



## STEVE JOBS AND THE LASERWRITER

When Apple Computer CEO Steve Jobs called Warnock in the spring of 1983, his company was already a success. The Apple II series of computers, which had been embraced by educators, and Apple's newest model, the Lisa, suggested that the graphical user interfaces developed at Xerox PARC could be adapted for personal computers in interesting ways. Unbeknownst to Warnock and Geschke, Jobs was already at work on his next innovation, the Macintosh, which displayed graphics, not just straight lines of ASCII text, onscreen.

Jonathan Seybold, founder of the influential conference Seybold Seminars, who had been following developments at Apple and Xerox PARC, says that when Jobs showed him the Macintosh he was convinced it was the future of not only computing but also publishing. "It was very clear to me that the distinction between computing and information science and graphics arts would just go away," he says.

Bob Belleville, an Apple employee and PARC alumnus who had caught wind of what Adobe was up to, advised Jobs to get in touch with Warnock. Jobs himself had glimpsed early examples of Warnock's work during a visit to Xerox PARC in 1979, when he also saw the first graphical user interface. Warnock and Geschke invited Jobs over for a visit.

Apple had a 72-dpi dot-matrix printer called the ImageWriter, but it was also working with printer-engine manufacturer Canon on a low-cost laser printer that produced crisp output for many thousands of dollars less than anything else available. But what Jobs didn't have was a way to tie the laser printer and the Macintosh together. As Jobs describes the scene: "John and Chuck were in their garage thinking about making laser printers, and we were in our garage working on ours."

Like Warnock and Geschke, Jobs knew that the key to the corporate market lay in improved office printing. Instead of high-end workstations, however, Jobs believed his easy-to-use personal computer with an onscreen point-and-click display could revolutionize office computing. IBM, which introduced its first PC in 1981, dominated corporate America, but its IBM 3800 laser printer cost hundreds of thousands of dollars. Jobs wanted to usurp Big Blue. High-quality printing, he knew, was the Trojan horse through which Apple could enter the steel-towered city.

PostScript wowed Jobs. "We were the first ones in the U.S. to have the Canon laser printer," Jobs recalls. "When we went over to see John and

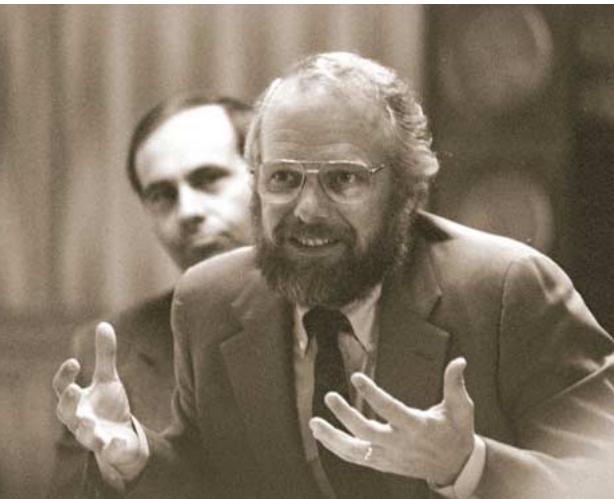


*"When we all saw that  
first sheet of paper come  
out of the LaserWriter,  
we knew we were going  
to hit it out of the park."*

—Steve Jobs

Chuck, we could quickly see that our hardware was going to be better than theirs and that their software was more advanced than what we were working on. I was simply blown away by what I saw.”

Over breakfast at a Cupertino health food restaurant, he proposed that Adobe license its technology to Apple for inclusion in a 300-dpi Canon-equipped laser printer driven by the Macintosh. According to Geschke, Jobs told them: “I don’t need the computer. I don’t need the printer. I need the software.”



This time the duo took notice. “If someone keeps saying, ‘You have a business here,’ and it’s not the business you’re doing, then it’s time to change your business,” Geschke says now. Jobs says, simply, “I convinced them to drop plans to be a hardware company and be a software company instead.”

They realized that by opting for a technology license, thus relieving themselves of the burden of manufacturing, they stood to profit handsomely from their software. In fact, Jobs offered them an advance of \$1.5 million against PostScript royalties. He also invested \$2.5 million in exchange for a 20 percent stake in the company, much to the dismay of Apple’s new president, John Sculley, who questioned such an investment in an unproven company. Jobs insisted. When Apple cashed out six years later its stake was worth more than \$87 million.

Jobs and Warnock hit it off immediately. “John and I liked each other and trusted each other. I would have trusted him with my life, and I think he trusted me,” Jobs says today. “It was a good personal relationship even though we didn’t always agree on everything.”

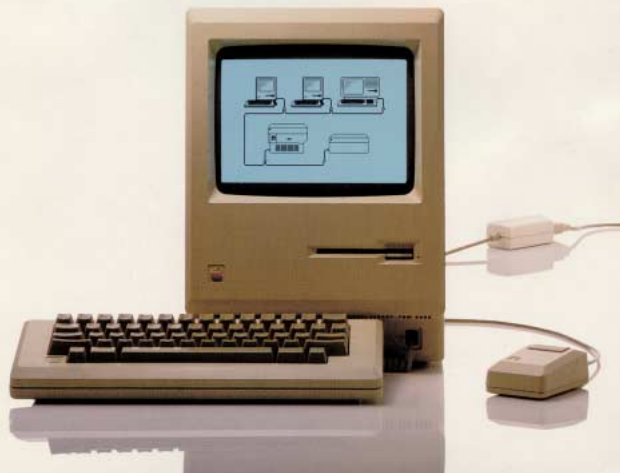
The success of Apple and Adobe’s partnership lay in more than just personal affection, however. Warnock and Jobs shared a deep and abiding belief that technology could transcend ordinary computing to achieve a higher aesthetic purpose. “We always felt that Apple should stand at the intersection of art and technology, and John felt the same way about Adobe,” Jobs says. “The Mac was the first computer that was commercially available with a graphical user interface. We were doing typography on the screen, while with PostScript Adobe was doing type on the printed page. John had a developed aesthetic sense, too. We meshed together well.”

During several negotiations in mid-1983, Jobs offered to buy Adobe outright. Over one meal at the Good Earth with Warnock, Geschke, Putman, and MacDonald, Jobs offered \$5 million for the untested company. Having just emerged from the shadow of large corporations, they declined, preferring to go it alone.



## The Macintosh Office

Apple introduces  
an alternative  
to business as usual.



The PostScript-equipped  
Apple LaserWriter was the  
keystone of the Macintosh  
office, in which office workers  
were liberated from “dumb”  
terminals and output devices.

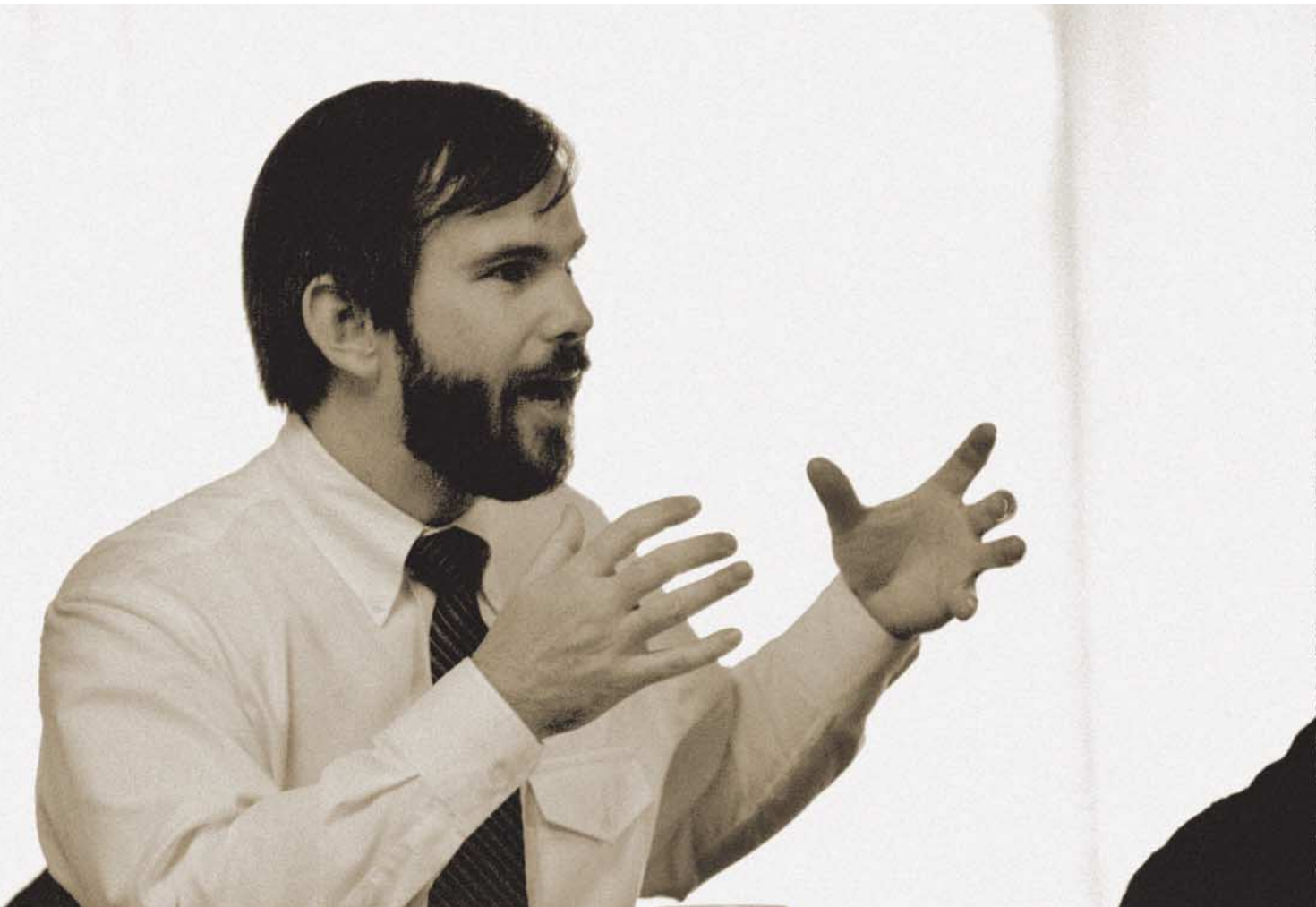


### The Appearance Problem

Adobe signed with Apple just one month before the Macintosh launched its opening salvo against soulless corporate computing (read: IBM) in the famous Ridley Scott-directed commercial that aired in January 1984. In the following months, Adobe aligned its sights to Apple's vision. Previously Adobe had been tuning PostScript for high-resolution devices. Printers such as the Canon engine that Apple was using were considered proof printers, and it was assumed the type would look terrible. But Jobs informed Adobe that the laser printer was now the only output device that mattered and that PostScript had to work flawlessly at 300 dpi. It was a challenging assignment.

"The Apple LaserWriter was just barely possible to achieve with the hardware technology available at the time," remembers Ed Taft, employee 16 and currently a principal scientist in Adobe's Advanced Technology Group. "The CPU was slow and memory was severely limited. It was a challenge to render a complex page of text and graphics at 300 dpi, all in software. Scan conversion of text from outline fonts was especially challenging; the conventional wisdom was that it couldn't be done in real time."

**Dan Putman, Adobe's designated "hardware guy," was one of the principal architects of the PostScript controller board.**



How the printer reproduced type was a big hurdle. Type had the propensity to appear thicker than intended at low resolutions, so thick that one type expert saw a 300-dpi PostScript-generated version of the regular-weight Souvenir font and mistook it for the bold weight. Warnock and Doug Brotz went to work on what they called “the appearance problem,” while other type refinements such as hinting, which makes fonts look pleasing at small sizes, fell to Bill Paxton.

The appearance problem was solved when the stem width of letters scaled appropriately when printed at any resolution. It truly meant that letters of the same font size and style looked good whether printed on a 300-dpi laser printer or a 1,200-dpi typesetter. This capability was a major breakthrough for PostScript and for Adobe, so much so that Adobe has never filed a patent on it, as the patent-filing process requires the technique to be published, thereby exposing it to competitors.

**Juggling Demands**

Throughout the rest of 1984, Adobe engineers focused on porting PostScript to the Motorola 68000 chip used in the Canon laser printer’s controller board. The Macintosh itself had limited processing power, so PostScript code was sent to the printer’s controller board, which housed the software that interpreted the code and which had enough power to handle the necessary computations. Apple had planned to do its own engineering of the controller board, but that was before Adobe engineers fed Apple their ideas on the board’s design. “We set up a meeting. Burrell Smith, Belleville’s lead hardware designer, brought in Apple’s controller design for the Macintosh and I brought in mine for the laser printer,” says Putman. “What came out of it was the LaserWriter controller board.”

Adobe was an exciting place to be. The company doubled in size, requiring a move to larger offices on Embarcadero Road in Palo Alto. The work was engaging and the engineers were confident. The teams enjoyed a great camaraderie and shared a work ethic carried over from the days at Xerox PARC. “John and Chuck brought in the best of Xerox PARC,” says Tom Malloy, vice president and head of Adobe’s Advanced Technology Group (ATG), the division in which most of Adobe’s remaining PARC-era engineers work. “These are people who revel in state-of-the-art technology and who have a fervent commitment to have their products accepted.” After the disillusionment of PARC, Adobe gave these engineers a public proving ground for their talent.

The work had its share of mishaps and light moments, however. Warnock’s reputation as a mercurial thinker and fidgeter was well established. To work out his nervousness he often walked through the office juggling three plastic clubs. One day a juggling Warnock wandered into the hardware lab where engineers had laid out operational prototype con-

**BizStats:**

1984

No. of employees:

27

Revenue:

\$2.2 million

Other:

>> 68% of revenue comes from Apple  
royalty payments for use of PostScript in  
its printers

Adobe enters licensing agreement with  
Linotype to develop Type 1 versions of  
Linotype fonts

Adobe moves into Palo Alto office



# ADOBE AND THE POWER OF POSTSCRIPT



**A**dobe PostScript was a breakthrough on many fronts, but to technically inclined designers and printers, it was a revelation. As a programming language PostScript gave publishers the opportunity to customize code for specific needs. Because the interpreter resided in the printer, programming could seem like magic—type in code onscreen, push a button, and watch the page emerge from the printer with your intentions intact. It changed the way publishers regarded their output devices.

## ON PERSONAL POWER

PostScript was revolutionary in that it had an interpreter running in a printer that you could access if you wanted to. In that sense the release of PostScript was almost as important as the release of the personal computer in terms of the control it gave us over printing.

**Chuck Weger, president, Elara Systems, publishing consultant, and early PostScript user**

**Scott Kim, one of the first people to design in PostScript, is known for his puzzles and art pieces. He designed this series of images in honor of PostScript's architect.**

I got into writing PostScript because I bought a big expensive PostScript RIP from Linotype and I wanted to learn how to program this big expensive computer I'd bought.

**Jim Birkenseer, cofounder with Peter Truskier of Premedia Systems, who learned PostScript at his father's prepress shop in 1989**

One of the best things I ever did was to write the PostScript code to gang multiple sheets on an imagesetter. I could save film, output more pages, and make more money. It gave me such a feeling of power to make this machine do my bidding.

**Peter Truskier, who worked extensively with PostScript at prepress shop STAR Graphic Arts**

You wrote this code, then typed in "showpage" and out of the printer came your graphic. It was exciting, an earthshaking moment.

**Chuck Weger**

## ON PROGRAMMING POWER

PostScript did essentially two things. It gave the ordinary user with a Mac the ability to make whole pages of text and graphics. Second, it gave the technically sophisticated the opportunity to program pages. That's what created the genre of Stupid PostScript Tricks.

**Chuck Weger**

Before Illustrator, we had to program all our designs in PostScript by hand. That helped me understand how PostScript and printers work. It taught me to think like a computer.

**Luanne Seymour Cohen, who joined Adobe's creative department in 1986**

## ON STAYING POWER

What's significant about PostScript is that they got it right. It's rare that a standard is set at the right time by the right people. From the beginning, PostScript was really well thought out and very stable.

**Scott Kim, mathematician, programmer, and designer who studied under Donald Knuth at Stanford and apprenticed under John Warnock at Xerox PARC**

*"People who think well in PostScript generally can't communicate with other human beings."*

— Jim Birkenseer

I've got an original 1985 LaserWriter sitting in my basement—one of the first few hundred that came off the line. I can hitch it up right now and print from pretty much any modern program. It's incredibly slow by today's standards, and there's only enough memory for a couple of downloaded fonts, but it prints! How many pieces of software encoded into ROM in 1984 are still working today, eighteen years later?

**Steve Roth, author of several books on PostScript and publishing, and editor of *Personal Publishing* magazine in the 1980s**

Publishing consultant Jim Birkenseer programmed this example of PostScript (right) to demonstrate the flexibility of the language. The payoff of such an exercise for any PostScript novice is the command “showpage,” the final instructions before printing.

```
% Set each letter with stretching
(P) TwistAndStretch
(o) TwistAndStretch
(s) TwistAndStretch
(t) TwistAndStretch
(S) TwistAndStretch
(c) TwistAndStretch
(r) TwistAndStretch
(i) TwistAndStretch
(p) TwistAndStretch
(t) TwistAndStretch

% Set the “windstorm” caption
200 286 moveto
TimesItali0 setfont
(During a windstorm) show

showpage      % Print the page!
```

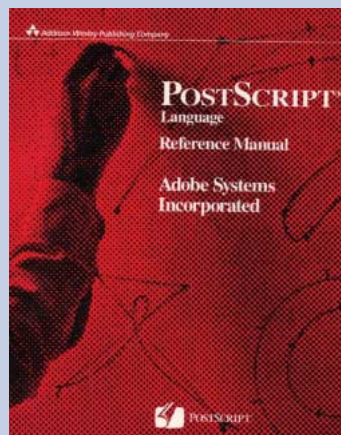
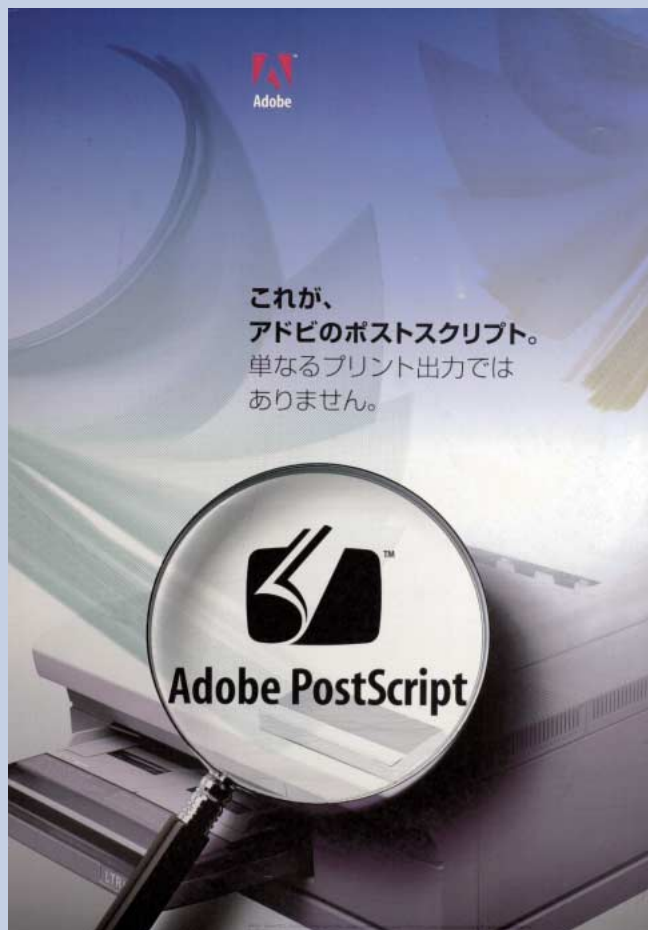
# PostScript

*During an earthquake*

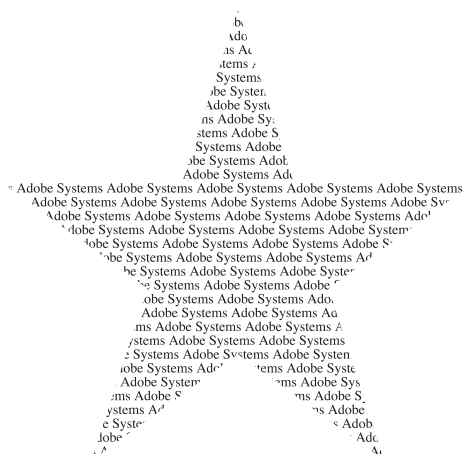
*PostScript*

*During a windstorm*

the caption



Starting with the “red book” in 1985, Adobe published a series of manuals that described how to program in PostScript. These volumes became bibles to technically savvy publishers.



**A test file showing PostScript's ability to create stencil-like effects with characters clipped through a self-intersecting geometric shape.**

troller boards on workbenches. The engineers were worried that a club would land on a board, and a suggestion was made henceforth to put a lock on the lab door.

As 1984 progressed, the Apple-Adobe corporate strategy coalesced into “the Macintosh Office.” Together the Apple Macintosh and PostScript-fueled laser printer would free office workers from the drudgery of document production (and the staid confines of an IBM workflow) by enabling them to create text- and graphics-rich documents on their computer screens and then print the pages exactly as they appeared. One key to the Macintosh Office was fonts.

Neither Apple nor Adobe had expertise in font design or production, although the principals at both companies appreciated fine typography. Fonts were the domain of the old-world printing industry and its phototypesetting equipment. And therein lay the opportunity: The right partner would not only supply the needed fonts but also provide a high-resolution output platform for PostScript, using typesetters as the foundation.

## Linotype's Leap of Faith

Adobe approached Compugraphic, at that time the United States' largest typesetting company. But Compugraphic had two strikes against it: The company wanted complete control over its fonts and over PostScript as well, which Adobe would not consider; and it had left bad feelings at Apple when an earlier deal over the Lisa computer soured.

Publishing consultant Jonathan Seybold once again played matchmaker. He advised Warnock to go see Allied Linotype, a 100-year-old printing firm with roots in metal typesetting. PostScript had the potential to undermine Linotype's business, but in what can only be described as a leap of faith, Linotype president Wolfgang Kummer licensed its treasured Times and Helvetica font families to Adobe and Apple. Plus, it agreed to work with Adobe to develop the first PostScript typesetter.

Although Linotype wasn't the country's largest typesetter manufacturer, it was the most established and most respected, so getting Linotype was something of a coup. Frank Romano, the Roger K. Fawcett professor of digital publishing at the Rochester Institute of Technology, asserts, “Once they got Linotype, PostScript was destined for success.”

Adobe's engineers set about converting Times and Helvetica into four styles each (regular, bold, italic, and bold italic). Adobe also developed four styles of Courier, the ubiquitous face of the IBM Selectric typewriter (using oblique instead of italics to save valuable chip space), and a single version of Symbol, an assortment of letters and mathematical characters. Those 13 fonts, as the basis of the first LaserWriter, formed the Rosetta stone of modern digital type.



& \* % \$ ? : " { }

One of the first Adobe Originals typefaces, Trajan was created by designer Carol Twombly, who modeled it after characters found on an ancient Roman column. "Trajan was from the first century, the epitome of the capital-letter form, and it didn't exist in any digital format," says Twombly.

# TRAJAN

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 0



Principal scientist Doug Brotz  
with Warnock and Geschke.

## A Watershed Moment

In the months leading up to the launch of the LaserWriter, Adobe laid the groundwork for its future. To make PostScript a standard, Adobe knew it needed more fonts. Liz Bond, a Xerox veteran and Adobe's first marketing person, approached Aaron Burns of International Typeface Corporation, the most important source of typefaces for New York's advertising and media communities. Adobe and ITC soon struck a deal to include ITC fonts in future iterations of PostScript.

In addition to securing Linotype as a provider of high-resolution output devices, Adobe signed with laser-printer manufacturer QMS. Based in Mobile, Alabama, QMS also used the Canon engine, so Adobe could quickly give it a PostScript controller board. In fact, QMS introduced a PostScript-based printer a month before Apple. But as the company had little sales or distribution prowess and lacked Apple's marketing muscle, QMS's printer will go down as a footnote to PostScript history.

In the summer of 1984, Jobs called Jonathan Seybold. "Steve wanted to see me urgently," Seybold recalls. "He said they had a deal with Adobe, they were signing a deal with Linotype, they had real fonts. I went to Cupertino and walked into this tiny room, and there stood Jobs and Warnock with a Mac and a LaserWriter. He showed me what they were up to. I turned to Steve and said, 'You've just turned publishing on its head. This is the watershed event.' When I turned to John, he had this look on his face. He was just so happy. I could tell he was thinking, 'This made the company. This is my validation.' It was a magic moment."

"When that first page came out of the LaserWriter, I was blown away," Jobs says today. "No one had seen anything like this before. I held this page up in my hand and said, 'Who will not want that?' I knew then, as did John, that this was going to have a profound impact."

It was the end of 1984, and the stage was set for the introduction of the Apple LaserWriter.



*"I said, 'You've just turned publishing on its head. This is the watershed event.'"*

—Jonathan Seybold