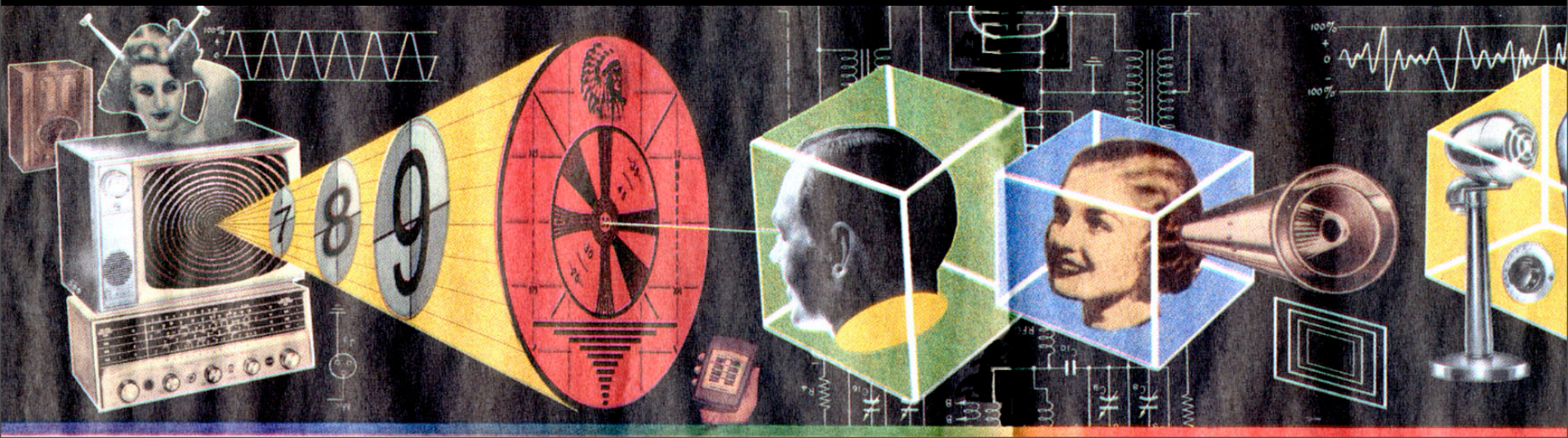
MEDP/FILMP 160:
Film and Media in a Digital Age

Hunter College

Dept. of Film and Media Studies

FALL 2012

Profs Hurbis Cherrier & Lucas



Camera plus film...

... a mechanical and a chemical medium

- The motion picture camera owes its origins to a variety of previous inventions…

The Camera Obscura

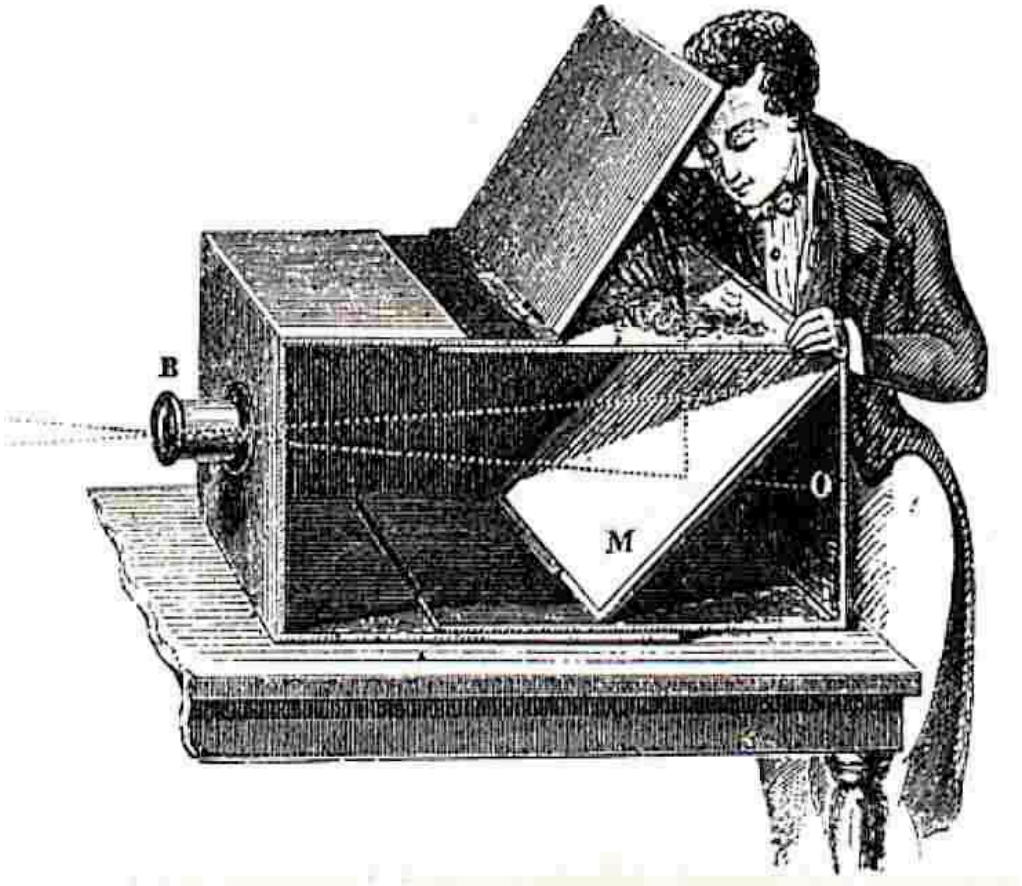
- Camera Obscura means “Dark Chamber”. A hole in the wall allowed light to ‘paint a picture’ inside the room.

A Painter's Tool

Painters began using the "camera obscura' during the Renaissance to help create 'realistic' images for new patrons.

View of Delft Today...

Adding a Lens makes the unit portable and the image size adjustable



- Artist Using a Portable ‘Camera Obscura’

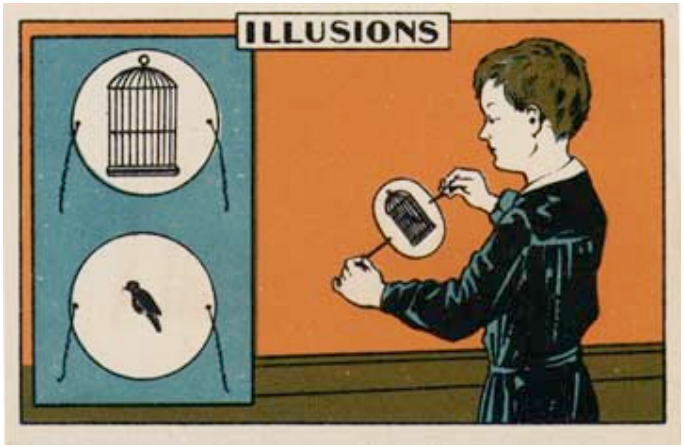
The Magic Lantern

Adding a light source to the Camera Obscura meant both a reversal of its logic, and a new form of entertainment. Here we see a Magic Lantern man with his projector.

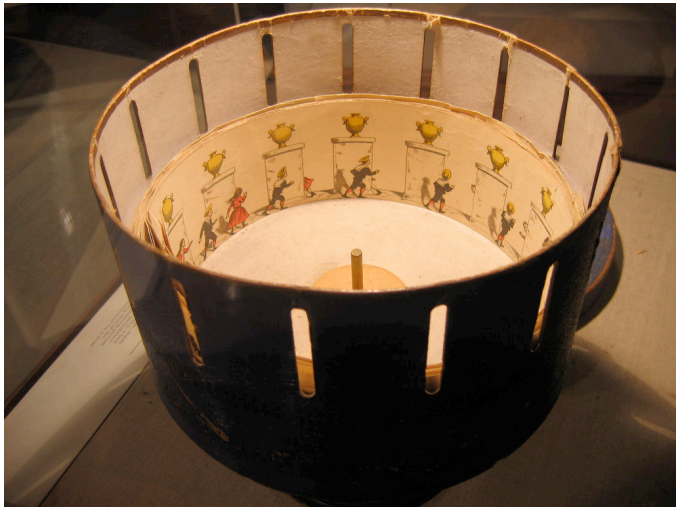
The Sewing Machine!

Mass Production &
Repetitive Motion
were developed in late 19th Century
Devices such as the Sewing Machine, the Typewriter and the Repeating Rifle led to the production capability needed to make the movie camera.

VICTORIAN OPTICAL TOYS



Thaumatrope



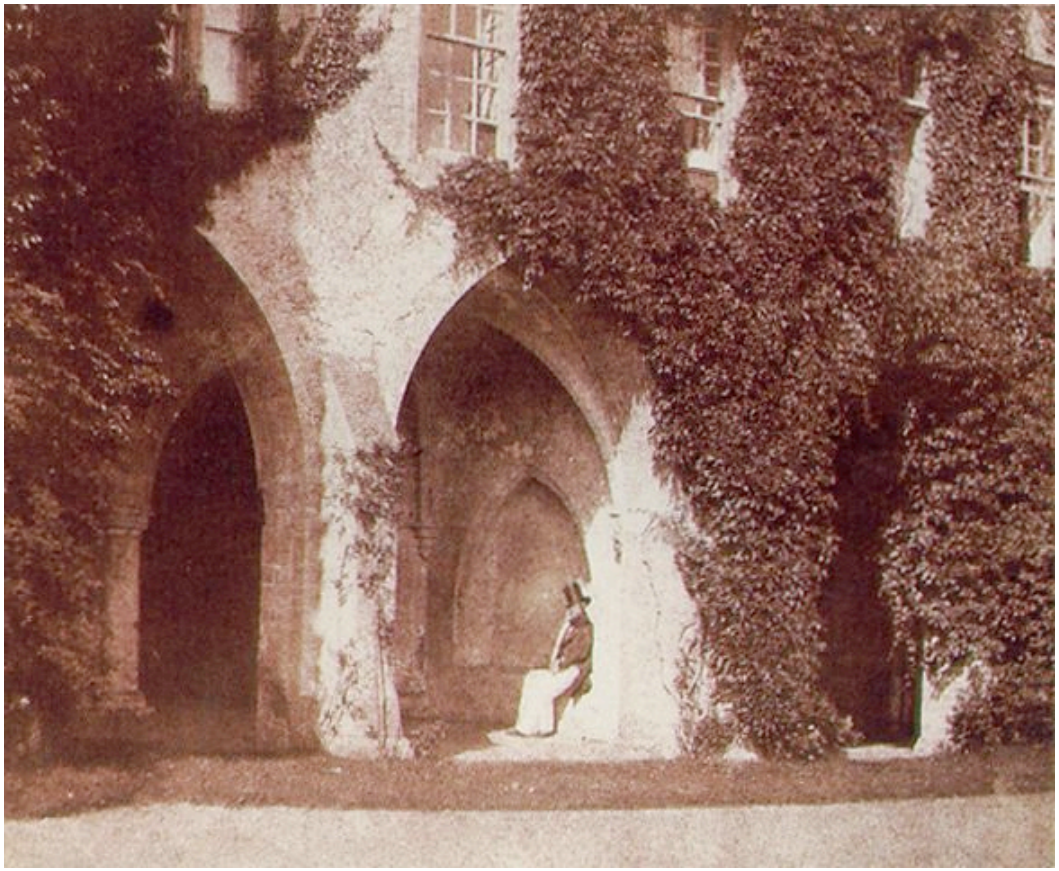
Zoetrope

The Zoetrope

This device was one of many 19th century toys to take advantage of

"SHORT RANGE APPARENT MOTION"

The Invention of Film

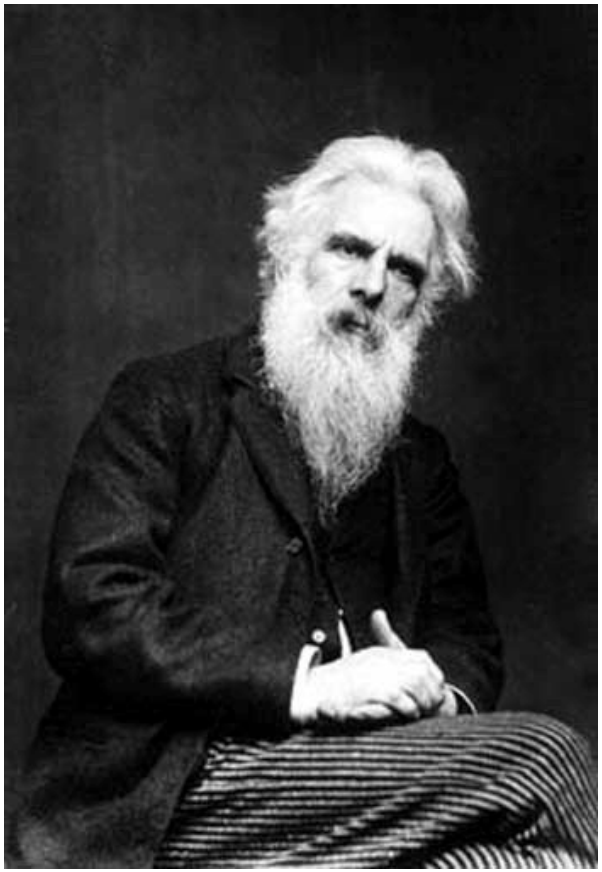


In the late 1830's the development of a science of chemistry meant that inventors in England and France were able to use the properties of SILVER NITRATE to create images with light.

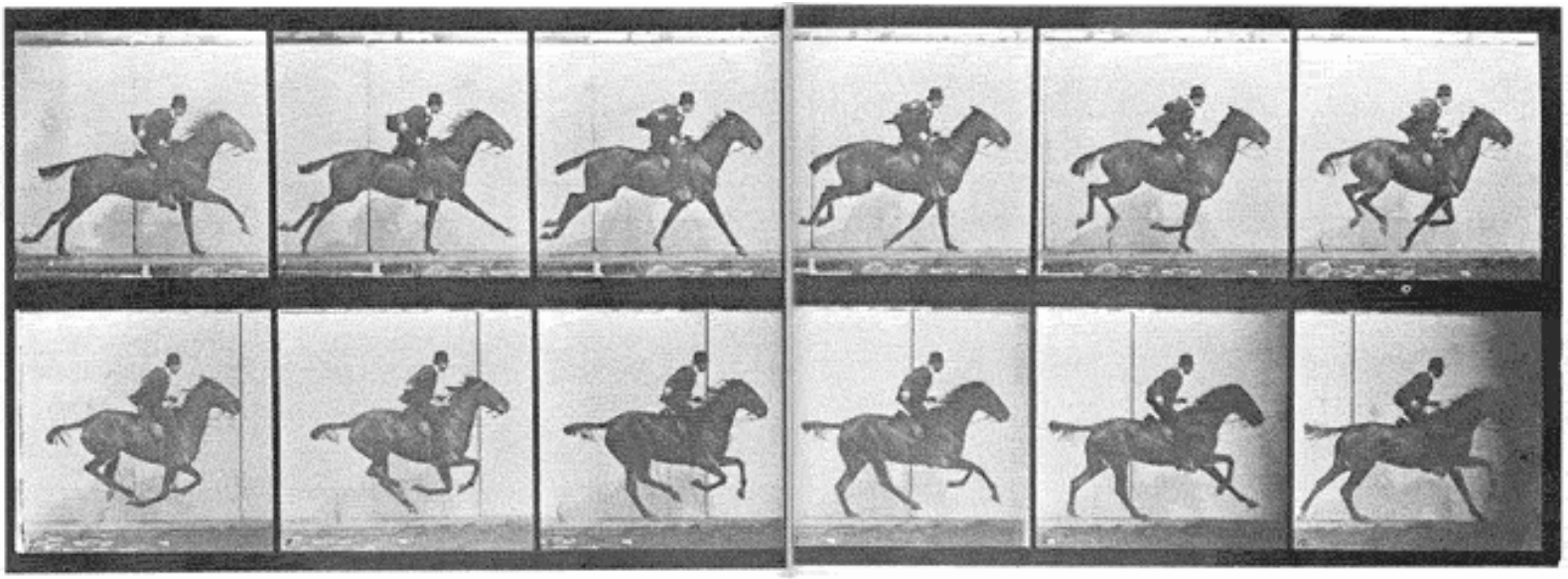
William Henry Fox Talbot

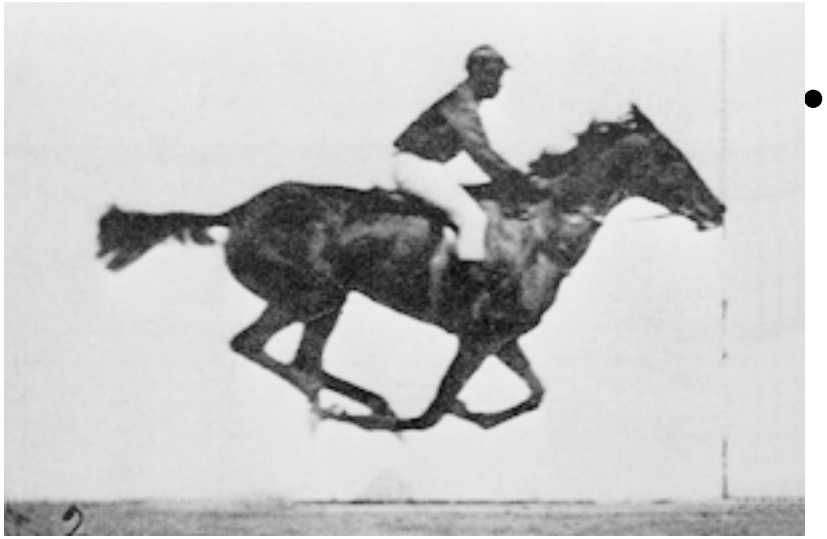
Talbot was an artist who used a ‘camera obscura’ as a drawing aid and made some of the first photographs.
For him, film, even without a camera, was also an alternative to his sketchbook.

Eadward Muybridge



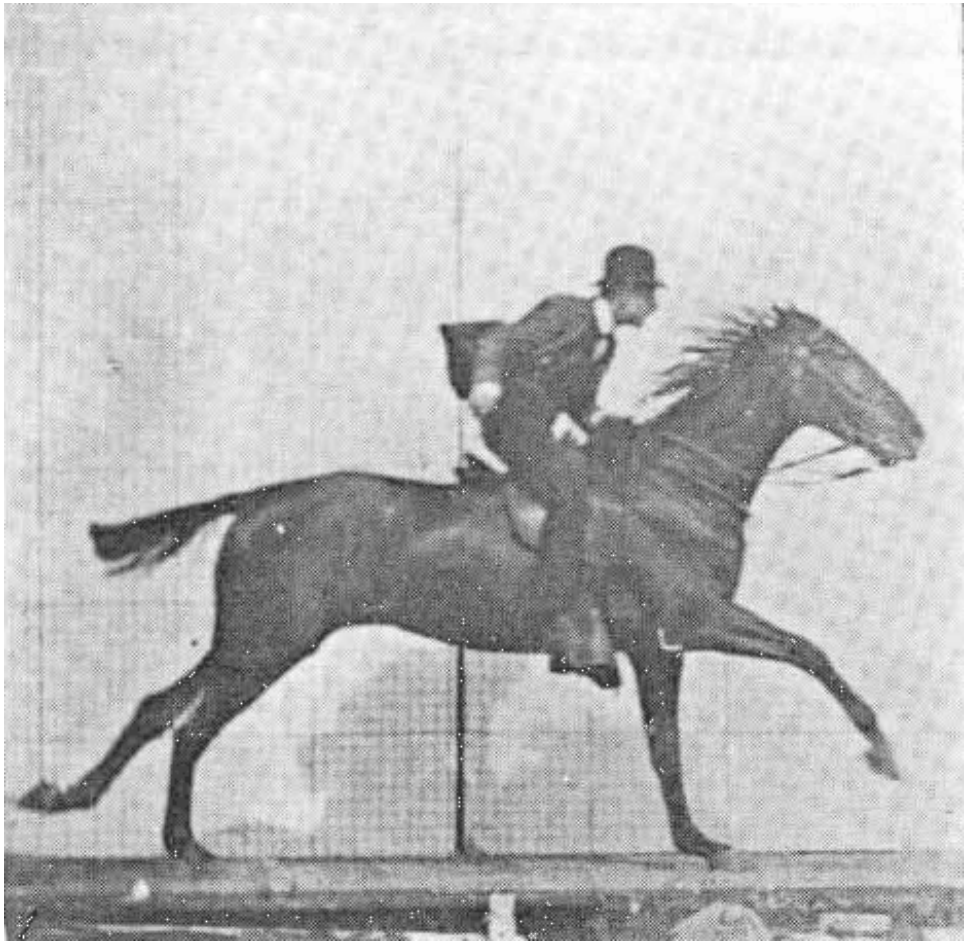
Muybridge was a photographer who got involved in a settling a question for former California governor and race horse owner Leland Stanford. “Did all four hooves of the horse leave the ground in running, or did one stay in touch?



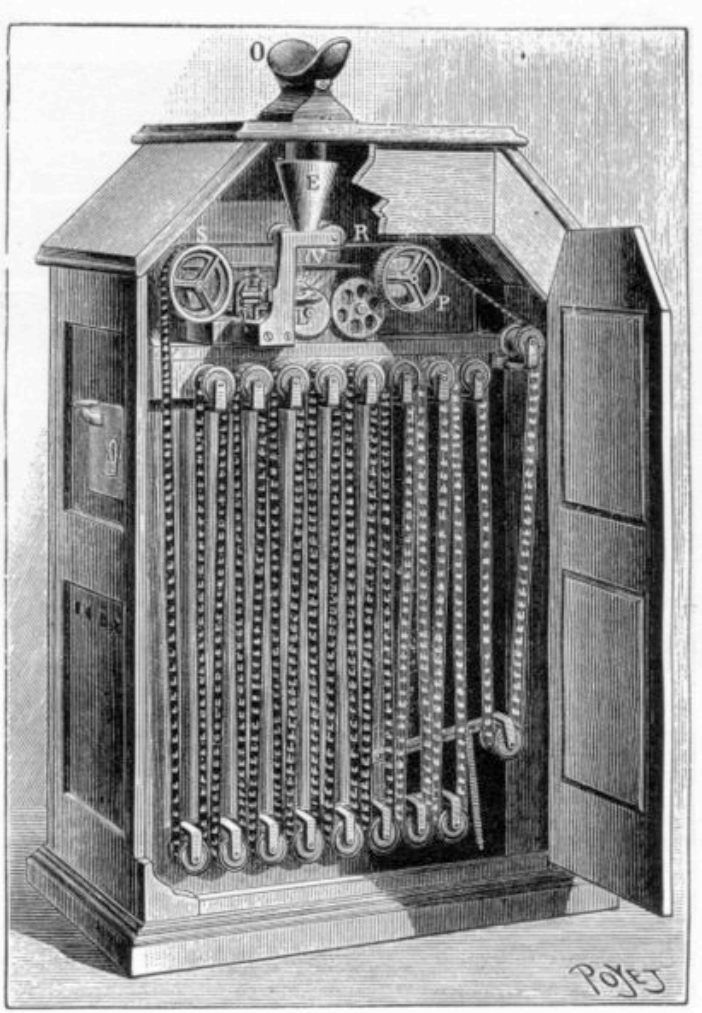


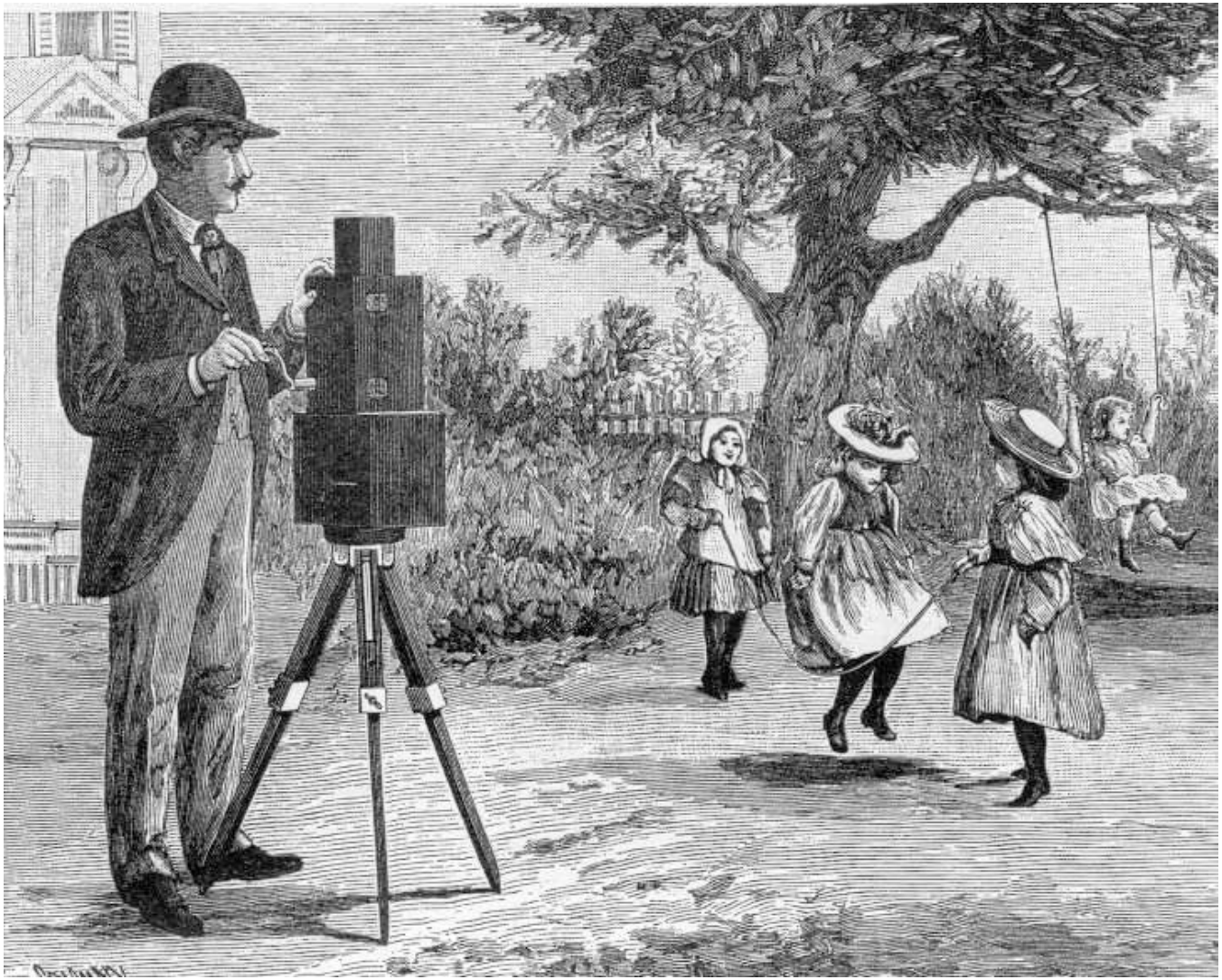
- In the late 1870s Muybridge invented a special high-speed shutter and a system of multiple cameras with strings that the horse would trip while galloping.

- While Muybridge never animated his images himself, his work is considered a predecessor of both film and animated moving image making.



Edison's Kinetoscope 1891



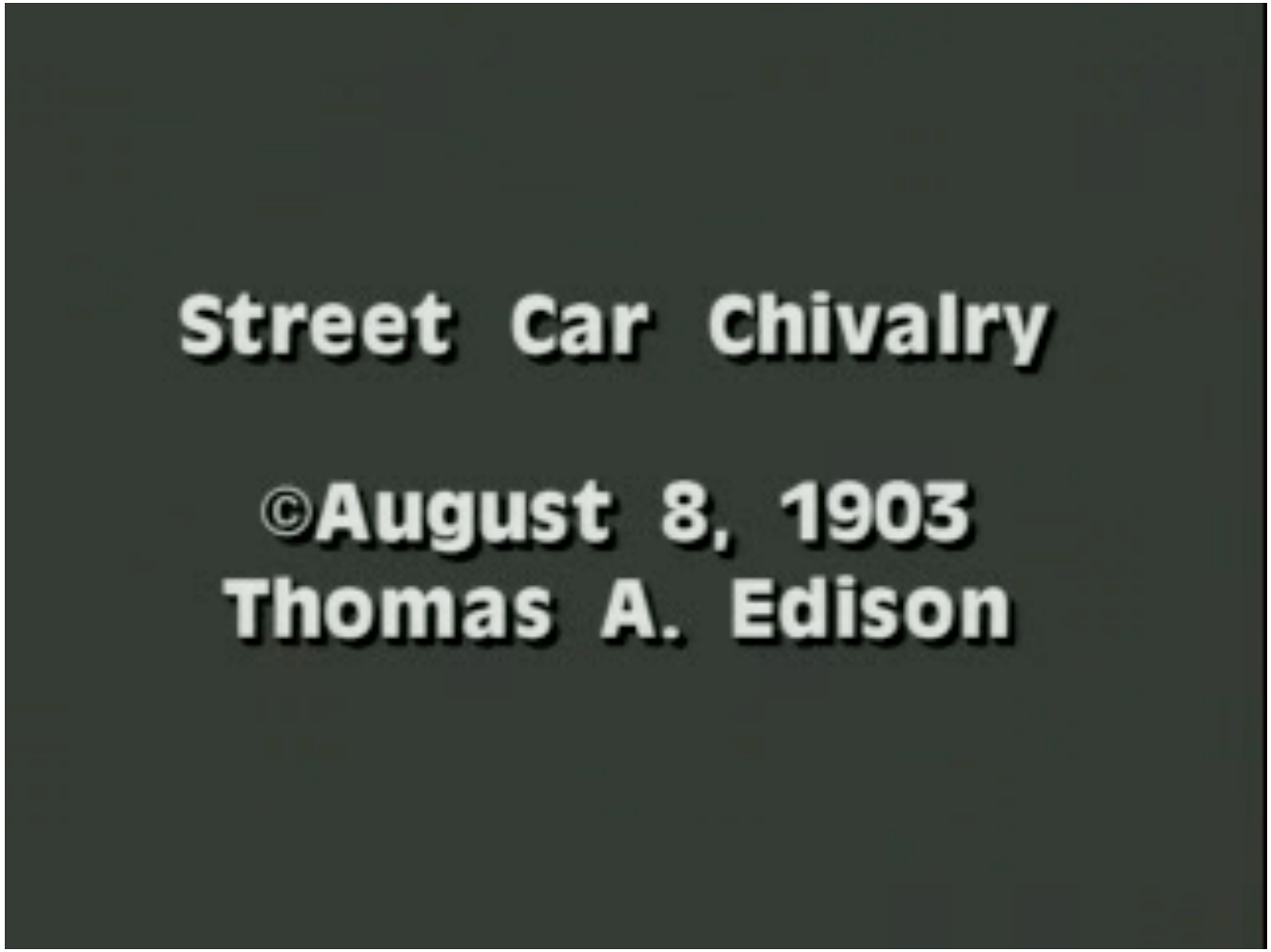


Lumiere’s movie camera - 1895

The *Flip* Book

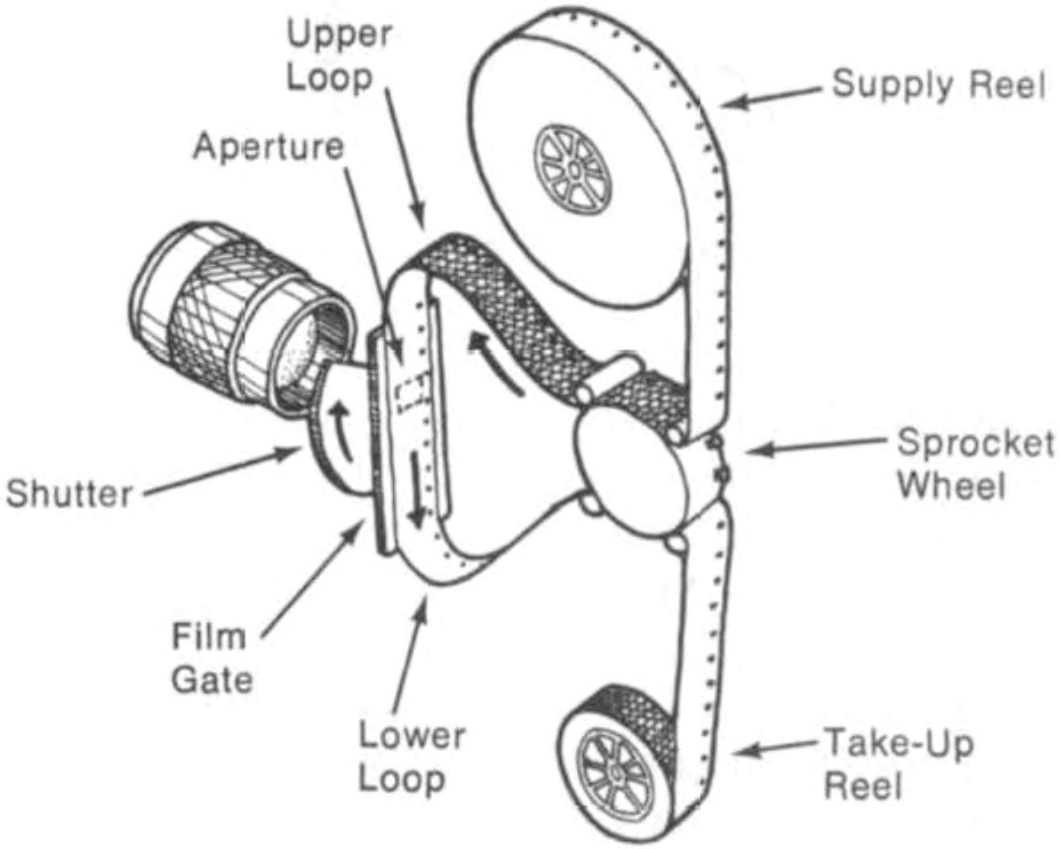
- A modern version of the zoetrope is the ‘flip book’, a short animated story designed to be watched by thumbing through it very quickly.

Clip from Pioneers of Cinema



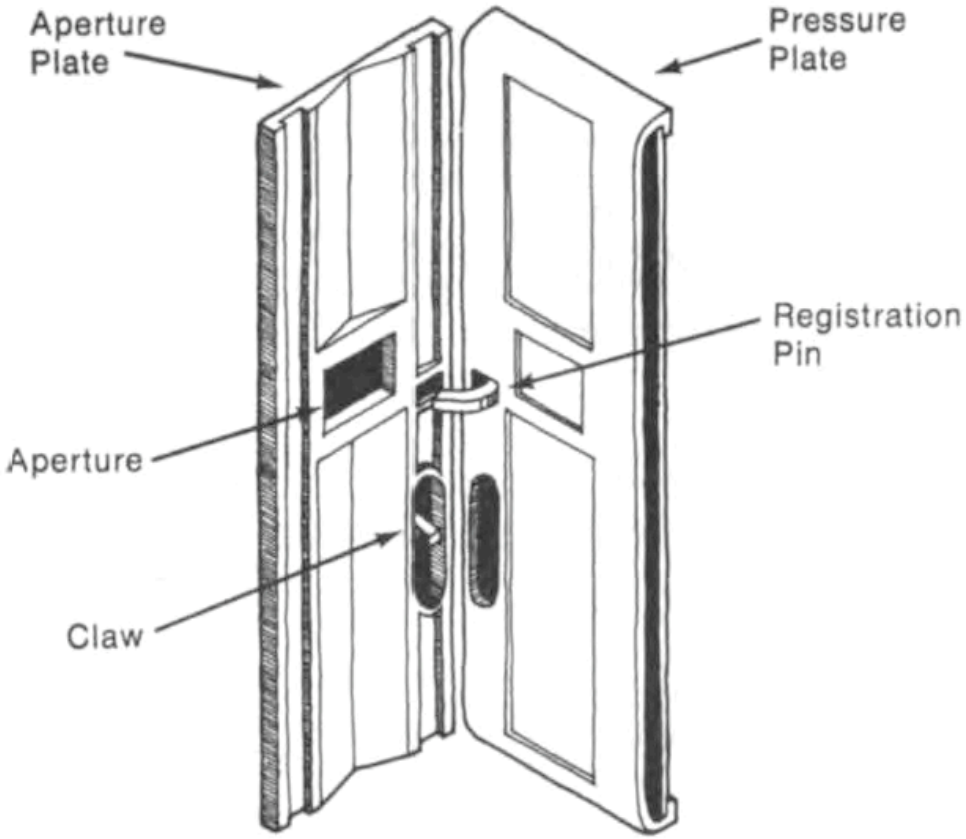

MONSIEUR LE BARON
A TROP BIEN DINÉ
"STAR FILM"
3

how film cameras work

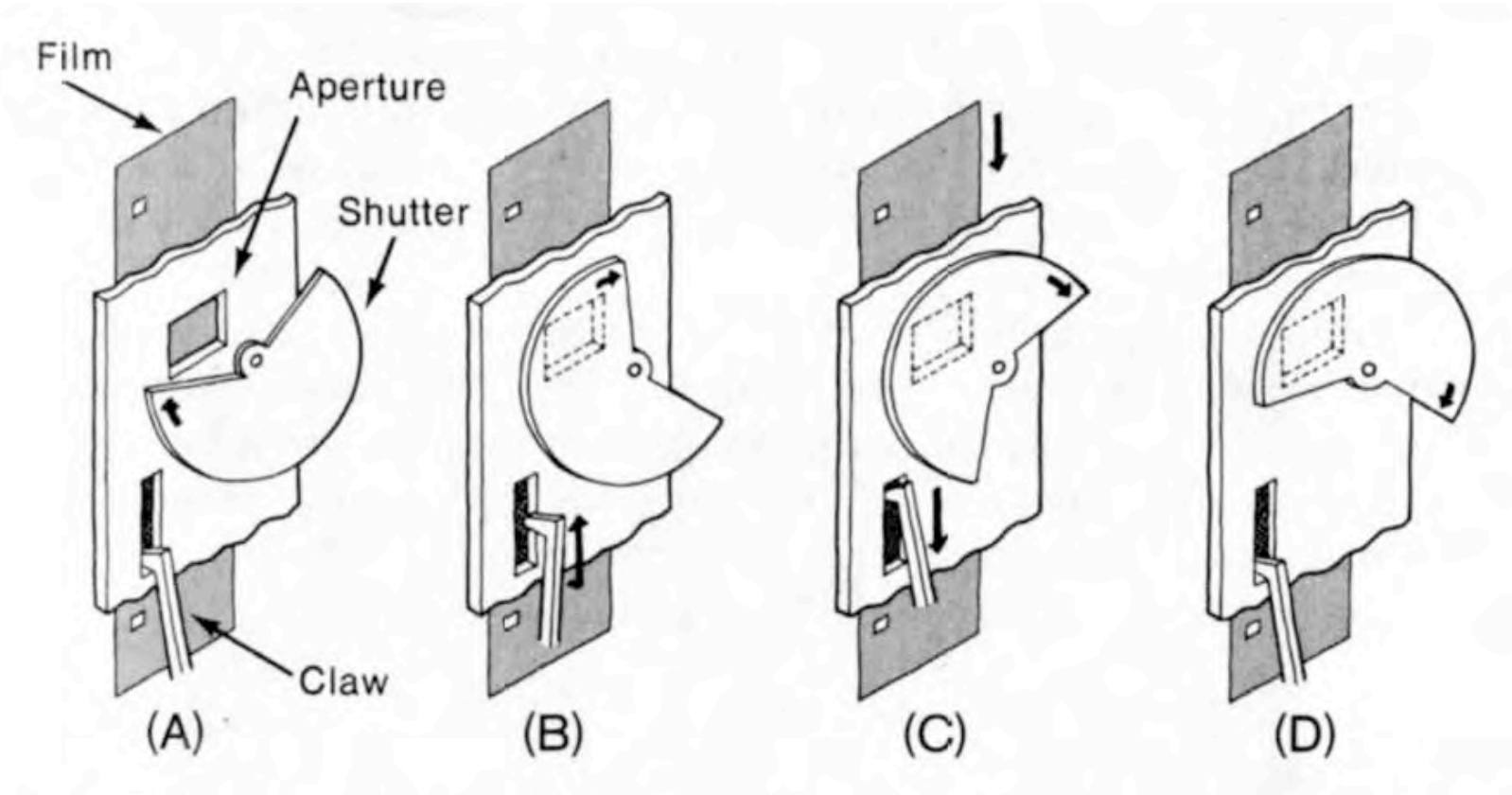


link

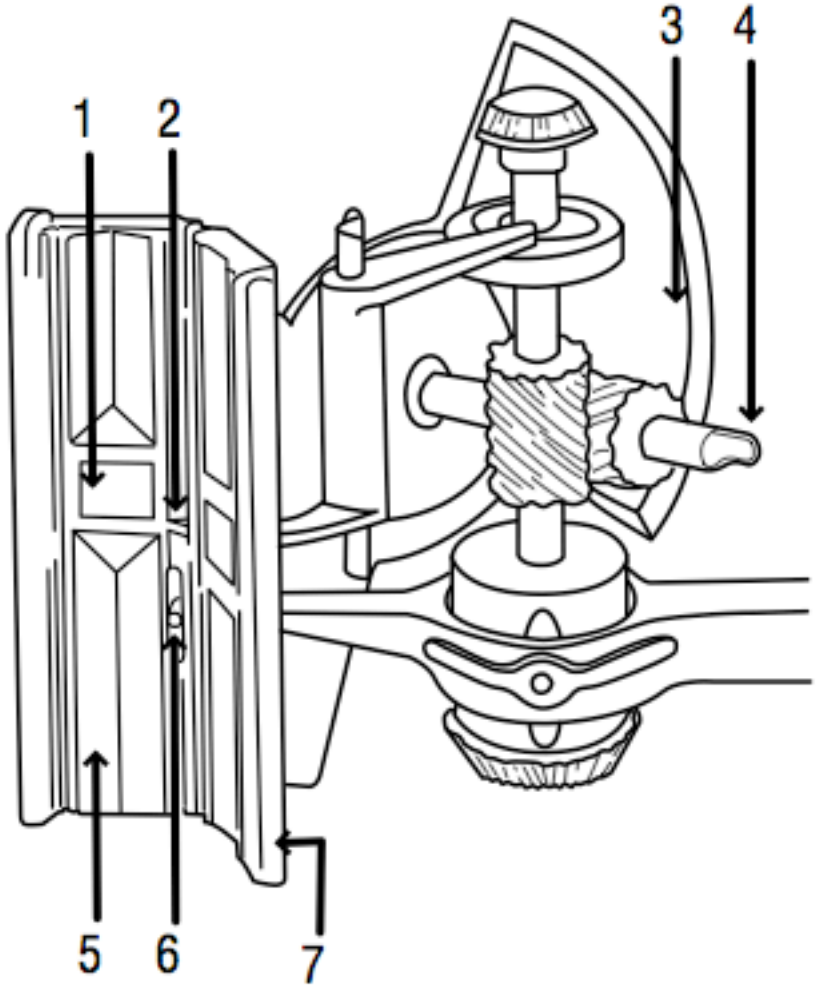
how the camera gate works



the film shutter



ARRIFLEX ARRI – 16S



ARRI–16S MOVEMENT

1 – APERTURE
2 – REGISTRATION PIN
3 – MIRRORED SHUTTER
4 – SHAFT TO INCHING KNOB
5 – APERTURE PLATE
6 – PULL–DOWN CLAW
7 – PRESSURE PLATE

frame rate

- flip book = 10 fps
- early film cameras = 16 fps
- modern cameras = 24 fps
- video = 30 fps (NTSC)

double vs. single system sound

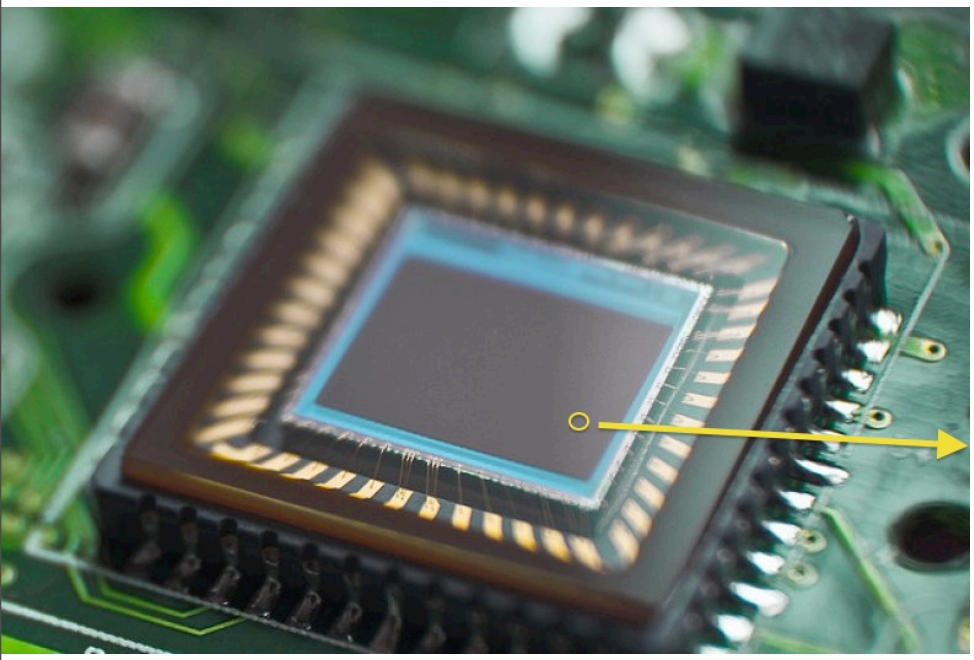
The Portapak -1968

First easy-to-use and fairly portable alternative to film...

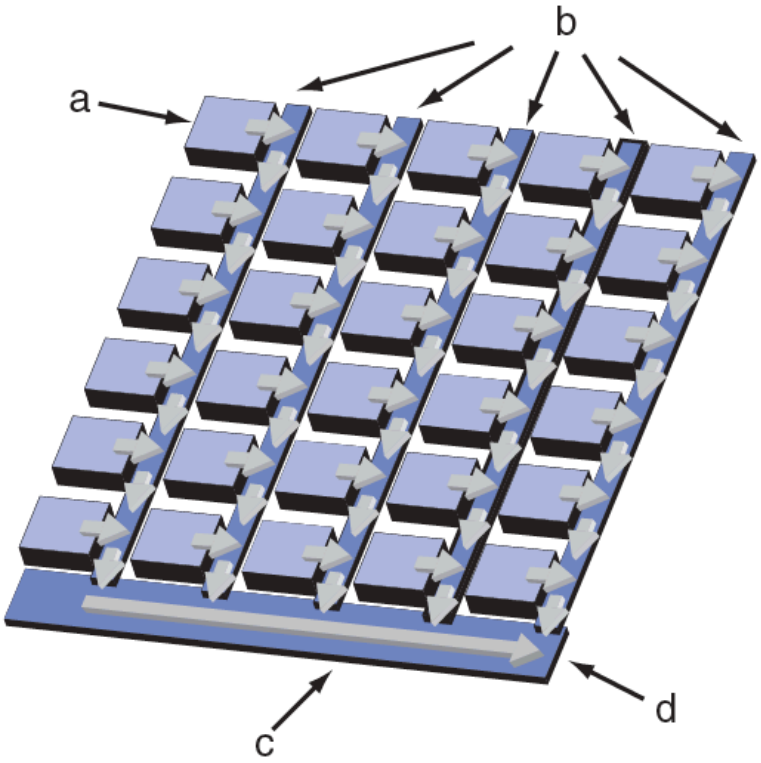
DIGITAL VIDEO

Electronic binary data processing

30 frames per second (29.97 fps)

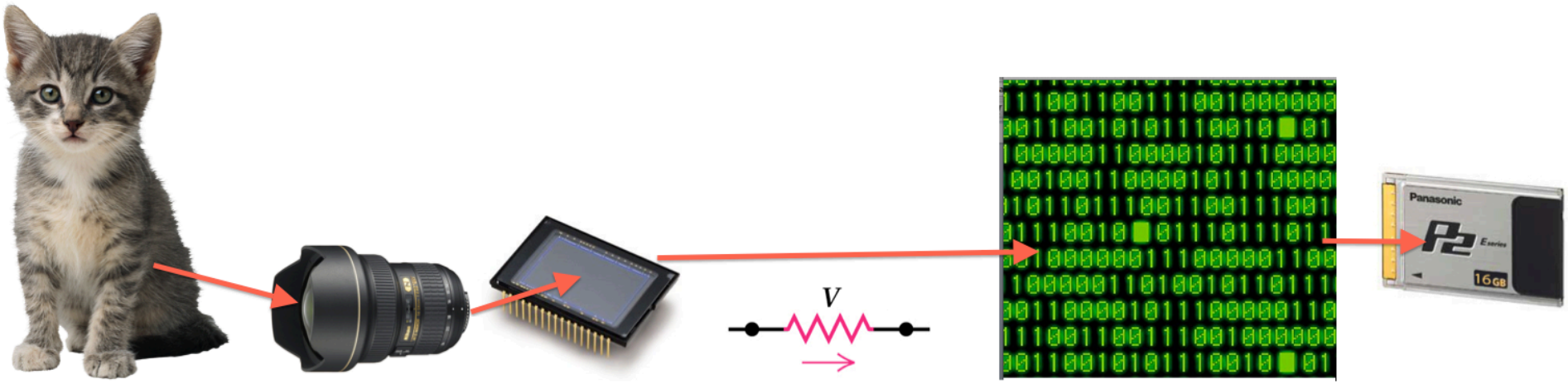


The CCD



■ **Figure 9-2** CCD chip. Individual pixels (a) collect brightness information and feed a corresponding charge down vertical registers (b), which carry them to a horizontal register (c). The raw video signal (d) is then fed to an output amplifier. The pixels are read one row at a time at the horizontal charge transfer area; once the information is collected, the row above gets transferred one row down to be collected. The charges in the rows are therefore "coupled" to one another.

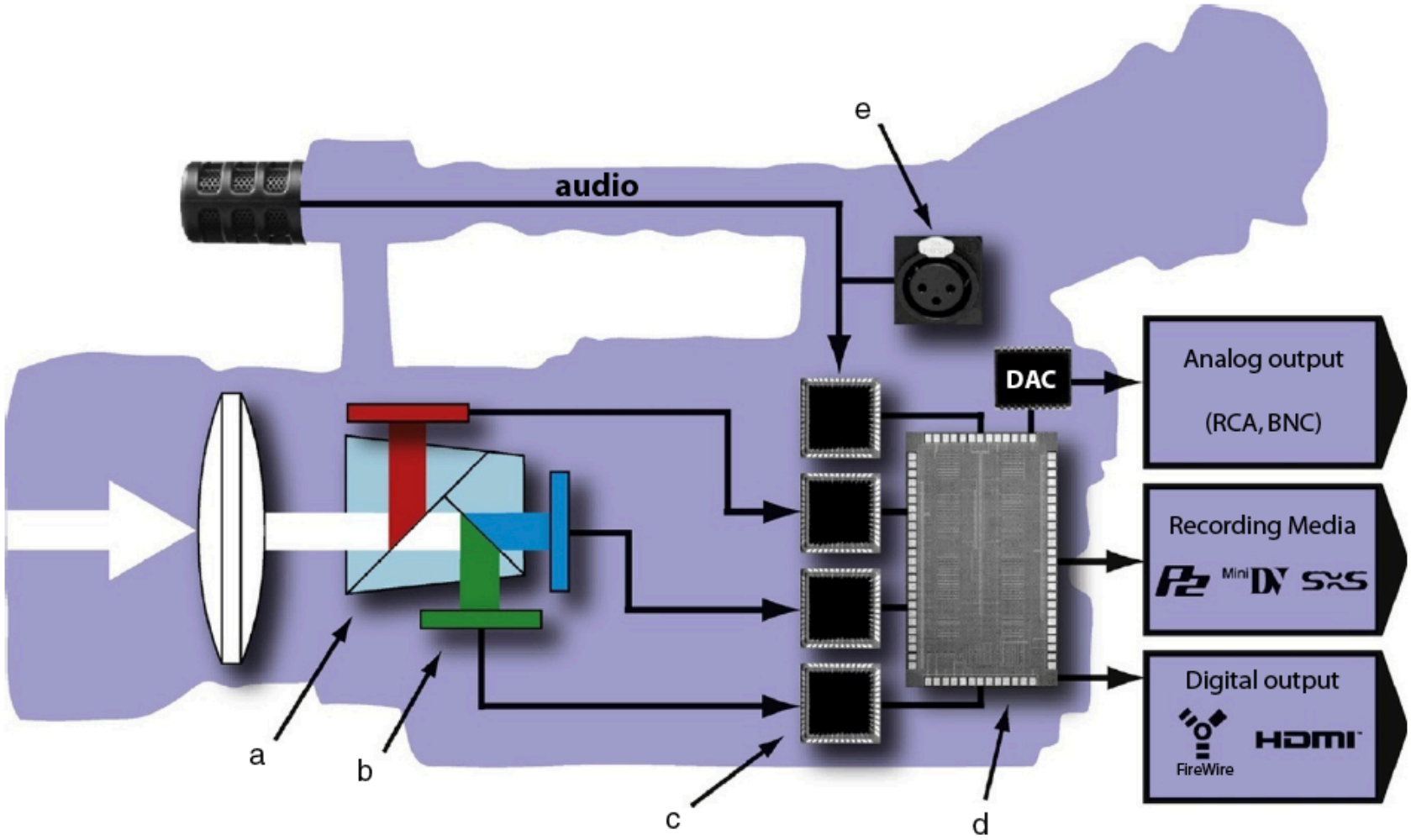
Light-lens-CCD-voltage-data-storage



COLOR SPACE = YRB
Y = Green + Luminance
R = Red
B = Blue

LUMINANCE = Brightness
(B&W)

CHROMINANCE = Color
Information
(Red, Green, Blue)



■ **Figure 9-30** A three-chip video camera produces an image by first dividing the light entering the lens into primary colors with a prism block (a), which are read by three CCD chips (b), their signal outputs are converted into digital data by an ADC (c), and they are processed by the DSP (d), ultimately outputting the data to the record media. Audio inputs (e) have their own ADC as well. See the color insert.

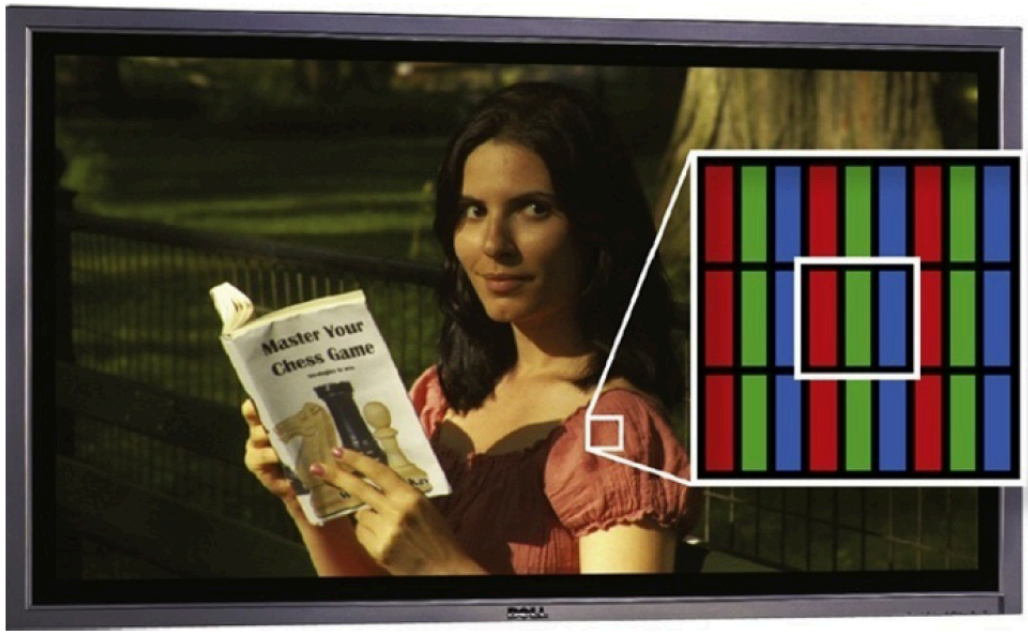
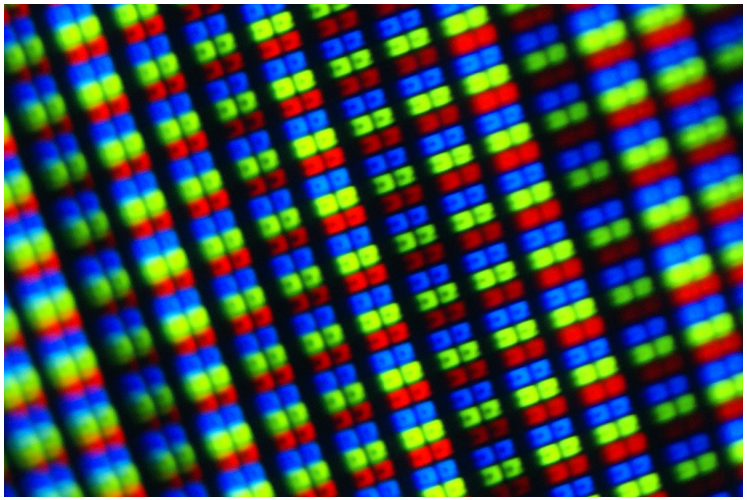
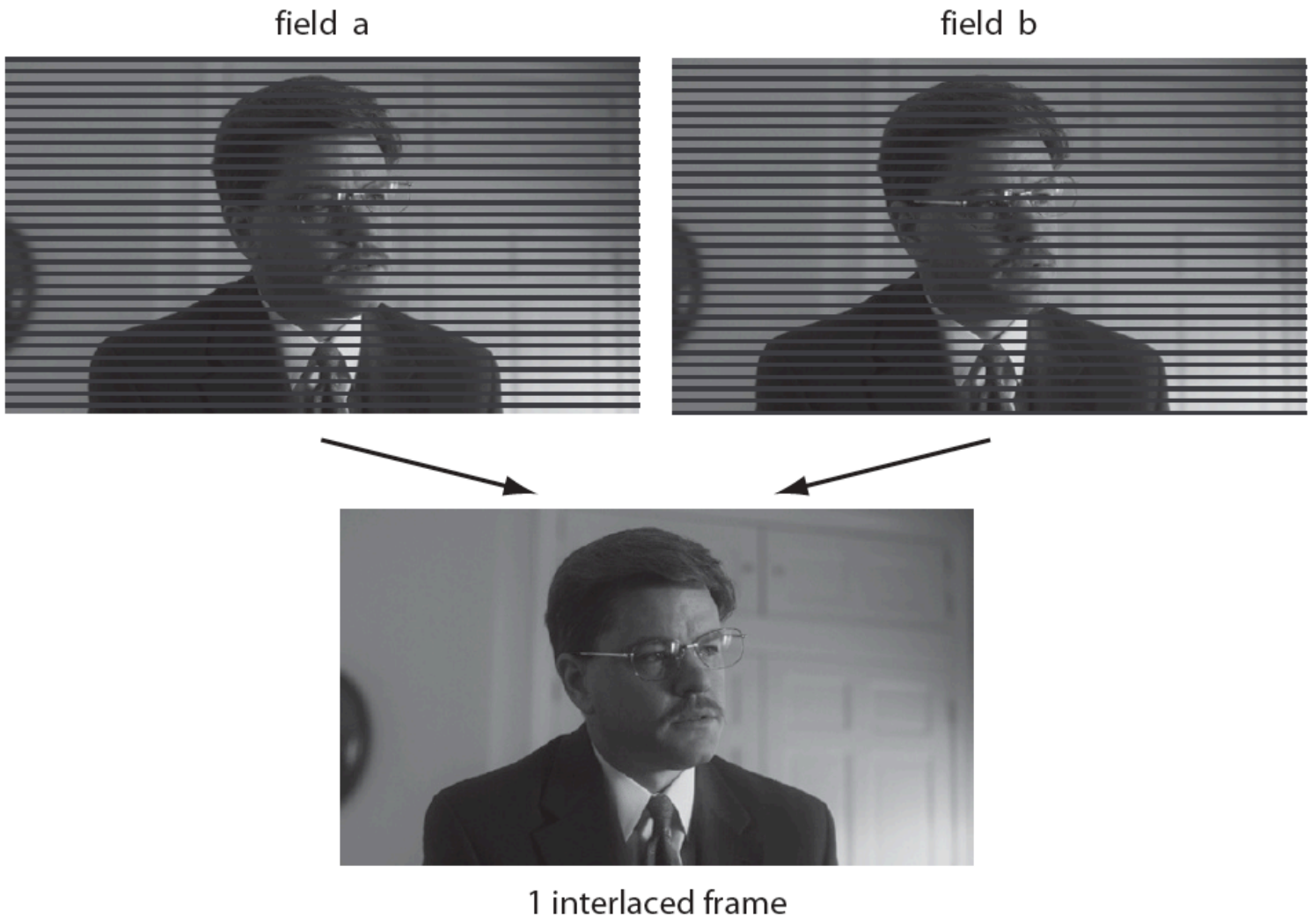


Figure 9-12 Just like camera sensors, color flat-screen displays (LCD or plasma) are made up of millions of pixels. Each individual pixel contains red, green, and blue subpixels (outlined). (See the color insert).



INTERLACED SCANNING



■ **Figure 9-3** Interlaced video. A single frame is created by scanning two alternate fields; first, the odd lines are scanned, from top to bottom, then the even lines are scanned, creating the second field.

Figure 9-4 Progressive scanning draws a full frame of video, from top to bottom, with each pass.

■ **Figure 9-5** When interlaced video is shown on progressing displays, a "combing" artifact occurs at the edges of moving objects caused by the displaced scan lines (notice that the stationary objects do not show any combing).

ATSC Digital Television Standard Video Formats

Source : ATSC

	Resolution		Aspect Ratio	Frame rate	
	Vertical lines	Horizontal pixels		Progressive (p)	Interlaced (i)
HD	1080	1920	16 : 9	24 / 23.976 30 / 29.97	30 (60i fields/sec) 29.97 (59.94i fields/sec)
HD	720	1280	16 : 9	24 / 23.976 30 / 29.97 60 / 59.94	
SD	480	704	16 : 9 , 4 : 3	24 / 23.976 30 / 29.97 60 / 59.94	30 (60i fields/sec) 29.97 (59.94i fields/sec)
SD	480	640	4 : 3	24 / 23.976 30 / 29.97 60 / 59.94	30 (60i fields/sec) 29.97 (59.94i fields/sec)

Figure 9-1 The ATSC digital television standards support 18 different DV formats.

How Big is a Frame?

Video in HD

The following section describes key video elements, such as frame sizes and frame rates, and how they apply to HD.

Frame Sizes

HD source formats are almost always either 1920 x 1080 resolution or 1280 x 720 resolution. Note that a substantial difference exists between the 1080 and 720 standards. The 1920 x 1080 resolution contains 2.25 times more pixels than 1280 x 720 resolution at the same frame rate. This difference substantially increases requirements for processing 1080 content in terms of encoding time, decoding speed, and storage.

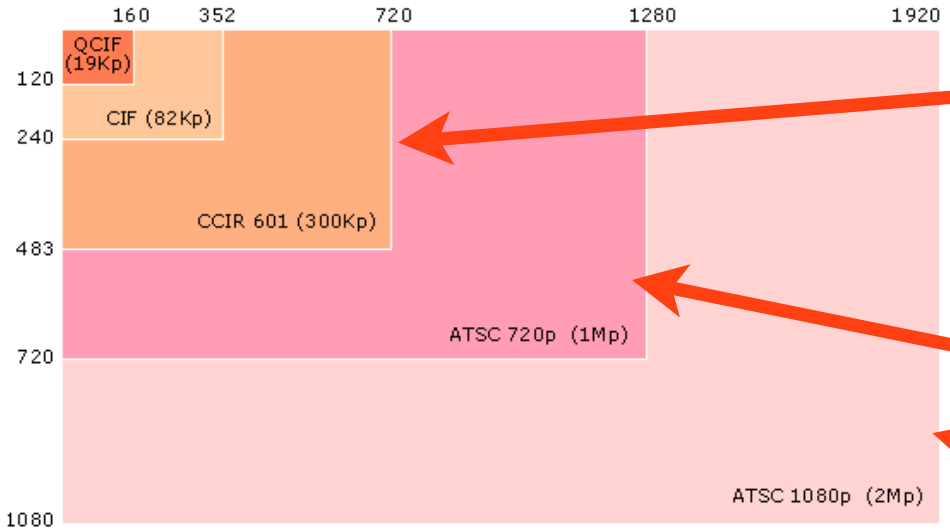


Figure 1. Screen resolutions

Standard Def video
720 x 486 pixels

Hi Def video
1280 x 720
1920 x 1080px

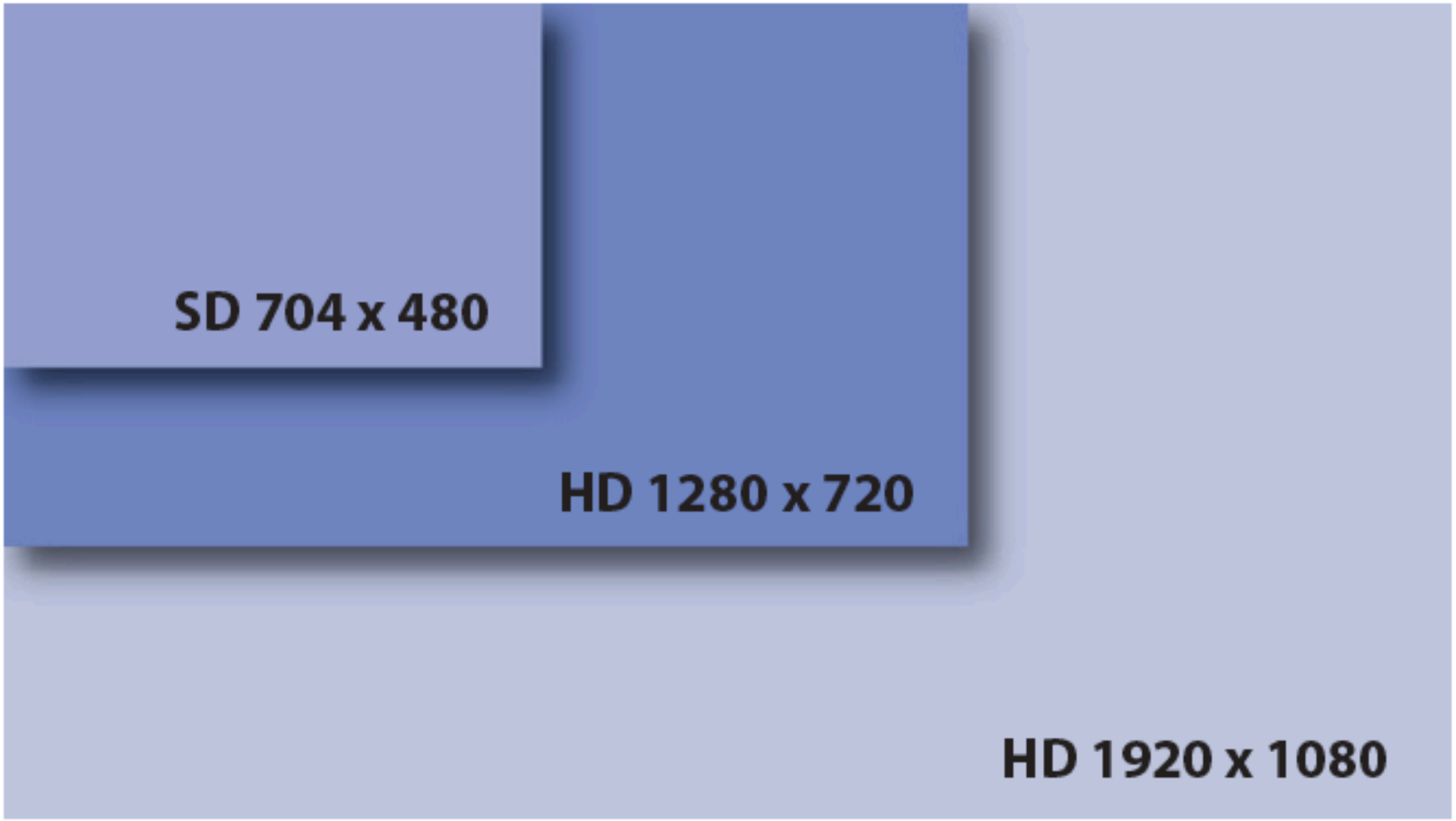


Figure 9-10 The resolution of DV formats can be roughly determined by multiplying the horizontal and vertical pixels. This illustration shows the relative resolution capabilities based on pixel count.

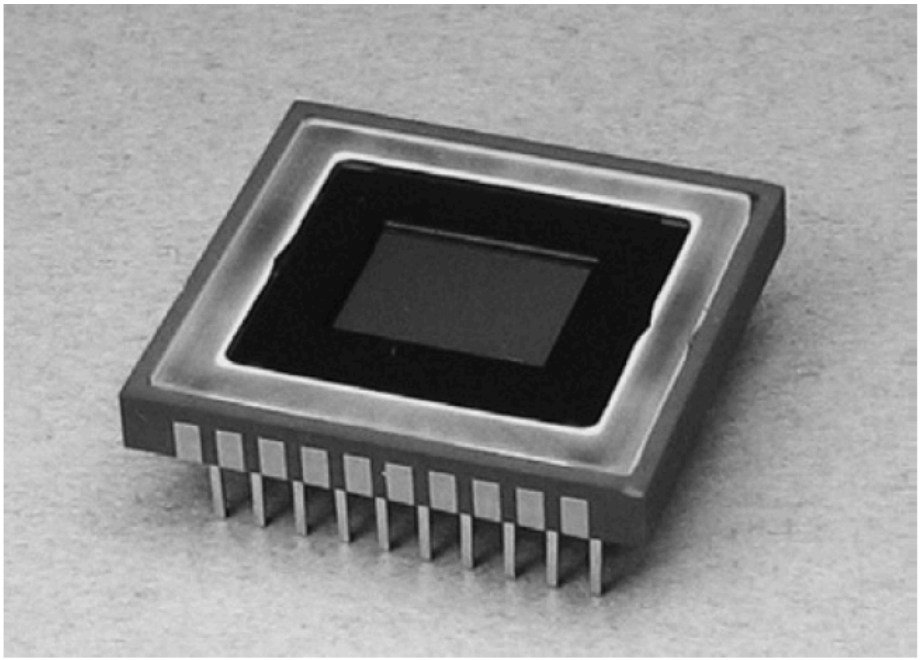
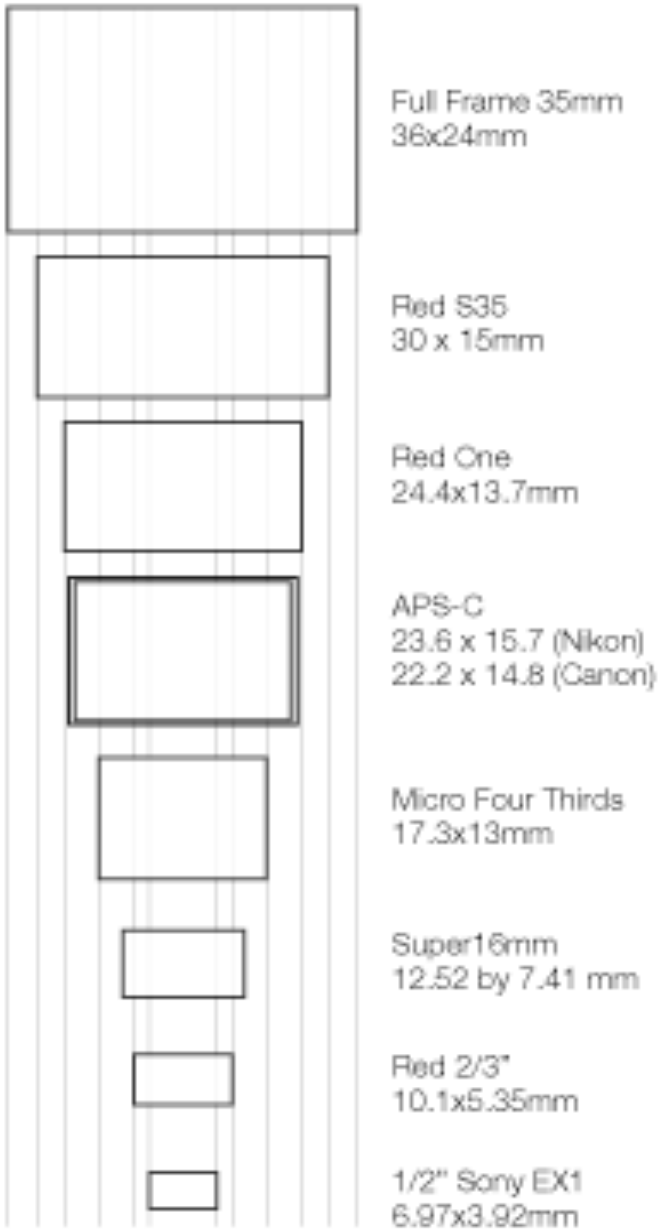
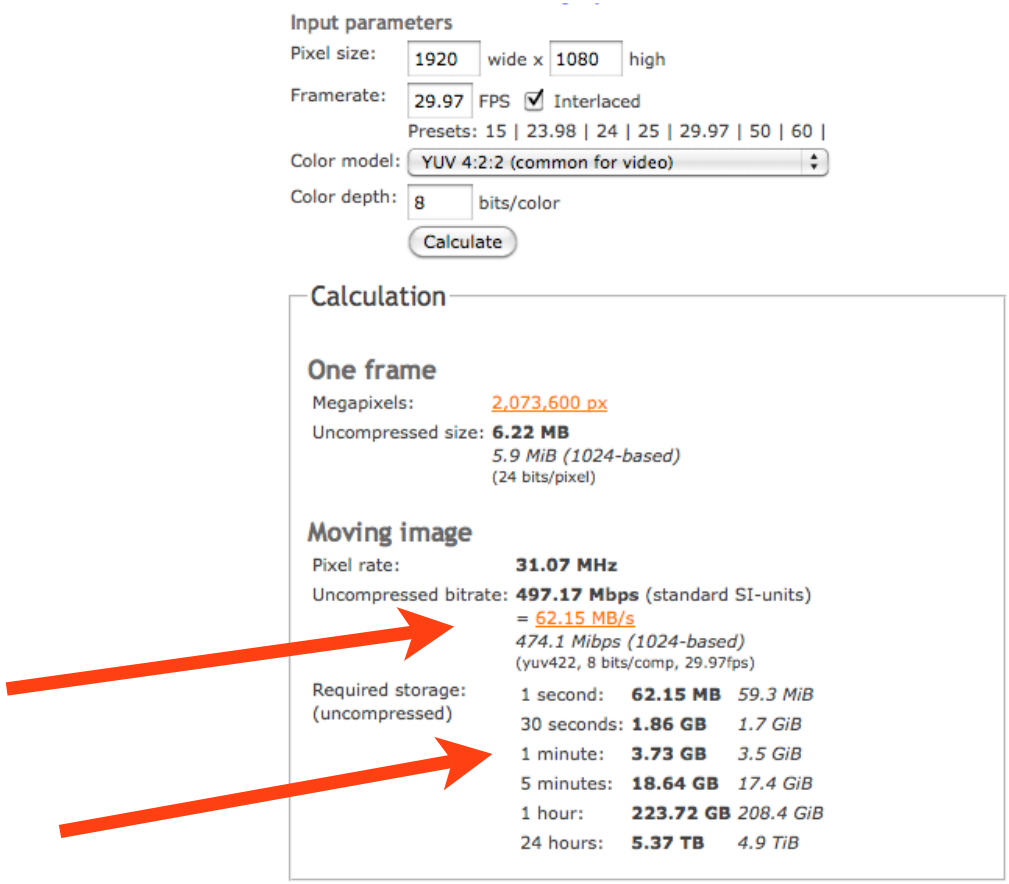
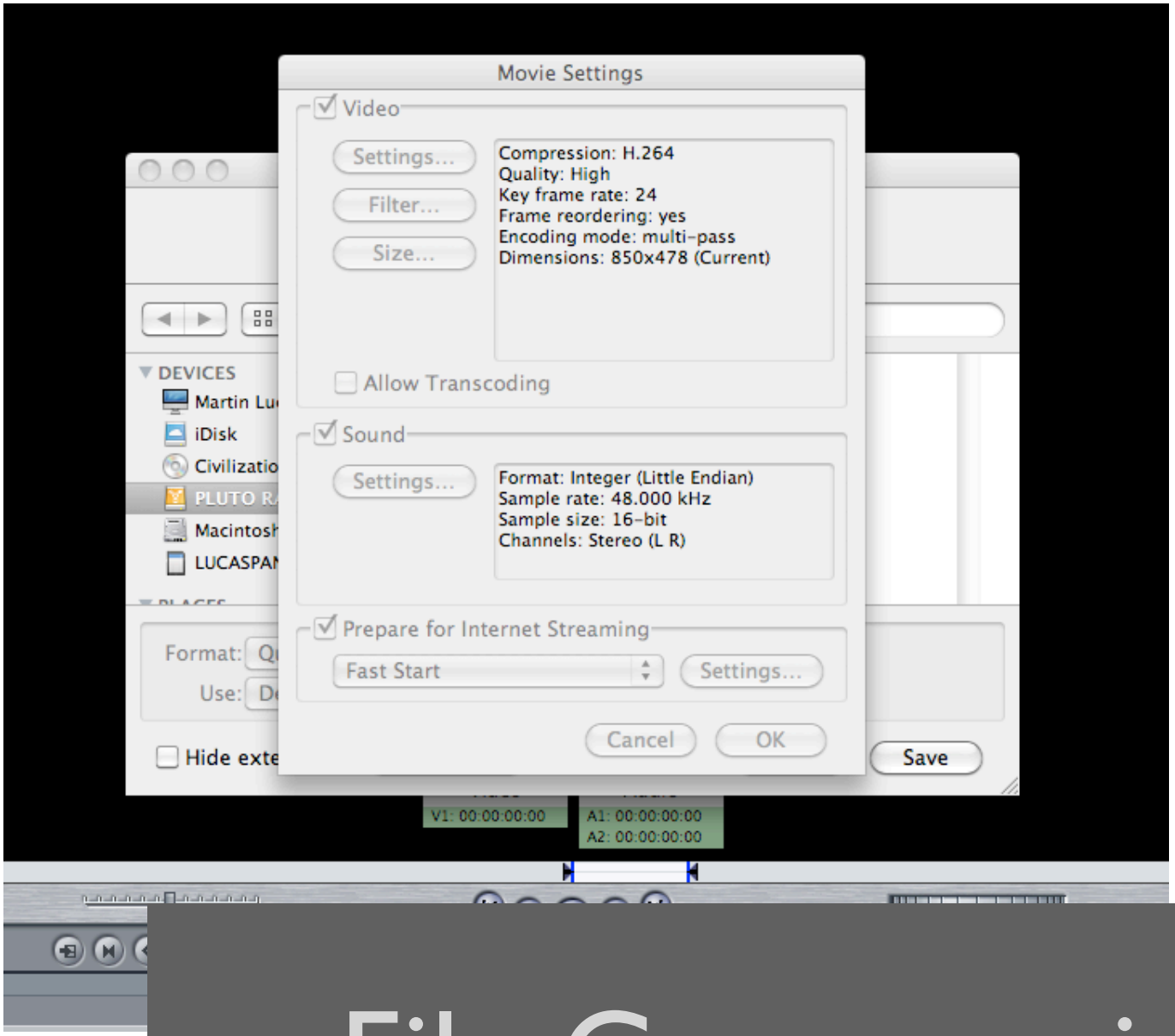


Figure 9-31 Most HD cameras have CCD chips in the16:9 format. Pictured is a ⅔-inch CCD image sensor. (Photo courtesy of sphl.)



“uncompressed video”





File Compression

Compression

- Storage method that involves eliminating redundant information to reduce file size
- Various “codecs” exist to do this

Digital video formats

- TAPE-BASED
- Mini-DV
- DV-Cam
- DVC-Pro
- DigiBeta

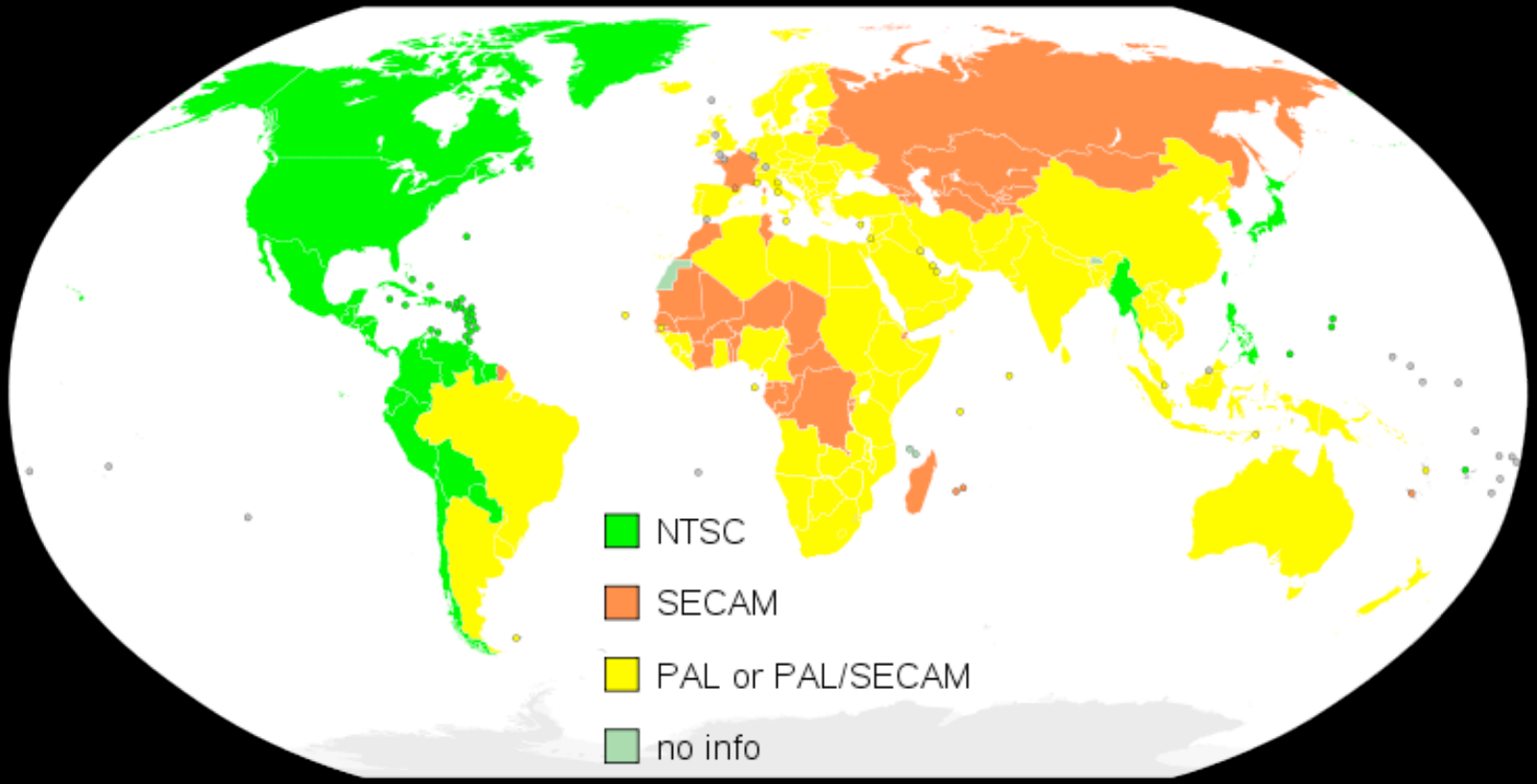
FILE-BASED

AVCHD
P2
XDcam

time code


TCR 01:58:30;25

video standards (SD)



NTSC = 525 lines at 30 frames per second
PAL = 625 at 25 frames per second.


ARRI
MEDIA
ALEXA