

Color Business Report

Color, Computers, and Reprographics

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The Lexmark Optra C710: An Alternative to HP?

We have been working with Lexmark's Optra C710 color laser printer that integrates "all-in-one" toner/photoconductor cartridges. Lexmark is offering the Optra C710 as a relatively inexpensive alternative to the HP Color LaserJet 4500. Its competitive features include 1200-dpi print resolution and a monochrome printing speed of 16 ppm, but the Optra C710 may be less competitive in demanding network environments, especially where users shopping on price carefully examine total cost of ownership and the need for user intervention.

Setup

The Optra C710 is shipped on a pallet measuring 30" by 28", and the box containing the printer measures 22" high by 28" wide by 30" long. The package weighs roughly 85 lb., and is easily handled by two people. To unpack the printer, we cut off the straps that held it down to the pallet, and removed four plastic locks at the base of the box. We then pulled off the one-piece top and sides of the box, revealing the Optra C710, which was encased in styrofoam and plastic. The four print cartridges for the printer were protected by cardboard and styrofoam sleeves, packed in bundles of two on each side of the printer. The transfer belt and oil coating roller were nestled in the styrofoam pieces covering the top of the printer; we removed these and the print cartridges and set them aside, along with the enclosed software CD and power cord. Also inside the box were three books: Setup Guide, User's Guide, and Internal Print Server Quick Start.

The clear plastic bag covering the printer was removed, and we lifted the Optra C710 out of its box, and placed it on our worktable. The Optra C710, which weighs 68 lb. without print cartridges, is lighter than many of the color laser printers we have worked with recently. Both the HP Color LaserJet 4500 DN and Lexmark OptraColor 1200n, reviewed in our March 1999 and August 1999 issues, weighed 112 lb. each, and required a fair amount of physical effort and caution to lift. The Optra C710 is only 19" wide and 23" deep, but requires 34" by 57" of table space, to ensure that the printer is properly ventilated.

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Six Consumables to Install

Next, we installed the transfer belt. Following the Setup Guide's instructions, we lowered the manual feed, and opened the printer by lifting a large grey latch above the manual feed tray. The front panel of the printer popped open, and we lowered it to reveal a cavity that extended about halfway inside the printer. On either side of the cavity one finds horizontal rails, on which the transfer belt assembly slides. We pushed the transfer belt all the way in until it clicked into place, and then shut the front panel.

To install the oil coating roller, we opened the top front panel of the printer by pressing an oval-shaped grey button on the printer's right side. Inside, covering the fuser door, were two styrofoam shims, wrapped in plastic (presumably to prevent styrofoam cells from breaking off and falling into the fuser mechanism). We removed these and lifted the fuser door. Holding the coating roller by a felt-wrapped wire handle, we lowered it into position above the fuser rollers, pushed the felt-lined cleaning bar down, and closed the fuser door covers. The next step was to turn the power on in order to install the four print cartridges.

Integrated Toner/photoconductors

After the Optra C710 had booted and performed a self-test, it beeped and displayed a "Cyan Toner Cart Missing" message on its LCD display (on setup, all cartridges are missing). We pressed the cartridge cover release button, located on the top of the printer, about halfway back. The cartridge cover sprang open, and we lifted it up and pushed it towards the back of the printer.

The crescent-shaped print cartridges for the Optra C710 incorporate a toner chamber and photoconductor, which is covered by a spring-loaded, translucent amber cover. To prevent users from touching the photoconductor accidentally, the cartridge has a thin green strap, which serves as a handle. Holding this handle, we pulled off two orange caps which covered the gears and contacts on either end of the cartridge, and shook it back and forth to distribute the toner evenly. We then slid the cyan cartridge into position, which caused the photoconductor shutter to open, and closed the cartridge cover. The cartridge carousel automatically rotated to the next empty slot, and we repeated this process for the remaining three print cartridges.

Network Connection

Our Optra C710 shipped with a network card installed, so we decided to connect it to our office Ethernet network. When we installed the Optra C710 printer driver, we also installed the various options and protocols necessary for connecting the printer to our

Ethernet network. As with the OptraColor 1200, we expected the process to be intuitive and relatively pain free. After restarting the computer, we went to our Windows "Start" menu, and opened "Printers" under the "Settings" tab. We clicked on the Lexmark Optra C710 icon, and selected "Properties" from the "File" menu. When the "Properties" dialog box appeared, we selected the "Details" tab, and clicked on "Add Port."

We were then prompted to input a network address, or choose from a list of network port types. On this list appeared "Lexmark Network Printer Monitor." This seemed a logical choice, so we selected it, and clicked "OK." An "Add Lexmark Network Port" dialog box, with "TCP/IP Ports" and "LexIPX Ports" appeared. Since our experience setting up TCP/IP connections has always been difficult, we tried the "LexIPX Ports" tab first. All the options on this tab were "greyed-out," in the list of available printers. The message "Please Wait, Searching the Network" then appeared. After several seconds, it appeared that the searching activity had found nothing, so we decided to try the dreaded TCP/IP method.

The "TCP/IP Ports" tab prompted us to enter a name for the port, and then to select from a list of printers on the network (none appeared), or to input the printer's IP address. After a few unsuccessful attempts at assigning the printer an IP address from the printer's front control panel, we decided to call Lexmark for help. The technician guided us through the same steps we followed when we had previously tried the "LexIPX Ports" option. We found that we should have waited a few seconds longer for the "LexIPX Ports" dialog box to display the printer. Once it appeared on the list of

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Lexmark Optra C710 Specifications

Resolution Modes	1200 dpi 600 dpi
Print Speed	
Black	16 ppm
Color	3 ppm
2-Color Mode	4 ppm
Print Speed, CBR Test Page	
Color (first page out)	1 minute, 7 seconds
Duty Cycle	35,000 pages/month
Printable Image Area	8.17" by 10.61" on letter-sized paper
Memory	32 MB (384 MB maximum, 64 MB on C710dn)
Processor	200 MHz QED
Software Compatibility	PostScript 3 (Lexmark) HP PCL 5 with color emulation HP PCL 6 monochrome
Interface	IEEE-1284
Networking	10/100Base TX (available on C710n and C710dn)
Automatic Duplexing	Optional (standard on C710dn)
Paper Handling	50-sheet manual feed Tray 1: 250-sheet input tray Tray 2: 250-sheet input tray (standard on C710dn)
Paper Sizes	Letter, legal, A4, B5, executive
Paper Types	Tray 1, 2: 16 to 24 lb. paper Manual Feed: 16 to 36 lb. paper, transparencies, envelopes, 90 to 100 lb. card stock
Size	18.5"W by 16.0"H by 22.5"D 18.5"W by 30.4"H by 22.5"D (C710dn)
Weight	79 lb. 132 lb. (C710dn)
Street Price	
C710	\$1,929
C710n	\$2,199
C710dn	\$3,549

Source: Lexmark International, Inc.

available printers, we clicked "OK" and "Apply" in the "Properties" dialog box, and we were soon printing over the network.

Our frustration in working with TCP/IP is nothing new. We asked David Peterbaugh, Marketing Manager for Networked Products at Lexmark, why Lexmark uses it in its printers, when IPX seems to be much easier to configure. Peterbaugh admitted that configuring devices to work with the TCP/IP protocol is less than intuitive. "You've got to remember that the TCP/IP protocol was invented back in 1968," he said. "Unfortunately, all its deficiencies (the need for manual configuration and assigning the correct IP addresses and subnet masks),

Lexmark Optra C710: Supplies and Accessories

Supplies	Street Price
Black print cartridge (10,000 pages each at 5%)	\$91.25
Color print cartridges (C, M, or Y) (10,000 pages each at 5%)	\$192.25 each
Coating Roller (15,000 pages)	\$61.25
Fuser Kit (100,000 pages)	\$371.25
Transfer Kit (100,000 black/25,000 color pages)	\$250.00
Accessories	Street Price
Paper drawer (holds two 250-sheet trays)	\$445.00
Paper tray (250 sheets)	\$86.00
Duplex Unit	\$656.00
Printer Cabinet	\$352.00

Source: Lexmark International, Inc.

have been carried down to the present day." TCP/IP is more commonly used than IPX, however, because it is the standard protocol of the Internet. These days, there is a more automatic method for configuring devices on a TCP/IP network, but it still requires a fair amount of IT know-how and a Windows NT server equipped with Dynamic Host Configuration Protocol (DHCP) software. With DHCP, devices on the network are automatically assigned IP addresses. IT personnel do not have to go out and manually configure each and every printer and computer. "We have 5,000 printers and 3,000 PCs at our Lexington, Kentucky headquarters," said Peterbaugh, "and we use DHCP to manage it all over the network."

Paper Handling

The Optra C710 and Optra C710n models ship with a single 250-sheet input tray, which seems like a small supply for a machine that can print 16 monochrome pages per minute. (A second 250-sheet tray is standard on the C710dn model, which also includes a duplex unit.) If the Optra C710 is to be installed on a network, and shared by several users, it seems that frequent user intervention to reload paper would be required. How many users does Lexmark recommend for the Optra C710? "Depending on the application for which the printer is used, the page volume could be higher or lower independent of the number of users," said Doug Frazier, Product Manager for Lexmark. "Our recommendation is typically 3,500 to 7,500 pages per month on average. In a general office environment this will typically be 10 to 15 users." To increase the Optra C710's input capacity

(continued on page 4)

Printers				
Announcement Date	Vendor	Product Model	Price	Comments
October 4, 2000	Epson	Stylus Photo 875DCS	\$349	Street price for 1440- by 720-dpi six-color ink jet photo printer. Features a PCMCIA slot for transferring images from digital camera removable media, and includes an adapter for Sony Memory Stick media. Prints a 4" by 6" photo in 48 seconds.
August 28, 2000	Kodak	Personal Picture Maker 200	\$299	Retail price for ink jet photo printer, based on the Lexmark Z32. Prints images from digital camera media, without a computer, and features a 1.8" LCD display for reviewing images. Prints at 1200-dpi resolution. Can print in six colors (C, M, Y, K, Light C, and Light M) when Kodak's photo cartridge is installed in place of the black cartridge.
August 28, 2000	Kodak	Personal Picture Maker 120	\$179	Retail price for four-color ink jet photo printer, based on the Lexmark Z32. Prints 1200-dpi images from digital camera media, without a computer.
October 23, 2000	Xerox	WorkCentre XK50cx	\$599	Street price for multifunction ink jet printer, based on the DocuPrint M750. Functions include color scanning, color faxing, and color copying. Prints up to 12 ppm black and 7 ppm color.

to 800 sheets, users can purchase a paper drawer and two additional 250-sheet paper trays for \$531. The printer also has a 50-sheet manual feed for printing on envelopes, letterhead, transparencies, and card stock. Output capacity, at 250 sheets, seems adequate.

Printing

Although its print cartridges have integrated toner and photoconductors, the Optra C710 is not a tandem-engine printer like the OptraColor 1200. The carousel upon which the print cartridges are mounted must make a complete revolution for each color printed, transferring the image onto the transfer belt. Once all the toner has moved to the transfer belt, the printer pulls a sheet of paper from the input tray. As the paper is pulled up along the front of the printer, the transfer belt moves with it, laying the toner down onto the paper, which then is fed up between the fuser and oil-coating roller. The printed page is then fed face down onto the output tray.

Reliability

About 1,100 pages into our print run on the Optra C710, we began to experience paper jams on nearly every page. As the paper was pulled into the fuser, the printer stopped, and displayed a paper jam message on the LCD panel. We were commanded to open the front panel of the printer to remove the jammed sheet, but we met too much resistance as we tried to pull it down out of the fuser rollers. We opened the top front panel, pulled out the oil roller assembly, and removed the sheet,

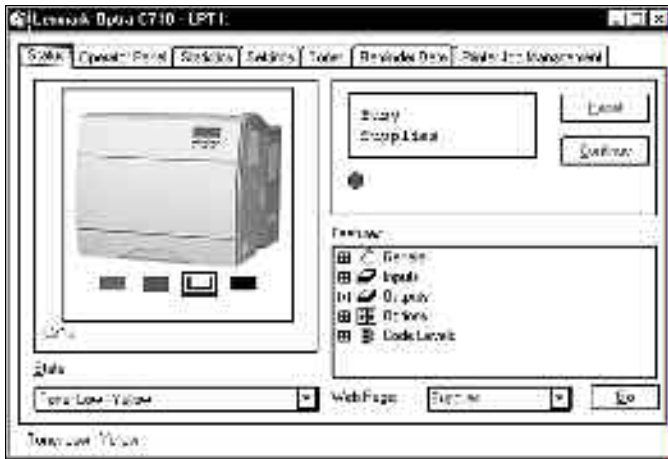
which extended about 1/2" up from the fuser rollers. We noticed flecks of toner on the oil roller, and melted gobs of toner on the assembly's smaller metal roller. When we alerted Lexmark about the problem, they shipped us a new oil roller assembly. After we installed it, we were able to print more than 10,000 pages without a single jam—the failure of the first oil roller must have been a fluke.

Monitoring the Printer

With Lexmark's MarkVision utility, users can monitor toner levels and other printer functions from their desktop (*see photo*). On the "Status" tab appears an image of the printer, with small toner icons below it. A "State" field displays the printer's current condition, whether there is an open door, empty paper tray, or a low toner cartridge, as is the case in the photo. In the upper right corner is a representation of the printer's front LCD panel. Below that is a list, which identifies the various installed options and paper trays. Users can also use the "Status" tab to connect to the Internet to order supplies, download drivers, and contact Lexmark technical support.

The "Printer Job Management" tab displays jobs in the print queue. Users have the option of deleting, holding, or releasing print jobs. With the "Reminder Date" tab, users can set dates to be reminded to check the printer's supplies or to perform maintenance.

The "Operator Panel" tab is an exact facsimile of the Optra C710's LCD panel and buttons. Users can



User's can monitor the C710's status with Lexmark's MarkVision Utility. Source: Lexmark International, Inc.

view and change menu settings from their PC, as though they were standing at the printer. The "Settings" tab allows users to change the default paper tray, the default number of copies, collation, and paper type. From the "Settings" tab, one can also change the printer's LCD display language (options include French, Spanish, Portuguese, Danish, Polish, and Turkish).

2-Color Draft Mode

To allow users to make quick, inexpensive proofs of color documents, the Optra C710 has a two-color draft mode (cyan and black). Color graphics are printed in various shades of cyan, and color photos are printed as cyan and black duotones. One would expect cyan graphics to print at their full intensity, but the 100% cyan field on our test page looks more like 50%. The

Lexmark Optra C710: Print Times for CBR Test Page (min:sec)

	Processing Time	Page Complete
600 dpi (default)	0:20	1:07
1200 dpi	0:25	1:12
2-Color Draft	0:20	0:41

Source: Color Business Report

appearance of the prints is similar to a printer's blue proofs, indicating the position of color elements on the page. Doug Frazier at Lexmark explained the process. "We will process images as a duo-tone, where the image is first processed as a greyscale image," he said. "Then it is mapped against a color table which applies cyan to the color areas with the same intensities and shading as it contained when originally processed as a greyscale. A pure cyan block cannot print as pure cyan; it will have black mixed in with it due to this process of first rendering the image as a greyscale." Print time is slightly shorter than in full-color mode—a single CBR test page in 2-Color Draft mode took 41 seconds to print, including processing time. The same image took one minute and seven seconds to print in CMYK mode.

Cost of Printing

The Optra C710 prints our Color Business Report test page for a street price of \$0.165, somewhat less than the Lexmark OptraColor 1200, which tested at \$0.171 (see Color Business Report, August 1999). With

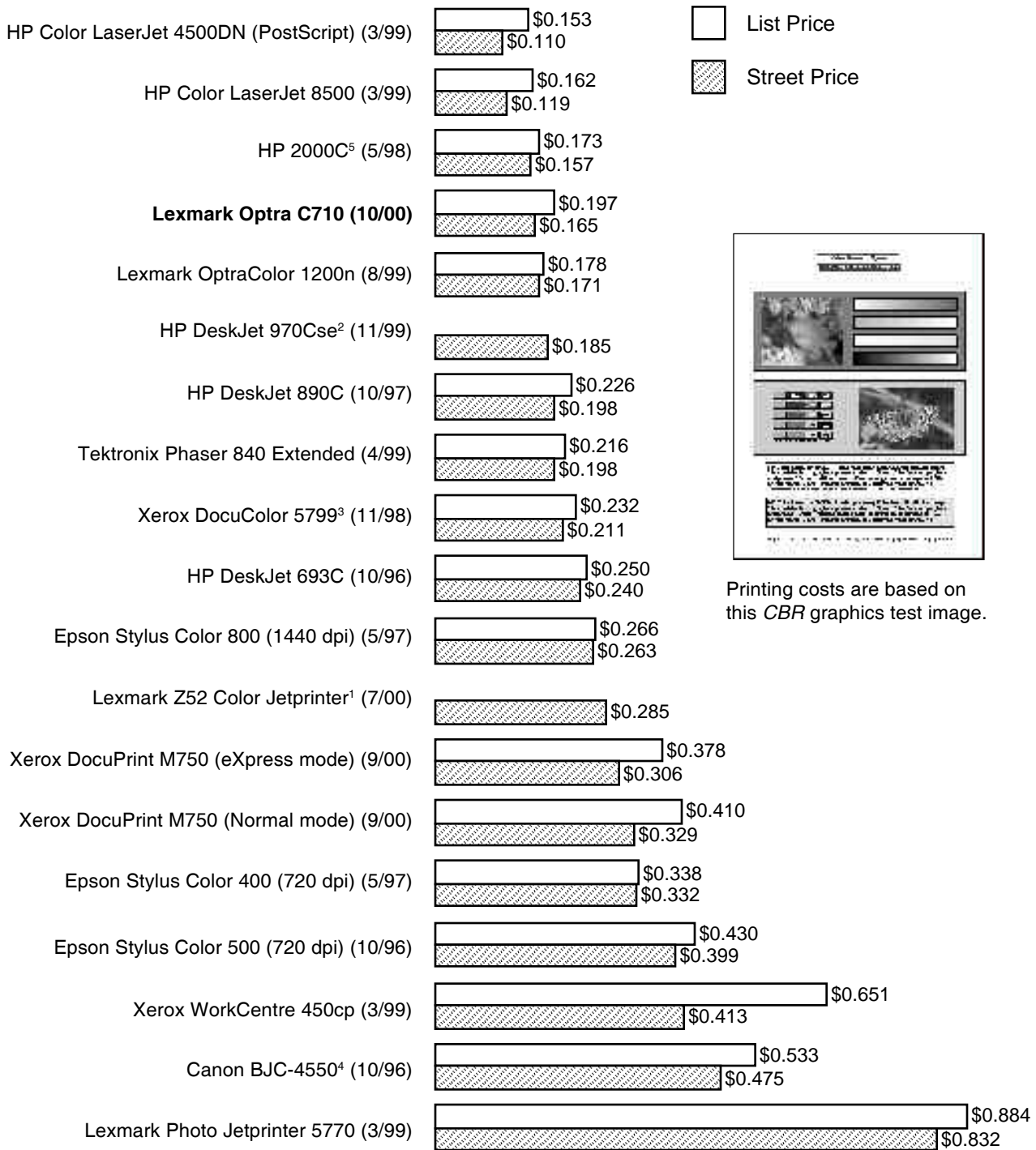
(continued on page 6)

Color Correction: Lexmark Optra C710

Setting	Comments
Auto	Applies different color profiles to each object on the printed page. Lexmark claims the "Auto" setting is especially useful when switching from one media type to another, such as from paper to transparencies.
Vivid	Adjusts CMYK components, resulting in more saturated colors. Lexmark suggests using this setting when creating overhead transparencies to enhance or sharpen colors if they seem faded, or if blues appear somewhat purple.
Off	When you select "Off" as your color correction, the printer expects to receive the necessary color correction from the software application in use.
CMYK	When you select CMYK as your color correction, the printer expects to receive CMYK values from the application. This setting is recommended when attempting to reproduce standard CMYK colors such as Pantone, or when printing CMYK images.
Display	Approximates the colors on the user's computer screen. Uses common color tables to translate the color settings displayed on the monitor into the color values used by the printer's CMYK color model. Generally used when an application does not do its own color correction and defines colors as RGB, HLS, or HSB.
2-Color Draft	Reduces the amount of toner used when printing drafts. Uses only cyan and black toner.

Source: Lexmark International, Inc.

Figure 1: Comparative Supplies Costs for Printing the Same Page



Note: Date in parentheses is when the cost data originally appeared. Costs include colorants (ink or toner) and other consumables, where appropriate. Costs for Xerox DocuColor 5799, HP 8500, and Lexmark OptraColor 1200n includes service charge. Costs do not include paper.

¹ Lexmark does not quote list price.

⁴ Calculations based on list prices updated 3/99.

² Economy #78 cartridge. HP does not quote list price. ⁵ Calculations based on high-capacity black cartridge.

³ Street price based on 20% discount off list price.

Source: Color Business Report

the C710, we did all our test prints in “Normal” mode, at 600-dpi resolution (see enclosed print sample). Toner accounts for \$0.147. Cyan, magenta, and yellow depleted rather evenly, at 4,148 pages, 3,943 pages, and 4,336 pages (see *Figure 1*). However, we had to estimate the \$0.008 cost for black toner, which was still going strong at 11,429 pages. To estimate cost, we removed the cartridge and weighed it to determine how much toner had been used. We calculated the percentage of toner used, based on the empty weights of the three depleted color cartridges. Dividing the total cost of the toner used by the 11,429 pages printed resulted in the \$0.008 figure (see *Figure 2*).

So Little Black?

We had expected that all the print cartridges would deplete relatively evenly during our print run, as they had on the Lexmark OptraColor 1200n: its same-sized toner cartridges had roughly the same depletion rates. On that 1200n, cyan was the first cartridge to run out, after 3,291 pages; the last cartridge to empty, black, stopped printing after 4,824 pages (see *Color Business Report*, August 1999).

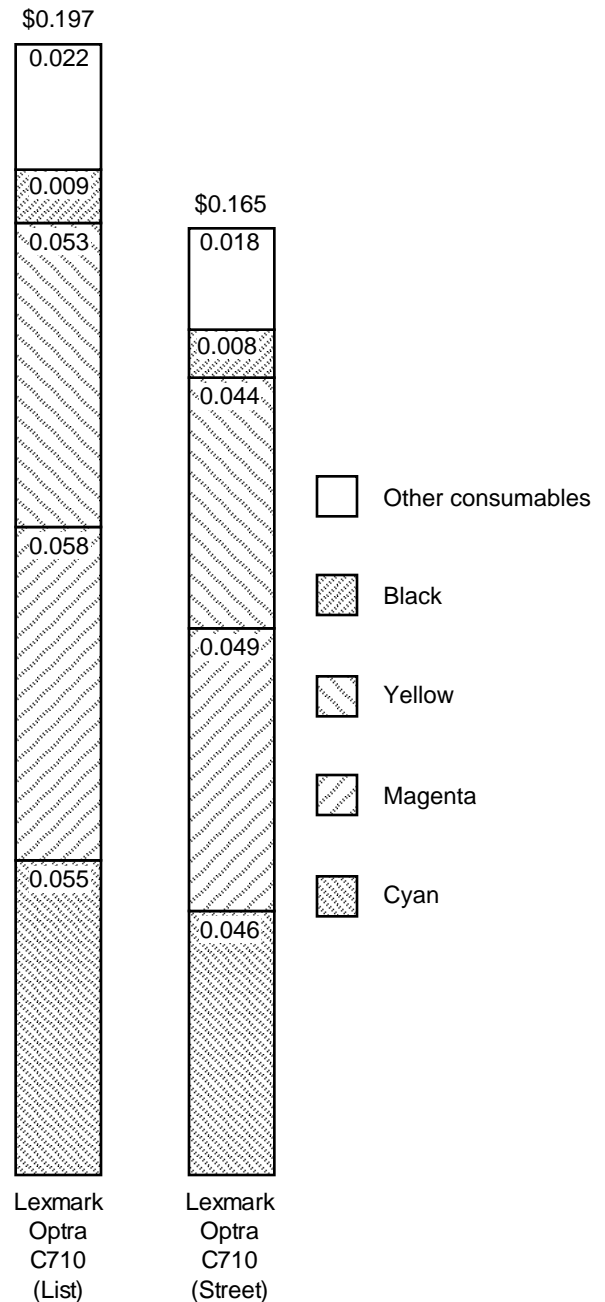
On the new Optra C710, the first cartridge to be depleted was magenta, at 3,943 pages. However, we estimate that it would have required more than 14,000 pages to deplete the black cartridge. Our calculations indicate that the Optra C710 used much less black to print our test page than the other three colors. The Optra C710 put 0.053 grams of cyan, 0.056 grams of magenta, and 0.051 grams of yellow onto each page, but only 0.016 grams of black toner was used. We surmised that the Optra C710 was printing composite black, composed of cyan, magenta, and yellow toner, in the fish and butterfly images on the page, and using black toner only in the text and vector graphics. “Up to a certain fill level, the Optra C710 uses composite black when you’re printing in Auto mode,” said Lexmark’s Doug Frazier. “Sometimes, especially when rendering flesh tones, the composite black will blend better than straight black.”

Although the use of composite black in the photos might account for some of the wide gap between the depletion points for black and the other three colors, we suspect that it is not the sole cause. Indeed, the *CBR* test page was initially designed and tested on printers with identical ink supplies for each color, and our experience has shown that some printer imaging models do deplete all the colorants at similar rates, so we sought another explanation for the long-lived black cartridge on the C710. Although we assumed otherwise, Doug Frazier told us that the composition and particle size of the black toner is the same as the color toner.

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Figure 2: Supplies Costs for Printing the Same Page, Lexmark Optra C710

This month we have added the Lexmark Optra C710 to our supplies consumption evaluation series. We print the same image on all printers, logging the point at which each colorant runs out. The cost-per-page figures are determined by dividing the street prices for supplies by the number of pages printed until the supplies are depleted. Other consumables for the Optra C710 include a transfer belt, coating roller, and fusing kit.



Source: *Color Business Report*



To determine toner level, light is shined through a window on the C710's toner cartridges.

Source: *Color Business Report*

Empty?

The print cartridges have a unique system to detect when toner has been depleted. On the top of each cartridge is a cross-shaped window, one and one-half inches square. The vertical axis of the cross is a rounded bulge, which extends 3/8" outward (*see photo*). On either side of the bulge are two triangular wedges, which appear to function as prisms. When the cartridge is in the bottom position on the carousel, and the window is upside down, the printer shines a light through the window to determine if it is clear or obstructed. This process is repeated for five revolutions of the cartridge, to estimate toner capacity. "Once we have accumulated approximately 25 of these judgments, we make a decision based on a narrow band statistical technique," said Doug Frazier. "Once we have accumulated approximately 5 empty judgments, we will post a "toner low" message."

We received "Toner Low" warnings about 600 pages in advance of the toner actually running out, more than ample time for most users to order a new print cartridge. However, "Toner Out" messages were sometimes a few pages late. Cyan page elements appeared blotchy and faint 216 pages before the "Cyan Toner Out" warning, and Magenta print quality tapered off 43 pages before the warning.

The Optra C710 offers users quick monochrome print speed and easy-to-install integrated toner and photoconductor cartridges, for a base street price of \$1,929. While its cost per page is somewhat less than the last Lexmark color laser printer we tested, the

OptraColor 1200n, the Optra C710 is still a more expensive printer to operate than the HP Color LaserJet 4500 DN, which printed our *CBR* test page for a street price of \$0.110. Also, the Optra C710 in its base configuration may not be versatile enough for heavy usage in a networked office. Network connectivity alone costs an additional \$270, and in high-volume environments, it may be necessary to increase the printer's paper handling capacity. The basic Optra C710 is a strong, low-priced offering. However, heavy network users will probably want to add duplexing and a second tray to upgrade it to the C710dn model, which places the product in direct competition with HP's Color LaserJet 4500DN.◇

Printers

Canon Executive Discusses Color Products and Strategy

At Canon Expo 2000 (New York, NY, Sept. 13 - 15, 2000), Mason Olds, Director and General Manager of **Canon USA's** (Lake Success, NY) Graphic Systems Division, discussed the company's color product marketing strategy, its position in the color market, and some of its new product offerings. Olds sees an increasing demand for color printing, driven by software and digital cameras, and feels that Canon's expanded color product line, including the CLC 5000, CLC 3000, Color imageRUNNER C2050, and BJ-W9000, is well-positioned to capture this increased color volume.

"Canon has held the number one position in color copiers for 13 years," he said. Olds identified three key market segments that Canon will focus its color marketing efforts on: production environments, graphics applications, and the corporate environment. Olds told us that Canon's product line had to catch up with its strategy to sell color gear to many different markets with a variety of needs. "Color is where a lot of our R&D effort has gone," he said. "That has given us products that have a unique ability to go after a lot of different areas, and pursue additional opportunities to sell color gear. Originally, we had to formulate our marketing strategy around one model to fit in all the areas we were trying to sell to, and we did very well with our CLCs in the print-for-pay and graphics markets." He told us that Canon's market share in the graphics segment is as high as 80%, thanks to the CLC 1000. Canon will build on this market share with its new CLC 5000 and CLC 3100 models, and exploit it by selling its large-format ink jet printers (such as the BJ-W9000) alongside them.

Olds is confident about the large-format ink jet BJ-W9000's chances. "We're newcomers in the large-format

market, but we expect that as people replace their older HP or Encad systems, they will want to give us a look," he said. "The BJ-W9000 is two to three times faster than many of the large-format ink jets on the market. We believe it will be as successful as the CLC 1000 was in the color copier market. Our salespeople have a very good relationship with the print-for-pay shops they sell to." Olds admits that it will require some effort to get salespeople to sell wide-format ink jet printers with the same enthusiasm with which they sell the more-expensive color laser copiers—the bigger the iron, the

bigger the commission.

Canon is also hoping that the CLC 5000 and 3100, introduced in August 2000, will increase its share of the production market—print-for-pay shops, commercial printers, facilities management providers, and central reproduction centers. Olds pointed out that the 50-ppm CLC 5000 costs \$89,500. "That's \$50,000 less than the Xerox DocuColor 2045. If you were to buy the 2045, you would have to spend an additional \$22,000 on a scanner, which is standard with the CLC 5000." The CLC 3100, *(continued on page 10)*

Scanners & Image Capture

Announcement Date	Vendor	Product	Price	Comments
September 26, 2000	Agfa	ePhoto CL34	\$229	Retail price for 1.3-megapixel digital camera with 1.8" LCD display. Includes 2 MB of internal memory, and serves as a video conferencing camera when connected to a user's computer.
September 26, 2000	Agfa	ePhoto CL20	\$149	Retail price for 1.3-megapixel digital camera with optical viewfinder. Includes 2 MB of internal memory, and serves as a video conferencing camera when connected to a user's computer.
September 18, 2000	Canon	PowerShot G1	\$999	Retail price for 2048- by 1536-dpi digital camera with 3X optical zoom lens. The G1 can focus on objects as close as 2.3", and gives users full manual control over aperture, focusing, shutter speed and metering. Other features include a five-mode automatic flash and 3X digital zoom.
October 2, 2000	Epson	Perfection 1640SU	\$299	Street price for 1600- by 3200-dpi flatbed scanner with USB and SCSI interfaces. Two other versions are available. The 1640SU Photo, which includes a transparency unit, costs \$399, and the 1640SU Office, which ships with a 30-page automatic document feeder, is available for \$499.
October 2, 2000	Epson	Perfection 1240U	\$199	Street price for 1200- by 2400-dpi flatbed USB scanner designed for SOHO users. The 1240U Photo, available for \$299, includes a transparency unit.
October 2, 2000	Epson	Perfection 640U	\$149	Street price for 600- by 2400-dpi flatbed USB scanner designed for entry-level users. Features one-touch scanning buttons for text, photos, or graphics. Available in November 2000.
October 2, 2000	HP	PhotoSmart 315	\$299	Street price for 1600- by 1200-dpi digital camera with 2.5X digital zoom. Users can transfer images to their computers or to a PhotoSmart printer with the camera's HP JetSend infrared technology. Features a 1.8" LCD for composing and reviewing images.
October 2, 2000	HP	PhotoSmart 215	\$199	Street price for 1280- by 960-dpi digital camera with 2X digital zoom. Features a 1.8" LCD display.
October 2, 2000	Kodak	DC3200	\$249	Retail price for 1.3-megapixel digital camera with 2X digital zoom. Features include built-in flash, 1.6" LCD display, and a video-out port to allow users to display images on a television screen.
September 18, 2000	UMAX	AstraNET iA101	\$129	Retail price for 600- by 1200-dpi flatbed scanner with push-button scanning feature, which allows users to send scanned images to e-mail, a personal web page, a Microsoft Office document, or to a printer.

a 31-ppm color copier/printer, is designed for print-for-pay shops and others who have lower speed color copier/printers (around 12 ppm) and want to test the waters of production printing.

Canon also seeks to garner more of the corporate market, where Olds sees a migration from monochrome to color page printing. "We are charged with placing affordable color in the office," he said. "We need to have the right mix of product functionality and affordable price point." The Color imageRUNNER C2050, also introduced in August 2000, prints 21 ppm in color and monochrome, and has a modular design. Sold as a color printer, a scanner can be added to give it copying capability, and finishing options such as a folder and saddle-stitcher are available. "We aim to replace monochrome copiers with the C2050," said Olds. "We also want it to be an alternative to desktop color printers, which often have limited page sizes, and have no finishing options." Another mission for the C2050 is to place cost-effective color in the office. Olds told us that its street price will be around \$20,000, and that its per-page cost will be \$0.025 for black and white pages and \$0.012 for color pages.♦

Also at Canon Expo 2000, **Canon** demonstrated a prototype digital camera with a built-in micro bubble jet printer. The three-color printer housed in the Micro Bubble Jet Camera (cyan, magenta, and yellow) has 64 nozzles per color, and makes 1200-dpi credit card-sized prints. When the user presses the print button, the printer analyzes the image to determine exactly how much of each ink color is required. The print head moves into position over the ink supplies to soak up the prescribed amount of ink, then prints the image. Total printing time, we were told, is about one minute. Ink and 20 sheets of photo paper will be delivered in a single cartridge, loaded into the side of the camera, which



Canon's Micro BubbleJet Camera makes credit card-sized 1200-dpi prints. Source: Canon USA

measures roughly 5" long by 3" high by 1-1/2" deep. Canon has no immediate plans to market the Micro Bubble Jet Camera, and would not give us specifications for the digital camera component.♦

On October 10, 2000, **Minolta-QMS, Inc.** (Mobile, AL) introduced the magicolor 2200 color laser printer, the first co-developed by both Minolta and QMS since Minolta acquired a majority stake in QMS. The magicolor 2200, available in four different models, integrates a newly designed Minolta print engine (previous QMS products have been based on Hitachi or Fuji-Xerox engines), and a QMS Crown II controller. Grady Yarbrough, Product Planning Manager for the magicolor 2200, expects that the printer's speed and paper handling options will be the key attributes that will make it an attractive alternative to color lasers from HP, Xerox, or Lexmark. Designed for small- and mid-sized workgroups, the magicolor 2200 has a color print speed of 5 ppm, a monochrome speed of 20 ppm, and a duty cycle of 35,000 pages per month.

The base model, the magicolor 2200 N, has a print resolution of 600 dpi—the GN, EN, and DP models can print at 1200 dpi, thanks to additional RAM. Standard memory on the 2200N is 64 MB (expandable to 256 MB), and 2.2 GB is optional (standard on EN and DP models). An input paper capacity of 650 sheets (500-sheet cassette, 150-sheet manual feed) is standard—the top-of-the line magicolor 2200DP has an additional 500-sheet cassette, and includes an automatic duplexing unit. All printers in the magicolor 2200 line include an IEEE-1284 bi-directional parallel interface and a 10/100Base-TX Ethernet card. The magicolor 2200 supports printing in PostScript Level 2, PCL 6, PDF, and HP-GL languages. When configured with the QMS SC-210 scanner (\$499 list), the magicolor 2200 can function as a color copier. Users can also employ this configuration to scan and send images over the network.

Minolta-QMS has set competitive price points for the magicolor 2200 series printers. The magicolor 2200



The print head in Canon's Micro BubbleJet Camera has 64 nozzles per color. Source: Canon USA

Price Changes			Old Price	New Price	Comments
Announcement Date	Vendor	Product Model			
September 12, 2000	Epson	Stylus Color 1160	\$399	\$299	Street price for 1440- by 720-dpi ink jet printer. Prints on media up to 13" by 44".
October 4, 2000	Epson	Stylus Photo 870	\$299	\$249	Street price for 1440- by 720-dpi six-color ink jet photo printer.
October 4, 2000	Epson	Stylus Photo 875DC	\$399	\$299	Street price for 1440- by 720-dpi six-color ink jet photo printer. Features a PCMCIA slot for transferring images from digital camera removable media.

N is available for a list price of \$2,499. Its competitors, the Xerox Phaser 750/N, Lexmark Optra C710N, and HP Color LaserJet 4500 N, are all within \$300 of this price, but all have slower print speeds. The magicolor 2200 GN, which ships with 128 MB of RAM, is available for \$2,799. The magicolor 2200 EN includes the 2.2 GB hard disk, and is available for \$3,299. The GN model, which features the auto-duplexing unit (\$499) and a second 500-sheet paper tray (\$499), costs \$4,199. Color toner cartridges for the magicolor 2200 are available for a list price of \$129, and black cartridges cost \$69.◇

On September 14, 2000, **Epson America, Inc.** (Long Beach, CA) again sent its damage control crews to work, to address customer complaints about color shift in images printed by the Stylus Photo 870, 875DC, and 1270 ink jet photo printers on Epson Premium Glossy Photo Paper. Epson claims that ozone gas and oxidants (to which Premium Glossy Photo Paper appears to be more vulnerable than previous Epson glossy photo papers) are the principal culprits causing the color shift problem. Epson recommends framing prints under glass or storing them to protect them, and has begun shipping a new formulation of Premium Glossy Photo Paper that is more resistant to airborne contaminants. Guidelines for displaying prints can be found at Epson's web site at www.epson.com/lightfastness.◇

Short-Run Printing

On September 14, 2000, **Hewlett-Packard Company** (Palo Alto, CA) and **Indigo N.V.** (Maastricht, The Netherlands) formed a strategic alliance to co-develop color digital printing systems. In the mean time, while those systems are being developed, HP has made a \$100 million investment in Indigo, and will OEM Indigo's digital color presses.

Anita Parisot, Marketing Manager at HP, told us that the alliance is an outgrowth of the previous technology-sharing agreement between the two companies, which was announced in November 1998.

"It was a natural progression," she said. "After looking at Indigo's technology, we thought it would integrate well with the solutions and services that we wanted to provide. We decided to work together."

HP is Indigo's first OEM partner and HP expects to add value to Indigo digital color presses by offering the partnership its manufacturing skills to streamline processes and bring the cost of the equipment down. In addition, HP's brand name, and the marketing and distribution skills that are behind it, should expand market opportunities for Indigo products. "We have marketing and channel strengths, and a high degree of customer satisfaction with our other products," said Parisot.

Until now, HP's fastest color laser printer was the Color LaserJet 8550, which prints 6 ppm in color. By integrating Indigo digital color presses into its product line, HP now has machines that can print anywhere from 60 ppm to more than 100 ppm. Even though it is a mighty power on the desktop, HP is involved almost overnight in an entirely new business—production printing—where its name alone may not guarantee success.

Parisot told us that HP's first introduction of a digital color press will most likely be in the spring of 2001. She expects the first customers to be the reproduction centers at Fortune 500 and 1000 companies, as well as production departments in government and education sectors. "We have a lot of learning to do in this market place," said Parisot. "We will see how things go with our traditional customers, and then think about branching off into different markets, such as print-for-pay."◇

On September 25, 2000, **Indigo N.V.** (Maastricht, The Netherlands) introduced the XB2 digital color press, the first of Indigo's Series-4 presses. Capable of printing up to seven colors, the XB2 has a maximum sheet size of 19.7" by 27.5" (B2 size), and can print up to 8,000 letter-sized pages per hour, or 136 ppm. Print resolution on the XB2 is 800 dpi. Indigo expects the XB2 to be commercially available in 2002.◇

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On September 25, 2000, **Xerox Corporation** (Stamford, CT) entered the offset printing market by introducing its DocuColor DI Series of digital offset presses, co-developed with Presstek. The presses integrate a Presstek ProFire direct-to-plate imaging system, and include Xerox DigiPath workflow software. The DocuColor 400 DI is made for Xerox by Adast, who showed it at DRUPA in May 2000 as the PAX-DI. It has a maximum sheet size of 15" by 20-1/2", and prints up to 400 ppm. Two configurations are available: the four-color DocuColor 400 DI-4, and the five-color DocuColor 400 DI-5. The DocuColor 233 DI is a two-up four-color press, which prints 233 ppm. Both of the DocuColor 400 DI models will be available during the first quarter of 2001, and the DocuColor 233 DI will be available during the second quarter of 2001. Pricing for the digital presses will range between \$421,000 and \$679,000.

Also on September 25, 2000, Xerox introduced the DocuColor 2000 CSX digital front end for the DocuColor 2045 and 2060. The unit has two 600-MHz Pentium III processors, 256 MB of memory, 384 MB of image memory, a 9 GB hard drive for system files, and an 18 GB hard drive for print files. The DocuColor 2000 CSX supports simultaneous RIPing and printing, post-RIP page imposition, and variable-data printing. It will be available December 1, 2000; pricing will also be available at that time.◇

Copiers

On September 25, 2000, **Xerox Corporation** (Stamford, CT) introduced the Pixography Solution, a computer workstation/scanner kiosk designed to connect to the DocuColor 12 color copier/printer, and meant for placement in retail and print-for-pay shops. Using the Pixography station, which has a touch-screen interface, retail customers can scan their photographs and import them into pre-designed templates to create business cards, letterhead, greeting cards, calendars, and invitations. Wizards guide them through the process.

The Pixography station features Xerox SmartScan software, allowing users to scan multiple images at one time. SmartScan automatically identifies individual images and aligns them. Users have rudimentary image editing functions at their disposal. They can crop, rotate, zoom, adjust brightness and contrast, and reduce dreaded red eye. When users have finished with composition, their documents are printed on Xerox Digital Color Photo Glossy Paper, which has a water-resistant glossy coating, resists fingerprints, and does not crack when folded. An optional component to the Pixography System is the DocuCutter 545, an automated folder and cutter developed for Xerox by Duplo.



Xerox's Pixography Solution helps retail customers make customized color documents. Source: Xerox Corporation

Xerox expects to sell the Pixography system to print-for-pay shops and retailers such as grocery stores. Event marketing might also be a good channel for the system, which has been tested at amusement parks such as Disney's Epcot Center, where, according to Xerox, it attracted 495,000 visitors, and at the Buffalo Bills' football training camp, where 17,000 people used it to create mementos. Xerox's press materials for the Pixography system were unencumbered by details such as the resolution of the scanner or specifications for the workstation. The Pixography Solution is available for a list price of \$13,995, and the DocuCutter 545 finisher is available for \$7,000.◇

Scanners and Image Capture

On September 18, 2000, **Conexant Systems Inc.** (Newport Beach, CA) introduced a 1.3-megapixel digital camera reference design kit. The camera platform, which integrates technologies from Conexant and Sierra

Distribution Notes

Announcement Date	Vendor	Comments
September 19, 2000	Presstek/VIP Offset & Graphic Arts Supplies	VIP to distribute Presstek computer-to-plate products in New York, New Jersey, and Connecticut.
September 25, 2000	Polaroid/London Litho	London Litho to distribute Polaroid's digital halftone proofing systems in the Midwest.

Imaging (acquired by Conexant in June 2000), is based on a 1.3-megapixel CMOS sensor, and incorporates a Raptor II-C image processing chip. Also included in the design are the S3P real-time operating system and Image Expert software, which allows digital camera users to organize and manage digital images. The camera design can be expanded to support Conexant technologies such as Bluetooth wireless networking and embedded modems. In addition to the working digital camera hardware, the reference design kit includes schematics, a recommended bill of materials, documentation, and set-up and calibration information. The reference design kit is available for \$15,000.◇

PDLs/Interpreters

On September 24, 2000, **Harlequin Inc.** (Waltham, MA) introduced ScriptProof, a version of its ScriptWorks RIP designed to generate color-accurate proofs from desktop ink jet printers such as the Epson Stylus Pro 3000 and 5000. ScriptProof supports PDF, PostScript, TIFF, or TIFF-IT/P1 file formats, and uses Harlequin color management and screening technologies. It supports press simulations such as SWOP and Euro, as well as ICC profiles. ScriptProof, which also drives large-format ink jet printers from Epson, HP, and Encad, will be available to Harlequin's OEM partners in November 2000. OEMs will determine pricing.◇

Calibration/Color Management

On August 29, 2000, **Eastman Kodak Company** (Rochester, NY) introduced the Kodak Professional Color Management Profiling Solution, a software/service combination that helps users in production environments to create a color-managed workflow. The system is targeted at commercial and portrait photo labs, service bureaus, sign shops, and corporate imaging centers. It includes Kodak Professional ColorFlow ICC Profile Tools, which is a color profile-building software, Kodak Professional ColorFlow Monitor Profile Builder (including an X-Rite DTP92 Colorimeter for monitor calibration), and Kodak Professional ColorFlow ICC Soft Proof. The Kodak Professional Color management

Profiling Solution, which includes two days of set-up time and consulting by Kodak technicians, is available for either Windows or Macintosh platforms for a list price of \$8,385.◇

Large Format

On October 4, 2000, **Gretag Imaging** (Palm Springs, CA) introduced the Bellise Plus Digital Picture Press, a 720-dpi six-color ink jet printer. The Bellise Plus, which has 24 print heads (128 nozzles each), can print on media up to 54" wide. Print speed at 360 dpi is 440 square feet per hour. Gretag claims that its six ink colors (cyan, magenta, yellow, black, light cyan, and light magenta) and ColorBlend technology gives 720-dpi prints from the Bellise Plus an apparent resolution of 1440 dpi. The Bellise Plus will be available later in the fourth quarter of 2000 for a list price of \$44,995. Pigmented ink will be available in one-liter bottles costing \$350 each.◇

Application Profile

With the Epson 2000P, Photography can Become a Serious Venture

Fine art and photo reproduction applications are arguably the most demanding applications for ink jet printers. While there is a vast photo-processing industry to make prints for those who want only photographic representations, digital technology appeals to those who want to manipulate their images. Ink jet printers and the broad range of media available for them give artists almost infinite control over the appearance of their work. Ink jet printing also gives them the luxury of fine tuning and creating different iterations of their images quickly—a process that would be longer and costlier if an outside service were doing the printing. The cost of printers that meet artists's or photographers' print quality and color fidelity expectations has continued to fall. Print speed is a lesser consideration; although photo ink jet printers are relatively slow compared to their

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office counterparts, the process of creating art is not a hurried one, and printing can sometimes be the briefest stage in a project.

However, most who create fine art want their work to last a long time. Until the introduction of printers like the Epson Stylus Photo 870 and Stylus Photo 2000P, users did not have an out-of-the-box system for producing prints with longer life spans. Previously, extended ink jet print life was gained by using third-party pigmented inks, which required color gamut concessions (see the June 2000 *Color Business Report* for coverage on the inks for the Stylus Photo 2000P).

Bob Hesse, who works by day as a research scientist at the Research Institute for Medicine and Chemistry in Cambridge, MA, has been an amateur photographer for over 30 years. For most of that time, he used traditional methods to print and view photos: silver halide prints, slides, and Cibachrome prints. For the last six years, Hesse has used a digital workflow, scanning his images (or having them scanned) and using ink jet printers to produce prints for display. Hesse has watched developments in digital imaging and ink jet technology closely for several years, and applies a methodical approach to the evaluation and use of the ink jet printers he has worked with. Recently, he has been producing prints of his photo artwork on an Epson Stylus Photo 2000P.

Hesse's favorite subjects are flowers, especially orchids. His flower images are manipulated in Photoshop—Hesse removes the background on some, sets them against dark backgrounds, or integrates them with other images. Hesse's work is printed on a variety of media, including photo paper, matte-coated paper, silken fabric, and even textured rice paper. He exhibits his work through the Winchester, MA Artist Network, and at flower shows. He has won awards from the New England Wildflower Society and the American Orchid Society.

Hesse investigated digital printing alternatives because he wanted more control over the appearance of his photographs. "I was always keen on photography, but not on working in a darkroom. Computers made the process of working with images and printing them so much easier," he said. "You have more control over a digital print. You don't have to rely on a photo lab to do the cropping and adjust the color balance and contrast to your liking." By having his images digitized, Hesse had more control over them, but there were still hurdles. "When I started doing this, I had a computer with a 50 MHz processor and 16 MB of RAM," he said. "It would start a task on one of my images, and I could go for a cup of coffee or read a book, and it would still be cranking away when I got back!"

Although computers gave Hesse the ability to *work* with his own images, the technology and cost of color printers still made it necessary to have prints made at service bureaus. "I'd have to copy the image file onto



Flowers, in this case an aquilegia, are Bob Hesse's favorite subject.

Source: Bob Hesse

several 3 1/2" floppies and send it out," he said. "The first service bureau I worked with had a Sienna film printer, which used C-type film, and had a print size of only 8" by 12". I also used services which had a Durst Lambda and Cymbolic Sciences LightJet. The prints were expensive, and I was still relying on others to make them the way I wanted. It was an iterative process—there was still a lot of back-and-forth, and some of the time I still got prints that I wasn't happy with."

Ink Jet Experimentation

As ink jet printers became less expensive and more widely available, Hesse was intrigued by the possibilities they presented. "Ink jets allow you to print on substrates that just aren't available with the photographic process," he said. Initially, Hesse began working with HP DeskJets. He was not particularly impressed by their print quality, but was happy to experiment with the printers, confident that better ones would come along.

Hesse's search for a better printer ended when he saw the six-color Epson Stylus Photo EX, introduced in April 1998. "It was a fantastic printer," said Hesse. "The

colors were gorgeous, and the prints it made were almost continuous tone—there was no banding or spotting, and it was really good with subtle tonalities.”

The Linchpin: Longevity

In the Stylus Photo EX, Hesse had a printer that satisfied most of his requirements—he could print his own images, and was extremely satisfied with the image quality. While he felt comfortable exhibiting the ink jet prints at art shows, he did not sell them. “I couldn’t sell prints, because the inks were fugitive,” Hesse said. “When somebody pays for a work of art, they expect that it will be stable, and last for many years. I knew that my prints would only last for a few years at best, and that was unacceptable.”

To solve the print longevity problem, Hesse tried loading the Stylus Photo EX with Lyson’s (Elk Grove Village, IL) E Series inks. “The Lyson inks are purported to have a 70-year life span,” he said. “I immediately shifted to using them.” Unfortunately, Hesse found that he was sacrificing image quality for longevity. “The color gamut of the Lyson inks was severely skewed and restricted,” he said. “The magenta was brick red. Desert scenes were OK and blues were great, but little else looked good. I had to choose images that would work well with the color gamut of the inks.” Despite the difficulties using the Lyson inks, Hesse commercialized

his hobby, and began selling his artwork.

Hesse got a shock when he learned that Wilhelm Imaging Research had published a more conservative life span estimate for Lyson inks—less than 30 years for the 6-color set. “I really pulled in my commercial horns at that point,” said Hesse. “I didn’t want to produce prints which would have to be replaced down the road due to fading.” Lyson conducts its own print longevity testing, using Wilhelm’s methods. However, its findings are somewhat different. E series inks, printed on Lyson’s Standard Fine Art Paper by an Epson Stylus Pro 3000, last only about six years in Wilhelm’s tests, while Lyson has a more optimistic estimate of 39 years. But the same inks printed on Arches Cold Press Paper last 54 years as tested at Lyson, and between 50 and 55 years according to Wilhelm. Lyson’s longest print life estimates are on Epson papers—prints made on Epson Archival Matte Paper are expected to last 66 years, and prints made on Epson Archival Gloss Paper have an estimated life of 59 years. Lyson has published its findings on its web site at www.lysonusa.com.

Epson 2000P to the Rescue

Epson claims that prints from the 2000P, which uses Epson’s pigment-based Archival inks, will last between 100 and 200 years, depending on the media used.

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Industry Notes		
Announcement Date	Vendor	Comments
August 29, 2000	Global Graphics/5D Solutions Ltd.	Global Graphics, parent company of Harlequin, to acquire 5D, developers of the Jaws PostScript RIP.
September 24, 2000	Harlequin/Pisces	Pisces signs OEM agreement to use Harlequin’s ScriptWorks RIP in its JetPlate System, which uses a modified Epson Stylus Pro 3000 ink jet printer as a computer-to-plate device.
September 25, 2000	Harlequin/Rampage Systems	Rampage signs OEM agreement to integrate the Harlequin ScriptWorks RIP into its Rampage RIPing System for imagesetters, platesetters, and halftone proofing systems.
September 24, 2000	Harlequin/Scitex	Scitex signs OEM agreement for Harlequin’s Loadable Edition RIP, a “GUI-less” edition of the ScriptWorks RIP, to drive its high-speed digital printing systems.
October 9, 2000	Indigo/ELetter	ELetter, an Internet-based printing and mailing house, to use Indigo TurboStream and UltraStream 2000 digital color presses to fulfill orders.
September 24, 2000	Kodak/Pantone	Pantone awards “Pantone Calibrated” license to Kodak’s Recipe Color software for Approval XP and XP4 digital halftone proofers.
September 12, 2000	Sir Speedy	Opens its first franchise in Singapore, increasing its worldwide presence to 1,100 stores in 29 countries.
September 13, 2000	Software 2000/Infowave	Software 2000 to acquire the Vancouver, Canada-based imaging division of Infowave, developer of PowerPrint and StyleScript printing technologies for Apple Macintosh computers. The division will become a subsidiary of Software 2000, and operate as Strydent Software.
September 14, 2000	X-Rite/Optronik GmbH	X-Rite to acquire Optronik, a German developer and manufacturer of light and color measurement instrumentation and software.

Product Specifications: Epson Stylus Photo 2000P

Nozzle Configuration	
Monochrome head	48 nozzles
Color head	48 nozzles x 5 (C,M,Y, Lt. C, Lt. M)
Resolution Modes	
	1440 by 720 dpi
	720 by 720 dpi
	360 by 720 dpi
	360 by 360 dpi
	180 by 180 dpi
Color Ink Droplet Size	
	6.5 picoliters
Photo Print Speed	
8" by 10" (720 dpi)	3 minutes, 40 seconds on Epson Archival Matte Paper 6 minutes, 21 seconds on Epson Semigloss Photo Paper
Print Longevity	
	Lightfastness rated 200 or more years before noticeable fading occurs, in normal indoor fluorescent lighting, under a glass frame, when using Genuine EPSON Archival Inks and compatible EPSON matte type papers. Under the same conditions, lightfastness rated at 140 years when using EPSON Premium Semigloss Photo Paper and EPSON Premium Luster Photo Paper.
Interface	
	IEEE-1284 parallel, USB
Printer Language	
	Epson ESC/P2
Paper Capacity	
	100 sheets (10 envelopes)
Paper Size Range	
	Letter, legal, 11" x 17", 13" x 19", A3, A4, B5, statement, executive, B4, user definable sizes and panoramic up to 13" x 44"
Paper Types	
	Plain and bond (text only), EPSON Premium Semigloss Photo Paper, Archival Matte Paper, Premium Luster Photo Paper, Watercolor Paper - Radiant White, Matte Paper - Medium Weight and other custom Epson media
Printable Area	
	13" by 43.76" on 13" by 44" panoramic paper
Dimensions	
	24" L by 30.3" W by 16.3" H
Weight	
	18.5 lb.
Sound Level	
	38 dB(A)
Ink Cost (street)	
	T015201 black cartridge: \$32.95 (521 pages @ 7% coverage) T016201 color cartridge: \$37.95 (206 pages @ 5% coverage per color)
Street Price	
	\$899

Source: Epson America, Inc.

"Wilhelm has already confirmed prints as lasting more than 100 years from the 2000P with some media," said Hesse. "I don't mind if somebody who has bought a print comes back after 100 years to complain about fading." Hesse is also impressed with the printer's image quality. "The color with pigmented inks is as good as Epson dye-based inks," he said. "The reds and blues are almost fluorescent."

Hesse finds paper handling on the 2000P to be robust and versatile, but has had some difficulties when experimenting with different media types. "Epson strongly advises against using media other than those specially designed for the 2000P for good reason," he said. On certain coated media, he finds that the ink does not dry quickly enough. "You get a gooey lake of ink on top of the sheet," he said. To compound the problem, the sprocketed wheels that deliver pages to the output tray are soiled by still-moist ink, and deposit ink where it is

not wanted. As a remedy, Hesse uses the 2000P's "wheel-cleaning" swab, and runs several sheets of plain paper through the printer slowly without printing, to absorb any ink residue or moisture from the wheels.

One drawback to the Stylus Photo 2000P, according to Hesse, is print speed. In his experience, an 8" by 10" photo printed on matte paper takes about six minutes. This time doubles when the best print quality setting is selected. "It prints in one direction only in the best setting," he said. "It slows down to give the ink time to dry." As one might expect, the largest-size prints at the highest print quality settings take the longest time to print. Hesse told us that a full-bleed 13" by 19" image takes up to half an hour to print.

Hesse enthusiastically sings praise for the Stylus Photo 2000P, in spite of these minor quibbles. "The printer is opening up a new market for ink jet printers," he said. "It really has no competition on the desk top—

Why Artists and Photographers Think Epson

Epson has combined the strong photo-printing capabilities of its ink jet printers with highly targeted marketing methods to make a name for itself among fine artists and photographers. Fabia Barsic-Ochoa, Product Manager for Photo Reproduction Printers, gave us some insight into how Epson developed its products and its marketing strategy to appeal to these user groups.

"Ever since the introduction of the first Stylus Color ink jet back in 1995, we made color our focus," said Barsic-Ochoa. "We had made a big jump to ink jet from being a dot-matrix printer manufacturer. Our movement since then has been based on that initial charge. We were the first company to make photo-printing quality a priority, the first to offer 1440-dpi resolution, and first to introduce a six-color printer." Epson has an extensive beta-testing program, which involves photographers in the product development process.

Epson has done much to promote its ink jet products to artists and photographers. Many of us are familiar with the company's clever magazine advertisements, which depicted a woman wearing a bathing suit ("At 1440 dpi, you can see that it's painted on."). In another ad campaign, an actual print sample was pasted down to the page, allowing magazine readers to judge print quality for themselves. Such ads have appeared in mainstream publications such as *Newsweek*. Epson also

buys ad space for its photo printers in major photography publications, including *Popular Photography*, *American Photography*, *Outdoor Photographer*, and *Shutterbug*. Ads for Epson's graphics printers have also appeared in the trade press. For example, ads for the Stylus Pro 3000 figured prominently in *Communication Arts*, a popular graphic design periodical.

Epson also employs direct mail campaigns, sending promotional pieces to artists, photographers, students, graphic design studios, and service bureaus. "We are capable of highly focused mailings," said Barsic-Ochoa. "For example, we are targeting the portrait market with the new wide-format Pro line. We can address many different segments of the photography market with our mailings."

Trade shows are another vehicle for promoting Epson's photo printing products. "Once we introduced the first Stylus Photo back in 1996, we began going to the photography and graphics shows, like Photo Plus East, Photo Marketing Association (PMA), and Graph Expo," said Barsic-Ochoa. "We've really expanded our trade show schedule, because it's important to demonstrate these printers first hand. Everybody touts their photo quality, but seeing is believing." Indeed, an Epson demonstration at the Seybold trade show made Bob Hesse want a new Epson photo printer, ultimately leading him to buy the Stylus Photo 2000P. ♦

it provides extreme longevity without compromising color imaging. The quality, delicacy, and refinement of its output stands up well against even an Iris printer. But Iris prints don't have the longevity." Hesse feels that a version of the 2000P with a larger, modular ink supply that can print on 17" by 22" paper would be a logical next step for Epson. "With such a printer, a small artist's studio or graphic design shop would have an ideal machine for making and selling prints of their work."

Making and selling prints is just what Hesse is doing, now that he has the Stylus Photo 2000P. "Now I can offer a product that meets an acceptable standard as a fine arts product," he said. "Anything I envision, I can come pretty close to in print. Now I can print my art out in such a way that I can guarantee will last if people hang it on their walls. I can tell them 'This is a serious archival piece of art.'" Hesse sells an 8" by 10" print from the 2000P for between \$60 and \$75.

Image Capture

While Hesse has been quick to adopt digital printing technology, he has taken a wait-and-see approach with digital cameras, choosing instead to work with 35 mm

film. "I keep watching digital camera developments, and have looked at the ones that my friends have. One reason for not switching is that I've got a substantial investment in camera bodies and lenses," he explained. "And while [very expensive] digital backs can capture superb images in medium or large format I think that digital photography has a long way to go before it matches the image quality from 35 mm." In Hesse's opinion, images scanned from film have much more image information than digital camera images. "It helps to have a good image to start with. My CanoScan 2710 at 2710 dpi will produce a raw file of 60 MB—about three to four times larger than the best files from current amateur digital cameras. Newer inexpensive film scanners from Polaroid and Microtek have 4000-dpi resolution and produce files twice as large, yet some photographers believe that it requires expensive drum scanners operating up to 10,000 dpi to extract the finest possible image from 35 mm film."

Many who embrace digital photography tout its immediacy, but Hesse is comfortable with the turnaround of the 35 mm workflow: "I shoot my pictures,

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Prices for Epson Photo Media

Premium Semigloss Paper (Some texture, slightly matte coated. For Epson Photo or Archival Inks.
0.265 thickness, opacity 97%, 93 brightness.)

Size	Media Cost	Printing Cost w/ Ink
Letter	\$0.85 per sheet	\$1.89 for 8" by 10"
4" roll (8 meters long)	\$19.99, or \$0.40 per 4" by 6" sheet	\$0.71 for 4" by 6"
Super B (13" by 19")	\$2.85 per sheet	\$4.86 for 11" by 14"

Premium Luster Photo Paper (Like "E-type" photo papers. For Epson Photo or Archival Inks.
0.256 thickness, opacity 97%, 93 brightness.)

Letter	\$0.85 per sheet	\$1.89 for 8" by 10"
A3 (11.6" by 16.5")	\$2.25 per sheet	\$4.26 for 11" by 14"
Super B (13" by 19")	\$2.85 per sheet	\$4.86 for 11" by 14"
13" roll (10 meters long)	\$63.00 or \$0.32 per 4" by 6" sheet	

Archival Matte Paper (For Archival Inks. 0.262 mm thickness, opacity 94%, 99+ brightness.)

Letter	\$0.36	\$1.40 for 8" by 10"
A3 (11.6" by 16.5")	\$0.90 per sheet	\$2.67 for 11" by 14"
Super B (13" by 19")	\$1.14 per sheet	\$2.91 for 11" by 14"

Watercolor Paper (For Archival Inks. 0.290 mm thickness, opacity 96%, 89 brightness.)

Super B (13" by 19")	\$1.35 per sheet	\$3.36 for 11" by 14"
13" roll (10 meters long)	NA	

Source: Epson America, Inc.

which are usually processed the next day by noon. Then I scan them as I want." Hesse will scan film himself on his film scanner or send them to a service bureau to have them scanned as Kodak Photo CD files.

Hesse champions the permanence of film images, and is concerned about the ease with which digital camera users delete potentially useful images. "With digital, you may inadvertently throw away useful images," he said. "That doesn't happen with film. I might not scan every one of my 35 mm images, but at least I have them."

Image Editing

Although Hesse uses Photoshop for most of his image manipulation tasks, he still relies on one of the first image-editing programs that he used, Picture Window, first introduced by Digital Light and Color (Cambridge, MA) in 1994. The company is currently selling version 2.5 of the software for \$49.95. More information about Picture Window can be found on the company web site at www.dl-c.com. "I started out with a program I still use, Picture Window, a dynamite little program that allows a photographer to work the way a photographer thinks. It has tools that are very similar to Photoshop, like histograms and curves and some unique special effects. At \$50, it costs less than any Photoshop plug-in that's out there. When I want to make a straight photographic print or open a Photo CD, I usually use Picture Window. The reason is that when you open a

Photo CD image, you can adjust brightness, contrast and gamma in full 30-bit (10 bits per channel) color prior to truncating to 8 bits on opening in Photoshop. This gives better image data to manipulate later."

The more bits per pixel, the more shades it can represent. For example, 4 bits per channel gives 16 shades of gray per channel, 8 bits (24-bit image) gives 256 shades, and 10 bits (30-bit image) gives 1024. For a 3-channel RGB or L*a*b image, the number of colors is the cube of the number of shades per channel. Hesse finds that Photoshop has limitations here. "In Photoshop at present (version 5.5), you cannot do 16-bit files in the L*a*b* color space," he said. "If I bring in a raw, high bit-level color scan, I'm still limited to how much I can change brightness, contrast, white point, and black point because I'm working in RGB. When you work in RGB, changes affect color balance. If you work in L*a*b* color space, you can change brightness or contrast without affecting color balance. In Picture Window, the default color space is HSL, which is like L*a*b*. In the PRO version you can take 16-bit color files and work to your heart's delight. To do it in Photoshop, you'd have to make those adjustments in the scan."

Color Management

Working with his digital images, Hesse is no stranger to a color-managed workflow. When he sent print jobs out to some service bureaus, he was given profiles for the service bureau's photo printer, and was

able to send color-corrected files to the service bureau. He makes color profiles for all the media and inks that he works with, using Monaco EZcolor color management software. To make his own color profiles, he first calibrates his monitor (optically or photometrically). To profile the scanner and the Epson's output, he prints an IT8 target from a digital file, and scans the printed target and original, matched IT8 target together. When printing an image, he applies the resulting profile in Photoshop. "The problem is that you have to make a profile for each and every type of media that you are using," said Hesse. "If a profile is wrong, or if the ink's color gamut is too small, you just won't be able to print some things. I have wasted a lot of ink and paper before doing my own profiles."

Media

For photographic printing, Hesse uses Epson's photo papers because he feels that they give him the best gamut and image quality. When he seeks to achieve a certain effect with his images, he will use specialty medias from third-party suppliers, including a silk fabric from Pictorico and Concorde Rag Paper. Hesse has tried coated canvas media, with less success. "I made a print on Capri Canvas," he said, "and it made a mess of the printer. I think that I have more success with Pictorico fabrics because the ink dries faster on its ceramic coating."

Some of Hesse's more intriguing images are printed on Kinwashi textured rice paper. Translucent and almost as thin as tissue paper, it is designed for arts-and-crafts projects, not a sanctioned media for ink jet printing. Making successful prints with it was a trial-and-error process for Hesse. "Paper feed is difficult," he said. "When I got it, the first sheet I printed on looked great. The next ten I tried were a mess, though." Because the rice paper is so thin, it tends to become skewed as the printer's paper rollers advance. As it skews, it

buckles, making contact with the print heads. To prevent this, Hesse tapes the rice paper to a carrier sheet, and sets the printer's thickness lever to the "envelope" position to raise the print heads. For Hesse, the added steps are worth it. He is pleased with his rice paper images. For display, he will sandwich the rice paper between two sheets of glass, or affix white paper behind the image and black paper behind the "margin" areas. "The image is really brought out by the white, while the delicacy of the rice paper is more apparent when it is placed over black paper," said Hesse. He has just begun using Japanese rice papers specially made for ink-jet printers. He has tried Hahnemühle Japan "rice" paper, and was not pleased with the results. "Their rice paper is more like fiberglass," he said. "The texture is like a scouring pad, and the image is muddy without profiling. The true Japanese papers are much more subtle and refined."

Hesse feels that many of the third-party ink jet media are overpriced. "Papers for desktop ink jet printing are almost like pet rocks," he said. "You pay an awful lot for something that is inexpensive to produce. Some photo media are much more expensive than traditional silver halide papers, up to five times more expensive in some cases. Epson gets about a dollar per 13" by 19" sheet of its Archival Matte Paper or Watercolor Paper," he said. "Others charge between \$3.00 and \$5.00 per sheet for a similar or somewhat heavier product. Hahnemühle wants \$232 for 50 sheets of its 13" by 19" Albrecht Durer paper. Concord Rag costs \$92 for twenty 11" by 17" sheets." Hesse buys his paper over the web through Digital Art Supplies (www.digitalartsupplies.com) and photinkjet.com.

Archiving Digital Images

Hesse also has concerns about the stability of stored image files. "Storage media can become unstable, and

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Controllers/Servers				
Announcement Date	Vendor	Product	Price	Comments
August 29, 2000	Canon	ColorPASS-Z40e	\$7,495	Retail price for EFI-developed embedded controller for the Canon CLC 1100. Features an Intel Celeron 433 MHz processor, a 6.0-GB hard drive, and 128 MB of RAM. Includes EFI's NetWise 2 networking software and ColorWise 2 color management system.
August 29, 2000	Canon	ColorPASS-Z20e	\$7,495	Retail price for EFI-developed embedded controller for the Canon CLC 900. Integrates an Intel Celeron 433 MHz processor, and includes a 6.0-GB hard drive, and 128 MB of RAM. Includes EFI's NetWise 2 networking software and ColorWise 2 color management system.

as the technology advances, you have to transfer images from the obsolete medium to the new medium. File formats change. I remember when they came out with the CGM format (computer graphics metafile). You were supposed to be able save just about anything as a CGM file, and you could open it on any computer platform. I'd save things as CGM and never be able to open them again! Even the TIF format has changed enough that I can't open some of my older TIF files. Film is always going to be film. If you store it properly, you'll always be able to retrieve it and use it."

Since he began his work with digital imaging, Hesse has sought the best method to archive his image files. Finding the best storage medium has not been without some pain, however. "I've made a few mistakes," he said. "I went out and bought the digital equivalent to the Ford Edsel—I bought SyQuests, which never really caught on." Hesse now burns his own CDs, but this method also has hazards. He no longer applies labels to the CDs—when he did, he found that the labels caused the CDs to become unbalanced when they were loaded into high-speed drives. "It's also easy to lose files on the CDs," he said. "If you fail to close your work session properly, the computer will rewrite the tracking information for the CD, and you won't be able to open the images later." In spite of these shortcomings, CDs are Hesse's primary archiving medium. He estimates that he has between 30 and 40 of them, containing a total of 20 GB of images. Most of the images are saved

as TIF files, but those that he has manipulated extensively are saved as unflattened Photoshop files. "Once you've made multiple layers or masks in Photoshop, it's nice to have them available to you later," said Hesse.

Getting More out of a Serious Hobby

Although Bob Hesse has been an avid photographer for many years, he never became a darkroom buff, relying on professional services to make photographic prints for him. Digital technology, particularly image editing software and ink jet printers, has enhanced his hobby—he can experiment with his images on his own terms and see results almost instantly. "If you tried to experiment with various effects on photographic prints, you'd be in the darkroom all day, and your work might still end up in the trash. With a computer, you can do the same thing in seconds," said Hesse. "Somebody once told me that in Photoshop, you shouldn't be afraid to see what will happen if you move the slider all the way up on a particular effect, right off the bat, to find out where the limits are. You can always click 'undo.'" Because the Epson Stylus 2000P makes prints that can last for several generations, the nature of Hesse's hobby has changed—it has become a commercial enterprise. While he still uses service bureaus to make larger prints, he might be able to make them himself if he gets his wish: for Epson to produce a wider format version of the 2000P.◇

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