

Digital cameras

Ruokosuo, Niko.

1995

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Paper No. 3

Digital Cameras

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Principle

"Photographing the scene is only half of the event - the other half comes from getting the image into the newspaper"

The latter part defines whether digital cameras are justified or not.



Advantages

- images can be produced directly (no film)
- no lab processing
- easy duplication - no loss of quality
- image view after capture
- deleting unnecessary images
- same storage medium can be used several times
- easy processing and transmission

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Disadvantages

- a PC is required for viewing
- exposure latitude is narrower
- at present, image quality is lower
- high cost of camera

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Types of digital cameras

- **Area CCD / Linear CCD**
 - 16.4 x 20.5mm / 1.3 megapixels (AP NC 200, DCS3)
 - 9 x 14.3mm / 1.5 megapixels (DCS 420, DCS5)
 - linear array of ~ 2000 pixels/ multiple exposure
- **One-shot / Three-shot**
 - tiny R,G and B sensor for each pixel (one CCD)
 - color-resolving prism > three CCDs
 - three exposures for R,G and B with rotating filter
- **Off-line / On-line**
 - own image storage (built-in or PCMCIA)
 - no own storage, usage with a computer



Advantages of larger CCD

- **larger pixels > more light (sensitivity)**
- **faster exposure**
- **larger viewfinder**
- **DCS 420 multiplies focal length by 2.5
(24mm lens becomes 60mm)**
- **NC 2000 multiplies focal length by 1.5
(24mm lens becomes 36mm)**



Quality

- **image resolution ~ 1.5 MB / channel**
 - 1500 x 1000 pixels
 - in newspaper printing 150 dpi required
 - 10 inch wide image is OK (no cropping)
 - (24x36mm film is equivalent to 2400x3600 pix)
- **10, 12 or 14 bits per pixel in camera**
- **internal software to improve highlight and shadow detail when converting to 8 bit**



Products; 1995

- **Low resolution cameras**
 - **area CCD, 400 000 pixels, off-line**
 - **image database, image memo**

Apple QuickTake 100,150

Casio QV-10

Dycam

Logitech Fotoman

Olympus VC1100 II

Ricoh DC-1

Kodak DC-40



Products; 1995

- **Standard Resolution Professional Cameras**
 - area CCD, 1.3 - 1.5 megapixels, off-line
 - press photography, DTP, image database

Kodak DCS 420
Canon EOS-DCS3
Kodak EOS-DCS5
Nikon E2
Agfa ActionCam

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Products; 1995

- **High Resolution Professional Cameras**
 - area CCD, 4 - 6 megapixels, off-line or on-line
 - studio, catalogue, DTP

Kodak DCS 460
Leaf CatchLight
Rollei ChipPack
Canon/Kodak EOS-DCSxx? (late 1995)

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Products; 1995

High Resolution Professional

- linear CCD, 6 - 45 megapixels, on-line
- high-end catalogue

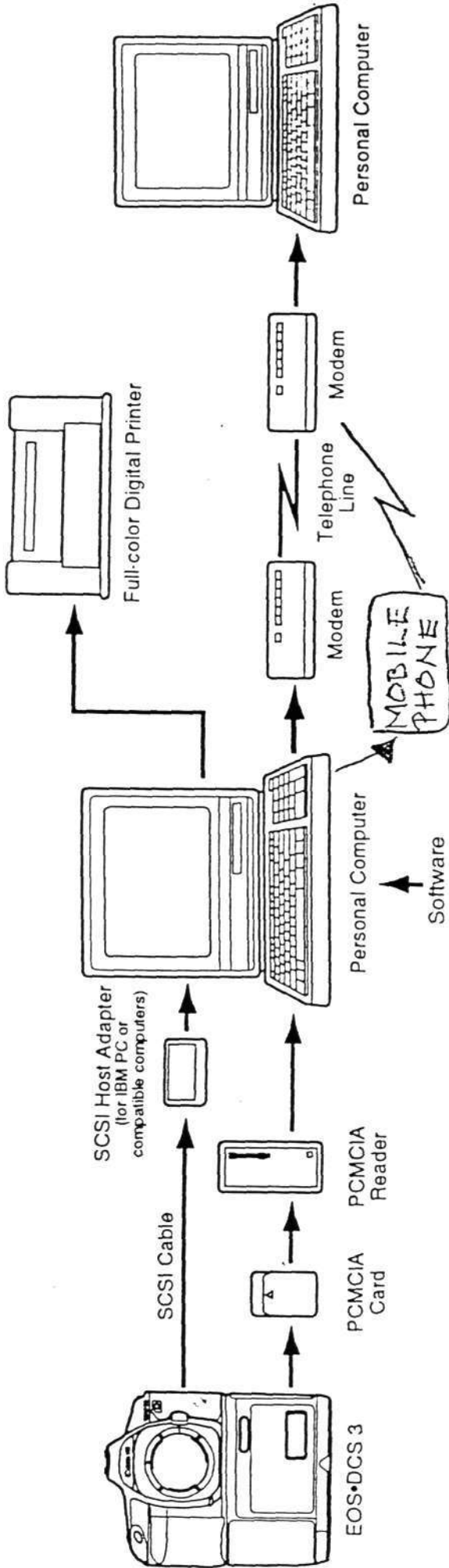
Dicomed
Leaf Lumina
Phase One
Rollei ScanPack

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Experiences

- frame buffer: 0 - 12 frames
- PCMCIA 170MB / 100-120 compressed images
- uncompressed images ~ 3.6 MB
- 200 - 1600 ASA; can be changed for each frame
- AP (Associated Press):
 - voice capture
 - latest developments in software (highlights, noise, colour rendition)
 - sensitive to exposure (use automatic)
 - deadline later
- Atlanta 1996 !!!

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For Macintosh
Driver Software or Compatible Image Editing Programs

For IBM PC or compatible computers
Drive Software/TWAIN-compliant Application Software

Manufacturer	Canon-Kodak (EOS-1N Base)	
	EOS-DCS 3	EOS-DCS 5
GENERAL SECTION		
Compatible Lenses	All EF Lenses (Including TS-E Tilt-Shift series)	
Viewfinder System	Image projects directly on CCD (no light loss)	
Viewfinder Display	Image area marked on focusing screen according to CCD size	
Standard Focal Length Conversion Factor	35mm 1.5x	20mm 2.5x
Number of Focusing Points AF Pattern	5 II+II	3 I+I
Light Metering Patterns	16-zone Evaluative, Center-weighted Average, Partial, Spot (linked to focusing point), Fine Spot	
Metering Patterns	3-zone A-TTL/TTL* linked to focusing point	
Maximum Framing Rate	2.7 fps	2.3 fps
Memory	12 frames	10 frames
Range (Color model)	200-1600	100-400
Range (Monochrome/IR)	400-3200	200-800
Exposure Compensation	+/- 3 EV in 1/3 or 1/2 steps	
Shutter Speed Range	1/8000-30 sec. in 1/3, 1/2 or full steps	
IMAGE QUALITY SECTION		
Image Size	16.4 x 20.5mm	9 x 14.3mm
Number of Pixels/Individual Pixel Size (μ = micron)	1.3 Million 1268 x 1012/16 μ	1.5 Million 1524 x 1012/9 μ
Input-to-digital conversion gradient	12-bit per channel (36-bit RGB, 4096 shades)	
Output conversion gradient	8-bit per channel** (24-bit RGB, 256 shades)	
Storage Medium (Removable)	PCMCIA-ATA Type I & II IC Cards or Type III Hard Disks	
Capacity (# of images)	approx. 120\$	approx. 100\$
PCMCIA-ATA Card		
Data Compression	None	
White Balance	None (Accomplished by supplied software plug-in)	
Video Output	25-pin Parallel/SCSI output to PC/Mac	
External Video Output	Not Provided	
Audio Recording	Provided (3 min. audio = 1.5 MB)	
Battery Source	Rechargeable Nickel-Metal Hydride (Built-in)	
Dimensions (WxDxH, mm)	161 x 89 x 191	
Weight (kg/lb.)	1.71kg/3.8 lb.	
Price (as of 5/15/95)	\$16,000/\$18,000 IR	\$11,995

* Distributed exclusively by Canon.

** Distributed exclusively by Kodak.

\$ = Shutter speed sensor adjusted for CCD to provide optimum exposure for standard scene based on Canon's standard test method.

IR = Image output scheduled for availability later this year.

AP-Kodak (N90 Base)		Kodak (N90s Base)		Nikon/Fuji	
NC2000	DCS 420	DCS 460	E2/DS505	E2s/DS515	
All Nikon F-mount Lenses (No Tilt-Shift lenses available)			AI Nikkor or later required 35mm focal length or longer--f/6.7 or faster		
Image projects directly on CCD (no light loss)			Image passes through relay optical system (Maximum aperture becomes f/6.7-- resulting in light loss up to 5-1/2 f/stops)		
Image area marked on focusing screen according to CCD size			98% coverage		
35mm 1.5x	20mm 2.5x	40mm 1.25x	50mm 1.0x		
1 +			1 —		
Center-weighted Average, Spot (3-D Matrix Not Available)			6-zone Matrix, Center-weighted Average, Spot (3-D Matrix Not Available)		
5-zone TTL not adjusted for CCD			5-zone TTL (not affected by CCD due to relay optics)		
2.0 fps	2.0 fps	Single Frame	1.0 fps	3.0 fps	
6 frames	5 frames	1 frame	None	7 frames	
200-1600	100-400	Maximum 200	800/1600 (No intermediate settings)		
Not Available	200-800	Maximum 400	Monochrome & IR Models Not Available		
+/- 5 EV in 1/3 steps			+/- 2 EV in 1/4 steps		
1/8000~30 sec. in full steps only			1/2000~1/2 sec. in 1/2 steps-Auto Mode 1/2000~1/8 sec. in 1/2 steps-Manual Mode		
6.4 x 20.5mm	9 x 14.3mm	18.5 x 27.5mm	2/3-inch (8.8 x 6.6mm)		
1.3 Million	1.5 Million	6 Million	1.3 Million		
68 x 1012/16μ	1524 x 1012/9μ	3060 x 2036/9μ	1280 x 1024/6μ		
12-bit per channel (36-bit RGB, 4096 shades)			10-bit per channel (30-bit RGB, 1024 shades)		
8-bit per channel** (24-bit RGB, 256 shades)			8-bit per channel** (24-bit RGB, 256 shades)		
PCMCIA-ATA Type I & II IC Cards or Type III Hard Disks			PCMCIA/JEIDA IC Cards ONLY		
approx. 120\$	approx. 100\$	approx. 30\$	5 when uncompressed 21, 43 or 84 images when compressed (with 15MB IC Card)		
None			JPEG Standard (Non-Reversible)		
None (Accomplished by supplied software plug-in)			Automatic (Built-in)		
25-pin Parallel/SCSI output to PC/Mac			8-pin RS-422 Serial Output		
Not Provided			Provided		
Provided (3 min. audio = 1.5 MB)			Not Provided		
Rechargeable Nickel-Metal Hydride (Built-in)			Exclusive Rechargeable Ni-Cd (Built-in)		
170 x 114 x 208			164 x 120 x 140	164 x 120 x 160	
1.71kg/3.75 lb.			1.65kg/3.6 lb.	1.85kg/4 lb.	
\$15,000	\$10,995	\$30,000	\$13,995/\$13,735	\$16,995/\$16,735	

Pricing & specifications subject to change without notice.