Phaser® 450 Color Printer

Fast, photographic-quality workgroup color printing

Key specifications

Technology	Dye sublimation
Resolution	300 dpi color
Media type	Special paper, transparency film, ColorSeal™ media
Page sizes	Letter/A4, and Letter Extra-size for Letter-size bleed printing
Print speed	1.9 minutes per page
Cost per print	$2.17 (Letter/A4-size, 3-color)
Price, U.S. MSRP	$6,995

Key features and benefits

Dye sublimation, continuous tone printing	Photographic color print quality.
High speed color printing	Faster printing for maximum user productivity.
Large image area	Allows Letter-size bleed printing on Letter Extra-size paper.
TekColor™ Photofine™	Proprietary image rendering enhances fine lines and text, and produces smoother color shading.
ColorSeal™ archive-quality media	Provides fade-resistant, long lasting color prints. During printing, a protective coating is applied to the print for UV and handling protection. The image will not rub off, or transfer on contact with other materials.
Adhesive-backed paper	For photographic labels, package mock-ups, etc.
Network connections	Standard: AppleTalk, parallel, RS-232 serial Optional: Ethernet, with support for Netware, EtherTalk and TCP/IP protocols
Built-in Adobe™ PostScript™ Level 2	Application compatibility with the industry-standard page-description language.
TekColor™ Dynamic Correction	Color corrections for printing press standards, display simulation, and vivid colors.
Color control strip	Easy checking of color consistency from page-to-page, or printer-to-printer of the same model.
Adobe Photoshop plug-in	Fast printing from Photoshop on PCs and Macintosh. Includes Fast Preview mode that downloads a full color RGB image in less than 30 seconds.
PANTONE®* approved	Industry color standard for graphic arts applications.
PhaserMatch™ software	For the greatest color accuracy. Includes calibration and custom profiles with the printer's Extended Features; includes calibration only with the standard version of the printer.
Optional lower paper tray assembly	Adds one auxiliary paper tray for efficient network printing. The tray holds 50 sheets. Users can select media trays from their computer.

* Pantone, Inc.'s check-standard trademark for color reproduction and color reproduction materials.

Target customers for the Phaser 450 printer

The five market segments for the Phaser 450 printer are listed below, **ranked in order of opportunity**. See the reference tables for details.

1. Creative/graphic arts: Best match for the Phaser 450 printer
2. Business Presentations: A traditionally strong market for color printers
3. Scientific and Engineering: Offers a variety of applications
4. Service Bureaus: Pay-for-print opportunities
5. Digital Photography: An emerging market

1. Creative/graphic arts: Best match for Phaser 450 printer

Customers	Applications	Key issues
■ Advertising agencies	■ Creative design and comps	■ Speed
■ Graphic design shops	■ Layout	■ Image quality
■ Corporate design departments	■ Brochures	■ Color accuracy
■ Public relation firms	■ Advertisement	■ Image durability
■ Publishing	■ Loose art	■ Save time and money using a desktop color printer
■ Commercial photography	■ Pre-film proofs	■ Pre-film color proofing: reduce (but not replace final) costly Matchprint iterations during design development
■ Freelancers	■ Illustration	■ Print full Letter-size bleeds
		■ PhaserMatch for color calibration and custom color profiles

2. Business Presentations: A traditionally strong market

Customers	Applications	Key issues
■ Manufacturing	■ Business presentations	■ Photographic quality overhead transparencies, especially when color scanned artwork is included
■ Finance (commercial banks, insurance investment)	■ Executive and board room presentation	■ Image quality
■ Aircraft and automobile design	■ High level marketing and sales presentation	■ Smooth color shading
■ Large commercial organizations		■ Fine line detail
■ Government		■ Save time and money using a desktop color printer
		■ Faster turn-around and cost savings compared to using a service bureau for color overhead transparency creation

3. Scientific and Engineering: A variety of applications

Customers	Applications	Key issues
■ Manufacturing	■ Geophysical information systems	■ Photorealistic images that match screen display
■ Natural resources	■ Medical Imaging	■ Superb image quality
■ Utilities	■ Architectural rendering	■ Color consistency
■ Chemical	■ Mapping	■ Durable and light fast output
■ Universities and research laboratories	■ Satellite data analysis	
■ Aircraft and automobile design	■ Mechanical design and solid modeling	
■ Government	■ Seismic	

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4. Service Bureaus: Pay-for-print opportunities

Customers	Applications	Key issues
■ Commercial printers	■ Pre-press proofing	■ Speed
■ Quick-print shops	■ Layout and positioning	■ Color accuracy
■ Graphic arts service bureaus	■ Loose art	■ Consistency
■ Specific print trades services (color separators, plate makers pre-press services)	■ Brochures	■ Cost of operation
		■ Save time and money using a desktop color printer
		■ Pre-film color proofing: reduce (but not replace final) costly Matchprint iterations during design development

5. Digital Photography: An emerging market

Customers	Applications	Key issues
■ Professional photographers	■ Photo-journalism	■ Image quality
■ Corporate users	■ Real Estate and automotive ads	■ Speed
	■ Images put on Internet	■ Durability of the output (UV protection, handling)
	■ Catalog imaging	
	■ Direct Mail	
	■ Book and publication design	

Print speeds

The speeds listed in the following table represent the print engine speed, which is the time it takes to print the image after it has been received and processed by the printer. Values are in minutes:seconds.

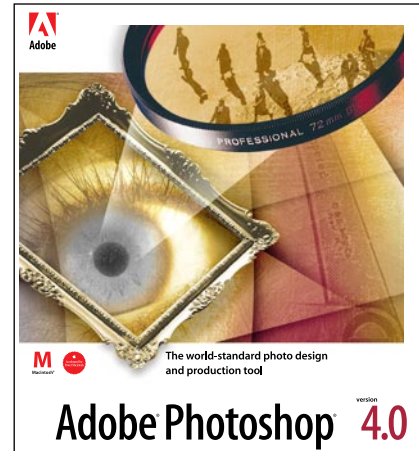| Transfer roll	Print time Letter-size paper	Print time A4-size paper	Print time Letter Extra- size paper	Print time Letter-size transparency	Print time A4-size transparency
3-Color	1:45	1:49	1:59	3:06	3:15
4-Color	2:19	2:26	2:40	4:00	4:13
ColorSeal*	NA	NA	2:58	NA	NA
Black	0:57	1:00	1:05	1:17	1:20

* ColorSeal media is available only in Letter Extra-size.

The print times listed for the following sample prints represent the total print time including data transmission time, imaging time, and print engine speed. For details on how these images were printed, see, "Competitive print speed comparison" on page 20.
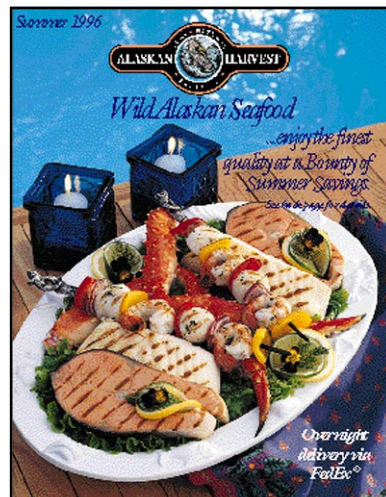
Freightliner transparency 6:05

Package Design 4:52

Alaskan Harvest Catalog Cover 6:51

Media attributes

The Phaser 450 printer uses new, improved media for superior print quality on both paper and transparency film.

Paper	Transparency film	ColorSeal media
■ Heavy weight, photographic-like	■ Heavy weight ■ Crystal clear (no yellow tint) for deep color saturation ■ Optimized for use with the 3-Color Transfer Roll for cost effective presentation visuals. ■ No stripe on the edge	■ Maximum durability ■ No image transfer on contact with other materials ■ Moisture and finger print resistance ■ UV resistance

Dye sublimation transfer rolls

The following transfer rolls are unique to Phaser 450 printers. Only Tektronix-supplied transfer rolls work correctly with this printer.

- ■ 4-Color Transfer Roll: 100 images
- ■ 3-Color Transfer Roll: 100 images
- ■ ColorSeal 3-Color Transfer Roll: 100 images
- ■ Black Transfer Roll: 200 images

The following table lists suggested applications for Phaser 450 printer transfer rolls.

Transfer roll	Optimized for	Applications
3-Color	■ Standard color printing ■ Best transparency quality	■ RGB images ■ Engineering/ scientific images
4-Color	■ Exceptional print quality ■ Superior color matching ■ Widest color gamut	■ CMYK images ■ Pre-press proofing
ColorSeal (3-Color)	■ Required for printing on ColorSeal paper or adhesive-backed paper ■ Digital photography ■ Print durability	■ Archival printing ■ Labels ■ Signs
Black	■ Black and White ■ Monochrome gray scale	■ Medical/scientific imaging

The following table lists the possible combinations of Phaser 450 printer media and transfer rolls.

	Transfer roll			
Media Type	Black	3-Color	4-Color	ColorSeal
Paper	1	1	2	0
ColorSeal paper	0	0	0	2
Transparency	1	2	1	0
ColorSeal Adhesive media	0	0	0	2

2 = Best match   1 = Acceptable match   0 = Not recommended

Print costs

The following print costs include the cost of the media and transfer roll.

Media	3-Color Transfer Roll	4-Color Transfer Roll	ColorSeal transfer roll
Letter/A4 paper	$2.17	$2.97	Not available
Letter Extra paper	$2.49	$3.29	$3.93
ColorSeal adhesive-backed media	Not available	Not available	$4.90
Transparency (Letter/A4)	$2.89	$3.57	Not available

PhaserMatch™ custom profiles

The PhaserMatch application for Macintosh and PC platforms offers different features depending on the printer's configuration:

■ With the printer's Extended Features option, you can calibrate the printer and create custom color profiles.

■ With the standard version of the printer, only the calibration feature is available.

Calibration options

Calibration is the process of compensating for certain color printing factors to ensure consistency in printing. Using the different test prints available in the PhaserMatch application, you can adjust a printer to compensate for variations between printers and for variations in ink levels in different transfer rolls.

Custom Profiles

The PhaserMatch application allows users to customize color profiles to adjust printed colors for the greatest accuracy and consistency. The PhaserMatch application complements the standard printing press color profiles provided with the Phaser 450 printer by allowing the user to fine tune printed colors to match a specific printing press. A custom profile can be saved for use whenever printed proofs for that specific press are needed.

By printing standard test charts on a Phaser 450 printer and comparing them to the same charts printed on the target press, the user can enter simple values to adjust the printer's colors. Users can adjust dot gain, control density, and adjust color reproduction curves to simulate the color output of the target press, paper, and inks. This unique tool lets users save, load, import and export color profile settings.

Tutorial

An interactive, on-screen PhaserMatch tutorial is available for the Macintosh, and is shipped with the printer.

Color Control Strip

The Phaser 450 printer offers a driver-selectable option for printing a control strip at the bottom of each print for easy color consistency checks. Primary (CMYK) and secondary (MY, CY, CM, CMY) colors are printed at 100% and 50% saturation, allowing for color comparisons between pages from the same printer, or from several printers of the same model.

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Phaser 450 printer compared to the Phaser 440

The Phaser 450 printer is a follow-on product to the Phaser 440 printer. The Phaser 450 printer uses the same cabinet, interfaces, and print engine as the Phaser 440 printer, while offering the following advantages:

- Faster scanned image processing, up to twice as fast
- ColorSeal media
- Adhesive-backed media
- Improved transparency film for more saturated colors
- Faster transparency printing
- Thicker paper
- Improved 3-Color, 4-Color, and Black Transfer Rolls
- Color Control Strip
- New color profiles (Photo, Dai Nippon, FujiProof, Toyo)
- TCP/IP is included with the Ethernet interface
- Adobe Photoshop plug-in Fast Preview mode provides image download in less than 30 seconds, four times faster than the Phaser 440
- Adobe Photoshop plug now for PCs as well as Macintosh.

Phaser 440/450 media compatibility

Note   *Mixing media between the two printers is not recommended.*

- The Phaser 450 printer's transfer rolls are encoded and cannot be used in a Phaser 440 printer.
- Using the Phaser 440 printer's transfer rolls in a Phaser 450 printer is possible, but not recommended because of unpredictable color results.
- Using the Phaser 450 printer's paper and transparency film in a Phaser 440 printer is not recommended as it will produce under saturated colors. Also, the Phaser 450 printer's transparency film may jam when used in a Phaser 440 printer.
- Using the Phaser 440 printer's paper in Phaser 450 printers will work but is not recommended because of unpredictable color results.
- None of the above combinations will cause damage to either printer.

Phaser 440 to 450 upgrade

Existing Phaser 440 printers can be upgraded to the full functionality of a Phaser 450 printer, by ordering the **Z450UP** upgrade kit. The upgrade includes firmware replacement on the existing Phaser 440 printer's controller board. On-site service installation of this upgrade is recommended.

Demonstrating the Phaser 450 printer

As with any demo, define the goals of the demo with the customer beforehand. Remember that large files with scanned images will take time to process and print.

Consult the *Phaser 450 Color Printer User Manual* (included with the printer) for information on setup, loading transfer rolls and media, and using printer drivers. Many of the topics below are covered in greater detail in the user manual.

Printer configuration

The Z450/D Dealer Demo Configuration supports all features, including PhaserMatch, and prints the full image area when using Letter Extra size paper. The Dealer Demo Configuration also delivers the fastest printing throughput.

While the Lower Tray Assembly (4685FTA) is not part of the Demo Configuration, it is strongly recommended. Load one tray with paper and the second with transparency film or adhesive-backed media. Then show the customer how easy it is to select media by selecting the tray in the driver. This is a powerful productivity booster, allowing users to select media without leaving their desks.

Time savers

Standard Tektronix print samples save time by demonstrating the printer's image and color quality in advance of the demo.

The print sample demo CD-ROM provides a convenient source of sample images. Use the CD-ROM with a compatible CD-ROM player connected to the printer's SCSI port to print multiple sample images. Each SCSI ID number on the CD-ROM player corresponds to a different sample image. Turning on the printer's power, or resetting the printer, prints the selected image.

If printing a customer-supplied image is required, pre-printing helps maximize face-to-face demo time.

Color correction

The printer's default setting is None, or no correction. Determine if the customer wishes to apply a color correction to their image before printing. You can make color correction selections from a supported printer driver or by using switches on the printer's rear panel.

- Select Vivid Color to produce the brightest possible colors for business applications.

- Try Simulate Display for engineering and scientific applications.

- Use the printing press adjustments for graphic arts applications.

- Tell customers with the most demanding color requirements that they can also use the PhaserMatch application to create custom color profiles to match the printer's colors to a specific printing press, paper, and ink.

Configuring the Phaser 450 printer

The Phaser 450 printer is available from the factory in two configurations to satisfy the majority of customer needs. The Phaser 450 printer with the Extended Features option offers the greatest performance and the best value. This option's configured price is less than the cost of the base printer plus the separate options. For customers with specific requirements, it is possible to order a custom configuration by ordering a Z450 with options or Field Kits listed below.

Standard Configurations

Ordering Nomenclature	Option Equivalent	Description
Z450/A	Z450	Phaser 450 Standard Configuration
Z450/B	Z450 + FX, 48, P1, 01	Phaser 450 with Extended Features and Ethernet
Z450/D	Z450 +DD, FX, 48, P1, 01	Phaser 450 Dealer Demo Configuration

Extended Features Option

The Extended Features option adds powerful capabilities to the Phaser 450 printer and is recommended for all environments.

Feature	Standard Configuration	With Extended Features
Memory	16 Mbytes	64 Mbytes
PhaserMatch	no	yes
Ethernet	no (optional)	standard
Standard Profiles	Commercial, SWOP, Euroscale, SNAP, Photo	Commercial, SWOP, Euroscale, SNAP, Photo + FujiProof, Toyo, DIC

Memory configuration

Memory configuration	Features
16 MBytes (Base memory configuration; Included with Z450/A standard configuration and Z450)	■ 3-Color (CMY) and black printing on Letter/A4-size media ■ Reduced image size on Letter Extra paper (not a full bleed) ■ PhaserMatch: calibration only, no custom profile capability
32 MBytes	■ 4-color (CMYK) printing ■ Full Letter Extra image area ■ PhaserMatch: calibration only, no custom profile capability
48 MBytes	■ Faster image processing (larger caches and buffers) ■ PhaserMatch: full functionality, calibration and custom profiles
64 MBytes (Recommended configuration; Included with Z450/B and Z450/D)	■ Best PostScript processing performance for complex graphics ■ Maximum throughput (largest network input buffers) ■ Allows processing of the most complex graphic or image ■ Best performance with Photoshop plug-in ■ Extra space for storage of download fonts ■ PhaserMatch: full functionality, calibration and custom profiles

Upgrade Kits

Field Installed for Z450/A, Z450/B, Z450/D or Z450.

Part number	Description
Z450FX	Add extended PhaserMatch (requires 48 MBytes & Ethernet)
Z450UP	Upgrade Phaser 440 to Phaser 450
Z450SSP	Supplies startup kit for Digital Photography
Z450SSG	Supplies startup kit for Graphic Arts
Z450SST	Supplies startup kit for Business Presentations Option 01: Metric media
4680FP1	Ethernet card (with Novell, EtherTalk, TCP/IP)
4685F16	16 MByte RAM Upgrade
4685FTA	Lower tray assembly
Z450FJ	Kanji upgrade kit

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Custom Configurations

Order a Z450 with the desired options installed at the factory, or add upgrade kits later.

Z450: Phaser 450 Color Printer with U.S. Power Cord, User Manual (in English), Driver and Utility Software and Reference Manual.

Options

Factory installed for custom configurations only.
Not available for Z450/A, Z450/B or Z450/D.

Option number	Description
01	Supplies startup-kit
FX	Add extended PhaserMatch (requires P1, 32)
P1	Add Ethernet Card (Novell, TCP/IP, EtherTalk protocols)
16	Add 16 MBytes memory for a total of 32 MBytes
32	Add 32 MBytes memory for a total of 48 MBytes
48	Add 48 MBytes memory for a total of 64 MBytes
A1 - A5	International power cords
DD	"Dealer Demo - Not For Resale" printed on front panel
FJ	Kanji Firmware (requires option 04 or higher)
L1 - L4	Alternate Manual (French, Italian, German, Spanish)
S0 (46S0)	On-site installation
S1	Upgrade to 1 Year On-site Service
S2	Upgrade to 2 Years of On-site Service
S3	Upgrade to 3 Years of On-site Service

Recommending Configurations

For optimum performance and production recommend:

- Z450/B: Includes the Extended Features Option and network connectivity

For budget constrained customers recommend either the Z450/A or the Z450:

- Z450/A Standard Configuration

    - Order desired Field Kits with printer

    - Add Field Kits later, as customer's budget allows

    - Field Kits may require installation by Tektronix or the Authorized Reseller.

- Z450

    - Order desired options with printer

    - Add Field Kits later, as customer's budget allows

    - Field Kits may require installation by Tektronix or the Authorized Reseller.

Printer drivers

The Phaser 450 printer ships with the following drivers. Some of these drivers are PPD-driven (except OS/2, Macintosh QuickDraw GX and LaserWriter 7 drivers). The Adobe drivers are recommended for access to the custom profiles created in the PhaserMatch application.

Operating System	PostScript driver	Availability		PhaserMatch support
		CD-ROM	Diskette	
Windows 3.1	Tektronix printer driver	✔	✔	✔
	AdobePS 3 driver	✔		✔
Windows 95	Microsoft 4.0	✔	✔	
	Adobe PS 4 (version 4.1)	✔	✔	✔
Windows NT	Windows NT 3.5, 3.51	✔	✔	
	Windows NT 4.0	✔	✔	
OS/2	OS/2 driver	✔		
Macintosh	Phaser 450 driver (LaserWriter 7.1.2)	✔	✔	✔
	LaserWriter 8.x (8.3.2)	✔		
	Adobe PSPrinter (8.3.1)	✔	✔	✔
	Phaser 450 GX driver (for use with QuickDraw GX)	✔	✔	✔

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Supplies and Accessories

Material	Part number	Description
Transfer rolls	016-1504-00	Black Transfer Roll, 200 images
	016-1501-00	4-Color Transfer Roll, 100 images
	016-1502-00	3-Color Transfer Roll, 100 images
	016-1503-00	ColorSeal Transfer Roll, 100 images
Paper	016-1510-00	A/Letter (U.S.), 8.5 x 11 ins., 200 sheets
	016-1511-00	A4 (Metric letter), 210 x 297 mm, 200 sheets
	016-1509-00	Letter Extra paper, 9.6 x 13.3 ins. (243 x 337 mm), 200 sheets
	016-1505-00	ColorSeal Letter Extra paper, 9.6 x 13.3 ins. (243 x 337 mm), 200 sheets
	016-1506-00	ColorSeal Adhesive Backed Letter Extra paper, 9.6 x 13.3 ins. (243 x 337 mm), 50 sheets
Transparency	016-1507-00	A/Letter (U.S.), 8.5 x 11 ins., 50 sheets
	016-1508-00	A4 (Metric letter), 210 x 297 mm, 50 sheets
Accessories	436-0278-00	Universal media tray
	436-0279-00	Letter-size paper tray
	436-0286-00	Spare transfer roll tray
Other items	016-1332-00	Cleaning kit
	070-9664-00	User manual (English)
	070-9076-00	Drivers and utilities printing reference manual
	070-8901-00	Network utilities manual
	063-2656-00	Phaser 450 drivers and utilities diskettes
	063-2594-00	Phaser 450 drivers and utilities CD-ROM (for standard configuration)
	063-2596-00	Phaser 450 drivers and utilities CD-ROM (for extended configuration)

Workstation printing software

PhaserPrint™ software for UNIX workstations (4690F20)

PhaserPrint™ for UNIX printing software provides fast raster image printing of Sun Raster Format (SRF), xwd, and SGI RGB format raster images to all Tektronix PostScript Level 2 printers. PhaserPrint software also offers push-button control of Tektronix printer features such as TekColor™ color corrections and print quality modes. The software is provided on CD-ROM.

PhaserPrint for UNIX software supports the following platforms and tested operating system versions:

Workstation	Operating System
Sun	SunOS 4.1.3, Solaris 2.3, 2.4
SGI	IRIX 4.0, 5.2, 5.3
HP 9000 700/800	HPUX 9.0.5
IBM RS/6000	AIX 3.2
DECstation	Ultrix 4.0, 4.4
DEC Alpha	OSF/1 3.0 and 3.2

EasyCopy/X™ for DEC VMS Workstation

EasyCopy/X printing software provides fast raster image printing to Tektronix printers. The following versions are available:

■ 4690F27: EasyCopy/X for DEC OpenVMS AXP/1 workstations

■ 4690F29: EasyCopy/X for DEC OpenVMS VAX workstations

PhaserSym™ software (4690F41)

PhaserSym™ software is a VMS print symbiont, a VMS utility that functions as a driver and as a queue manager. PhaserSym software expands the use of Tektronix printers for use in VAX DECnet environments and in UNIX TCP/IP environments.

PhaserSym software is compatible with DEC workstations running VAX/VMS version 5.0 and later. PhaserSym software communicates over the TCP/IP Ethernet interface of Tektronix printers. Software is provided on CD-ROM.

TekColor Care℠ Service

Warranty

The Phaser 450 printer is covered by a one-year return-to-depot warranty.

TekColor Care Service Options

On-site coverage

Upgrades the standard warranty to on-site coverage. Covers parts and labor for the Phaser 450 printer.

- Option S1:   1 year of on-site service
- Option S2:   2 years of on-site service
- Option S3:   3 years of on-site service
- Option S0:   Printer installation

Phaser 450 printer versus the Kodak Digital Science 8650 PS Color Printer

Compared to the Kodak 8650 printer, the Phaser 450 printer provides the following advantages:

Feature comparison: Phaser 450 printer versus Kodak 8650

Feature	Tektronix Phaser 450 Color Printer	Kodak 8650 PS
Superb print quality and pre-press proofing advantages	Built-in color profiles provide simulations for these standards: Commercial, SWOP, SNAP, and Euroscale Press; plus optional Fuji Proof, Photo, Dai Nippon, and Toyo.	Uses Kodak's proprietary UltraColor Rendering program, which is either on or off. UltraColor is biased towards 3-Color or transparency printing.
	PhaserMatch provides accurate and consistent color, page after page. In addition to the printer's standard color profiles, users can fine-tune printed colors to match a specific printing press and inks.	Custom profile capability is not available from Kodak.
	Superior print quality. New CMY and CMYK transfer rolls, combined with new paper and transparency film, together produce superb color quality with finer detail. Proprietary TekColor Photofine technology enhances fine lines and text, and produces smoother color shading.	Has difficulties with text. "*The 8650 had problems with thin character strokes and tended to experience some voiding, or white gaps, within characters.*" — MacWorld, October, 1996.
	Capable of full-bleed, Letter/A4-size comps for pre-film color proofs.	Oversize media is only capable of a maximum print area of 8.5 x 12 inches, which does not allow for a full Letter-size bleed.
	Color Control Strip allows users to check the consistency of printed colors between prints made on the same printer, or between prints made on more than one of the same model of printer.	This time saving capability is not available from Kodak.
Lower price	Lists at $6,995 for 3-color printing, and $9,495 for 4-color printing.	Is priced at $9,995 for 3-color printing, and $10,795 for 4-color printing.
Performance	Faster processing for greater user productivity. On most files tested, the Phaser 450 printer is faster in total throughput than the Kodak printer.	
	Dual tray option for greater user productivity; Users can select media from their computers.	The Kodak printer does not offer this capability.
Photoshop plug-in	The Fast Preview mode allows printing of a full page RGB image in 30 seconds.	Kodak does not offer this capability.
	Prints either Photoshop RGB or CMYK images without any changes to the printer's configuration.	The transfer roll must be changed to match the image mode in Photoshop.
	The Tektronix Photoshop plug-in supports PostScript.	The Kodak Photoshop plug-in supports only raster file printing. The printer must be manually placed in raster mode from the front panel, and changed back again to print from a PostScript application.
	Allows users to easily assign multiple images to a single printed page.	Kodak users must perform this task manually.
Adhesive-backed media	The Phaser 450 printer supports Tektronix opaque white media with an adhesive backing.	Not available from Kodak.

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Print cost break-even analysis

Some of the Kodak printer's print costs are lower than those for the Phaser 450 printer. Customers comparing the Phaser 450 and Kodak printers may think the Kodak printer's lower print costs mean the Kodak is less expensive to operate. But it takes a lot of prints to offset the Kodak printer's higher purchase price. Look at the numbers and consider that the *prints per day* numbers are **much higher than average usage**; break even for the average user would take longer than shown here. The analysis in the following table is based on MSRP for each printer, list prices for print costs, 250 working days per year.

Printer models	Printer purchase price difference	Print cost difference	Number of prints before break even	Prints per day to break even in 3 years
■ Phaser 450 printer, Standard configuration ■ Kodak 8650 PS/32	$3,000	9¢	33,333 Letter-size, 3-Color, paper prints	44 prints per day
		29¢	10,344 transparencies, 3-color	14 prints per day
■ Phaser 450 printer, Extended Features ■ Kodak 8650 PS/48)	$1,300	9¢	14,444 Letter Extra/Oversize paper prints, 4-Color	19 prints per day

Phaser 450 printer versus the Kodak Digital Science 8650 PS Color Printer

Feature	Phaser 450 Color Printer	Kodak Digital Science 8650 PS Color Printer[1]
Resolution	300 dpi	300 dpi
Paper sizes	Letter, A4, Letter Extra	Letter, Legal, 8.5 x 12 inches, 9.5 x 14 inches, A4, A4 Long, A4 Extra Long
Letter-size bleeds	yes	no
Print modes	3-color, 4-color[2], black	3-Color, 4-Color[3], black
Print speeds (3-Color)	■ Letter/A4: 1.7 min. ■ Letter Extra: 2 min. ■ ColorSeal (Letter Extra): 3 min. ■ Transparency (Letter /A4): 3.1 min.	■ Letter: 1.3 min. ■ Oversize: 1.5 min. ■ XtraLife ribbon (Letter): 1.7 min. ■ Transparency (Letter): 3 min.
Print speeds (4-Color)	■ Letter/A4: 2.3 min. ■ Letter Extra: 2.6 min. ■ Letter/A4 transparency: 4 min.	■ Oversize: 2 min.
Print cost (3-Color)	■ Letter/A4: $2.17 ■ Letter Extra: $2.49 ■ ColorSeal (Letter Extra): $3.93 ■ Transparency (Letter /A4): 2.89	■ Letter: $2.08 ■ Oversize: $2.60 ■ XtraLife (Oversize): $3.57 ■ Transparency (Letter): $2.60
Print cost (4-Color)	■ Letter/A4: $2.97 ■ Letter Extra: $3.29	■ Letter: $2.98 ■ Oversize: $3.20
Prints per Transfer Roll	■ 3-Color: 100 ■ 4-Color: 100 ■ ColorSeal[4]: 100 ■ Black: 200	■ 3-color: 100 ■ 4-color: 85 ■ XtraLife[4]: 85 ■ Black: 150
Host connections	■ Standard: LocalTalk, RS-232 serial, parallel ■ Optional: EtherNet	■ Standard: LocalTalk, parallel, SCSI (2) raster only ■ Optional: EtherTalk, Novell, TCP/IP
Input tray capacity	50 sheets	100 sheets
Memory	16 to 64 Mbytes	32 to 64 Mbytes
Language support	Adobe PostScript Level 2	Adobe PostScript Level 2
Print handling and UV protection	yes	yes
Adhesive-back media	yes	no
Dual input tray option	yes	no
External SCSI disk connect	yes	yes
Pantone®* approved	yes	yes
Color controls	TekColor Dynamic Correction, ColorSync	Kodak UltraColor Rendering, EFI, ICC
Color control strip	yes	no
Custom color profiles	yes	no
Fine-line processing	yes	yes
Warranty	90 days on-site	1 year return-to-depot
Price, U.S.[5]	$6,995 standard configuration (3-Color printing) $9,495 with Extended Features (4-Color printing)	$9,995 (8650 PS/32 Mbytes for 3-Color printing) $10,795 (8650 PS/48 Mbytes for 4-Color printing)

[1] Competitor's specifications are as supplied by the manufacturer as of 9/96.
[2] Requires a minimum of 32 Mbytes RAM.
[3] Requires 8650 PS/48 Mbyte model.
[4] 3-Color only.
[5] Prices are in U.S. dollars; prices outside the U.S. vary, but relative price positioning should be equivalent.
* Pantone, Inc.'s check-standard trademark for color reproduction and color reproduction materials.

Secondary competitor's specifications[1]

Features	FARGO Pictura 310 and 310e	Seiko ColorPoint 820 PS
Technology	Dye sublimation/thermal wax	Dye sublimation/thermal wax
Resolution	300 dpi	300 dpi
Print speeds	Dye sublimation, Tabloid-size, 4-color: 12 min. Thermal wax, Tabloid-size, 4-color: 4 min.	Dye sublimation paper: A/3-color: 1.7 min. A/4-color: 2.3 min. A4-Super/3-color: 2.4 min. A4-Super/4-color: 3.1 min.
Print cost	Thermal wax, Tabloid-size: $1.60 Dye sublimation, Tabloid-size: $6.58	A/3-color: $2.30[2] A/4-color: $2.80[2] A4-Super 3-color: $2.75[2] A4-Super 4-color: $3.25[2]
Paper sizes	B/A3 Super, A/A4 Super. Accepts any paper size larger than 8.27 x 11 ins. up to 12 x 20 ins.	A, A4, Legal, A4-Long, A4-Super
Letter-size bleeds	yes	yes
Media types	Thermal wax: Premium paper, transparency, T-shirt transfer, 1- and 4-color thermal wax ribbons. Dye sublimation: Paper, 4-color dye sublimation ribbons.	Thermal wax, dye sublimation, and transparency media (requires different ribbon and media for different print modes)
Memory	Not applicable (host-based)	12 Mbytes to 136 Mbytes 256 Mbyte hard disk

Paper tray capacity	135 sheets thermal wax paper
	  65 sheets dye sublimation
	  75 sheets transparency
		50 sheets

Prints per Transfer Roll	4-color, all sizes, thermal wax and dye sublimation: 50 images	3-color thermal wax: 178 4-color thermal wax: 148 3-color dye sublimation: 100 4-color dye sublimation: 75
Language support	Adobe CPSI PostScript host-based software(optional); (standard with Pictura 310e)	Adobe PostScript Level 2
Host connections	Standard: parallel (plus serial interface for Pictura 310e) Optional: none	Standard: serial, parallel, LocalTalk Optional: Ethernet (EtherTalk, TCP/IP)
Color systems	Agfa FotoTune, ColorSync, Kodak Color Matching Systems, DayStar Digital ColorMatch, FargoColor (standard with 310e)	MatchPoint: SWOP, Euroscale, DIC, Toyo, MatchPrint, Chromalin, Fujiproof
Photoshop plug-in	no	yes
Pantone approved*	no	yes
Warranty	1 year return-to-depot	1 year return-to-depot
Price[3]	$5,995: Pictura 310e (includes PostScript software and color matching) $4,995: Pictura 310 $795 (PostScript option) $99 (Optional Color Matching)	$7,999

[1] Competitor's specifications are as supplied by the manufacturer as of 10/96.
[2] Dye sublimation print costs.
[3] Prices are in U.S. dollars; prices outside the U.S. vary, but relative price positioning should be equivalent.
* Pantone, Inc.'s check-standard trademark for color reproduction and color reproduction materials.

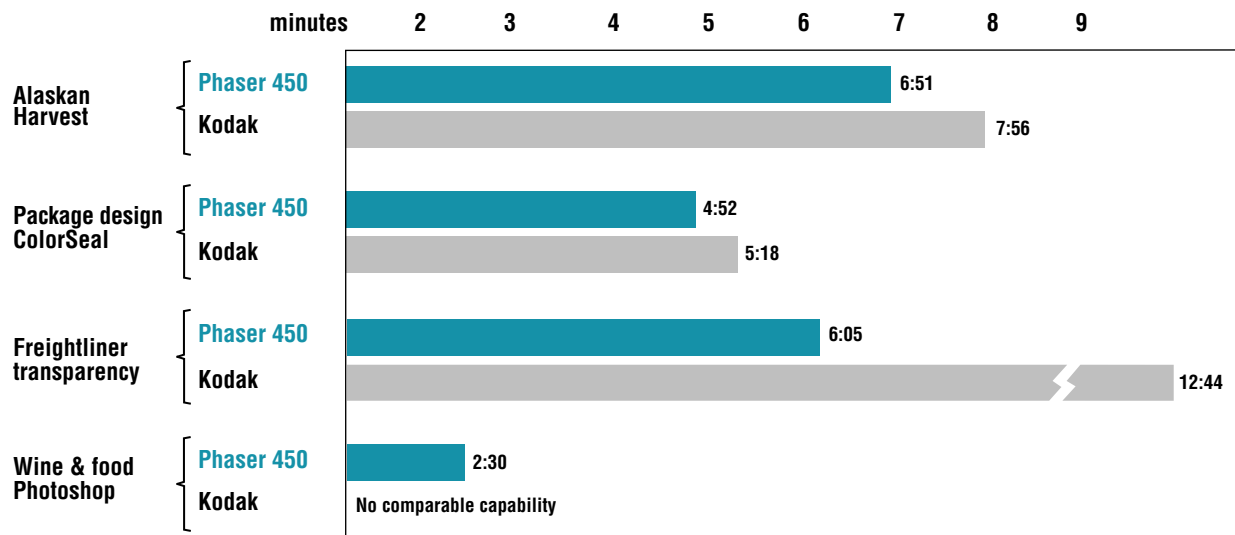# Competitive print speed comparison

The results of the print speed comparison are shown in table and graph formats. Times are in minutes and seconds measuring total throughput (transmission, imaging, and print engine time). Detailed performance comparisons are available on HAL; call 1-800-835-6100, and request document numbers 8505 and 345.

File	Description	Phaser 450 Color Printer	Kodak DS 8650 PS	Result
Alaskan Harvest	Catalog cover, 48.7 Mbyte file, 4-Color Transfer Roll, Letter Extra paper	6:51	7:56	Tek 16% faster
Eng-Sci Collage	Image and illustration, 47.4 Mbyte file, 3-Color Transfer Roll, Letter Extra paper	8:35	6:49	Kodak 26% faster
Package Design	29.5 Mbyte file, 3-Color ColorSeal (XtraLife for Kodak) Transfer Roll, Letter Extra paper	4:52	5:18	Tek 9% faster
Freightliner	OHP sample, 35.7 Mbyte file, 3-Color Transfer Roll, Letter-size overhead transparency media	6:05	Fast: 11:13 Best: 12:44	Tek 109% faster
Wine & Food	Photoshop image, 24 Mbyte file, Letter Extra paper			
	Using vendor's Photoshop plug-in			
	3-Color Transfer Roll, Photoshop RGB mode	3:45	4:20*	Tek 16% faster
	4-Color Transfer Roll, Photoshop CMYK mode	5:06	5:28*	Tek 7% faster
	Using vendor's drivers to print from Photoshop	6:35	7:28	Tek 13% faster
	Using Tektronix Photoshop plug-in Fast Preview mode		No comparable capability	
	3-Color Transfer Roll, Photoshop RGB mode	2:30	—	—
	4-Color Transfer Roll, Photoshop CMYK mode	3:27	—	—

* See page 16 for a description of the Kodak printer's limitations.

Test environment: Macintosh Quadra 840 AV.   Private Ethernet.   All files except Photoshop sent to printer as PostScript files via file downloader utility.
Printer configurations: Phaser 450 printer and Kodak 8650 PS printer: 48 Mbytes RAM. No color corrections were used. Fine line enhancement was turned on.

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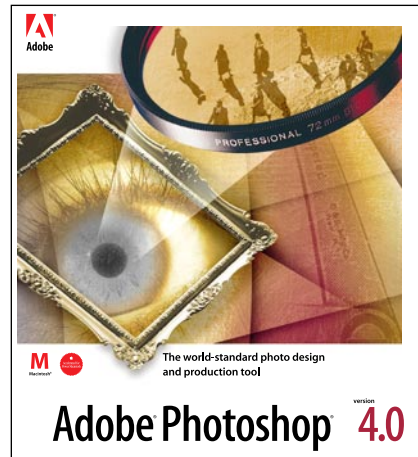
The Kodak printer is harder to use

1. The Kodak Photoshop plug-in does not work in PostScript mode. The printer must be placed in raster mode using the front panel. (When using PostScript applications other than Photoshop and the plug-in, the printer must be placed back into PostScript mode.)

2. When printing in raster mode, the image data mode in Photoshop (RGB vs. CMYK data representation) must match the transfer roll installed in the printer. When printing an RGB image, the printer must have a 3-Color Transfer Roll installed. When printing a CMYK image, the printer must have a 4-Color Transfer Roll installed.

The Phaser 450 printer does not have these limitations. Printing an image with the Photoshop plug-in is independent of the transfer roll type, and the printer doesn't have to be set up in a particular mode. The Phaser 450 printer is more flexible and requires less user intervention than the Kodak.
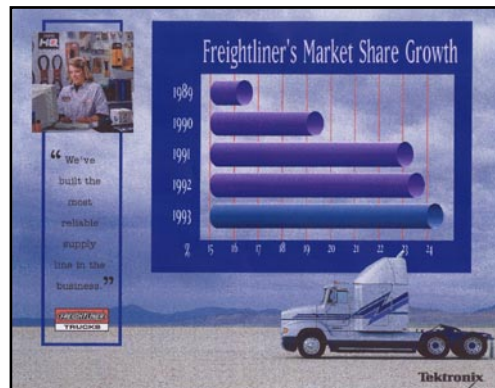
Alaskan Harvest

Package design

Freightliner

Wine & Food

Tektronix information

Reseller and customer programs

TekColor Care ^{SM}	■ Technical support hotline ■ Nationwide service organization ■ HAL automated fax information library ■ Bulletin board service
Reseller sales tools	■ Print samples, data sheets, sales guides, product presentations and more available on CD ROM or the reseller web site (see below) ■ Customer seminars ■ Direct mail flyers ■ Nationwide sales force for joint sales calls ■ National advertising program

Contacting Tektronix

Reseller information, ordering and service	■ 1-800-893-7003
Reseller-only web site (Password required; U.S. resellers call 1-800-893-7003 for password, elsewhere contact local Tektronix office)	■ http://www.tek.com/Color_Printers/resellers
Customer web site	■ http://www.tek.com/Color_Printers/ ■ ftp server: ftp.tek.com/cpid/bbs/ ■ Technical Support: support@ColorPrinters.tek.com
Bulletin Board Service (BBS)	■ (503) 685-4504
America On-Line	■ Keyword: Tektronix
CompuServe	■ GO:Tektronix

Tektronix: The desktop color printer leader

■ Tektronix' Color Printing and Imaging Division manufactures workgroup color printers for business, engineering, scientific, and graphic arts markets.

■ With **34 percent market share**, Tektronix is the leader in the sale of desktop PostScript color printers in the $2,000 to $20,000 price range.

■ Tektronix has a long history in desktop printing, dating back to 1969, with a unique monochrome screen copier. **Since 1982**, when we introduced our first color ink-jet printer, we have focused on producing high-quality color printers that encompass all available color printing technologies, at a broad range of prices beginning at under $1,500.

■ Our color printing expertise has helped us produce a long line of award winning printers. Industry experts from publications such as *MacWorld*, *PC Magazine*, *MacUser*, *Byte*, *MacWEEK*, *Publish*, and *PC Computing*, have issued **more than 30 awards** for Tektronix color printers.

■ Tektronix stock has been listed on the **New York Stock Exchange since 1963**.