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Fonts

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The European Modern fonts

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The European Modern (EM) fonts are based on Computer Modern (CM), but have ready-made accented and composite characters, thus enabling TeX hyphenation when using languages that use such characters. The EM fonts are in ATM compatible Adobe Type 1 format, also known as 'PostScript' or 'ATM' form.

Unlike Computer Modern text fonts, the EM fonts are set up as ordinary text fonts and do not have hard-wired encoding (character layout). They can, for example, be used easily with either T1 (Cork) or LY1 (TeX 'n ANSI) encoding. Because of this flexibility they also work well with applications other than TeX, where they are simply reencoded to platform-specific text font encoding.

There are 57 EM text fonts corresponding to the CM text fonts. For typesetting math, the font set also contains some 23 EM and CM math fonts. The naming of EM fonts follows that of CM, so there are for example EMR6, EMSSBX10, and EMMIB7 fonts corresponding to the familiar CMR6, CMSSBX10 and CMMIB7 fonts.

The big difference between EM and CM is that EM text fonts each contain over 300 glyphs, including over 90 accented characters, compared to the typical CM text font with fewer than 120 usable glyphs, and no ready-made accented characters.

The European Computer Modern (EC) fonts also arose in part to solve the problem of hyphenation in languages using accented characters. In contrast to EM, however, they exist in METAFONT form and thus work only with TeX, using fixed resolution PK bitmapped fonts. There are over 500 EC fonts which have to augmented with the 'text companion' (TC) fonts and CM for math. And as do all PK fonts, the EC fonts use fixed encoding.

The EM fonts have some interesting special features, some of which are also available in EC. One is support for hanging hyphens, which make the right margin appear less jagged by allowing hyphens to partially penetrate the right margin. This works for both T1 and LY1 encoding in EM.

Another aspect is kerning with respect to the 'boundary character' (the inter-word space). In CM, Knuth added extra sidebearings to the quotation marks so as to effectively insert space around the quotation to set it off from the rest of the text.

This works fine for English when using CM, but other languages use different quotation marks, or worse yet, use the same glyphs in a different way (e.g. the German closing quote is 'quoteblleft', used in English for opening a quote).

By removing the extra sidebearings from the glyphs themselves in EM, and adding kerning with respect to the boundary character, the extra space can be inserted independent of the way the quotation marks are used. Of course, not everyone agrees that added space around quotations is necessarily desirable, since it destroys the even grey tone of the text.

By the way, kerning with respect to the boundary character is a relatively recent addition to TeX, and it is a little tricky, since kern pairs with the boundary character on the left are considered *before* ligatures of the right character, while kern pairs with the boundary character on the right are consider *after* ligatures for the left character. Also, the latter uses the ordinary kern pair mechanism, while the former depends on a special ligkern program for the left boundary character.

When using CM fonts, the upright uppercase Greek characters are drawn from the text fonts. This means they are not subject to the special magic that is available to math fonts. In particular there is no possibility of independently controlling the subscript and superscript positions. For overhanging shapes like 'Gamma', 'Upsilon' and 'Psi' this means that subscripts are placed too far to the right. In EM, these characters come instead from the math italic EMMI fonts and so have been adjusted to provide optimal positioning of subscripts and superscripts.

Some additional points may be worth mentioning. One is that a few non-ideal kerning pairs in CM have been fixed in EM, and the side-bearings of a few characters adjusted. The position of the accents has been improved a bit, especially the grave and acute accents for French and the Umlaut for German.

Kern pairs with respect to accented characters have been added. In order to limit the resulting bloat of the TFM file, ligkern programs are shared as far as possible (This means that in a few instances 'nonsense' kerns are included that will never be used, but that help reduce the size of the TFM file by making ligkern programs for two characters identical).

While the fonts can be used with any desired encoding, TFM files are provided for the most commonly used text font encodings, namely T1, LY1 and LM1 (used by Textures). A single TFM file per

font provides real and pseudo ligatures as well as kerning. There is no need for virtual fonts.

Support for EM fonts exists for plain TEX, LATEX 2ε and LATEX 2.09. In LATEX 2ε, to use the 'em' package, just add `\usepackage[T1]{em}` or `\usepackage[LY1]{em}` between the commands `\documentclass{...}` and `\begin{document}`.

The fonts are available in file formats suitable for IBM PC/Windows, Macintosh, as well as Unix. They are easy to use with dvips by making suitable additions to psfonts.map.

The metrics of the basic alphabet of CM, EM and EC essentially match, but you have to be aware that there may be some changes in line breaks when switching from CM to EM (or EC).

The new Y&Y EM TEX System is based on the EM font set. It also includes the new 'TeX Pi' font set, which adds math/symbol fonts to augment what is available in EM and CM math fonts.

European Modern release 1.2 is the outcome of a development effort that spans several years. It draws heavily, of course, on Donald Knuth's Computer Modern and the existing CM and AMS fonts in Type 1 format, developed by Blue Sky Research and Y&Y, Inc. Many of the new characters where constructed one way or another from existing characters in these two large font sets.

EM also received inspiration from the EC font set of Jörg Knappen and Norbert Schwartz — although in some cases different choices were made about details. Critical typographic feedback, particularly from Jean-Pierre Vial, Alain Joly, Thierry Bouche, Hilmar Schlegel, Tapio Luttinen, and others must also be acknowledged.

David Carlisle provided the official PSNFSS support for EM. Doug Henderson played an important role as did Yuri Yarmola.

European Modern solves the problem of hyphenation in TEX when using 'Latin' languages with accented characters. At the same time the fonts are in scalable outline format and so usable with Acrobat and other applications, not just TEX.

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