A Guide to PostScript Products and Technology

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It's not just printing, it's Adobe™ PostScript™ printing.™

A Guide to Choosing Your Next Printer

Adobe PostScript

These days, as printers become more capable and sophisticated, it's hard to know exactly which combination of features is right for you. Fortunately, the criteria for making an informed decision are as simple as ever.

At the most basic level, you'll want a printer that will make you look good, one that can print with the level of quality and flexibility that your work deserves…from a simple memo to a sophisticated spreadsheet to a complex business presentation.

You'll also want a guarantee that your printer installs easily and works with the computer system—and the software programs—you have now. As well as with those systems you will use in the future. And, of course, you'll want a printer that represents the very best value you can get for your money.

Only one kind of printer meets all these criteria. The kind that comes with genuine Adobe PostScript software inside. Adobe PostScript is a special kind of software, called a page-description language, that tells your printer how to format the information it receives from your computer, and how to print it on a page. Unlike printers using other software—including PostScript "clones"—printers that contain genuine Adobe PostScript place no limits on how your information may be presented. Or, for that matter, on what kind of document you can create and print. Only printers with true Adobe PostScript software can assure you of the highest quality output available, every time.

That's why the PostScript language has become the industry standard for computer printing. Since 1985, Adobe PostScript technology has been helping users—from small-business owners to professional publishers—to express themselves in print in the most professional yet dynamic way possible.

Today, Adobe PostScript software is available in printers from nearly every major manufacturer (see the listing that starts on page 10). So no matter what brand of printer you choose, or what level of performance you need, you can be sure that there is an Adobe PostScript printer just for you.

Look for this symbol of quality and compatibility: **Adobe PostScript**

The symbol of quality and compatibility.

Adobe PostScript

A printer that works with what *you* work with.

Adobe PostScript software wouldn't be the industry standard unless it worked with the kinds of products you use most often in your daily business activities.

This means that whether you're using DOS, Windows,™ OS/2,® UNIX,® Macintosh,® a mini or mainframe computer, or any combination of these platforms or versions of their operating systems, you can output your work to any printer that contains Adobe PostScript software. And still have the same assurances of getting the very highest print quality. In all, over 300 devices from more than 50 manufacturers around the world—ranging from black-and-white and color printers to imagesetters and digital presses—include the Adobe PostScript standard. So you have the broadest range of choices to fit your needs.

What about software? These days, you'd be hard pressed to find an application that does not support the PostScript language. Which makes Adobe PostScript technology, quite simply, the most dependable way to print for business users. And when you consider that you can send PostScript language files over any network, including those from Novell, 3Com and others, you can see that there isn't a more complete printing solution on the market.

Moreover, only with Adobe PostScript technology can you be sure that, as your business needs grow, the printer you choose today will be able to keep pace with the hardware and software you buy tomorrow. So you'll have the confidence of knowing that, even in the future, your output will always look just the way you want it to.

And no matter what you work with, Adobe PostScript will work for you.

Just think of what you'll be able to print!

It's almost that simple; just about whatever you can imagine, you can output with a printer that has Adobe PostScript software.

The presence of Adobe PostScript assures you that all the imagination you've used to create your document will be rewarded when you print it out. Only printers having Adobe PostScript software give you the power to add true pizzazz to your output, enabling you to more effectively —and easily—communicate your message.

Use clip art, for example, from any popular software publisher. And scanned photos, or artwork that you create yourself. Scale your spreadsheets, up or down, with a shrink-to-fit feature. And add your favorite charts and graphs, knowing that they'll print correctly—thanks to Adobe PostScript.

Today, you can even choose a printer with Adobe PostScript Fax capabilities to send faxes of the same quality as that of your original document! And receive incoming faxes on the plain paper used by your printer. Either way, Adobe PostScript technology gives you the highest quality output available.

Just think of it.

What does this mean to you? It means that no matter how demanding—or simple—your application, an Adobe PostScript printer won't slow you down. A variety of new hardware and software technologies, from the

You don't have to wait any longer.

Over the years, printers have been increasing in speed and performance. Those with Adobe PostScript are no exception; today, printers using Adobe PostScript software consistently outperform other printing technologies.

innovations of PostScript Level 2 to high-performance processors and more powerful printer drivers, makes this possible. Cost-saving Adobe Memory Booster™ technology reduces the amount of memory a printer needs without compromising functionality. You still get the very best quality in your documents at performance levels that suit your needs.

Today's Adobe PostScript printers have speeds ranging from 4 to 135 pages per minute. And all while letting you use the hardware and software applications of your choice—a claim that no other printing technology can make.

But with a high-performance Adobe PostScript printer at your command, the benefits go beyond just faster output. You also get the confidence of knowing that you'll never have to sacrifice quality for printing speed.

Why wait any longer for an Adobe PostScript printer?

The value of having Adobe PostScript in your printer.

Today, Adobe PostScript printers start at under $1,000. So there's one within the reach of everybody, from a small-business user working out of a home office to workgroup members in large corporations.

The real value of an Adobe PostScript printer, however, goes well beyond the purchase price.

What is the value of knowing that you'll always be able to print exactly what you create on your computer? Adobe PostScript technology means that what you see on the screen is what you get on the printed page. You can always use industry-standard fonts, either TrueType™ or Type 1 (with Adobe Type Manager™), that scale to any size. And you can include the most sophisticated graphics.

What is the value of knowing that you'll be able to reliably print your entire document, no matter what kind of computer you use? Adobe PostScript technology lets you use any operating system or platform. And any software application. It gives you the freedom to choose.

And what is the value of knowing that the document you print today will print perfectly on the printer you purchase tomorrow? Or on the one that you purchased years ago? Adobe PostScript technology makes it possible.

Adobe PostScript. When you add it all up, you won't find a more valuable lesson in printer economics.

There's an Adobe PostScript printer that's right for you, no matter what your budget or printing needs. If you need specific product information or help in evaluating the possibilities, please contact the manufacturers listed on the following pages. –>

Where to look for your next printer.

There are hundreds of Adobe PostScript printers to choose from. When you're ready to take a closer look at a printer that incorporates Adobe PostScript software, just call one of the following manufacturers for product literature and for the names of dealers in your area.

For a more detailed catalog of Adobe PostScript products, call 1-800-833-6687 or 408-986-6555.

Black-and-White Printers

Apple Computer CA, US 800-538-9696 • Canada 416-477-5800 • France 33-1-4901-4901 • Japan 81-3-5411-8720

Product	PPM	DPI	Interface	Fonts
Apple® Personal LaserWriter® 320	4	300	LocalTalk®, Parallel, Serial All ports simultaneously active.	35
LaserWriter Pro 630	8	600	EtherTalk®, LocalTalk, Parallel, Serial 1 external and 1 internal SCSI port. All ports simultaneously active.	35
LaserWriter Pro 810	20	300 400 600 800	LocalTalk, Serial Ethernet support for TCP/IP, DEC LAT, IPX and EtherTalk. All ports simultaneously active. PostScript Fax	35
LaserWriter Select 360	10	600	LocalTalk, Parallel, Serial All ports simultaneously active. PostScript Fax	35

Canon NY, US 516-488-6700 • Japan 81-3-3348-2121

Product	PPM	DPI	Interface	Fonts
PS-GPU for GP55 Copier	20	400	AppleTalk®, Parallel, Serial	39

Compaq Computer TX, US 800-345-1518

Product	PPM	DPI	Interface	Fonts
			Printers include Adobe's IntelliSelect™ auto-emulation sensing software and PostScript Level 2.	
PAGEMARQ™ 15	15	800x400 400x400 300x300 PET 300x300	AppleTalk, Ethernet, Parallel, Serial, Token Ring PostScript Fax	35
PAGEMARQ 20	20	800x400 400x400 300x300 PET 300x300	AppleTalk, Ethernet, Parallel, Serial, Token Ring PostScript Fax	35

Black-and-White Printers

COMPUPRINT BULL Italy 39-2-777-92-802

Product	PPM	DPI	Interface	Fonts
Pagemaster 825	8	300	Parallel, Serial	17 or 35
Pagemaster 1025	10	300	Parallel, Serial	17 or 35
Pagemaster 1625	16	300	Parallel, Serial	17 or 35

Dataproducts CA, US 818-887-8000 • Ireland 353-1-474-855

Product	PPM	DPI	Interface	Fonts
LZR® 960	6	300	AppleTalk, Parallel, Serial	35
LZR 965	9	600x600	AppleTalk, Parallel, Serial	35
LZR 1560	15	300 or 400	AppleTalk, Parallel, Serial	35
LZR 1580	15	300 400 600 800	AppleTalk, Ethernet, Parallel, Serial PostScript Fax	35
LZR 2080	20	300 400 600 800	AppleTalk, Ethernet, Parallel, Serial PostScript Fax	35

Digital Equipment Corporation MA, US 800-DEC-INFO or 800-343-4040 • Japan 81-3-3989-7212

Product	PPM	DPI	Interface	Fonts
DEClaser™ 1150	4	300	Parallel, Serial	43
DEClaser 1152	4	300	AppleTalk, Parallel, Serial	17
DEClaser 2150	8	300	AppleTalk, Novell®, Parallel, Serial	43
DEClaser 2250	8	300	AppleTalk, Novell, Parallel, Serial	43
DEClaser 5100	8	600 1200	AppleTalk, Ethernet, Parallel, Serial	43
PrintServer™ 17	17	300	Ethernet	29
PrintServer 17-600	17	600x600	DECnet™-PCP, Ethernet	43
PrintServer 32	32	300	Ethernet	29

Black-and-White Printers

Eastman Kodak NY, US 800-242-2424

Product	PPM	DPI	Interface	Fonts
Ektaplus™ 7016R Printer	16	300	AppleTalk, Parallel	35
1580 Copier-Printer	70	400	EtherTalk, LocalTalk, Parallel, TCP/IP	39

Gestetner Australia 61-2-975-0555

Product	PPM	DPI	Interface	Fonts
GLP800 Scout 2 or 4 single or dual bin	8	300	AppleTalk, Parallel, Serial	35

Hewlett-Packard ID, US 800-752-0900 • Europe (Switzerland) 41-22-780-8111

Product	PPM	DPI	Interface	Fonts
HP DeskWriter 520 with PostScript Software for the HP DeskWriter Family		600x300	LocalTalk, Serial Requires a minimum Macintosh configuration of 8 MB RAM and 68030/68040 processor.	35
HP LaserJet 4M Plus PostScript Printer with multiple network support	12	600	Ethernet, LocalTalk, Hi-speed Parallel, Serial, Token Ring	35
HP LaserJet 4ML	4	300	Ethernet, LocalTalk, Hi-speed Parallel, Token Ring	35
HP LaserJet 4MP	4	600	Ethernet, LocalTalk, Hi-speed Parallel, Token Ring	35
HP LaserJet 4Si MX PostScript Printer with multiple network support	17	600	Ethernet, LocalTalk, Hi-speed Parallel, Token Ring	35

NEC Technologies MA, US 800-343-4418 • Germany 49-89-93-0060 • Japan 81-3-3454-1111

Product	PPM	DPI	Interface	Fonts
Silentwriter™ Model 95	6	300	AppleTalk, Parallel, Serial PostScript Fax	35
Silentwriter Model 640	6	300	AppleTalk	17
Silentwriter Model 1097	10	600	AppleTalk, Parallel, Serial PostScript Fax	35

Okidata NJ, US 800-OKI-DATA • UK 44-81-577-9000

Product	PPM	DPI	Interface	Fonts
OL830 Plus	8	300	Parallel	17
OL850	8	300	AppleTalk, Parallel, Serial	60
OL870 *(Europe only)*	8	300	AppleTalk, Parallel, Serial	35
OL410e-PS	4	600	AppleTalk, Parallel	37

Black-and-White Printers

Panasonic NJ, US 800-447-4700 • UK 44-344-853-901

Product	PPM	DPI	Interface	Fonts
KX-P4455™ Laser Partner™	11	300	AppleTalk, Parallel, Serial	39
KX-P5400™ SideWriter™	4	300	AppleTalk, Parallel, Serial PostScript Fax	17
KX-P5410™	5	300	AppleTalk, Parallel, Serial	17

Ricoh US 408-432-8800 • Germany 49-211-528-50 • Japan 81-3-3479-2905

Product	PPM	DPI	Interface	Fonts
DS530™	30	400	AppleTalk, Parallel, Serial	35

Texas Instruments TX, US 800-527-3500 • UK 44-234-270-111

Product	PPM	DPI	Interface	Fonts
microLaser™ Pro 600 PS23	8	600	AppleTalk, Parallel, Serial	23
microLaser Pro 600 PS65	8	600	AppleTalk, Parallel, Serial	65
microLaser PS17	9	300	AppleTalk, Parallel, Serial	17
microLaser PS35	9	300	AppleTalk, Parallel, Serial	35
microLaser Turbo	9	300	AppleTalk, Parallel, Serial	35
microLaser XL PS17	16	300	AppleTalk, Parallel, Serial	17
microLaser XL PS35	16	300	AppleTalk, Parallel, Serial	35
microLaser XL Turbo	16	300	AppleTalk, Parallel, Serial	35
microWriter™ PS23	5	300	AppleTalk, Parallel, Serial	23
microWriter PS65	5	300	AppleTalk, Parallel, Serial	65

Black-and-White Printers

Varityper NJ, US 800-631-8134 Ext. 1 or 200-887-8000 Ext. 999

Product	PPM	DPI	Interface	Fonts
VT400	15	300 or 400	Centronics®, LocalTalk, RS232	65
5100A	20	600	Centronics, Ethernet, LocalTalk, RS232	65
5100E	20	600	Centronics, EtherTalk, LocalTalk, RS232	65
5160	8	600	LocalTalk	65
5510A	5	600	Centronics, Ethernet, LocalTalk, RS232	65
5510E	5	600	Centronics, Ethernet, LocalTalk, RS232	65

Xerox CT, US 203-968-3378 or 800-832-6979

Product	PPM	DPI	Interface	Fonts
DocuPrint 390	92	300	Ethernet	81
DocuPrint 6135	135	600	Ethernet	81
DocuTech® Model 90			Intel® 80960 board containing Adobe PostScript software for IBM® PC or compatibles.	
	92	600	AppleTalk, Ethernet	51
DocuTech Model 135			Intel 80960 board containing PostScript software for IBM PC or compatibles.	
	135	600	AppleTalk, Ethernet	51
4215/MRP Mid Range System Printer	15	300 400 800x400	AppleTalk, IPDS, Parallel, RS232/422, SCS, Twinax/Coax PostScript Fax	35
4219/MRP Mid Range System Printer	20	300 400 800x400	AppleTalk, IPDS, Parallel, RS232/422, SCS, Twinax/Coax PostScript Fax	35
4220™	20	300	AppleTalk, Ethernet, Parallel, Serial PostScript Fax	35
4220/MRP Mid Range System Printer	20 simplex 17 duplex	300	AppleTalk, IPDS, Parallel, RS232/422, SCS, Twinax/Coax PostScript Fax	35
4505PS Desktop Laser Printer	5	600	AppleTalk, Ethernet, Parallel, RS232/422, Token Ring	35

Xerox CT, US 203-968-3378 or 800-832-6979

Product	PPM	DPI	Interface	Fonts
4510PS Desktop Laser Printer	10	600	AppleTalk, Ethernet, Parallel, RS232/422, Token Ring	35
4520MP Desktop Laser Printer	20	600 or 800	AppleTalk, Ethernet, Parallel, RS232/422, Token Ring	35

Xerox Engineering Systems (Versatec) CA, US 408-225-2800

Product	PPM	DPI	Interface	Fonts
8600™	2 ips	200 400	Ethernet	51
8810™	15	400	Ethernet	51
8812™	15	400	AppleTalk, Ethernet, Parallel, Serial	51
8836™	1 ips	400	Ethernet	51
8840™	8	400	Ethernet	51

Black-and-White Printers
International Language Capabilities

Apple Computer CA, US 800-538-9696 • Canada 416-477-5800 • France 33-1-4901-4901 • Japan 81-3-5411-8720

Product	PPM	DPI	Interface	Fonts
LaserWriter Select 610 *(Japan only)*	10	600	LocalTalk, 1 internal SCSI port	35+J2

Canon NY, US 516-488-6700 • Japan 81-3-3348-2121

Product	PPM	DPI	Interface	Fonts
LaserShot™ A404PS	4	300	AppleTalk, Parallel, Serial	39 + J5
LaserShot A404PS LITE	4	300	AppleTalk, Parallel, Serial	39 + J2
PS-GPU for GP55 Copier	20	400	AppleTalk, Parallel, Serial	39 + J2

Dataproducts CA, US 818-887-8000 • Ireland 353-1-474-855

Product	PPM	DPI	Interface	Fonts
LZR 960J/Plus	9	300	AppleTalk, Parallel, Serial	35 + J2 or J5
LZR 1560J/Plus	15	300 or 400	AppleTalk, Parallel, Serial	35 + J2 or J5

Digital Equipment Corporation MA, US 800-DEC-INFO or 800-343-4040 • Japan 81-3-3989-7212

Product	PPM	DPI	Interface	Fonts
PrintServer 17	17	300	Ethernet	29 + J1
PrintServer 32	32	300	Ethernet	29 + J1
turbo Print Server 20	20	300	Ethernet	29 + J1

Fujitsu Ltd. CA, US 408-432-1300 or 800-626-4686 • Japan 81-3-3216-3211

Product	PPM	DPI	Interface	Fonts
FMLBP211PS	5	400	Parallel, Serial	13 + J2

NEC Technologies Ltd. Japan 81-3-3454-1111

Product	PPM	DPI	Interface	Fonts
PC-PR3000PS/4 (SW 80PS2)	8	400	AppleTalk, Parallel, Serial	17 + J2 or J5
PC-PR3000PS/4 (SW 80PS5)	8	400	AppleTalk, Parallel, Serial	17 + J5

Oki Electric Industry Co., Ltd. Japan 81-3-3501-3351

Product	PPM	DPI	Interface	Fonts
MicroLine® 801PSII	8	400	AppleTalk, Parallel, Serial (RS-422A)	17 + J2
MicroLine 801PSII +F	8	400	AppleTalk, Parallel, Serial (RS-422A)	35 + J5
MicroLine 800PSII LT	8	400	AppleTalk, Parallel, Serial (RS-422A)	17 + J2

Ricoh Japan 81-3-3479-2905

Product	PPM	DPI	Interface	Fonts
Imagio® 530/PJ	30	400	AppleTalk, Parallel, Serial	35 + J2 or J5

Varityper NJ, US 800-631-8134 Ext. 1 or 200-887-8000 Ext. 999

Product	PPM	DPI	Interface	Fonts
5100A	20	600	Centronics, Ethernet, LocalTalk, RS232	65 + J5
5100E	20	600	Centronics, EtherTalk, LocalTalk, RS232	65 + J5
5160	8	800	LocalTalk	65 + J5
5510A	5	600	Centronics, Ethernet, LocalTalk, RS232	65 + J5
5510E	5	600	Centronics, Ethernet, LocalTalk, RS232	65 + J5

Color Printers

Apple Computer CA, US 800-538-9696 • Canada 416-477-5800 • France 33-1-4901-4901 • Japan 81-3-5411-8720

Product	PPM	DPI	Interface	Fonts
Apple Color StyleWriter® Pro with GDT StyleScript™: Adobe PostScript Level 2 software InkJet Printer	2	360	High-Speed Serial	13

Canon NY, US 516-488-6700 • The Netherlands 31-20-565-8900 • Japan 81-3-3348-2121

Product	PPM	DPI	Interface	Fonts
PS-IPU for CJ10 Copier BubbleJet™ *(US only)*	.5	400	AppleTalk, Parallel, Serial	39
PS-IPU for CLC 10 BubbleJet *(Europe only)*	.5	400	AppleTalk, Parallel, Serial	39
PS-IPU for CLC 300, 350, 500, 550 Laser Copier	3-10	400	AppleTalk, Parallel, Serial	39

Dataproducts CA, US 818-887-8000 • Ireland 353-1-474-855

Product	PPM	DPI	Interface	Fonts
Jolt® Solid InkJet	1	300	AppleTalk, Parallel, Serial	35

Digital Equipment Corporation MA, US 800-DEC-INFO or 800-343-4040 • Japan 81-3-3989-7212

Product	PPM	DPI	Interface	Fonts
ColorMate PS Thermal Transfer	1	300	AppleTalk, Parallel, Serial	35

Eastman Kodak NY, US 800-242-2424

Product	PPM	DPI	Interface	Fonts
ColorEase™ PS Dye Sublimation	3.5	300	AppleTalk, EtherTalk, Parallel, Serial	35

Hewlett-Packard ID, US 800-752-0900 • Europe (Switzerland) 41-22-780-8111

Product	PPM	DPI	Interface	Fonts
HP DesignJet 650C/PS Color InkJet Plotter		300	Ethernet, LocalTalk, Hi-speed Parallel, Serial, Token Ring	39
HP DeskJet 1200C/PS Color PostScript InkJet Printer	1-6	300x600 (black text) 300 (color)	Ethernet, LocalTalk, Hi-speed Parallel, Token Ring	35
HP DeskWriter 550C with PostScript Software for the HP DeskWriter Family InkJet Printer	Requires a minimum Macintosh configuration of 8 MB RAM and 68030/68040 processor.			
		300	LocalTalk, Serial	35

Color Printers

Hewlett-Packard ID, US 800-752-0900 • Europe (Switzerland) 41-22-780-8111

Product	PPM	DPI	Interface	Fonts
HP DeskWriter 560C with PostScript Software for the HP DeskWriter Family InkJet Printer		600x300 (black) 300 (color)	LocalTalk, Serial	35
HP PaintJet XL300 Color PostScript InkJet Printer	.5	300	Ethernet, LocalTalk, Parallel, Serial, Token Ring	35

NEC Technologies MA, US 800-343-4418 • Germany 49-89-93-0060 • Japan 81-3-3454-1111

Product	PPM	DPI	Interface	Fonts
Colormate™ PS Model 40 Thermal Transfer	1	300	AppleTalk, Parallel, Serial	17
Colormate PS Model 80 Thermal Transfer	1	300	AppleTalk, Parallel, Serial	35

Océ Graphics CA, US 415-964-7900 or 800-545-5445 • France 33-1-4898-8000

Product	PPM	DPI	Interface	Fonts
G5241-PS Thermal Transfer	1	300	AppleTalk, Parallel, Serial	35
G5242-PS Thermal Transfer	1	300	AppleTalk, Parallel, Serial	35

Seiko Instruments USA, Inc. CA, US 408-922-5900

Product	PPM	DPI	Interface	Fonts
Professional ColorPoint® PSF Model 14 Dye Sublimation	.5	300	AppleTalk, Ethernet, Parallel, SCSI, Serial	135 + ATM
Professional ColorPoint 2 PSF Model 4 Dye Sublimation	.5	300	AppleTalk, Ethernet, Parallel, SCSI, Serial	135 + ATM

SuperMac Technology CA, US 408-245-2202

Product	PPM	DPI	Interface	Fonts
Proof Positive™ Color Printer Dye Sublimation	.15+	300	AppleTalk, Ethernet, SCSI	35

Synergy Computer Graphics CA, US 408-988-3038

Product	PPM	DPI	Interface	Fonts
ColorWriter 400 Electrostatic	.5"/sec	400	Ethernet	35

Color Printers

Tektronix OR, US 800-835-6100 • UK 44-628-486-000

Product	PPM	DPI	Interface	Fonts
Phaser™ 200e Thermal Wax	2	300	AppleTalk, Parallel, Serial	17
Phaser 220e Thermal Wax	2	600x300	AppleTalk, Parallel, Serial	17
Phaser 220i Thermal Wax	2	600x300	AppleTalk, Ethernet, Parallel, Serial	39
Phaser 300i Thermal Wax	1	300	AppleTalk, Ethernet, Parallel, Serial	39
Phaser 480 Dye Sublimation	.3	300	AppleTalk, Ethernet, Parallel, Serial	39
Phaser II SDX Dye Sublimation	.3	300	AppleTalk, EtherTalk, Parallel, Serial	39
Phaser III PXi Solid Ink	.5	300	AppleTalk, EtherTalk, Parallel, Serial	39

Xerox CT, US 203-963-3378 or 800-832-6979

Product	PPM	DPI	Interface	Fonts
DocuPrint 350HC Laser	50	300	Ethernet	81
DocuPrint 390HC Laser	92	300	Ethernet	81
Xerox® 5775™ Laser	7.5-30	400	AppleTalk, Ethernet	39

Xerox Engineering Systems (Versatec) CA, US 408-225-2800

Product	PPM	DPI	Interface	Fonts
Versacolor™ Thermal Transfer	1	300	Ethernet	51
8900™ Electrostatic	1-2 ips	200-400	Ethernet	51

3M Corporation MN, US 612-733-2332

Product	PPM	DPI	Interface	Fonts
3M Rainbow™ Desktop Color Proofing System Dye Sublimation	.15	300	AppleTalk, Ethernet, SCSI	13

Color Printers
International Language Capability

Canon NY, US 516-488-6700 • The Netherlands 31-20-565-8400 • Japan 81-3-3348-2121

Product	PPM	DPI	Interface	Fonts
PS-IPU for Canon Color Laser Copier	3-10	400	AppleTalk, Parallel, Serial	39 + J5
PS-Jet for PixelJet™ Copier	.5	400	AppleTalk, Parallel, Serial	39 + J5

Dataproducts CA, US 818-887-8000 • Ireland 353-1-474-855

Product	PPM	DPI	Interface	Fonts
Jolt Solid Ink	1	300	AppleTalk, Parallel, Serial	35 +J2 or J5

Océ Graphics CA, US 415-964-7900 or 800-545-5445 • France 33-1-4898-8000

Product	PPM	DPI	Interface	Fonts
G5232PS-J/ PS-432/J	1	300	AppleTalk, Parallel, Serial	35 + J2
G5241PS-J/ CHC446PSJ	1	300	AppleTalk, Parallel, Serial	35 + J2

Seiko Instruments USA, Inc. CA, US 408-922-5900

Product	PPM	DPI	Interface	Fonts
Professional ColorPoint 2 PSF Model 4 Dye Sublimation	.5	300	AppleTalk, Ethernet, Parallel, SCSI, Serial	39 + J2
Professional ColorPoint 2 PSF Model 4 Thermal Transfer	.5	300	AppleTalk, Ethernet, Parallel, SCSI, Serial	39 + J2
Professional ColorPoint 2 PSF Model 14 Dye Sublimation	.5	300	AppleTalk, Ethernet, Parallel, SCSI, Serial	39 + J2
Professional ColorPoint 2 PSF Model 14 Thermal Transfer	.5	300	AppleTalk, Ethernet, Parallel, SCSI, Serial	39 + J2

SuperMac Technology CA, US 408-245-2202

Product	PPM	DPI	Interface	Fonts
Proof Positive Color Printer Dye Sublimation	.15-.3	300	AppleTalk, Ethernet, SCSI	35 + J2

Color Printers
International Language Capability

Tektronix OR, US 800-835-6100 • UK 44-628-486-000

Product	PPM	DPI	Interface	Fonts
Phaser 220J Thermal Wax	2	600x300	AppleTalk, Ethernet, Parallel, Serial	39+J2
Phaser 300J Thermal Wax	1	300	AppleTalk, Ethernet, Parallel, Serial	39+J2
Phaser 480J Dye Sublimation	.3	300	AppleTalk, Ethernet, Parallel, Serial	39+J2
Phaser IISDXJ Solid Ink	.3	300	AppleTalk, Ethernet, Parallel, Serial	39+J2
Phaser III PXi-J Solid Ink	.5	300	AppleTalk, Ethernet, Parallel, Serial	39 + J2

3M Corporation MN, US 612-733-2332

Product	PPM	DPI	Interface	Fonts
3M Rainbow Desktop Color Proofing System Thermal Sublimation	.15	300	AppleTalk, Ethernet, SCSI	13 + J2

PostScript Upgrade Products

The following products upgrade non-PostScript output devices to PostScript output devices.
Each listing includes the name of the manufacturer, the upgrade product and the device(s) to which
it provides PostScript language capabilities.

Adobe Systems CA, US 415-961-4400 • The Netherlands 31-(0)20-65-11-200 • Japan 81-(0)3-3437-8950

Product	PPM	DPI	Interface	Fonts
PostScript Cartridge				
Hewlett-Packard LaserJet II	8	300	Parallel, Serial	35 + J2

Canon NY, US 516-488-6700 • The Netherlands 31-20-565-8400 • Japan 81-3-3348-2121

Product	PPM	DPI	Interface	Fonts
Canon ScriptCard™ 1				
Canon® LBP-8 Canon LBP-8 PLUS Mark III single bin	8	300	Parallel, Serial	39
Canon LBP-8 Canon LBP-8 PLUS Mark III R dual bin duplex	8	300	Parallel, Serial	39
Canon LBP-8 Canon LBP-8 PLUS Mark III T dual bin	8	300	Parallel, Serial	39
Canon ScriptCard 2				
Canon LBP-4 Canon LBP-4 LITE Canon LBP-4 PLUS Laser Printer	4	300	Parallel, Serial	39

Digital Equipment Corporation MA, US 800-DEC-INFO or 800-343-4040 • Japan 81-3-3989-7212

Product	PPM	DPI	Interface	Fonts
User-installable PostScript cartridge to upgrade DEClaser 1100 to DEClaser 1150.				
DEClaser 1150	4	300	Parallel, Serial	43
User-installable PostScript cartridge to expand DEC 17 fonts to DEC 43 fonts.				
DEClaser 1152	4	300	AppleTalk, Parallel, Serial	43
User-installable PostScript cartridge to upgrade DEClaser 2100 to DEClaser 2150.				
DEClaser 2150	8	300	AppleTalk, Ethernet, Parallel, Serial	43
User-installable PostScript cartridge to upgrade DEClaser 2200 to DEClaser 2250.				
DEClaser 2250	8	300	AppleTalk, Ethernet, Parallel, Serial	43

PostScript Upgrade Products

Epson America CA, US 800-289-3776

Product	PPM	DPI	Interface	Fonts
The PostScript Identity Card (Level 1) from Epson is available for the following currently shipping Epson products. The PostScript upgrade may be available for other Epson products; contact your Epson representative.				
ActionLaser™ 1000*	6	300	AppleTalk, Parallel, Serial	35
ActionLaser 1500	6	300 with RITech	AppleTalk, Parallel, Serial	35
Epson EPL™-8000**	10	300 with RITech	AppleTalk, Parallel, Serial	35

   * The ActionLaser 1000 and ActionLaser 1500 are sold in Europe, Australia and the Pacific Rim by Seiko Epson Corporation as the EPL-5000 and EPL-5200, respectively.
  ** The Epson EPL-8000 is sold in Europe, Australia and the Pacific Rim by Seiko Epson Corporation as the EPL-8100 (Europe) and as the EPL-8000 (Australia and the Pacific Rim).

GDT Softworks Canada 604-291-9121

Product	PPM	DPI	Interface	Fonts
StyleScript: Adobe PostScript Level 2 Software for the Apple Color StyleWriter Pro Printer	2	360	High-speed Serial	13

Hewlett-Packard ID, US 800-752-0900 • Europe (Switzerland) 41-22-780-8111

Product	PPM	DPI	Interface	Fonts
Hewlett-Packard DesignJet 650C PostScript SIMM (Level 2)				
HP DesignJet 650C Color InkJet Plotter		300	Ethernet, LocalTalk, Hi-speed Parallel, Serial, Token Ring	39
Hewlett-Packard DeskJet 1200C PostScript SIMM (Level 2)				
HP DeskJet 1200C InkJet	1-6	300x600 (black text) 300 (color)	Ethernet, Hi-speed Parallel, Serial, Token Ring	35
PostScript Software for the HP DeskWriter Family (Level 2): Requires a minimum Macintosh configuration of 8 MB RAM and 68030/68040 processor.				
HP DeskWriter 520 InkJet		600x300 (black)	LocalTalk, Serial	35
HP DeskWriter 550C InkJet		300	LocalTalk, Serial	35
HP DeskWriter 560C InkJet		600x300 (black) 300 (color)	LocalTalk, Serial	35

Hewlett-Packard ID, US 800-752-0900 • Europe (Switzerland) 41-22-780-8111

Product	PPM	DPI	Interface	Fonts
HP LaserJet 4 Printer PostScript SIMM (Level 2)				
HP LaserJet 4	8	600	Ethernet, Hi-speed Parallel, Serial, Token Ring	35
HP LaserJet 4P Printer PostScript SIMM (Level 2)				
HP LaserJet 4P	4	600	LocalTalk, Hi-speed Parallel, Serial	35
HP LaserJet 4 Plus Printer PostScript SIMM (Level 2)				
HP LaserJet 4 Plus	12	600	Ethernet, Hi-speed Parallel, Serial, Token Ring	35
HP LaserJet 4Si Printer PostScript SIMM (Level 2)				
HP LaserJet 4Si	17	600	Ethernet, Hi-speed Parallel, Serial, Token Ring	35
HP LaserJet IIISi Printer PostScript option (Level 2)				
HP LaserJet IIISi (User-installable ROM for serial #'s 3199J or lower; user-installable SIMM for serial #'s 3200J or higher)	17	300	Ethernet, Hi-speed Parallel, Serial, Token Ring	35
HP PaintJet XL300 Color PostScript Level 2 Upgrade Kit				
Upgrade kit includes 4 MB printer memory – no additional RAM required.				
HP PaintJet XL300	0.5	300	Ethernet, LocalTalk, Parallel, Serial, Token Ring	35

Okidata NJ, US 800-OKI-DATA

Product	PPM	DPI	Interface	Fonts
PostScript controller board replaces boards in OL810 to upgrade to OL850.				
OL850	8	300	AppleTalk, Parallel, Serial	60

Panasonic NJ, US 800-447-4700 • UK 44-344-853-901

Product	PPM	DPI	Interface	Fonts
Panasonic SideWriter Upgrade Kit				
This kit upgrades the KX-P4400 to a KX-P5400 PostScript Level 2 printer through a controller change.				
KX-P5400	4	300	AppleTalk, Parallel, Serial PostScript Fax	17
Panasonic KX-P4410 Upgrade Kit				
This kit upgrades the KX-P4410 to a KX-P5410 PostScript Level 2 printer through a controller change.				
KX-P5410	5	300	AppleTalk, Parallel, Serial	17

PostScript Upgrade Products

Seiko Epson CA, US 800-289-3776 • The Netherlands 31-20-547-5222

Product	PPM	DPI	Interface	Fonts
The PostScript Identity Card (Level 1) from Epson is available for the following currently shipping Seiko Epson products. The PostScript upgrade may also be available for other Seiko Epson products; contact your Seiko Epson representative. The following two products are sold in Japan:				
LP-2000	6	300	Parallel, Serial	35 + J2
LP-3000	6	300	Parallel, Serial	35 + J5

Tektronix OR, US 800-835-6100 • UK 44-628-486-000

Product	PPM	DPI	Interface	Fonts
	This kit upgrades the Phaser 200e to a Phaser 200i.			
Tektronix® 4681 FXi PostScript Level 2 Upgrade Kit	2	300	AppleTalk, Ethernet, Parallel, Serial	39
	This kit upgrades the 4693D, 4693DX, 4693PX (Phaser PX), 4693RGB, and RGB II printers to PostScript Level 2 printers with the following features:			
Tektronix 4693 FXi PostScript Level 2 Upgrade Kit	50 secs.	300	AppleTalk, Ethernet, Parallel, Serial	39
	This kit upgrades the 4694SX (Phaser II SX), 4694DX (Phaser II DX), 4694PX (Phaser II PX), 4694PXe (Phaser II PXe), and RGB III printers to a Phaser II PXi printer with the following features:			
Tektronix 4694 FXi PostScript Level 2 Upgrade Kit	50 secs.	300	AppleTalk, Ethernet, Parallel, Serial	39

Texas Instruments TX, US 800-527-3500 • UK 44-234-270-111

Product	PPM	DPI	Interface	Fonts
	Easy-to-install, modular upgrade kit includes PostScript Level 2 software and 2 MB of RAM. Upgrades microLaser to microLaser Turbo, and microLaser XL to microLaser XL Turbo.			
microLaser Turbo Upgrade	9	300	AppleTalk, Parallel, Serial	35
microLaser XL Turbo Upgrade	16	300	AppleTalk, Parallel, Serial	35
microWriter Upgrade	Upgrade kit brings PostScript Level 1 functionality to the microWriter product.			
	5	300	AppleTalk, Parallel, Serial	23 or 65

PostScript Upgrade Products

Xerox CT, US 203-968-3378 or 800-832-6979

Product	PPM	DPI	Interface	Fonts
	Adobe PostScript available as an optional upgrade.			
4505 Desktop Laser Printer	5	600	AppleTalk, Ethernet, Parallel, RS232/422, Token Ring	35
	Adobe PostScript available as an optional upgrade.			
4510 Desktop Laser Printer	10	600	AppleTalk, Ethernet, Parallel, RS232/422, Token Ring	35
	Adobe PostScript available as an optional upgrade.			
4520 Desktop Laser Printer	20	600 or 800	AppleTalk, Ethernet, Parallel, RS232/422, Token Ring	35

Font Sets

Every Adobe PostScript printer comes with a collection of Type 1 typefaces. Here are the contents of each font set that appears in the printer listings.

Standard 13
Courier Reg, Obl, Bold, Bold Obl
Helvetica* Reg, Obl, Bold, Bold Obl
Times* Roman, Ital, Bold, Bold Ital
Symbol φ δ 0 ≠ Ω π Ⅎ

Standard 17
Standard 13, plus:
Helvetica Narrow Reg, Obl, Bold, Bold Obl

Standard 30
Americana® Reg, Extra Bold
Barmeno™ Reg, Med, Bold, Extra Bold
Blackoak™
Carta™ ♨ ⚖ ⚒ ★ ⚓ 🏃
Adobe Caslon™ Reg, Ital, Semibold, Semibold Ital
Formata® Reg, Med, Ital, Med Ital
Adobe Garamond™ Reg, Ital, Bold, Bold Ital
Kaufmann® Reg
LITHOS™ Reg, Black
Parisian
Park Avenue®
Poetica™ Ornaments ℱ ✳ ❧ ❦ ✢ ✍
Tekton™ Reg, Bold
TRAJAN™ Bold
Adobe Wood Type™ 2 Ornaments 🎋 ♣ ❧ ❧

Standard 35
Standard 13, plus:
ITC Avant Garde Gothic® Bk, Bk Obl, Demi, Demi Obl
ITC Bookman® Light, Light Ital, Demi, Demi Ital
Helvetica Narrow Reg, Obl, Bold, Bold Obl
New Century Schoolbook Roman, Ital, Bold, Bold Ital
Palatino* Roman, Ital, Bold, Bold Ital
ITC Zapf Chancery® Medium Ital
ITC Zapf Dingbats® ❑ ☛ ◆ ✈ ✳ ☆

Standard 39
Standard 35, plus:
Helvetica Condensed Reg, Obl, Bold, Bold Obl

DEC™ 29
Standard 13, plus:
ITC Avant Garde Gothic Bk, Bk Obl, Demi, Demi Obl
ITC Lubalin Graph® Bk, Bk Obl, Demi, Demi Obl
New Century Schoolbook Roman, Ital, Bold, Bold Ital
ITC Souvenir® Light, Light Ital, Demi, Demi Ital

DEC 43
DEC 29, plus:
ITC Bookman Light, Light Ital, Demi, Demi Ital
Helvetica Narrow Reg, Obl, Bold, Bold Obl
ITC Lubalin Graph Bk, Bk Obl, Demi, Demi Obl
Palatino Roman, Ital, Bold, Bold Ital
ITC Zapf Chancery Medium Ital
ITC Zapf Dingbats ❑ ☛ ◆ ✈ ✳ ☆

IBM 22
Standard 13, plus:
BrushScript
Adobe Garamond Reg, Ital, Semibold, Semibold Ital, Bold, Bold Ital
Hobo
STENCIL

IBM 51
Standard 17, plus:
ITC Avant Garde Gothic Bk, Bk Obl, Demi, Demi Obl
ITC Bookman Light, Light Ital, Demi, Demi Ital
ITC Garamond® Light, Light Ital, Bold, Bold Ital
Helvetica Light, Light Obl, Black, Black Obl
ITC Korinna® Reg, Kursiv Reg, Bold, Kursiv Bold
Letter Gothic Reg, Slanted, Bold, Bold Slanted
New Century Schoolbook Roman, Ital, Bold, Bold Ital

Palatino Roman, Ital, Bold, Bold Ital
ITC Zapf Chancery Medium Ital
ITC Zapf Dingbats ❑ ☛ ◆ ✈ ✳ ☆

Seiko 135
Standard 30 and Standard 39, plus:
Baker Signet™
Bell Gothic Light, Bold, Black
ITC Berkeley Oldstyle® Bk, Bk Ital, Med, Ital, Bold, Bold Ital, Black, Black Ital
Birch™
Brush Script
Caslon Open Face
Copperplate Gothic 31AB, 31BC
CUTOUT™
ITC Flora® Med, Bold
Hobo
ITC Kabel® Bk, Med, Demi, Bold, Ultra
ITC Korinna Reg, Kursiv Reg, Bold, Kursiv Bold
ITC Lubalin Graph Bk, Bk Obl, Demi, Demi Obl
ITC MACHINE® Med, Bold
Myriad™ Tilt
MYTHOS™
Nuptial Script
Old Style 7 Roman, Ital, Roman Small Caps, Ital Old Style Figures
Serpentine™ Light, Bold
STENCIL
ITC Stone® Informal Reg, Ital, Semibold, Semibold Ital, Bold, Bold Ital
ITC Stone Sans Reg, Ital, Semibold, Semibold Ital, Bold, Bold Ital
ITC Stone Serif Reg, Ital, Semibold, Semibold Ital, Bold, Bold Ital
UMBRA™
Willow™

Standard Japanese 2 (Std. J2)
Gothic Medium BBB™ 書体は情報伝達の符号
Ryumin™ Light KL 書体は情報伝達の符号

Standard Japanese 5 (Std. J5)
Standard J2, plus:
Futo Min A101™ 書体は情報伝達の符号
Futo Go B101™ 書体は情報伝達の符号
Jun 101™ 書体は情報伝達の符号

TI 23
Standard 17, plus:
Adobe Garamond Reg, Ital, Bold, Bold Ital
Tekton Reg, Obl

TI 65
Standard 30 and Standard 35

Xerox 51
Standard 17, plus:
ITC Avant Garde Gothic Bk, Bk Obl, Demi, Demi Obl
ITC Bookman Light, Light Ital, Demi, Demi Ital
Courier Reg, Obl, Bold, Bold Obl
ITC Garamond Light, Light Ital, Bold, Bold Ital
Helvetica Light, Light Obl, Black, Black Obl
ITC Korinna Reg, Kursiv Reg, Bold, Kursiv Bold
New Century Schoolbook Roman, Ital, Bold, Bold Ital
Palatino Roman, Ital, Bold, Bold Ital
ITC Zapf Chancery Medium Ital
ITC Zapf Dingbats ❑ ☛ ◆ ✈ ✳ ☆

Xerox 81
Xerox 51 and Standard 30

Additional Manufacturers of Adobe PostScript Products

Agfa Division of Miles Inc.
MA, US 508-658-5600 · NY, US 800-288-4039; 914-365-0190
Belgium 32-3-44-2111 · Japan 81-3-5704-3071

AST Research
CA, US 714-727-4141

Autologic
CA, US 805-498-9611 · UK 44-727-834-132

H. Berthold AG
Germany 49-30-77950

Birmy Graphics
FL, US 407-768-6766

COLORBUS Software
CA, US 714-852-1850

Dainippon Screen
Belgium 32-2-6769111 · Japan 81-75-415-3701

DS America
IL, US 708-870-7400

Diconix
OH, US 513-259-3100

Digital F/X
CA, US 415-961-2800

E.I. du Pont de Nemours Company
DE, US 800-441-7515

Electronics for Imaging
CA, US 415-286-8600

GCC Technologies
MA, US 800-422-7777; 617-890-0880

International Business Machines
NY, US 800-IBM-2468 · France 33-1-4767-6000

Lexmark International
KY, US 606-232-2000

Linotype-Hell AG
NY, US 516-434-2000 · Germany 49-6196-980
UK 44-242-222-333 · Japan 81-3-5391-6740

Mannesmann Scangraphic GmbH
Germany 49-4103-801-237

NeXT Computer
CA, US 800-848-next · Japan 81-044-549-5111

Optronics
MA, US 508-256-4511

Silicon Graphics
CA, US 415-960-1980 · Switzerland 41-22-798-75-25

Wang Laboratories
MA, US 508-459-5000

Glossary

Once you've selected a printer that has Adobe PostScript software, you have many options to choose from. Here are some of the more important terms to understand.

Adobe Memory Booster: Technology built into some Adobe PostScript printers that reduces the amount of memory a printer requires without diminishing performance. Helps lower printer costs and improve value.

CPSI: Configurable PostScript Interpreter, an implementation of Adobe PostScript Level 2 software that resides in a workstation or personal computer, rather than in a printer's embedded controller—and delivers the same high-quality results.

DPI: Dots per inch, a measure of resolution, or how sharp the printed output is. The higher the dpi number, the crisper the type and images. For basic office documents, a 300-dpi printer is typical. For added quality, higher resolution printers are also available.

Fonts: A collection of typefaces in different styles, such as Helvetica and Times Roman, to give your documents personality. All Adobe PostScript printers come with scalable fonts that can be printed at any point size.

Interface: The way a printer is connected to a computer or network. Adobe PostScript printers are designed to work with a wide variety of interfaces, including serial, parallel, AppleTalk, SCSI, Ethernet and Token Ring.

Page-description language: Software that resides within a printer and defines how elements such as text and graphics appear on the printed page. Adobe PostScript is the industry standard page-description language.

Adobe PostScript Fax: Technology built into some Adobe PostScript printers that enables sending of high-quality faxes from your computer to fax machines, and receiving high-quality faxes on plain paper. Creates a combination printer/plain-paper fax machine.

Printer driver: Software that serves as the communications link between applications and the page-description language used by printers. Adobe provides printer drivers for Macintosh, Windows and UNIX platforms. For details, call 1-800-833-6687 or 408-986-6555.

PPM: Pages per minute, the maximum speed of the printer's marking engine as rated by the manufacturer. Personal printers typically carry a rating of 4 to 10 ppm. Faster printers are often used in networks and other shared environments.

RAM: Random access memory, measured in megabytes. The higher the number, the more space available to create images for printing and to store components of a page, such as downloaded fonts and forms.

Adobe

ADOBE
TYPE 1 FONTS
Communication Handbook

Guidelines for

communicating

the major features

and benefits of the

Type 1 font format

from Adobe Systems

. . . .

Adobe Systems revolutionized electronic printing and publishing when it introduced the first Type 1 outline fonts in 1984. Adobe™ was the first company to license typographic-quality fonts and make them available in electronic form to everyone from users of desktop computers and printers to professional publishers.

The support Adobe's Type 1 format has received since then from leading typeface vendors, hardware manufacturers, software developers, and users has made it an industry standard. In fact, the International Standards Organization has specified Adobe's Type 1 format as the standard for outline fonts.

Type 1 fonts are compatible with a wider range of computer systems, operating systems, output devices and software applications than any other type technology in the history of computing and publishing. As a result, the PostScript™ language and the Type 1 format have become part of the basic fabric of the printing, publishing, and computing industries.

With its expertise in both type design and computer technology, Adobe is committed to enhancing the Type 1 standard. It continues to expand the Adobe™ Type Library by offering the most popular designs from the world's leading type foundries and by creating a collection of original typeface designs and classic revivals known as Adobe Originals.™ At the same time, it continues to advance the technology behind digital type, as demonstrated most recently by multiple master typefaces and the Adobe Type 1 Coprocessor.

This handbook provides an overview of Adobe's type technology and provides answers to many of the most-frequently-asked questions about Type 1 and competing font formats. We hope you find this information useful in understanding the benefits of Type 1 font software and its role as a standard that provides significant advantages to the computing and electronic printing and publishing industries.

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Table of Contents

An Overview

Type 1 is an outline font format invented by Adobe. It is a key component of the PostScript language, and every printer with PostScript software from Adobe includes a collection of Type 1 fonts.
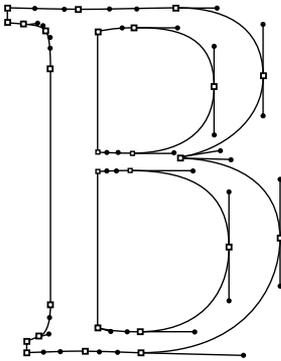
Adobe Type 1 outlines are designed to provide high quality, typefaces compact file size and efficient, reliable performance.

Each character in a Type 1 font is a PostScript language program representing a series of lines and curves, which can be scaled to any size. This mathematical representation of the shape of each character can be displayed and printed at any resolution, in any color, and at any degree of rotation. From one outline, characters may be created for a full range of displays and hardcopy output devices, from low-resolution dot matrix printers to laser printers to high-resolution imagesetters or film recorders.

PostScript software and Type 1 fonts are "device independent," that is, they are not tied to a specific device. The same Type 1 font can be used for a 96 dots-per-inch (dpi) display screen, a 300 dpi laser printer or a 3,000 dpi imagesetter.

Adobe's device-independent Type 1 technology eliminated the need for bitmap fonts and made a wide selection of typefaces available to users of a variety of devices. By bringing high-quality, scalable type to desktop computer users, Adobe Type 1 fonts made it less expensive and more efficient to create professional-looking documents. For that reason, Type 1 fonts are a key part of the technology that helped create and establish the desktop publishing industry.

Before Adobe introduced the Type 1 format, hardware manufacturers sold bitmap fonts for their devices. A character in a bitmap font is a pattern of dots (bits) that closely resembles a character shape in a given typeface, point size, rotation and resolution. Bitmap fonts from a specific hardware manufacturer worked only on that manufacturer's output devices.
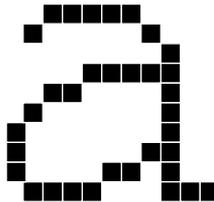
A bitmap font is a pattern of bits arranged to represent character shapes.

A bitmap font consists of type in only one size (e.g., 10 point) for one resolution (e.g., 300 dpi). A different bitmap font is required for each size and each resolution. These fonts require "hand-tuning," a process that adjusts the shape of each character to look as good as possible when printed at a specific size and resolution.

To get multiple sizes of one typeface, users needed a collection of bitmap fonts, which required a large amount of storage space.

To achieve the highest quality possible for a variety of sizes and resolutions, Type 1 fonts are "hinted." Hints are additional instructions for each character that are programmed into every Type 1 font. Hints are designed to improve the appearance of the character at small point sizes and at low resolutions.

Unhinted rendering   **Hinted rendering**
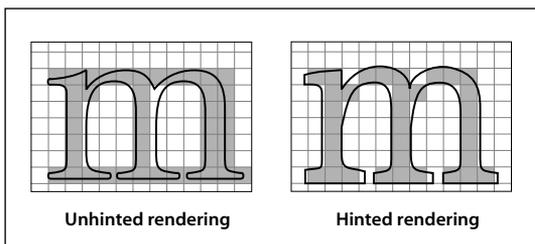
Adobe Type 1 fonts are hinted to prevent serif collision and provide control over stem widths and counters. This ensures that text remains legible even at small point sizes.

Hinting accomplishes what hand-tuning did — better quality type at a given size and resolution. Adobe's innovation is that a Type 1 font with PostScript software does this automatically.

Recognizing that Adobe's technology produces electronic fonts that faithfully reproduce the appearance of professional-quality typefaces, the most prestigious type foundries in the world produce fonts in the Type 1 format and license their typeface designs to Adobe. They include Agfa, Berthold, International Typeface Corporation, Linotype-Hell, Monotype, and Morisawa.

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PostScript software and Type 1 fonts are now available on all major desktop computers in the form of Adobe Type Manager™ (ATM™) and the Display PostScript™ system. Type 1 fonts can be displayed and printed from Windows™, OS/2® and DOS on the PC platform as well as from the Macintosh® and a variety of UNIX® workstations.

Among the benefits ATM and the Display PostScript system offer is sharp text on the display, which dramatically improves the WYSIWYG (What You See Is What You Get) effect between display and printer. Better WYSIWYG means more convenience and higher productivity for users creating documents of all kinds.

Adobe has produced more than 1,600 Type 1 fonts for the Adobe Type Library and some 30 other vendors have produced and distribute more than 15,000 Type 1 fonts worldwide. All these fonts can be displayed by more operating systems and printed to more devices than any other type technology. Whenever you purchase a printer or computer that contains PostScript software from Adobe, or a software application that includes ATM, you also get a collection of Type 1 fonts and access to thousands more.

Only Adobe Type 1 fonts, which offer device independence, the industry's most extensive font library, and wide availability give users the assurance they can maintain font compatibility across different systems and different printers.

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Using Adobe Type 1 Fonts

Users may get access to Adobe Type 1 fonts for display or printing by:

- Installing Adobe Type Manager software on their computer. This is by far the most common way to get Type 1 fonts.

- Using a UNIX workstation from DEC, IBM, NeXT, or Silicon Graphics that is running the Display PostScript system.

- Installing CPSI (Configurable PostScript Interpreter) from Adobe on a standard workstation.

- Printing to a PostScript printer (or to a non-PostScript printer with ATM or CPSI).

While the means of accessing Type 1 fonts are different, the results are the same — high quality type and reliable viewing and printing of documents. Because of its widespread use, ATM software is the focus of this section.

ATM is system-level software that instantly generates type at any size and resolution from Type 1 fonts. ATM generates type automatically for both displays and non-PostScript printers. For PostScript printers, ATM allows Type 1 fonts to be downloaded for quick and efficient printing.

Like Type 1 fonts, ATM is actually a component of PostScript software — essentially it is the *type rasterizer* in PostScript software, modified to be used in the host computer. Introduced in 1989, ATM software has become the de facto standard type rasterizer.

ATM is available for:

The Macintosh. ATM was introduced first for the Macintosh and quickly became an indispensable addition to the computer's system software. Due to its success, Apple will integrate ATM into the Macintosh operating system in future releases of System 7.

Microsoft Windows. Introduced for Windows 3.0 in 1990, ATM brought the same type capabilities and ease of use features to Windows that it had brought to the Macintosh. Users with both Macintosh and PC computers could rely on one common font format to bridge the platforms. In Windows 3.1 (and also with the Mac®) environments, TrueType™ fonts co-exist with ATM and

ATM creates sharp, smooth type for displays and printers from Adobe Type 1 outline fonts.
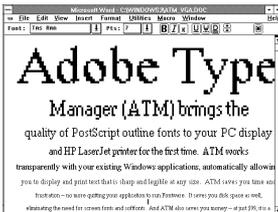
Without Adobe Type Manager
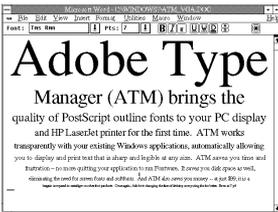
With Adobe Type Manager
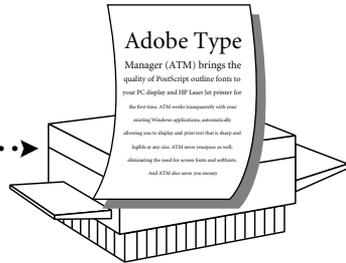
Type 1 software. As a result, users can reliably view their documents and print them to any Windows-supported printer.

OS/2. ATM is integrated into OS/2 and has been adopted by IBM as the standard type technology for all SAA-compliant systems. OS/2 users can use the same Type 1 fonts they purchased for their DOS or Windows applications, thereby maximizing the return on their investment in cross-platform-compatible Type 1 fonts.

WordPerfect. Recently WordPerfect Corporation and Adobe announced that ATM and a collection of Type 1 fonts will be integrated into WordPerfect software, the best-selling word processing application on the PC platform. Millions of WordPerfect users will be able to use Type 1 fonts with either the DOS or Windows version of WordPerfect.
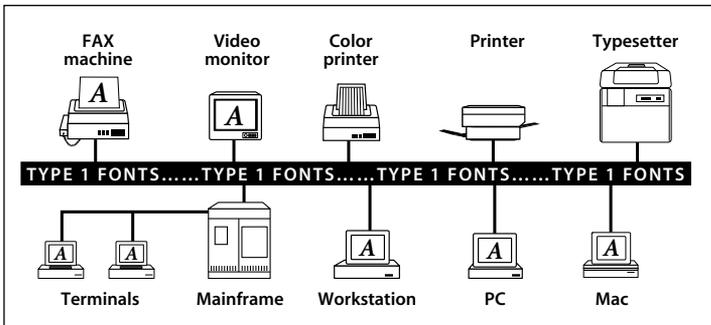
Type 1 fonts are supported by various computers and output devices. Adobe's PostScript language and Type 1 font format provide document portability in multi-platform environments.

Type 1 font technology also protects a user's investment whenever ATM upgrades are introduced. New versions of ATM do not make existing fonts obsolete; the upgraded version of ATM simply uses existing Type 1 fonts to produce better-looking type faster than ever before. Type 1 fonts are the safest investment in type technology a user can make.

With the access provided by ATM software, users can choose from thousands of Type 1 fonts to help them create documents that get attention and get your message across.

Adobe's ATM technology also delivers solutions when you *don't* have fonts. This new product is called SuperATM.

SuperATM software helps customers overcome the problem of missing typefaces by creating substitute fonts for viewing, editing and printing text and thus improves the exchange and communication of documents. This new "intelligent font substitution" technology— the ability to simulate typefaces— works at the system level so it can be transparent to applications and to customers. At the system level, SuperATM will generate a font that matches the spacing (character widths) and weight (boldness) of the original selected typeface if that typeface is not present on the system. The document's text format and basic appearance is then maintained.

When you create a document, you format it with typefaces that help you communicate your message effectively.

But when you send your document to a colleague, the application is likely to display a generic, default typeface, thus losing your text formatting information and hindering communication.

SuperATM software preserves text formats and document readability.

Adobe Type 1 and
Other Font Formats

Adobe's Type 1 technology has been available and in widespread use since 1984. During that time, while Type 1 has become an industry standard, other font formats have been developed using different outline font technologies. Like Type 1, many of them provide font scaling on both computer displays and hardcopy output devices.

Only Adobe Type 1 fonts, however, are available across a variety of computer platforms, are supported by thousands of software applications, and are resident in more than 250 products.

Although other formats "compete" with Type 1, they also co-exist with Type 1 under the specific operating systems they support. That means users can combine, for example, Type 1 and TrueType fonts in the same document. Adobe believes users should be able
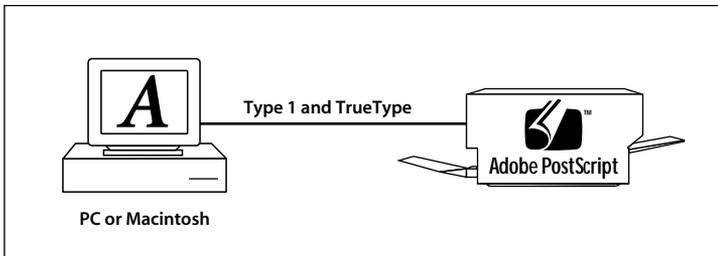
Documents containing Type 1 or TrueType fonts can be printed on a PostScript printer.

to focus on producing the most effective documents rather than worrying about type formats. With the Type 1 format, users retain complete freedom of choice, in the type of computer they use, their operating system and their application. They also have a choice among 15,000 fonts, more than are available in any other format.

Because Type 1 fonts are PostScript language files, they produce the highest-quality documents on PostScript printers from such manufacturers as Apple, Compaq, Hewlett Packard, IBM, Texas Instruments, Xerox and many others. Customers not only get high quality text with a PostScript printer but graphics, images and color capabilities—something that other font formats simply don't do.

Type 1 fonts are available for Macintosh computers, PCs with DOS, Windows or OS/2, UNIX workstations, VAX™/VMS™ and mainframe computers. Aside from high quality typefaces, Type 1 font format has additional benefits to all kinds of customers:

• Compatible with widest range of output devices and software applications

• More fonts available from more vendors

• Widest selection of corporate standard typefaces

• Easy to install and use

The Industry Standard

Type 1 fonts have become the industry standard for outline type because they offer a combination of benefits and advantages no other technology can match, including:

Open standard. The specification for creating Type 1 fonts is published in a book entitled *Adobe Type 1 Font Format*, available from Addison-Wesley. More type vendors create, sell, and support Type 1 fonts than any other font format in the world.

ISO Standard. The International Standards Organization, in ISO specification 9541, identifies Adobe's Type 1 format as the worldwide standard for outline fonts. This means that customers, software developers and hardware manufactures requiring international standards can rely on Adobe Type 1.
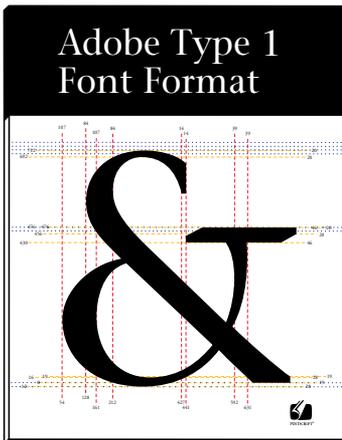
The Type 1 specification is designed to provide software developers and type vendors information for developing and supporting high quality and efficient Type 1 fonts.

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Availability. Type 1 fonts are shipping in more than 250 PostScript language products from more than 40 OEMs. Over 15,000 Type 1 fonts are currently available. Type 1 fonts are currently bundled with IBM's OS/2 and with popular software applications, available from such major vendors as Aldus, Lotus, MacroMind, Micrografx, Ventura, and soon WordPerfect.

Cross-platform compatibility. Type 1 fonts are available for Macintosh, DOS, Windows, OS/2, UNIX and PC UNIX workstations, VAX/VMS and mainframe computers.

Proven font-building tools. Software tools used to design, produce, and quickly manufacture Type 1 fonts are available from Adobe and many third parties. The world's most prestigious type foundries use them to create fonts in the Type 1 format. To ensure compatibility and quality, Adobe provides extensive technical support to vendors developing Type 1 fonts.

Small code size. Type 1 fonts occupy as much as 50 percent less disk space than competing font formats. This saves precious hard disk space.

Non-roman font support. Japanese, Chinese, Cyrillic and other non-roman languages with very large character sets, multiple writing directions, and complex encodings are supported by the Type 1 font format.

あ　　　　成

Typeface: Futo Go B1O1™　　　　**Typeface: Futo Min A1O1™**
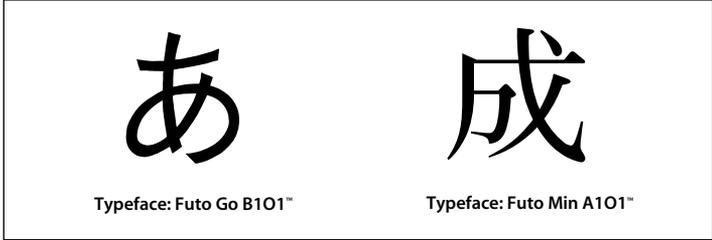
Adobe Type 1 technology is well-suited for output devices and displays supporting complex character sets, such as Japanese.

Extensible technology. The Type 1 font format has proven to be very extensible, as demonstrated by the recent development of multiple master typefaces, an advancement that enables users to customize the appearance of a typeface for a specific document.

Offering capabilities not available from competing technologies, multiple master typefaces give users a new level of flexibility and control over the look of fonts on screen and in documents. Multiple master software also offers software developers the ability to incorporate advanced features for hyphenation and justification, copy fitting, and graphic design.

In addition, multiple master technology will play a key role in future products enabling users to communicate documents electronically. Products such as SuperATM will take advantage of a feature of some multiple master typefaces called *font substitution.* Font substitution is the ability of one multiple master font to closely mimic another font, thereby preserving the text format of

an electronically communicated document, even when a recipient doesn't have type-faces that were part of the original document. With font substitution, document exchange becomes more efficient and users more productive.

Light condensed   Light expanded

B B B B B B B B B B B B
B B B B B B B B B B B B
B B B B B B B B B B B B
B B B B B B B B B B B B
B B B B B B B B B B B B
B B B B B B B B B B B B
B B B B B B B B B B B B

Black condensed   Black expanded
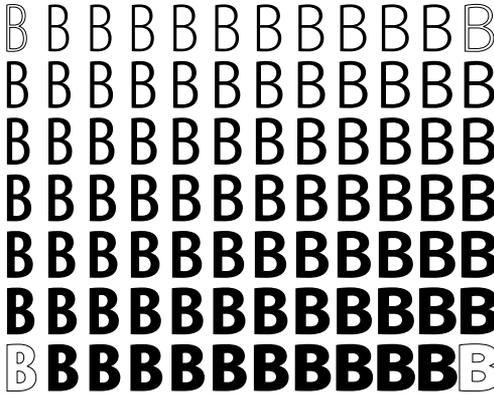
Multiple master type-faces generate a vast array of fonts from "master designs" shown at the corners of this matrix. Represented here is Adobe's Myriad™ multiple master typefaces.

Glossary

Adobe Type Manager (ATM)—A system software utility that quickly generates type at any size from Type 1 outline fonts. ATM software belongs to a category of software programs called type rasterizers.

Bitmap font—A pattern of dots (bits) that closely resembles a character shape in a given typeface, point size and resolution. Bitmaps cannot be scaled without distortion and require considerable storage space.
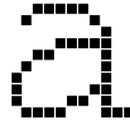
Font—An implementation of a typeface in a specific medium, such as metal, film or digital format. Traditionally, a font in metal type consisted of all characters in a single size, such as Palatino* Italic 12 point bold.

In the digital medium, a bitmap font is the file containing all characters in a single size. An outline font, in contrast, is a file containing outline characters that can be scaled to any size.

Hinting—The process of adding information to a character's outline to improve its appearance at low resolutions and small point sizes. For example, hints make stem weights consistent and align characters accurately to make baselines even.
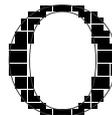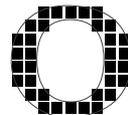
24 pt. at 72 dpi   **12 pt. at 72 dpi**
(magnified)

Outline font—A method of describing the shapes of the characters in a typeface by a program. This mathematical representation of lines and curves is resolution-independent and device-independent.

Rasterizing—The process of converting outline characters into bitmaps at the resolution of the target display or printer.

R → Adobe PostScript → R
Type 1 Outline   ATM   Rendered Character
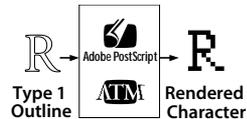
Typeface—A collection of characters with a unique design. For example, Palatino Bold and Helvetica* Regular are typefaces.

Palatino Bold
Helvetica Regular

Type 1 font—An outline font program based on the PostScript language. Most PostScript printers contain a number of Type 1 fonts in ROM, and additional fonts can be downloaded. Type 1 fonts are more compact than Type 3 fonts (see next definition) and contain hints.

Type 3 font—An outline or bitmap font format introduced by Adobe. The Type 3 format is also a PostScript program but does not contain hints. Type 3 fonts are also called "user-defined fonts," and are useful for describing complex graphic shapes, such as a logo.

Adobe PostScript

POSTSCRIPT™ LANGUAGE
Communications Handbook

Understanding

the major

features and

benefits of

Adobe™ PostScript

software.

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Adobe PostScript software is used in more than 300 products from more than 50 manufacturers.

In this handbook, the term "product" refers generically to all products containing Adobe PostScript software, including black-and-white printers, color printers, imagesetters, film recorders, workstations, software RIPs, video systems and mainframes.

This diversity of products and the range of solutions they offer are two of the many benefits of Adobe PostScript technology.

As we move forward with extending the PostScript language advantage, we feel it is important for our customers to understand our position on a variety of issues surrounding PostScript Level 2 products. We hope you find the enclosed information helpful.

Adobe PostScript™

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TABLE OF CONTENTS

What is the Difference Between PostScript Level 1 & Level 2 ?

Building on the standard.   The PostScript language has always had a very powerful and complete imaging model for describing the appearance of complex pages with integrated text, graphics and images. This power and flexibility, which has made PostScript language technology the industry standard for high-quality printing and publishing, remains unchanged.

PostScript Level 2 builds on the PostScript language standard by providing alternate and, in some cases, more efficient ways to describe the appearance of a page. For example, there are new techniques for more efficiently switching fonts, composing text, transmitting compressed images, and caching the text and graphics that describe the appearance of forms and patterns. However, any page you can describe and print on an Adobe PostScript Level 2 printer can also be printed or displayed on the installed base of Adobe PostScript products.

Extending the range of solutions.   PostScript Level 2 products have simply increased the variety of PostScript language solutions available to the customer. Rather than exploring the differences between PostScript Level 1 and Level 2, perhaps a more relevant question is: What are your organization's printing and publishing

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needs and which Adobe PostScript products address them most effectively? This decision might include a comparison of:

- Vendor choices and service needs
- Price/performance goals
- Cross-platform requirements (Macintosh®, PC, workstations, mainframes)
- Networking needs
- Page-size and paper-handling options
- Output resolution and quality

Full compatibility. As mentioned previously, the newest Adobe PostScript Level 2 products are fully compatible with the installed base of Adobe PostScript products, application software, printer drivers, and archived PostScript language files. End users can seamlessly integrate the newest Adobe PostScript products into their corporate computing environments without incurring any penalties.

The bottom line. As long as your printer or display system has Adobe PostScript software, you can feel confident that you are getting the highest-quality results possible – ensuring clear, effective visual communication.

WHAT IS POSTSCRIPT LEVEL 2 ?

PostScript Level 2 unifies and extends the PostScript language. The foundation of Level 2 is the same PostScript software that is found in today's Adobe PostScript products. This common core of technology ensures compatibility with existing application software, Display PostScript™ systems, Adobe PostScript printers, and Adobe PostScript imagesetters.

Unifying the language.

PostScript Level 2 unifies the language by incorporating several enhancements made over the last few years. Previously, these features existed only in certain PostScript products, such as color printers, Japanese-language printers, and Display PostScript systems. Today, all Level 2 products include support for:

• Cyan, magenta, yellow and black (CMYK) color model

• Color images (RGB and CMYK)

• Non-Roman character sets and encodings (Japanese, Chinese, Cyrillic, etc.)

• Optimized text and graphics operators from the Display PostScript system
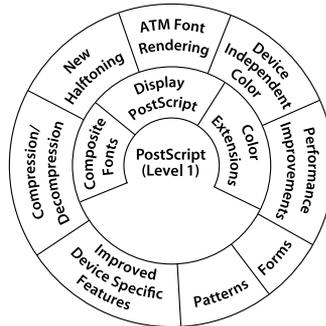
PostScript Level 2

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Extending the language. PostScript Level 2 extends the language by adding new features for more conveniently and efficiently describing the appearance of a page. These new Level 2 features include support for:

• Forms and form caching
• Patterns and pattern caching
• Device-independent color
• Data compression and decompression filters
• Improved halftoning algorithms for color separations
• Improved memory management
• Resource management
• Improved support for printer-specific features

Compatibility. At the core of all Adobe PostScript products is the same powerful and complete PostScript language imaging model for describing the appearance of complex pages with integrated text, graphics and images. PostScript Level 2 builds on this core technology, but does not obsolete existing PostScript products.

More details. *The PostScript Language Reference Manual, Second Edition*, written by Adobe Systems and published by Addison-Wesley, offers the most comprehensive coverage of the entire PostScript language, including Level 2. It is available at your local bookstore or directly from Adobe (1-800-833-6687).

Feature Descriptions for PostScript Level 2

Forms and form caching. The form cache optimizes repeated uses of the same form. A "form" can be any arbitrary text, graphics and sampled images that are to be imaged multiple times – on each of several pages or several times at different locations on a single page.

Patterns and pattern caching. PostScript Level 2 software provides a convenient way to paint with patterns as well as solid colors. With patterns, the PostScript interpreter applies "paint" that is produced by replicating a small graphical figure, called a pattern cell, to cover the area being painted. There is a pattern cache to optimize repeated uses of the same pattern.

Device-independent color. PostScript Level 2 software provides a method for specifying colors based on the international standard CIE 1931 (XYZ)-space, a system for specifying color values in a way that is related to visual perception. Device-independent color enables users to create, view, transfer and print color information with more predictable results on a variety of displays and printers.

Data compression and decompression filters. PostScript Level 2 supports industry-standard formats for compression, decompression and ASCII encoding of binary data. Standard formats include run-length encoding, CCITT Group 3 and 4, LZW, JPEG and ASCII-85. For printing environments where file transmission is a

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bottleneck, transmitting compressed data translates directly into faster printing.

Improved halftoning algorithms. Adobe Accurate Screens ™ technology dramatically improves the accuracy of the angles and frequencies in PostScript imagesetter halftone screens. Depending on such parameters as the exact screen angle and frequency requested, resolution of the device, and memory available for use by the algorithms, the screens can have an angular accuracy of ± .001 degrees and frequency accuracy of ±.01 lines per inch or better. Because this is such an important feature for high-resolution imagesetters, Adobe has already incorporated accurate screen technology into some PostScript Level 1 interpreters running on RISC-based Emerald controllers.

Improved memory management. Memory is more efficiently and dynamically shared among different uses (VM, font cache, form cache, etc.) and arbitrary memory restrictions have been eliminated. One pool of memory is available for all resource needs.

Resource management. PostScript Level 2 software provides convenient facilities for locating, storing and managing resources such as fonts, forms, patterns, font encoding vectors, and CIE-based color-rendering dictionaries.

Compatibility

Fully compatible. Adobe PostScript Level 2 products are compatible with the installed base of Adobe PostScript products, application software, printer drivers, and archived PostScript language files.
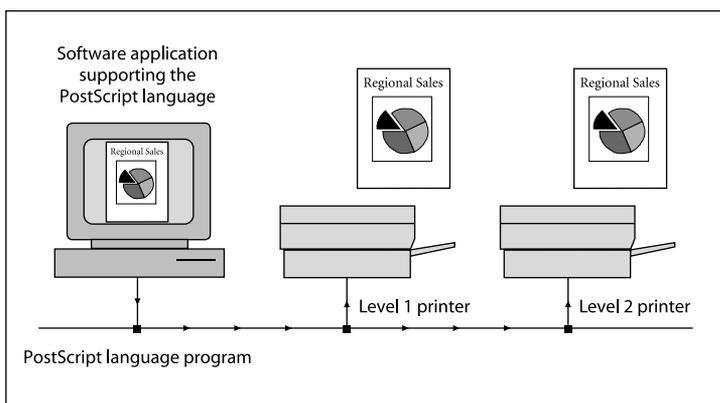
Mix and match.   End users can seamlessly mix Adobe PostScript products – Level 1 or Level 2 – in their corporate computing environments.

Existing products are not obsolete. PostScript Level 2 does not obsolete existing Adobe PostScript products. While Level 2 brings many new convenience features to the PostScript language, any page you can describe and print on a Level 2 printer can also be printed on any of the installed base of Adobe PostScript printers and imagesetters.

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Backward compatibility. Application software and printer drivers can easily take advantage of new Level 2 features while remaining compatible with existing Adobe PostScript products. The *PostScript Language Reference Manual, Second Edition* and the Adobe Developers Association provide application software developers with clear guidance and examples.

The PostScript language has always had a very powerful and complete imaging model for describing the appearance of complex pages with integrated text, graphics and images. PostScript Level 2 builds on this foundation, which helps ensure compatibility between all Adobe PostScript products.

Performance

Systems approach. PostScript Level 2 software is just one facet of a systems approach that Adobe is taking to improve the overall "click-to-clunk" performance of Adobe PostScript printers.

The effectiveness and performance of any printing environment is affected by five main elements:
• Host computer
• Printer driver
• Communications channel
• Controller processor and memory
• Print engine
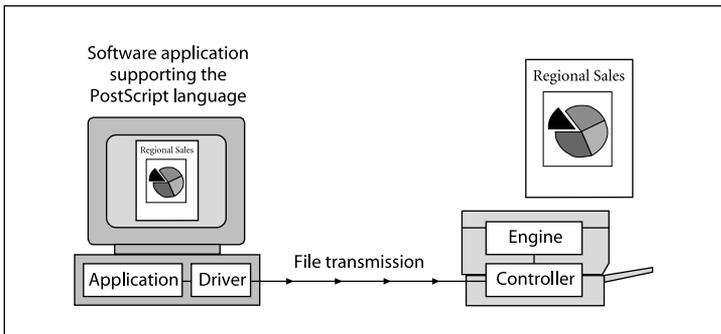
A good printer driver can produce PostScript language programs that print significantly faster than those created by an inefficient driver. Communications bottlenecks can account for a majority of the time to print a page; very large grayscale images can take minutes to transmit to the printer. The speed of the controller's

processor has a direct impact on the time required to print a document. And, ultimately, the limiting factor in performance is the rated engine speed of the output device.

Performance expectations. Performance improvements with PostScript Level 2 printers will be fully realized when printer drivers and applications utilize new Level 2 features. For example, by sending compressed image data to the printer – a feature available on Adobe PostScript Level 2 printers – file transmission time is reduced. For printing environments where file transmission is the bottleneck, this translates directly into faster printing.

In general, PostScript language files that do not take advantage of Level 2 features can be expected to perform equivalently on Level 1 or Level 2 printers.

Printer Drivers
and Application Support

Compatibility . Adobe PostScript Level 2 printers work with existing PostScript printer drivers that adhere to the *PostScript Language Reference Manual.*

New drivers . The printer driver is an important factor in realizing the full value of any Adobe PostScript printer. Because of this, Adobe has developed new printer drivers for the Macintosh and Microsoft® Windows™ environments. These printer drivers are designed to replace existing system-level drivers and work with existing Adobe PostScript printers as well as newer Level 2 printers.

Using the new drivers increases the value of all Adobe PostScript printers – not just Level 2 printers – by enabling greater utilization of printer-specific features, such as multiple paper trays and envelope feeders, and improving performance by transmitting more efficient PostScript language programs to the printer. Adobe encourages all users of Adobe PostScript printers to use the new drivers.

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Pricing and availability . Adobe printer drivers are bundled with many popular printers and applications or can be purchased as an inexpensive retail product directly from Adobe by calling 1-800-833-6687.

Other environments . Some system environments, such as DOS and UNIX®, require applications to have their own PostScript printer drivers. For these ISVs, Adobe has developed a Software Developer's Kit that guides the ISV through the process of adding support for Level 2 functionality while retaining compatibility with existing Adobe PostScript printers.

Adobe works closely with software developers in the DOS and UNIX environments to optimize their PostScript printer drivers by adding support for PostScript Level 2 software features.

For more information on the Adobe Developers Association, please call 415-961-4111.

Benefits of Adobe PostScript Software

Quality. The PostScript language is the world's standard imaging technology, providing the highest quality display and printing solutions in the industry. That's why it's the choice of publishing professionals worldwide.

Compatibility. The Adobe PostScript standard is the only way to guarantee that your printer will work with virtually every software application, operating system and hardware environment – today and tomorrow.

Performance. Today, products based on Adobe PostScript provide the highest level of quality and compatibility without sacrificing performance.

Flexibility. From memos and spreadheets to illustrated brochures and annual reports, in color or black and white, Adobe PostScript software lets you print any document.

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Choice. Choose from a wide range of products from more than 50 of the most prestigious companies in the peripherals and computing industry. Products include laser printers at a variety of resolutions, color printers, imagesetters, duplex printers, color film recorders, display systems, video and more. These Adobe PostScript products are supported by more than 5,000 software applications in the Macintosh, Windows, DOS, OS/2, UNIX, VAX™/VMS™ and mainframe environments.

"When the entire world is using PostScript for multimedia applications, for facsimile, for electronic publishing, and for other applications, why would anyone buy anything other than a PostScript printer, regardless of the merits of [other technologies]? Of course, it is hardly a sure thing that Adobe will actually be able to expand PostScript into a universal communication medium. But historically, there have been few companies with more vision than Adobe; perhaps if anybody can do it, Adobe can." – BIS CAP International, Fall 1990

Benefits of Adobe's Type 1 Font Technology

Open standard. More type vendors create, sell and support Type 1 fonts than any other font format in the world. The specification for creating Type 1 fonts is published worldwide in a book entitled *Adobe Type 1 Font Format.*

Availability.   Type 1 fonts are shipping in more than 300 Adobe PostScript products from 50 OEMs. There are more than 1,800 Type 1 fonts in the Adobe Type Library and more than 15,000 Type 1 fonts available from all type vendors worldwide.

Cross-platform compatibility. Type 1 fonts are available for Macintosh, DOS, Windows, OS/2, UNIX, VAX/VMS and mainframe environments.

Document portability.   Because Type 1 fonts are platform independent, documents and PostScript language files using Type 1 fonts are portable between Macintosh, DOS, Windows, OS/2, UNIX, VAX/VMS and mainframe computers.

Proven font-building tools.   Software tools used to design, produce and manipulate Type 1 fonts are available from Adobe and many third parties.

Simple hinting mechanism.   Type 1 fonts are easily hinted, which preserves the quality and character of type when rendered at small point sizes and low resolutions.

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Support from all major type vendors. Agfa Compugraphic, Autologic, Berthold, Bitstream, Linotype-Hell, Monotype, Morisawa, Scangraphic, URW and Varityper all fully support the Adobe Type 1 font format.

Highest quality and performance. Independent tests have consistently concluded that Type 1 fonts are faster and of higher quality than competing font formats.

Small code size. Type 1 fonts occupy less disk space on your computer and require less time to download to your printer than competing font formats.

Non-Roman font support. Japanese, Chinese, Cyrillic and other non-Latin languages with very large character sets, multiple writing directions, and complex encodings are supported by the Type 1 font format.

Extensible technology. The Type 1 font format has proven to be very extensible, as witnessed by the recent advancement of multiple-master Type 1 fonts, which enable users to create a limitless variation of weight, width, style and optical size from a single outline font.

Adobe PostScript

Adobe™ PostScript™ Fax

for Adobe PostScript printers

The technology that lets you fax PostScript printer-quality documents anywhere

With an Adobe PostScript Fax printer, you can fax documents as easily as you can print them. And you can be sure that they will arrive at their destination looking as good as your original.

PC/Windows™

Macintosh®

PC/MS-DOS®

PostScript Fax printer

Fax modem & firmware

Standard fax machine

PostScript language file | Clean, 200 dpi fax image | Clean faxed output
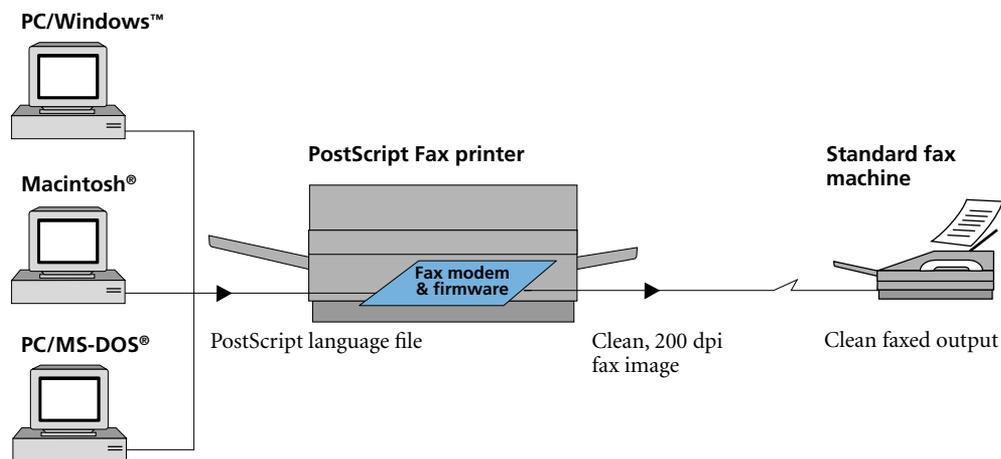
Fax Alternatives Today

It's true that fax technology has improved the way businesses communicate. But when you need to send a critical document quickly, with all the text and image detail intact at the receiving end, standard fax machines are not the best solution.

Using a standard fax machine, you have to print the document before faxing it. Then, what your fax machine actually sends is a scanned image to the receiving machine – a copy marred by crooked lines, imperfect halftones, character drop-out and other distortions. The more complex the document, the longer it takes to transmit, costing you more money. And the fax prints on thermal paper that curls, smudges and is almost unusable unless photocopied onto plain paper.

One alternative to standard fax machines is computer-based faxing. Although it's more convenient, because you don't have to print the document first, installing computer fax boards and modems can be tricky and costly. You need one board and modem for each user, so it's an expensive choice. Faxing ties up your computer system while you're transmitting. And the software that comes with the fax board doesn't translate the image well, so you end up with poor-quality output.

The Higher Quality, Lower Cost Alternative

Using a PostScript Fax printer, you send faxes of the same quality as your original document. That's because the PostScript Fax software you use to transmit the fax is based on the high-quality PostScript language – the same language your software application uses to create the document. So rather than sending an imperfect scan or a poorly translated image, you send a fax guaranteed to print with text, graphics and images of the same size and quality as your original.

Printers equipped with PostScript Fax technology save you time and money in several ways. They let you send high-quality faxes anywhere, eliminating the cost of sending follow-up printed copies via expensive overnight courier or slow first-class mail. They are networkable, eliminating the need to purchase and install multiple fax boards, fax modems and fax lines for everyone on the network. They don't tie up your computer while transmitting a fax, so you can continue to work. And they reduce installation and maintenance costs because they're easy to install and don't require dedicated hardware.

Adobe

Sending a fax with today's technology

Fax machine → **Fax machine**

Computer-based fax → **Fax machine**

Bias Piston
Bias Spring
Title: Motor assembly
Product: B20 Earth Mover
Part No: N47602-B20

Bias Piston
Bias Spring
Title: Motor assembly
Product: B20 Earth Mover
Part No: N47602-B20
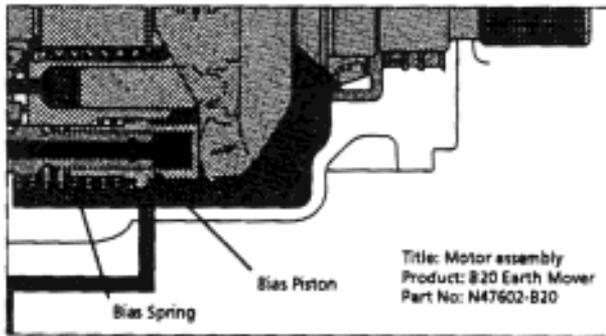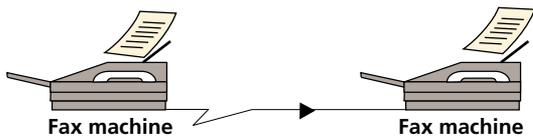
Example of a document sent from one fax machine to another. Notice how the transmitting fax machine creates distortions such as filled-in type, uneven lines and loss of detail that corrupt the printout.
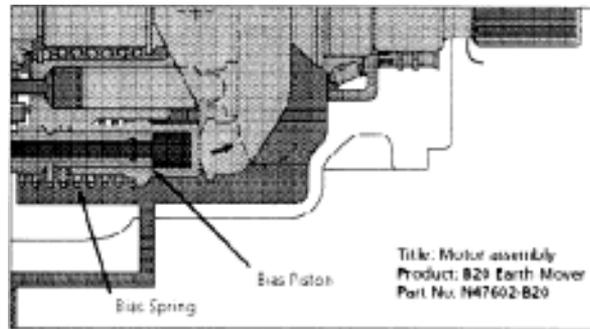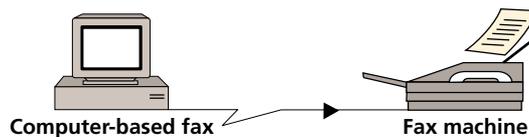
The same document sent from a computer-based fax to a fax machine. Because it doesn't translate the image well, the computer fax software causes distorted type, uneven lines and loss of detail that result in poor-quality output.

Unique PostScript File Transmission

When a PostScript Fax printer transmits to a standard fax machine, the image is printed at a clean, 200 dots per inch (dpi), with all the detail accurate and intact.

But besides transmitting a regular fax image, PostScript Fax printers also have the unique ability to send fax documents as PostScript language files.

When you send a PostScript language file to a destination that's also equipped with a PostScript Fax printer, you have several key advantages. First, the transmission time and costs are less because the file size is generally smaller than a standard fax image.

Second, the output quality of a fax sent from one PostScript Fax printer to another is better because the destination printer images the fax at the maximum possible resolution.

Third, you aren't limited by standard fax capabilities for document size. The faxed document can print in any size that the receiving PostScript Fax printer can accommodate, even legal or tabloid. And soon, you'll be able to send color documents via a PostScript Fax printer.

In essence, you'll have the ability to use any option – resolution, size and color – to print on a remote printer anywhere in the world.

Receive Faxes on Plain Paper

In addition to sending high-quality faxes, PostScript Fax technology lets you receive incoming faxes that output directly on to the printer's standard paper, just like a plain-paper fax machine. So there's no need to photo copy a fax from hard-to-use thermal paper onto plain paper.

If it's busy outputting local jobs, your PostScript Fax printer holds incoming faxes in memory, printing them once the local job is complete. And unlike computer-based fax boards, because the fax automatically prints after it's received, you don't waste time previewing, scrolling and zooming in on the fax to view it on your screen, then routing it to the printer yourself. →

Easy to Install and Use

You can install a PostScript Fax printer in a matter of minutes. Simply connect the telephone line and the parallel or AppleTalk® cable, and you're ready to go. The printer comes with host computer software built right in, designed to work with your PostScript driver. There are no cards to install, no jumpers to configure, no I/O addresses to remember and no serial ports to initialize.

Once installed, the host software makes faxing as easy as printing. Just enter the receiving fax number, either by typing it into the enhanced print dialog box or by selecting it from one of your previously created phone lists, choose the cover page option if you wish, and click Send.

Best of all, because it uses the PostScript page-description language that's the standard worldwide, your fax printer gives you the highest-quality output available, whether you're printing documents or incoming faxes. And it's compatible with popular operating systems, including Macintosh, Windows and MS-DOS.

→

Sending a fax with PostScript Fax technology

PostScript Fax printer → **Fax machine**

Title: Motor assembly
Product: B20 Earth Mover
Part No: N47602-B20

Bias Piston
Bias Spring
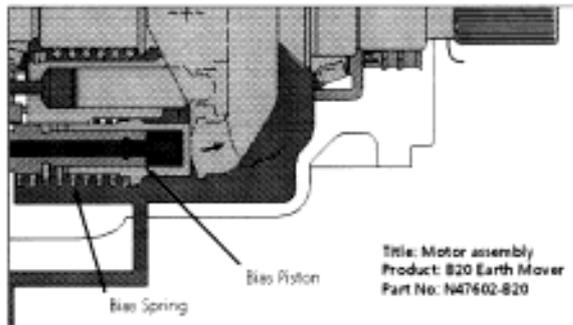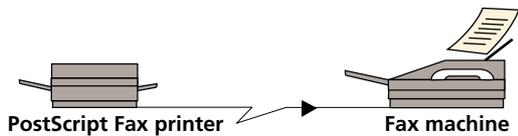
The same document sent from a PostScript Fax printer to a fax machine. The result is a clean, 200 dpi printout, free from distortions.

PostScript Fax printer → **PostScript Fax printer**

Title: Motor assembly
Product: B20 Earth Mover
Part No: N47602-B20

Bias Piston
Bias Spring
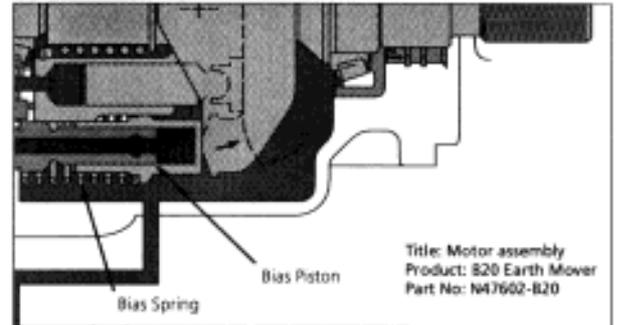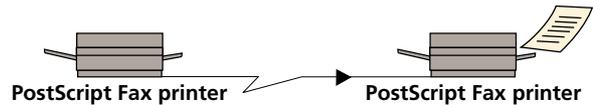
The same document sent from one PostScript Fax printer to another. This gives you the best-quality fax printout of all. You get laser-printer resolution or better (the image shown is 800 x 400 dpi), nonstandard paper sizes, plain paper printout and color (near future).

## What a PostScript Fax Printer Does for You

Scenario 1

PostScript Fax technology makes it easy to collaborate on a document, even from distant locations. If, for example, you've created an overhead slide presentation and need to make last-minute changes, you can make corrections on your computer and send the revised slide right to the presenter's hotel fax machine. Because the transmitted slide prints on the hotel fax machine at laser quality, it can be photocopied onto overhead film. It's faster, easier and less expensive than costly overnight delivery.

Scenario 2

With a PostScript Fax printer, it's quick and easy to send the same document to many destinations. Using the Phone-book and Broadcast features, you can easily create a complete list of recipients, then automatically send copies to each destination on the list. And everyone who receives your fax gets high-quality output in real time, for a much lower cost than by mail or courier.

Scenario 3

When you're publishing a document professionally, every detail and moment is critical. Using a PostScript Fax printer, you can speed up the process by faxing high-quality proofs to clients instantly – much faster and less expensively than any delivery service. With the quality of PostScript language text, graphics and images, customers can review and approve your faxed proofs quickly and easily.
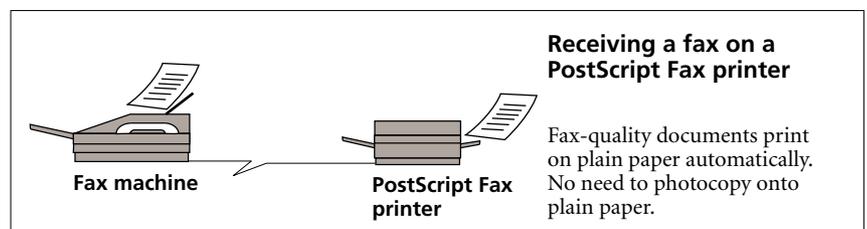
Fax machine **PostScript Fax printer**

Receiving a fax on a PostScript Fax printer

Fax-quality documents print on plain paper automatically. No need to photocopy onto plain paper.

Windows interface for PostScript Fax

DOS interface for PostScript Fax


DOS interface for PostScript Fax

Windows interface for PostScript Fax

Macintosh interface for PostScript Fax
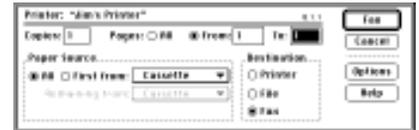
Macintosh interface for PostScript Fax

Key Features

- Send faxes as Standard (200 x 100 dpi) or Fine (200 x 200 dpi) Group 3 images, or as PostScript language files.
- Fax directly from any application using the included Macintosh, Windows and DOS fax utilities.
- Receive faxes on plain paper.
- Keep track of incoming and outgoing faxes with an activity summary report.
- Stamp Date, Time and Sender information on fax pages.
- Simultaneously print documents and receive inbound faxes.
- Automatically verify receipt of trans mission with confirmation sheets.
- Assure fax communication with automatic retry if destination is busy.
- Receive notification of incoming fax.
- Dial destination fax machines with pulse or tone dialing.

- Schedule faxes to be sent at a future date and time with Delayed Transmission.
- Broadcast fax documents to groups of destination fax machines.
- Create and use Phone book database of frequently used fax numbers.

Product Includes

- PostScript laser printer equipped with PostScript Fax technology.
- PostScript Fax host software for Macintosh, Windows and DOS (bundled with printer).

Macintosh Host Software System Requirements

- Macintosh Plus, SE, SE 30, Macintosh II, PowerBook, Macintosh Centris, Macintosh Quadra® or Power Macintosh™
- Apple® System Software version 6.07 or greater, including version 7
- Hard disk
- PostScript Fax printer ➡

PC Host Software System Requirements

- IBM AT,™ PS/2® or compatible computer
- DOS 3.1 or greater (640K of RAM) or Microsoft® Windows 3.0 or greater (requires minimum 2 MB RAM)
- Hard disk
- PostScript Fax printer

For More Information

For specific product, price and availability information, call

- Apple Computer, Inc.
  1-800-538-9696
- Dataproducts Corporation
  1-800-980-0374
- NEC Technology Corporation
  1-800-NEC-INFO (1-800-632-4636)
- Panasonic Communications and Systems Company
  1-800-742-8086
- Xerox Corporation
  1-800-832-6979 ➡

Adobe PostScript
FAX

Adobe Memory Booster™ Technology

This document was printed at 600 dpi on an Adobe PostScript reference printer with Adobe Memory Booster technology and 2 megabytes of memory. This is an example of a Strategy 1 print sample.

Overview

The laser printer market has become increasingly competitive as prices continue to drop. However, higher resolutions and new printing technologies tend to require more memory, which add to a printer's cost. As the cost of a printer's components drop, such as the engine and controller, the cost of the memory becomes a greater percentage of the total cost. In fact, the cost of memory alone can determine whether or not the product is price-competitive.

Adobe Systems Incorporated is helping its OEMs control the cost of memory in their products with an advanced new printer technology called Adobe Memory Booster (AMB). Printer manufacturers can integrate this new technology, which works with Adobe™ PostScript™ software and LaserJet 4 compatible software (PCL® 5e) from Adobe, to reduce the amount of memory required without sacrificing printer performance or output quality.

Through a sophisticated combination of data compression and data complexity techniques, AMB technology "multiplies" the amount of effective memory in the printer to print all pages. AMB technology is fully scalable to the performance and resolution of the printing device and offers both software-only and hardware-assist implementations.

With AMB technology, printer OEMs can lower their manufacturing costs and offer a printer that, right out of the box, lets end users print virtually any page.

The Problem of Expanding Memory Requirements

Printing devices that print pages at higher resolutions or in color demand more memory. To keep such devices affordable, OEMs must find a way to control the cost of memory in their products.

Laser printers are raster devices that allow each dot, or pixel, to be addressed individually and turned on or off. In a bi-level monochrome printer, a pixel which is turned on causes a black dot of toner to appear on the page. Bi-level is the term given when the dot, or pixel, is either full intensity on or full intensity off, hence two levels. In a bi-level printer, each pixel requires one bit of memory to indicate whether or not a dot of toner should appear on the page at a given location. Prior to printing a page, a complete pixel map of the entire page has to be created so the laser can place toner particles on the proper positions on the page. At 300 dot per inch (dpi) bi-level monochrome printing, roughly one megabyte of memory is required to store the pixel map of a letter-sized page. However, as resolution doubles, the amount of memory required to store the pixel map quadruples. Hence, 600 dpi printing requires roughly four megabytes of memory to store a letter-sized pixel map. Larger paper sizes, such as legal, require even more memory.

As printing engine technology improves, and higher resolutions are supported, the problem of memory requirements is exacerbated. For example, 800 dpi bi-level monochrome printing would require roughly 7.5 megabytes of memory to store the pixel map—almost twice the memory

Adobe

required for 600 dpi printing. Bi-level color printing makes matters even worse by having as many as four entire pixel maps per page, one for each color, or plane. Bi-level color printing at 300 dpi can require as much as four megabytes per letter sized page; 600 dpi would require 16 megabytes.

Clearly, a solution to the problem of expanding memory requirements for higher resolution devices is needed if newer-technology printing engines are to be affordable. At roughly $20-25 per megabyte of memory, by applying typical manufacturer and dealer margins, a 600 dpi bi-level 4-page-per-minute (ppm) printing system could require upwards of $450-500 end-user cost for memory alone, pushing the price point of the product well over the $1000 level.

A Scalable Solution: Adobe Memory Booster Technology
An opportunity thus exists to help manufacturers reduce the cost of printers: If printers did not need to store a full pixel map to print a page, manufacturers could reduce the amount of memory in a printer and produce lower-cost devices. A scalable solution is needed, so that the higher the resolution, the greater the memory savings. In addition, the solution should not negatively impact performance or throughput, for typical documents. Finally, the solution must be reliable and maintain high quality output.

Adobe's solution is called Adobe Memory Booster technology, which applies to a whole family of products. These include low end (1-10 ppm) bi-level monochrome and color printers, through the mid-range (10-20 ppm), and up to the high-end (20 ppm and above). AMB technology is scalable, and can be tailored to meet the individual product's needs. Today, AMB technology is applicable to bi-level monochrome and color devices. Expect future announcements of AMB technology for continuous tone (contone) devices, where each pixel in the pixel map can require up to 24 or more bits of memory to represent each dot's intensity level. Memory savings for continuous tone devices will be even more significant—upwards of hundreds of megabytes.

AMB technology uses a sophisticated combination of data compression and data complexity techniques to reduce the actual amount of memory in the printer while still maintaining the system performance of the original or "effective" memory configuration. For example, a 2 megabyte, 600 dpi printer with AMB technology has equivalent, or in some cases, better performance than a five megabyte conventional system. For this reason, a 2 megabyte, 600 dpi printer with AMB technology is said to have 5 megabytes of "effective" memory. AMB technology guarantees pages will print at full resolution in a minimal RAM configuration.

The following table shows the amount of memory required with a monochrome printer using Adobe Memory Booster technology:

Resolution	With Memory Booster	Without Memory Booster
300 dpi	1 MB	2 MB
600 dpi	2 MB	5 MB[*]
800 dpi	3-4 MB	9 MB
1200 dpi	6 MB	18 MB

Bi-level color printers using Adobe Memory Booster technology offer even more memory savings:

Resolution	With Memory Booster	Without Memory Booster
300 dpi (3-color)	2 MB	4 MB
600 dpi (3-color)	4-5 MB	14 MB
300 dpi (4-color)	3 MB	6 MB
600 dpi (4-color)	6 MB	18 MB

[*] Most Adobe PostScript Level 2 printers without Memory Booster technology ship with a minimum of 6 MB of memory at 600 dpi. Due to packaging or costing issues, however, most manufacturers do not ship an odd amount of memory, such as 5 MB. Since the most popular shipping 600 dpi system comes with 6 MB of memory standard, the typical savings with Adobe Memory Booster technology at 600 dpi is actually 4 MB (from 6 to 2) rather than 3 MB (from 5 to 2).

Printers with AMB technology will print any page that could be printed in the printer's equivalent "effective" memory configuration. Typical pages always print at full speed and resolution. AMB technology is fully scalable to the performance and resolution of the printing device and offers both software-only and hardware-assist implementations. Furthermore, adding memory to the base configuration of a printer with AMB technology proportionally increases the amount of "effective" memory in the printer for increased performance.

Markets

One of the fastest growing segments of the laser printer market is for low-cost machines in the one-to-six page per minute category. Cost is a primary concern to many customers looking for printers in this category. As lower-cost 600 dpi engines become more prevalent, users preconditioned to low-cost 300 dpi machines will demand the newer 600 dpi machines at or near the 300 dpi price points. As the cost of color engines begins to comes down, memory will become a major factor in the cost of color printing solutions.

Adobe is meeting the challenges of low-cost printing solutions by offering AMB technology to a wide range of products. Today, the family consists of support for bi-level monochrome and color printing. In addition, two ASICs are available to enhance performance for high end applications. (See ASIC Support section) Expect future additions to the family of products using AMB technology, especially in the area of continuous tone (contone) color printing.

Memory-Saving Strategies: Current Methods to Reduce Costs

There are a number of current technologies designed to minimize the amount of memory needed in a printer. While these strategies reduce required memory to varying degrees, they also have disadvantages associated with each approach. All these strategies assume there is not enough memory in the printer to store a full pixel map.

Banding Strategy

Laser printers require the raster data in the pixel map to be supplied to the print head at a predetermined rate which is based on a number of factors, most notably engine page per minute speed and dot per inch resolution. Once the page has started moving through the engine, there is no way to stop its motion. As the paper moves past the laser beam at its predetermined rate of speed, the data in the pixel map indicating which dots to "turn on" must be available. If at any point while the paper is moving through the print engine, the pixel data is not available at the instant it is needed, a fatal error known as a "print underrun" occurs. If a "print underrun" error occurs, the page will be permanently damaged either by having a white gap where no printing occurs for the rest of the page or have some other obvious flaw.

Early page description languages used a technique known as "banding" to accomplish "just in time" printing. They produced one or more "bands" of pixel map data, then started the paper moving through the engine in the hope that the rest of the bands on the pages would be produced "just in time" to meet the timing requirements of the laser in the print engine. Each band represents a small fraction of the total page, and as a result requires only a fraction of the total memory required to store the pixel map data for a full page. For example, if the pixel map for a 300 dpi letter size page requires roughly 1 megabyte, a banding implementation which only allocated two bands might only need roughly 77 kilobytes of memory for the two bands of pixel data, assuming 26 bands on a page.

Breaking through
the RED tape

by Murice de Coppé

3
2
1
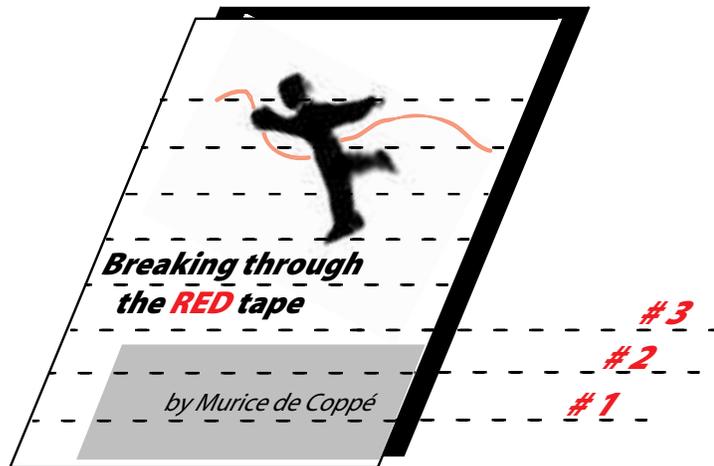
Page segmented by bands

The "banding" technique worked fine with early page description languages, mainly because they were fairly simple both in terms of their actual representation and functionality. Due to the simplistic representation of the early languages, it was usually possible to fit the entire representation of the original page description in the printer's memory. This is very important because it is not possible to do "just in time" printing if the entire page description is not available in memory to "rasterize", or convert to pixel data, when a band becomes available. An analogy would be trying to paint an entire strip on a wall non-stop and continuously from the ceiling to the floor using a standard paint roller. As long as there is enough paint on the roller to keep it moist throughout the entire strip, it is possible to paint the strip. If the roller cannot hold enough paint, it will not be possible to paint the entire strip. Similarly, if a printer can not store the entire page description, it will not be possible to print the entire page. In the case of a "banding" printer, this situation results in either the page not printing at all, causing a "memory overflow" error, or a partial page printing, causing a "print underrun" error.

Assuming the first requirement of a "banding" printer, that of being able to store the entire page description in memory, can be met, there is a second requirement which must be met. It must be possible to "rasterize", or convert to pixel data, the original page description "just in time" to meet the laser timing requirements. Early page description languages were fairly simplistic in terms of their functionality, so it was possible to do this rasterization in time. However, as page description languages have become more complex, it has become much more difficult to guarantee that rasterization can be completed for a band "just in time". If rasterization takes too long, a "print underrun" will occur. The PostScript page description language, for example, is too complex to guarantee rasterization can occur "just in time" for all bands on the page.

Some technologies have been introduced recently to add special hardware-assist to guarantee rasterization can occur "just in time" and prevent "print underrun". However, these hardware-assist solutions add cost to the printer and do not address the "memory overflow" problem of not being able to store the entire page description in the printer. Hence, many pages fail to print.

Display Lists and Reversion Fallback Strategy

Adobe PostScript Level 2 printers have always been pseudo "banding" in the sense that the page is divided into a series of bands to be printed. As the PostScript language input data file is processed, an intermediate representation of the page, called a "display list" representation is created. The advantage of the display list representation is that it is more compact and more easily rasterized. Display lists are created for each band on the page, and then each band's "display list" is pre-rasterized into the full pixel map of the page. By using "display lists", the first problem discussed previously with banding printers is addressed. Specifically, because the display list representation is very compact, it is very likely to fit entirely within the printer's memory, thus avoiding a "memory overflow" error. By pre-rasterizing all the bands into the full pixel map, the problem of "print underrun" is addressed. All the bands are pre-rasterized, so "print underrun" is not possible. Of course, the disadvantage is that a full pixel map is required to store all the pre-rasterized bands.

Even though the display list representation is very compact, it is still possible to overflow the available memory in the printer if the page is extremely complex and the resulting display list representation is very large. Should this condition happen, a sophisticated technique called "reversion" occurs. The Adobe PostScript Level 2 interpreter changes its imaging strategy during reversion to guarantee the page will print. The reversion process and imaging strategy can be somewhat slower than the display list imaging strategy. However by employing this reversion, or "fallback" strategy, Adobe has always been able to minimize the chance of a "memory overflow", thus assuring the page will always print.

Data Compression Strategies

More recently, data compression techniques have been employed to reduce the storage requirements of the raster data in the pixel map. By compressing the raster data, which is usually stored as a series of bands, it is possible to considerably reduce the amount of memory needed to store the band. Depending on the complexity of the raster data, compression, or reduction, ratios as high as 20 to 1 are not uncommon. For a 300 dpi one megabyte pixel map, through data compression, it may be possible to store the entire page's pixel map in as little as 50 kilobytes. This is obviously the key significant advantage of using a data compression strategy, but there are a number of disadvantages which make its sole use impractical.

The process of compressing, and then subsequently decompressing, each band on the page diverts the CPU during those times to be devoted to the compression and decompression process. Thus, the data compression process can have a significant negative impact on performance and severely negatively impact throughput. Moreover, all data compression strategies which guarantee no loss of data content have the characteristic that the size of the resultant compressed data is not known in advance of doing the compression computations. For complex bands, the size of the compressed data can actually be quite large, in some cases even larger than the original uncompressed data.

It is possible to add hardware-assist to offload the compression and decompression functions from the main CPU, however this adds additional cost which may not be tolerable in the lowest end of a product line. Furthermore, the addition of hardware will not handle the problem of unknown final compressed data size. The result is a chance of overflowing available memory due to the compressed bands taking up too much space by having poor compression ratios.

Resolution Doubling and Image Enhancement Strategies

Some strategies attempt to solve the low memory problem by "simulating" higher resolutions, such as 600 dpi, through the use of resolution doubling or image enhancement techniques. For example, it is possible to start with a standard 300 dpi one megabyte pixel map and artificially enhance it at print time to simulate a 600 dpi pixel map. While the resultant page usually looks better in simulated 600 dpi mode than the original 300 dpi page, it almost never achieves the quality and appearance of the true 600 dpi page.

The advantage of this strategy is that only the amount of memory required to store the "lower" resolution pixel map is required. However, the main disadvantage of this strategy is that the quality is never as good as if the page were originally created and printed at the higher resolution. Furthermore, this strategy almost always is realized as a post-processing step, and requires additional hardware, and thus cost.

Summary of Strategies

The strategies just discussed have their advantages and disadvantages. However, no single strategy produces the best results over a wide range of printing scenarios.

- The "banding" strategy is good for high performance because the data is rasterized "just in time" when it is actually needed by the laser print engine. The "banding" strategy fails when the pages become too complex either because of "memory overflow" or "print underrun" conditions.

- The display list and fallback strategies address the "memory overflow" and "print underrun" conditions, but at the added expense of requiring a full pixel map of the page to be stored in memory.

- The data compression strategies address the problem of requiring a full pixel map, but at the expense of poor system performance and potential target compression ratio failures.

- The image enhancement strategies mask the problem by trying to simulate higher-resolution printing, resulting in lower quality than a true high resolution print.

Any single technique can be used to reduce RAM requirements in the printer. However, because each technique has serious disadvantages, the user must add extra memory to the base configuration to achieve a satisfactory level of product performance. No single strategy provides the user with a good low-cost solution.

How Adobe Memory Booster Technology Works

Adobe Memory Booster uses breakthrough technology that automatically does complexity and data analysis on a band-by-band basis and chooses the best memory saving strategy for the given printing situation.

AMB technology weaves together all the memory-saving strategies in a novel and effective manner to provide the user with the best performance of each, while virtually eliminating all of the disadvantages.

AMB technology guarantees that pages with common text and business graphics print at rated engine speed. If AMB technology determines one or more bands are complex and might potentially cause a "print underrun," the troublesome bands, and only the troublesome bands, are processed to guarantee they will successfully print. Data compression strategies may also be applied to reduce memory requirements. AMB technology provides the optimal performance for each printing situation.

If a potential "memory overflow" condition is about to occur, AMB technology automatically employs the fallback display list "reversion" strategy. New technology was invented enabling display list reversion in low memory situations without a full pixel map. With AMB technology, it is possible to still print the page even if the display list representation overflows. While in this uncommon situation, a slowdown in performance can occur. However, AMB technology assures the page will eventually be printed, a significant advantage over "banding" strategies, which may not print all pages in this situation.

In extremely rare situations, when traditional "lossless" compression strategies are not sufficient to print the page, AMB technology automatically employs a "lossy" compression technique to the page. (See attached print sample of "lossy" compression.) The "lossy" technique will introduce some loss of detail into the page, however, Adobe has taken measures to ensure the "lossy"

compression techniques minimize these minor imperfections and produce the best possible page under these extreme circumstances. In most cases, the user will be unable to notice that "lossy" compression has been applied to the page. Again, AMB technology assures the page will print.

In all cases, the user has the option of adding memory to the printer. AMB technology will automatically reconfigure itself to produce the best possible performance and operating properties at each memory configuration. In most cases, the user will not need to add memory to the base configuration of a printer with AMB technology. However, by simply adding memory, the user can obtain a performance increase and virtually eliminate the remote chance of a "lossy" compression. If enough memory is added to the product to support a full pixel map configuration, the printer can automatically switch to the traditional operation with no compression strategies whatsoever required. In addition, like all Adobe PostScript Level 2 printers, extra available memory is always used to begin processing subsequent pages (page pipelining and job overlap) to improve throughput. As always, extra memory can be used to store extra downloaded fonts. The same holds true for printers with AMB technology.

Now that all the memory-saving strategies have been introduced, it is clear that AMB technology offers the best solution.

Strategy	Advantages	Disadvantages
"Banding"	High performance. Data rasterized when needed.	Fails with complex pages. May result in "memory overflow" or "print underrun" conditions.
Display List & Reversion Fallback	Minimize "memory overflow" & "print underrun" conditions.	Require full pixel map of page to be stored in memory.
Image Enhancement	Simulates higher-resolution printing.	Lower quality than higher resolution. Added hardware cost.
Adobe Memory Booster technology	Reduces required memory. Prints virtually all pages at full resolution. Text and business graphics print at engine speed. Increased performance with added memory.	None.

ASIC support

AMB technology does not require any additional hardware-assist support for most typical low-cost implementations. However, for higher performance or medium-range to high-end applications, Adobe offers two specially designed Application Specific Integrated Circuits (ASICs) to either enhance performance or enable Adobe Memory Booster solutions for the medium-range to high-end applications.

The Adobe™ PixelBurst™ coprocessor is an Adobe designed hardware ASIC that processes Adobe display lists, providing high speed rasterization capability. PixelBurst can be used to substantially increase performance of the AMB technology "banding" strategy, enabling more pages to be processed in "banding" mode for higher end applications.

In addition, Adobe offers an ASIC design package to incorporate the bi-level software data compression strategy in silicon for hardware assisted compression and decompression. This ASIC

can be used to improve performance in the low end for those pages which require the "data compression" strategies. It also enables high end applications, where software-only solutions may not be possible, to take advantage of AMB technology.

Either of these ASIC solutions can be used to enhance performance of a product with AMB technology. Both ASICs can be used in tandem to provide maximum performance for those high end applications that may need it.

Other Adobe Technology Support

Adobe Memory Booster technology is designed as an architectural extension to the Adobe Printing Operating Environment. As a result, AMB technology is not tied to any specific page description language or technology. All Adobe technologies can operate within the Adobe Memory Booster framework. Today, these technologies include Adobe's LaserJet® 4 compatability (PCL 5e), Adobe PostScript page description languages and Adobe PostScript fax technology. Future Adobe technologies will also be able to leverage the Adobe Memory Booster technology.