CHAPTER 1

# Introduction

This document describes the organization of the Adobe Type 1 font format and how to create a Type 1 font program. A Type 1 font program is actually a special case of a PostScript® language program. The PostScript interpreter renders the font intelligently, in a device-independent manner. This allows a font developer to create one font program that can be rendered on a wide variety of devices and at many different resolutions.

- A Type 1 font program consists of a clear text (ASCII) portion, and an encoded and encrypted portion.

- The PostScript language commands used in a Type 1 font program must conform to a much stricter syntax than do "normal" PostScript language programs.

- Type 1 font programs can include special "hints" that make their representation as exact as possible on a wide variety of devices and pixel densities.

This document explains the required contents of the clear and encrypted portions of a Type 1 font program, reveals the font encryption and decryption algorithms, provides syntax information, and explains how to declare hints when creating Type 1 font programs.

- Chapter 1 discusses some background issues about Type 1 font programs and their differences from Type 3 font programs.

- Chapter 2 explains the different parts of the PostScript language program that makes up a font program.

- Chapter 3 describes general terminology and how the different features that make up the characters in a font program are constructed.

- Chapter 4 provides several tips on managing the technical part of design aesthetics.

- Chapter 5 explains the contents of the **Private** dictionary.

- Chapter 6 explains the contents of the **CharStrings** dictionary, explains charstring number and command encoding, and lists the commands used in Type 1 charstrings and their encodings.

- Chapter 7 discloses the method of encrypting and decrypting Type 1 font programs.

- Chapter 8 shows how subroutines can be used for font program space requirement reduction and hint substitution.

- Chapter 9 describes the special organization of synthetic and hybrid font programs.

- Chapter 10 provides necessary information to ensure compatibility with Adobe Type Manager™ (ATM™) software.

- The appendices contain lists of dictionary entries, commands, and PostScript language code that you may wish to include in your own font programs.

## 1.1 What Is a Type 1 Font Program?

The PostScript language has changed the way computers display and print documents. This language unifies text and graphics by treating letter shapes as general graphic objects. Since letters are used so frequently in printed images, the PostScript language has special operators to handle collections of letter shapes conveniently. These collections are called *fonts*; each font usually consists of letters and symbols whose shapes share certain stylistic properties.

The complete specification for the PostScript language, including information on how font programs are organized, appears in the *PostScript Language Reference Manual*, published by Addison-Wesley. In addition to the font format that is described in the *PostScript Language Reference Manual* (commonly known as "Type 3 font format" or "user-defined font format"), the PostScript interpreter also accepts a font format, called the *Type 1 font format*, that is not part of the PostScript language definition and is not fully described in the *PostScript Language Reference Manual*.

Type 1 font programs have several advantages over Type 3 font programs.

- Type 1 font programs are more compact.
- The PostScript interpreter uses special rasterization algorithms for Type 1 font programs that result in better looking output—especially at small sizes and low resolutions.
- Type 1 font programs contain *hints* that indicate special features of character shapes not directly expressible by the basic PostScript language operators.

The special rasterization algorithm and the hints for the Type 1 font format that the rasterization algorithm uses are directed at features common to collections of letter shapes. The special rasterization algorithm and the hints aim to preserve baselines, letter heights, stem weights, and other such features. Thus, the Type 1 format is excellent for characters intended to be read as text. Company logotypes and other symbols are candidates for the Type 1 font format only insofar as they are letter-like. While a graphic symbol may benefit from being made into a character in a font, extremely complicated graphic constructions are better served by the Type 3 font format as described in the *PostScript Language Reference Manual*.

## 1.2 What This Document Does

The Type 1 font format is a subset (and extension) of the PostScript language, with its own syntactical rules. This document explains how to create a Type 1 font program that will run properly in the PostScript interpreter and with other Type 1 font rendering software such as Adobe Type Manager. It also gives a developer the information necessary to decrypt and understand the organization of existing Type 1 font programs (such as the font software included in the Adobe® Type Library). This document assumes familiarity with the *PostScript Language Reference Manual*, especially the information about font programs.

*Note* *Although Type 1 font format elements are fully explained here, this document does not include any algorithms that achieve the results specified; for example, it does not include details of the rendering algorithm used by Adobe's PostScript interpreter.*