (where `file.map` denotes the filename of your map file)

The programs `gsftopk` and `ps2pk` convert Postscript type 1 fonts into bitmap fonts and make these fonts accessible to DVI drivers that do not directly support Postscript type 1 fonts. This conversion is automatically invoked by the `mktexpk` script. That script calls `gsftopk` by default. If you do not have installed the `ghostscript` program (which `gsftopk` needs), or if you want to use `ps2pk` for other reasons (e.g., because it is usually faster) you just need to define the variable `ps_to_pk` to `ps2pk`. This variable can be set in your environment or in the `mktex.cnf` file (see below).

2.6 Configuration files maintained by texconfig

The `texconfig` utility is a user interface for changing the configuration of the teTEX system. The configuration is stored in several individual files. This section documents the names of these files, their location in the texmf tree and their content. This explains how `texconfig` works and enables you to manually configure parameters which are not supported by `texconfig`.

- `dvips/config/config.ps` stores configuration information for `dvips`. The default values are: 600 dpi resolution; ljfour METAFONT mode; A4 paper; offset for printing: 0pt,0pt; output goes to `lpr` command.
- `tex/generic/config/pdftexconfig.tex` This file sets some defaults for pdfTEX, e.g. the default paper size. This information is dumped into format files, so if you modify this file directly (without using texconfig), you have to rebuild the format files by using the command `fmtutil --all`.
- `xdvi/XDvi` This file sets some defaults (e.g. media size, metafont mode) for `xdvi`. It is read via the app-default mechanism of X11. You can override these app-defaults as usual (i.e. via a file `~/.Xdefaults` or with resources managed by `xrdb`).
- `dvipdfm/config` defines the defaults for `dvipdfm`, e.g. the default paper size, the command to convert encapsulated postscript graphics into PDF etc.
- `web2c/mktex.cnf` This file sets the default metafont mode used for automatically generated bitmap fonts, the resolution which is used in scripts (e.g. `mktextfm`) and a list of "features" used for automatic font generation. The most important "features" are described below; for a full list, see section 2.2.9.1 of the kpathsea manual (`texdoc kpathsea`).

appendonlydir Set the sticky bit on directories that have to be created. The sticky bit has the effect that a file in such a directory can only be removed by the owner of that directory or by the owner of that file.

varfonts When this option is enabled, fonts that would otherwise be written to some texmf tree go below the `VARTEXFONTS` directory instead. The default value is in `/var/tmp/texfonts`. The "Linux File System Standard" recommends `/var/tex/fonts`. The `varfonts` setting in `MT_FEATURES` is overridden by the environment variable `USE_VARTEXFONTS`: if set to 1, the feature is enabled, and if set to 0, the feature is disabled.

texmfvar Force generated files that would go into a system tree (as defined by `SYSTEXMF`) into `TEXMFVAR`. The `varfonts` feature takes precedence if also set. A user can override this setting in either direction by setting `USE_TEXMFVAR` to 1 or 0.

- `web2c/updmap.cfg` controls how `updmap` generates map files for all supported tools. Besides some general parameters, all active map files are listed here.

- `web2c/fmtutil.cnf` This file defines which format files are built (and how) and which file can be used to customize the hyphenation patterns that are loaded into these formats. The programs `fmtutil` and `texlinks` (which are automatically called if the formats are set up via `texconfig`) operate on this file. `fmtutil` can be used to create the format files according to the "rules" defined in `fmtutil.cnf` (for a brief description, just call `fmtutil --help`). If you define a new format file, you usually also need a symbolic link with the name for the format to the appropriate TeX engine (e.g., `latex` → `pdfetex`). To create these links, just call the `texlinks` script.

- hyphenation setup files as defined in `web2c/fmtutil.cnf`: the third field of the file `fmtutil.cnf` defines names of files which can be edited to customize hyphenation (for the format which is named in the first field). Since `fmtutil.cnf` itself is a configuration file, the list of files in the third field might vary. Table 2 shows the names of the files used in the default configuration. Additional files (used

file name	used by format
`tex/context/config/cont-usr.tex`	cont-en
`tex/generic/config/language.dat`	latex, pdflatex
`tex/lambda/config/language.dat`	lambda, lamed
`tex/plain/config/language.def`	etex, pdfetex

Table 2: files for setting up hyphenation

by formats that are disabled in the default configuration) are: `platex/config/language.dat` and `mex/config/mexconf.tex`.

2.7 Automatic font generation

By setting various "features" (see 2.6) the automatic font generation can be customized in many ways. The tool `texconfig` offers support in configuring and setting up the directories where automatically generated fonts end up.

In the default configuration of teTEX, all automatically generated fonts end up in the directory tree which is specified by the `VARTEXFONTS` variable. The command line mode of `texconfig` (*not* the interactive mode) allows you to manipulate the path and the permissions of this directory tree and also adjusts the "features" for automatic font generation to match the chosen directory permissions:

texconfig font vardir DIR This changes the path which is stored in the `VARTEXFONTS` variable to `DIR`. You must have write permissions to the main `texmf.cnf` file, because the variable is stored there.

texconfig font rw This makes the `VARTEXFONTS` directory (and subtrees `pk`, `tfm`, `source`) world writable and sets the "features" `appendonlydir` and `varfonts` in the config file `mktex.cnf`. To change the global `mktex.cnf` file (instead of modifying an individual copy), use `texconfig-sys` instead of `texconfig`.

texconfig font ro This makes the `VARTEXFONTS` directory (and subtrees `pk`, `tfm`, `source`) writable for the owner only and sets the "features" `texmfvar` in the config file `mktex.cnf`. To change the global `mktex.cnf` file (instead of modifying an individual copy), use `texconfig-sys` instead of `texconfig`.

The assumption behind the manipulations of `texconfig` is that you set up a world-writable `VARTEXFONTS` tree if you want all generated fonts (by all users) to be stored there. If you set the global `VARTEXFONTS` tree to read-only, then the `texmfvar` is activated which results in a user-specific default destination for automatically generated fonts (`$TEXMFVAR/fonts`).

2.8 TCX files

TCX (TEX character translation) files help TEX support direct input of 8-bit international characters if fonts containing those characters are being used. Specifically, they map an input (keyboard) character code to the internal TEX character code (a superset of ASCII).

teTEX has the TCX files `il1-t1.tcx` and `il2-t1.tcx` which support ISO Latin 1 and ISO Latin 2, respectively, with Cork-encoded fonts (a.k.a.: the T1 encoding). TCX files for Czech, Polish, and Slovak are also provided.

All TCX files that are distributed as part of teTEX can be found in the web2c subdirectory of the main texmf tree; their file name extension is `.tcx`.

You can specify a TCX file to be used for a particular TEX run by specifying the command-line option `-translate-file=`*`tcxfile`* or (preferably) specifying it explicitly in the first line of the main document `%& -translate-file=`*`tcxfile`*. Note, however, that parsing the first line of an input file in an extension that is disabled by default and has to be turned on via command line switch (`-parse-first-line`) or in the `texmf.cnf` file (see section 2.4).

When processing a document using a TCX file, you usually must not use LaTeX's `inputenc` package. One exception to this rule are TCX files that map all characters to their original position such as `cp8bit.tcx`, `cp227.tcx` and `natural.tcx`. The purpose of these TCX files is to manipulate the "printability" attribute in TeX's internal tables.

2.9 Creating PDF files

If you want to create PDF documents with the help of TeX, there are at least three different ways to do this

1. translate your TeX sources directly into PDF by using pdfTeX.
2. translate DVI files generated by TeX into PDF by using the `dvipdfm` program (now included in teTeX).
3. translate a Postscript file generated by TeX and `dvips` into PDF by using Adobe Acrobat or the `ps2pdf` utility included in ghostscript.

When using `ps2pdf`, you should make sure to use at least version 6.50 of ghostscript. Earlier versions are known to have serious restrictions on creating PDF output.

No matter which approach you use, there is one common rule when creating quality PDF files: you should avoid bitmap fonts. They just display very poorly on screen when used in PDF documents (which is caused by poor bitmap rendering of Adobe Acrobat Reader in all versions up to 5.x).

Using only the fonts provided by teTeX, you have more choices for which fonts to use. The following typeface families are included in Postscript type 1 format:

- Computer Modern and the AMS fonts (extended versions with polish, czech and slovak and russian letters are available, too); a special extension to Computer Modern providing lots of additional characters (most, but not exclusively accents) are the Latin Modern fonts
- the full set of the 35 basic "LaserWriter fonts" (see psnfss documentation, supporting other fonts are pazo, tx/px fonts)
- Bitstream Charter

The EC fonts are not included in type 1 format in teTeX. If you have a LaTeX document that uses EC fonts, you have at least two ways to get around this problem. The first is to stop using EC fonts—which can in most cases be done by switching to the Latin Modern fonts. Usually, the EC fonts are activated by `\usepackage[T1]{fontenc}` or `\usepackage{t1enc}` and you just have to add `\usepackage{lmodern}`. The second is to use the CM-SUPER Type 1 fonts, not included in teTeX, but available on CTAN servers in the directory `fonts/ps-type1/cm-super`. This package is pretty huge, but it contains all EC fonts in outline format and much more.

If the Latin Modern solution works for you, this is the recommended one for the following reasons:

- quality: the Latin Modern fonts have been created by using a better technology and they have been carefully hand-optimized (hinting, kerning, accent positioning etc.)
- the Latin Modern fonts are already included in teTEX
- the resulting files are usually much smaller

3 Release notes for teTEX 2.0

Some default settings of "`tex`, the Web2C implementation of TEX" have changed. We determined that some extensions were in fact in conflict with the strict definition of TeX as laid down by Knuth.

The most notable change is that parsing of `%&` constructs in the first line of an input file is now disabled by default – it can be enabled in `texmf.cnf` if you desire this. In that case, tex will announce itself as "TeXk" and print an additional banner line saying that `%&`-line parsing is enabled.

We may encounter more places where the default behaviour is not what it should be, and proceed to make this optional (and by default off) in future versions of Web2C.

4 Release notes for teTEX 3.0

This section briefly describes what has changed since the last major release.

4.1 New programs / font support / macro packages

Two programs (see section 1) have been added with this release: Aleph and dvipng. Many macro packages have been added, too. The largest additions are the packages beamer and memoir. In the fonts sections, some additions and updates have happened, too. The largest change in this area is the addition of the Latin Modern Fonts (`lmodern`) in Postscript Type 1 format. These fonts are not as exhaustive as the `cmsuper` fonts, but they are of very good quality and sufficient for languages which use Latin characters. Using the Latin Modern Fonts is in most cases preferable over using the `ae` fonts (e.g. PDF files with accents are searchable, text extraction works better).

4.2 Changes to web2c

- TEX now uses the new `tex.web` (version 3.141592) from December 2002 (fixed `\xleaders`, glueset, weird alignments).

- encTEX (see `texdoc encdoc-e`)), a TEX extension by Petr Olšák for input reencoding is now available (for non Omega based engines). The new functionality is enabled by setting the `-enc` switch at format generation time. It defines 10 new primitives which can be used to control TEX's internal character translation tables and proper multibyte input (e.g. for handling UTF-8).
- The `\input` primitive in `tex` (and `mf` and `mpost`) now accepts double quotes containing spaces and other special characters. Typical examples:

  ```
  \input "filename with spaces"   % plain
  \input{"filename with spaces"}  % latex
  ```

  See the Web2C manual for more: `texdoc web2c`.

4.3 Modifications to the directory structure and file searching

split of texmf trees The instruction of installing teTEX from the sources that I provide have been changed. The unpacked texmf tarball (`$prefix/share/texmf-dist`, set up as `$TEXMFDIST` in `texmf.cnf`) is no longer mixed with the files that are installed via "`make install`" from building and installing the program sources. These files (e. g. format files) that are more tied up with the programs end up in the directory `$prefix/share/texmf` (`$TEXMFMAIN`).

So, the content of the texmf tarball remains completely unchanged in `$TEXMFDIST` and can easily be replaced with a new version without loosing other runtime files that are not provided elsewhere.

changed location for font map files Following a change introduced with version 1.1 of the TEX Directory Structure (see `texdoc tds`), font map files (`.map`) are now only searched in subdirectories of `fonts/map` in each `texmf` tree. The subdirectories of `fontname`, `dvips` and `pdftex` are no longer searched for these files. The `texmf` trees from this distribution follows this convention, but you might need to rearrange some files if you maintain a local `texmf` tree.

Within the `fonts/map` tree the files are organized by syntax and package. Known map file syntaxes are `dvips` (this is the most common one), `pdftex` (a superset of the `dvips` syntax, e. g. the psname field is optional), `dvipdfm` and `vtex`. If some file is stored within the `fonts/map/dvips` subtree, this does not mean that `dvips` is the only program that accesses these files. Other programs which support the same syntax can use these files as well. It's just that the program `dvips` has given its name for this syntax.

The next directory level specifies the package that the map file belongs to. Example: the file `charter.map` of the `psnfss` package follows the syntax of `dvips`, so it is stored in `fonts/map/dvips/psnfss/charter.map`.

If you happen to see that some application cannot find a map file which is stored in a wrong location, you have to move that file to the right location. Try to find out the syntax and the package that the file belongs to. If unsure, you can always choose "unknown", since the only restriction for the directory tree below `fonts/map` is that all file names are unique. The precise `<syntax>/<package>` subdirectory does not affect searching. Do not forget to update the filename database (`ls-R`) by running the command `mktexlsr` (resp. `texhash` which is the same).

changed search path for map files Map files used to be searched along the `$TEXCONFIG` variable ("dvips config" format in terms of kpathsea internals). This has been changed to the `$TEXFONTMAPS` variable ("map" format). The new location of the font map files is included in the new default setting of `$TEXFONTMAPS`, but not in the default setting of `$TEXCONFIG`. The result is that an old application that searches font map files along the "dvips config" format will not work.

For the "C" API of kpathsea this change means that map files should be accessed using `kpse_fontmap_format` instead of `kpse_dvips_config_format`. For scripts that use kpsewhich, one has to make sure that `--format=map` is used to search font map files.

changed location for font encoding files Together with font map files (see above), the font encoding files have been given a new location, too. The new location is `fonts/enc/<syntax>/<package>`. So, if you happen to see some application to fail finding a font encoding file, just move it to the right location in the texmf tree and update the filename database.

omission of "engine" directories Within the texmf trees, the directory trees associated with the names of TeX engines (e. g. `etex`, `pdftex`, `omega`, `mltex`) are no longer searched for TeX macro packages. This means that the `$TEXINPUTS` search path now lies completely within the `tex` subtree.

If you are using the above mentioned "obsolete" locations for TeX macro packages, you have to move them into the `tex` directory tree.

4.4 Changes to texconfig / updmap / fmtutil

Following the new directory layout, it is desired not to modify the directory tree specified by the `$TEXMFDIST` variable any more. This makes it necessary to redirect generated output (e.g. map files created by updmap, updated config files) somewhere else.

A new approach was taken by the implementation in teTeX-3.0: two new variables have been introduced to specify where to store this data:

TEXMFCONFIG	configuration data
TEXMFVAR	variable (cached) runtime data

If a teTeX installation is shared among several users, each of them can now use teTeX's configuration tools. For each of the three programs, a `-sys` variant exists. Calling this variant, e.g. `texconfig-sys`, is the same as calling the regular variant, except that the variables TEXMFCONFIG and TEXMFVAR are redirected to TEXMFSYSCONFIG and TEXMFSYSVAR respectively. This means that the output trees for these commands will be TEXMFSYSCONFIG and TEXMFSYSVAR.

The idea behind this is as follows: in the default settings of teTEX, the variables TEXMFCONFIG and TEXMFVAR point to directories within the user's home directories. This means that each user can have his own configuration, but this makes it difficult to change the global defaults. That's where TEXMFSYSCONFIG and TEXMFSYSVAR come into play. These global trees are included in the search paths of all users. By using the `-sys` variant of the tools mentioned above, it becomes easy to administrate the global defaults. So, if for example, some administrator installs a font-package that comes with a map file in a system's tree (e.g. TEXMFLOCAL), then he should use `updmap-sys` to add the new map file to the global configuration.

4.5 Changes to pdfTEX

- All parameters previously set through the special configuration file `pdftex.cfg` must now be set through primitives; `pdftex.cfg` is no longer supported. Some settings (e.g. the default papersize) are loaded via `pdftexconfig.tex` into the format files.

- `\pdfmapfile` and `\pdfmapline` provide font map support from within a document.

- Microtypographic font expansion can be used more easily.
  `http://www.ntg.nl/pipermail/ntg-pdftex/2004-May/000504.html`

- See the pdfTEX manual for more: `texdoc pdftex-a`.

4.6 pdfetex: the new default TEX engine

teTEX uses `pdfetex` for all formats except "good-old" `tex`. So, if you run `latex`, the underlying engine will be `pdfetex`. Some (broken) TEX macros assume that pdfTEX is running in PDF generation mode if they detect primitives that pdfTEX has introduced (e.g. `\pdfoutput`). This is wrong, since pdfTEX can also be used (and is used) to generate DVI output. A reliable way of detecting PDF output mode is implemented in `ifpdf.sty` which works for plain TEX as well as LATEX.

4.7 Changes to xdvik

- On supported platforms the default toolkit of `xdvi` is now Motif. The GUIs for both toolkits (Motif and Xaw) have been updated: There is a page list for easier navigation and improved menus. The Motif version now has a toolbar and a 'Preferences' dialog for advanced customizations.

  User preferences that are set via this dialog, the 'Options' menu and other dialogs are now saved in a file `~/.xdvirc`. This file overrides other X defaults, but not the command-line options. (The option '-q' and the X resource '.noInitFile' can be used to disable this feature).

- The new GUI elements can be selectively toggled via the option or the X resource '-expertmode', which should be used instead of '-expert'/'-statusline'.
- The functionality of oxdvi has been merged into xdvi; oxdvi no longer exists as a separate binary.
- Xdvi now supports string search and text selection in DVI files (menu 'Modes → Text Selection'), printing DVI files and exporting them in PDF, Postscript and plain text format. Pages can be marked with Mouse-2 in the page list to select them for printing/saving.
- By default, xdvi will create a backup copy of the DVI file so that viewing and navigating still works when the DVI file is being written by TeX.
- Other new features include: Support for color specials and colored hyperlinks (customizable via the 'linkstyle option and X resource), a '-watchfile' option, a '-unique' option for loading new files into a running instance of xdvi, support for hyperrefs 'hdvips' specials, and a history of recently viewed files via the menu 'File → Open Recent'.

4.8 Changes to dvipsk

- The functionality of odvips has been merged into dvips; odvips no longer exists as a separate binary.
- Fonts used in included graphics files are no longer partially downloaded.

4.9 Improved documentation

- The file doc/index.html in the distributed texmf tree provides a much improved overview of the included documentation and also provides a search facility for various TeX related information sources.

  This file is generated by a PHP script which is included in teTeX as well.
- The PHP script doc/texdoc.php is able to offer a web interface to the information provided in texdoctk databases.

5 Resources

This section describes where you can find further (or more up-to-date) material and support in the world of TeX.

5.1 Helpindex file for the documentation tree

The file `index.html` in the root of teTeX's documentation tree is a guide for the documentation that is included in teTeX. It is a good point to start when you want to browse through the documentation or search for the solution of a specific problem.

5.2 Internet Newsgroups

If you encounter a problem which might not be teTeX specific, but rather a general problem with TeX or LaTeX (e.g., "How can I format a section heading in a different way?"), you should not raise your question on one of the mailing lists for teTeX. In the following newsgroups, TeX-related matters are discussed:

comp.text.tex General things about TeX.

news.answers FAQs (also TeX-related FAQs).

comp.answers FAQs (also TeX-related FAQs).

de.comp.text.tex General things about TeX (German).

fr.comp.text.tex General things about TeX (French).

comp.fonts Font matters.

comp.programming.literate Literate programming.

5.3 TeX User Groups

If you enjoy TeX, you can join a TeX user group to get support and software and help the TeX community by your membership. The web site of the TeX User Group (TUG), `http://tug.org/` has the necessary contact information for several TeX user groups.

5.4 Mailing Lists

All teTeX mailing lists are hosted on the same server which is managed by Majordomo software. Administrative requests, e.g., to (un)subscribe or to get an archive of a list are handled by the address: `majordomo@dbs.uni-hannover.de` To get a list of available commands that the Majordomo server understands, just send the message "help" to the server (in the body of a message, not in the header). The lists are:

tetex General discussions + bug reports about teTeX. General TeX matters that are not teTeX-specific are not discussed. Especially general questions about TeX should *not* be directed to this list; use a newsgroup instead.

tetex-announce This (moderated, low traffic) list is used for important announcements about teTeX, such as new releases or important updates.

tetex-pretest This is used to discuss beta versions of teTeX and to report bugs in these versions. Bug reports about official (non-beta) releases should not be send here, but to the `tetex` list.

Some of the packages which are contained in teTeX (e.g., Omega and pdfTeX) have special mailing lists or web resources on their own. The web site of TUG, `http://tug.org/` has links to many of them.

5.5 Comprehensive TeX Archive Network (CTAN)

To aid the archiving and retrieval of TeX-related files, a TUG (TeX User Group) working group developed the Comprehensive TeX Archive Network (CTAN). Each CTAN site has identical material, and maintains authoritative versions of its material. These collections are extensive; in particular, almost everything mentioned in this article is archived at the CTAN sites, even if its location isn't explicitly stated.

The CTAN sites are currently `dante.ctan.org`, `cam.ctan.org` and `tug.ctan.org`. The organization of TeX files on all these sites is identical and starts at `/tex-archive`. To reduce network load, please use the CTAN site or mirror closest to you. A complete and current list of CTAN sites and known mirrors can be obtained by using the `finger` utility on 'user' `ctan@cam.ctan.org` (it also works with the other CTAN hosts); it is also available as file `help/ctan/CTAN.sites` in teTeX's documentation tree.

5.6 The TeX Catalogue

This catalogue lists many TeX, LaTeX, and related packages and tools. Most are available worldwide online from CTAN, the Comprehensive TeX Archive Network. Links are provided in this catalogue to available sources and documentation. The teTeX documentation tree contains a version of this catalogue in `help/Catalogue`. The most recent online version is available at

`http://texcatalogue.sarovar.org/`

5.7 Frequently Asked Questions (FAQs)

Documents which list frequently asked questions and their answers (in short: FAQs) are collections of solutions to many common problems. The documentation tree of teTeX contains the teTeX FAQ in the directory `tetex` and the UKTUG FAQ in the directory `help/faq/uktug-faq`. The teTeX FAQ can be read by the command `texconfig faq`.

References

[1] Donald E. Knuth. *The METAFONTbook*. Addison-Wesley, 1984.

[2] Leslie Lamport. *LaTeX: A Document Preparation System*. Addison-Wesley, 2nd edition, 1994.