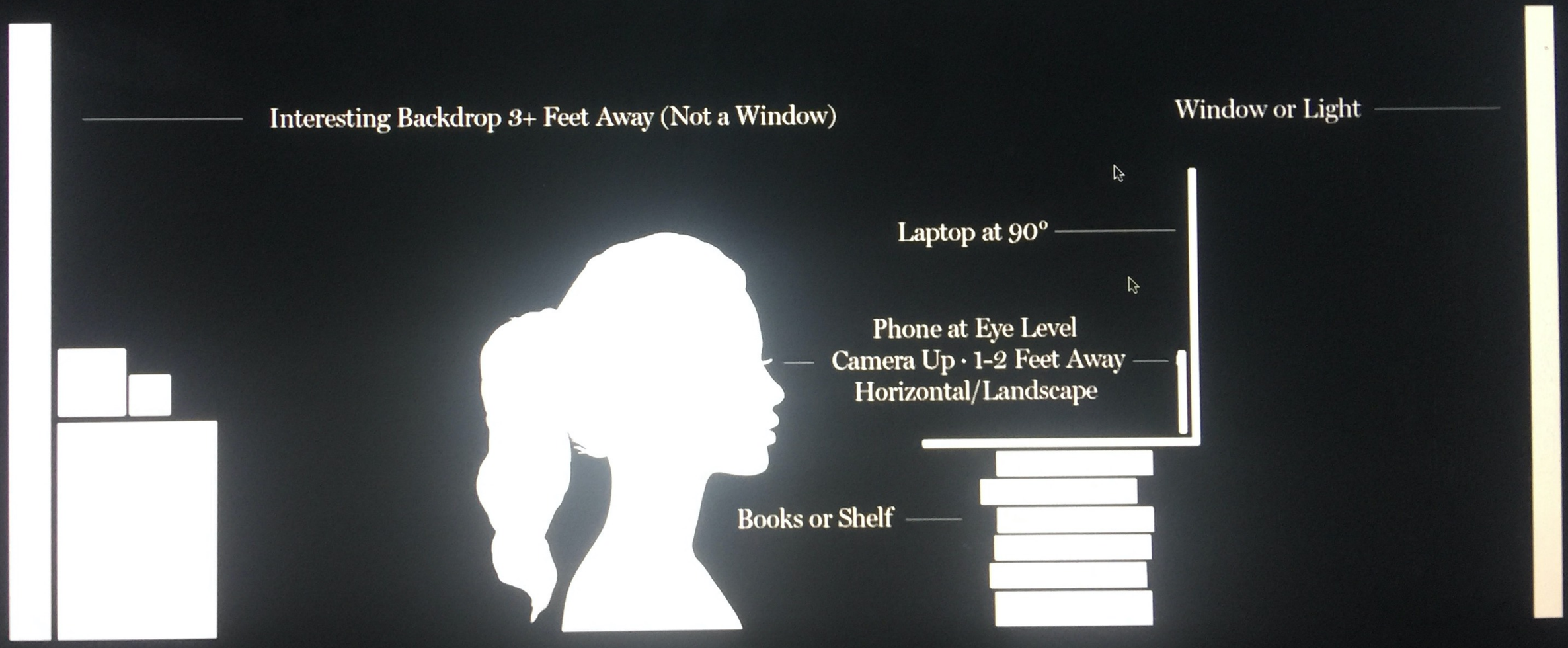
Tech Talk

IMA DOC II
April 7, 2020

Martin Lucas, 2020

Remote Interview Setup

Subject's Phone as Recording Device



Safari File Edit View History Bookmarks Window Help

U.S. 100% Tue 2:50 PM Martin Lucas

obsproject.com

OBS
Open Broadcaster Software

Home Download Blog Help Forum

Contribute

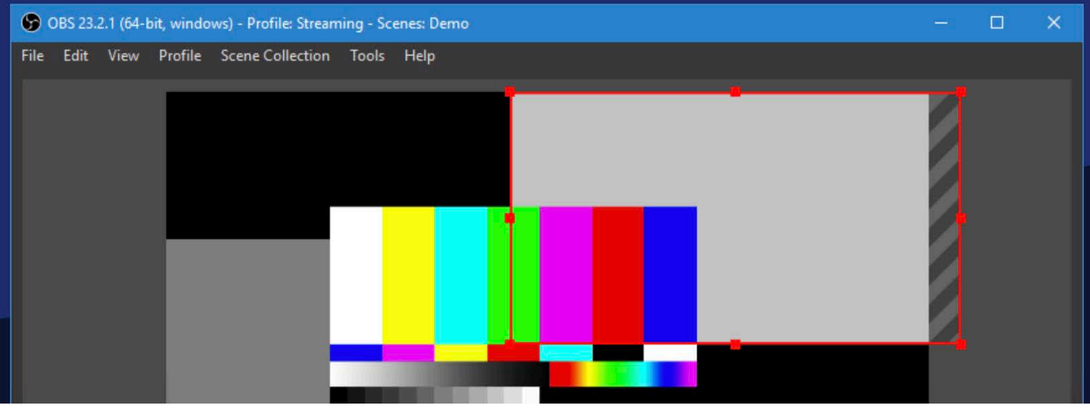
OBS Studio

Latest Releases 25.0.4 24.0.6 25.0.4

Windows **macOS 10.12+** **Linux**

Free and open source software for video recording and live streaming.

Download and start streaming quickly and easily on Windows, Mac or Linux.



Screenshot

What's it all mean?

CANON C100

Video Compression: MPEG-4 AVC/H.264
Audio Compression: Linear PCM, 16 bits, 48kHz, 2ch.

Video Configuration:
24Mbps LPCM (VBR) or 17Mbps (CBR)

Image Sensor: Super 35 equiv. CMOS
8,290,000 pixels (3840 x 2160)
24.6 x 13.8 (28.2 mm diagonal)

- ***“Film is an art.***
- ***Television is an appliance.”***

Woody Allen

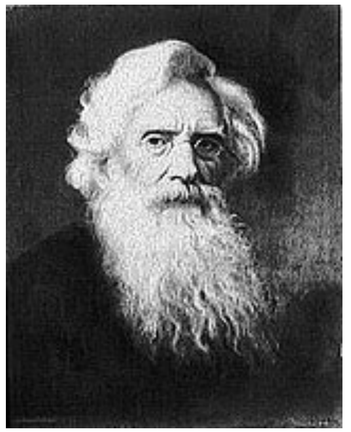
Television emerges from a series of devices intended for long distance communication, as the ‘tele” [from Greek *tēle-* **‘far off.’**] suggests.

The Telegraph

- The rise of the railroad meant the need for a rapid system of communications to indicate train movement. Each train train track was accompanied with a telegraph cable carrying an electric current.

Morse Code

- In addition to a telegraphic device, Morse developed a system of coded dots and dashes, the first ‘digital’ communications code. Curiously, Morse was also a well-known portrait painter.



Go to Audacity file

https://www.youtube.com/watch?v=_J8YcQETyTw

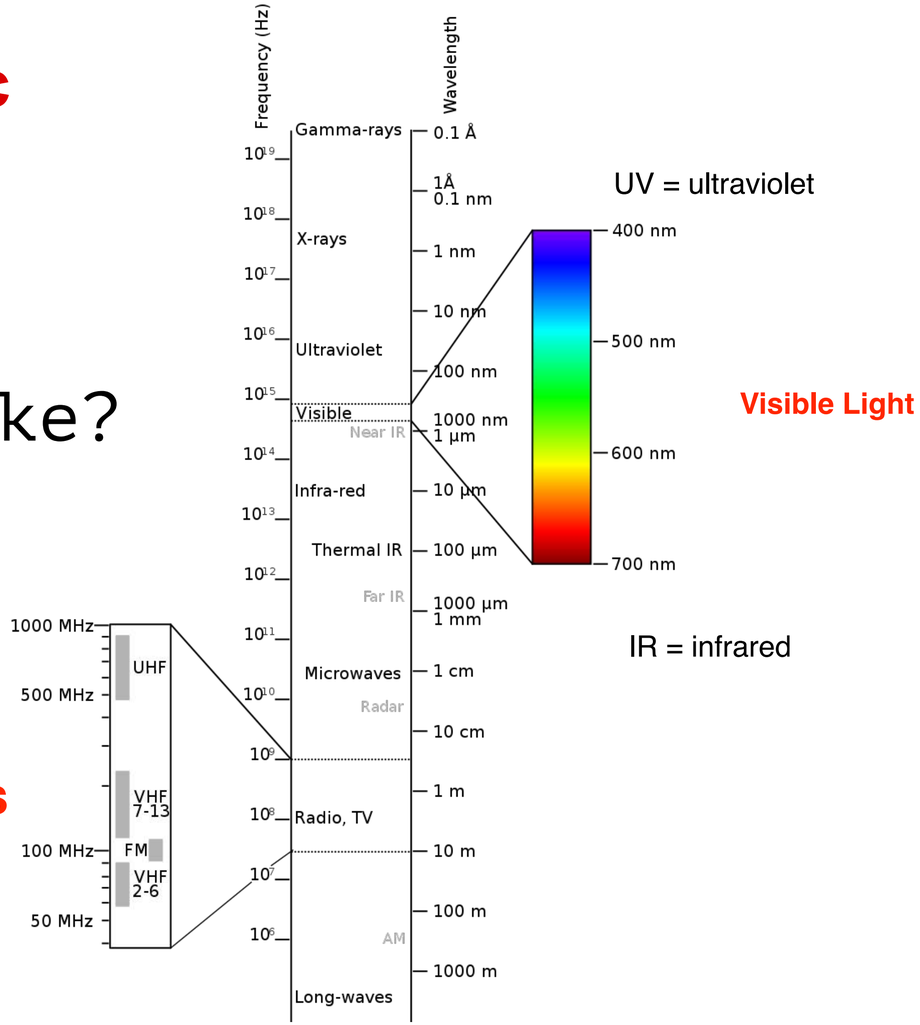
https://www.youtube.com/watch?v= xsDk5_bktFo

Turn on Your Radio

- Guglielmo Marconi convinced the British Navy in 1902 that radio would be useful as a method of communicating with ships at sea using morse code. Only later would it be discovered that the system could carry voice as well as code.

Electro-magnetic Radiation

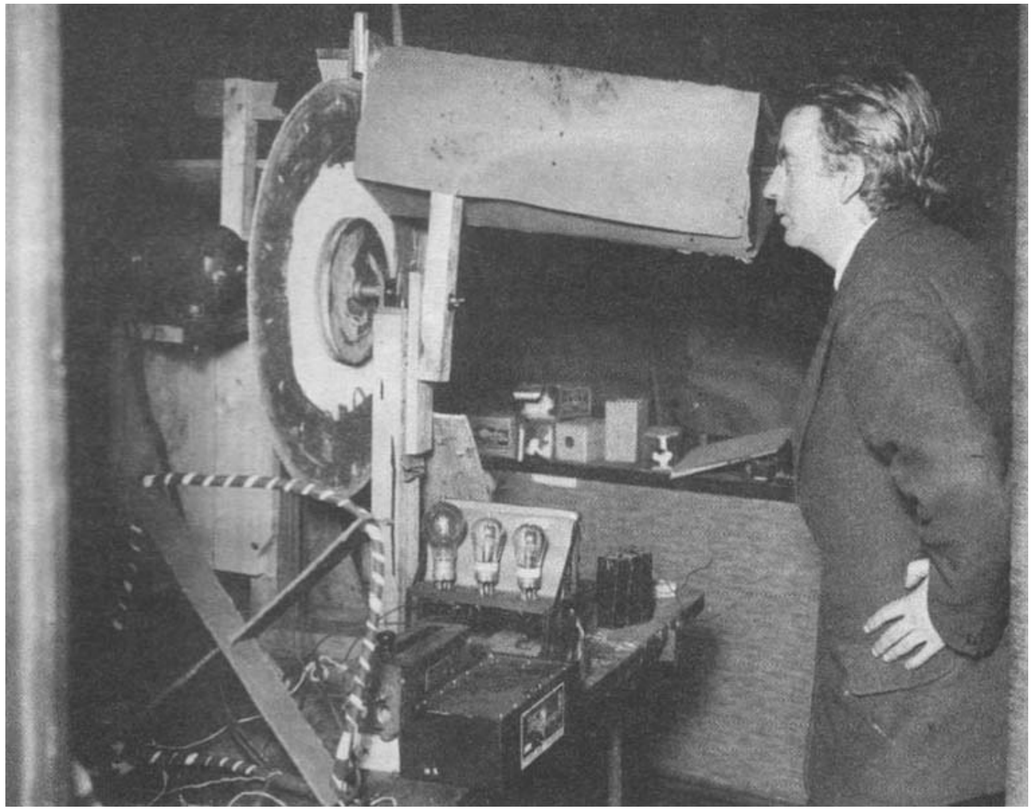
What forms does it take?



ANALOG

The development of radio depended on the fact that radio waves could be produced, transmitted and received in a form that duplicated the qualities of sound waves in terms of frequency and volume, in other words, the radio waves are ***analogous*** to the sound waves.

John Logie Baird developed the first working television transmission system in 1926.

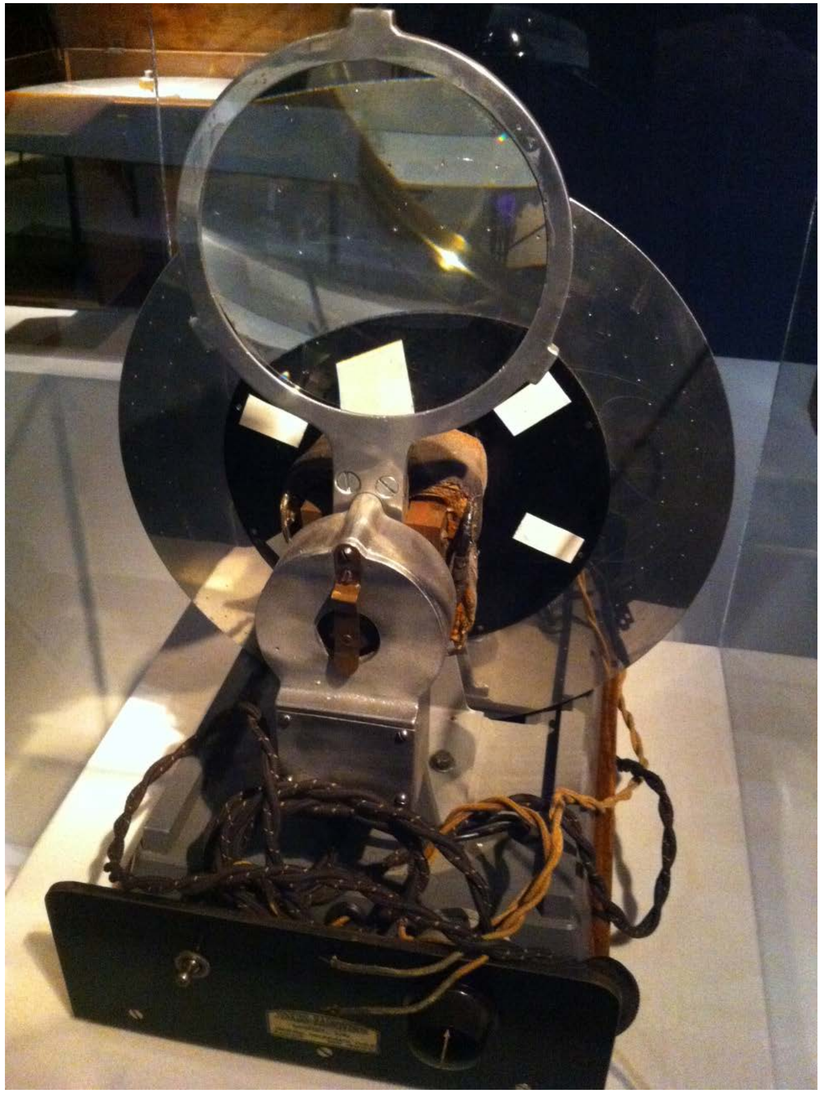


A Picture as a Wave

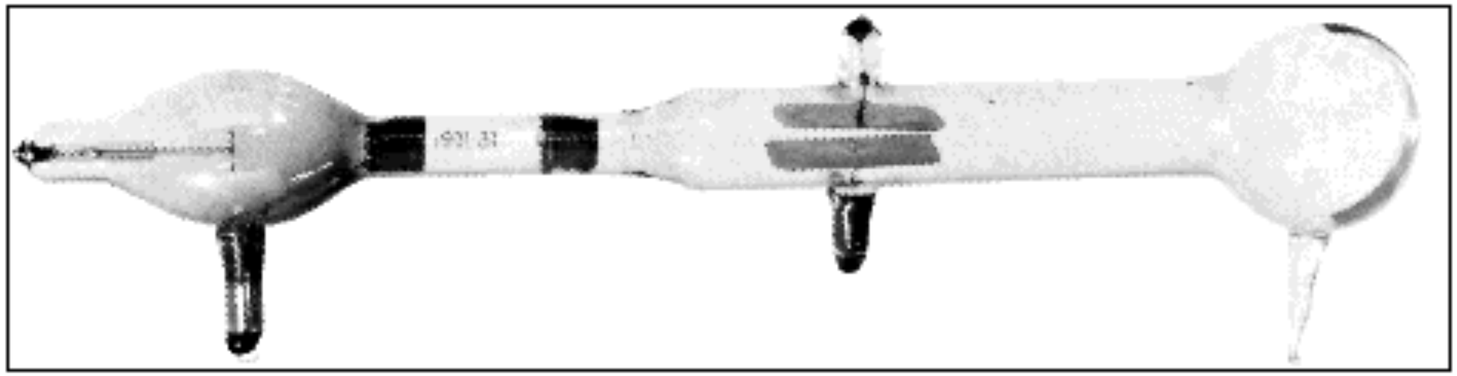
The first technical problem encountered with trying to use radio waves to record and transmit an image is how to turn an image into something you can send as a stream of information.

The answer is to break down the image into lines, read one after the other, and re-constitute them at the receiving end.

in order to paint a picture with a continuous stream of electricity, the image had to be broken down into lines by "scanning".



Note the similarity of this early TV scanner to the zoetrope and related toys.

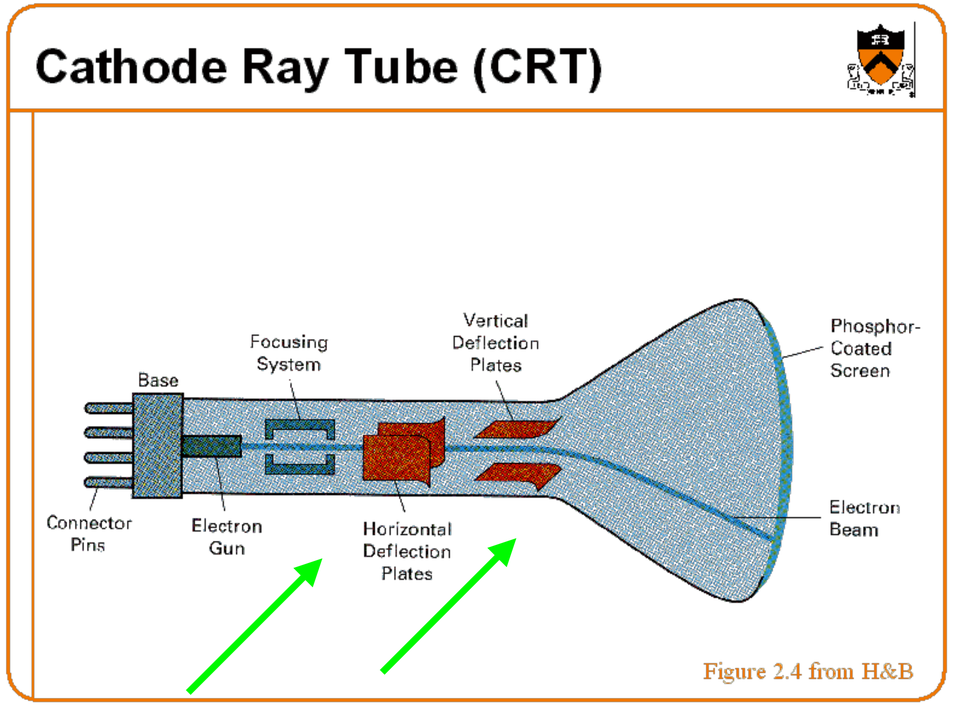


CathodeRay Tube

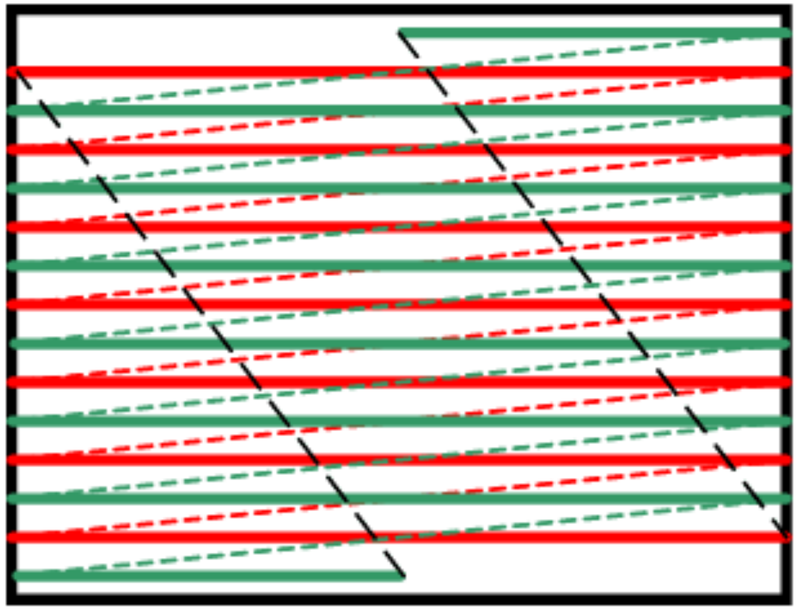
- The cathode ray tube, developed as part of British experiments in high energy physics lies at the heart of TV technology. A very high voltage at one end resulted in a stream of electrons pouring out the other end…

The Picture Tube

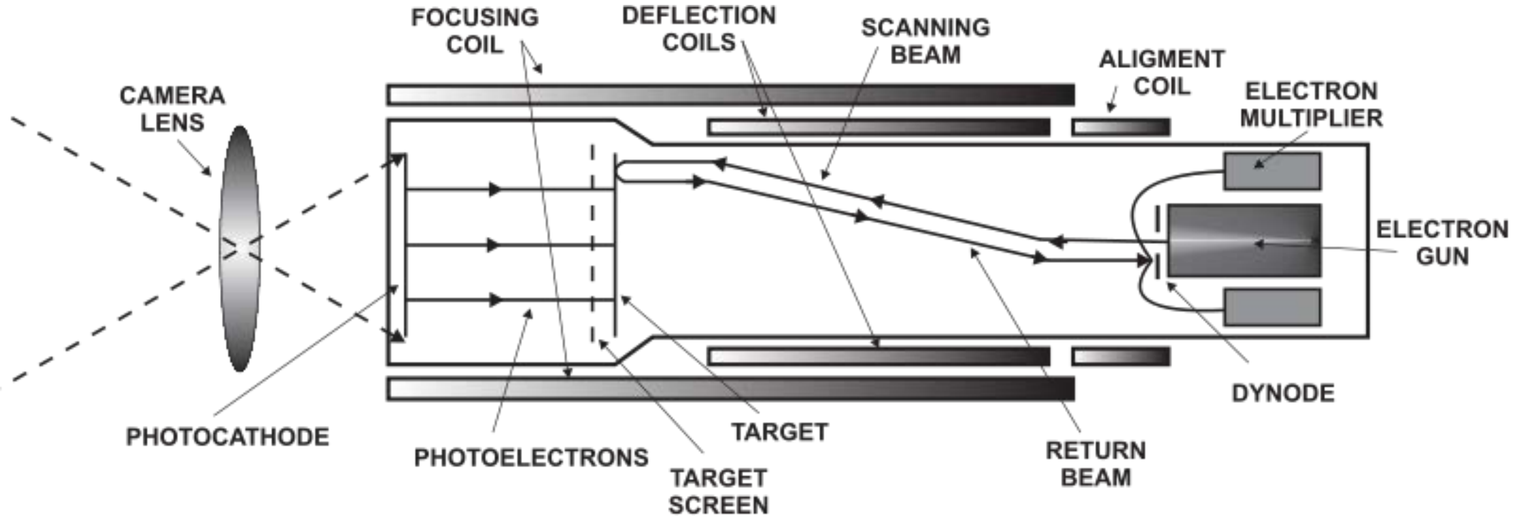
- Experiments in the 1920s by Zworykin, Farnsworth and others led to the development the scanning system that turned the CRT into a method of long distance visual communications.



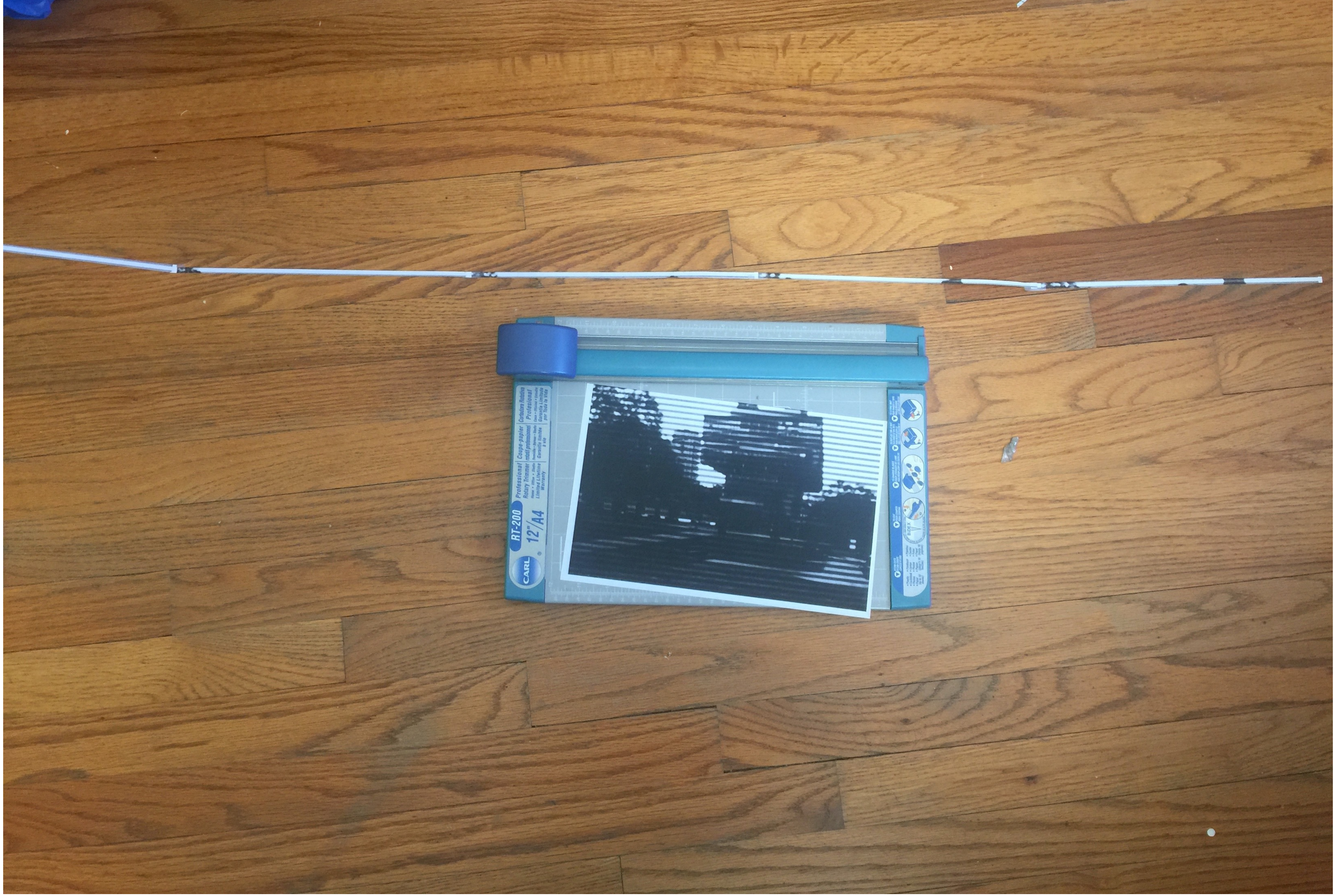
ThroughaScanner...

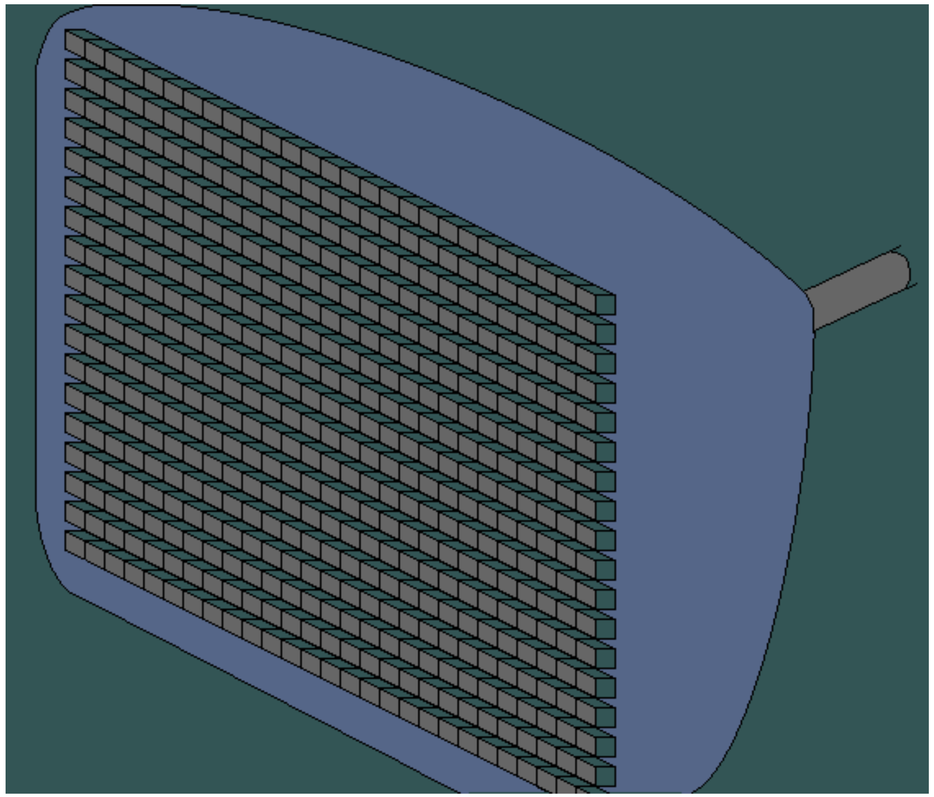


- The image on a CRT or TV screen is built by a single beam of electrons hitting the front of the screen and making phosphors glow. The beam (of negative electrons) is controlled by electromagnets.


FOCUSING COIL
DEFLECTION COILS
SCANNING BEAM
ALIGMENT COIL
ELECTRON MULTIPLIER
CAMERA LENS
ELECTRON GUN
DYNODE
PHOTOCATHODE
PHOTOELECTRONS
TARGET
TARGET SCREEN
RETURN BEAM


CARL
RT-200
12"/A4
Professional Rotary Trimmer
Limited Lifetime Warranty
Coupe-papier rotatif professionnel
Garantie limitée à vie
Cortadora Rotativa Profesional
Garantía Limitada por Toda la Vida


CARL
RT-200
12"/A4

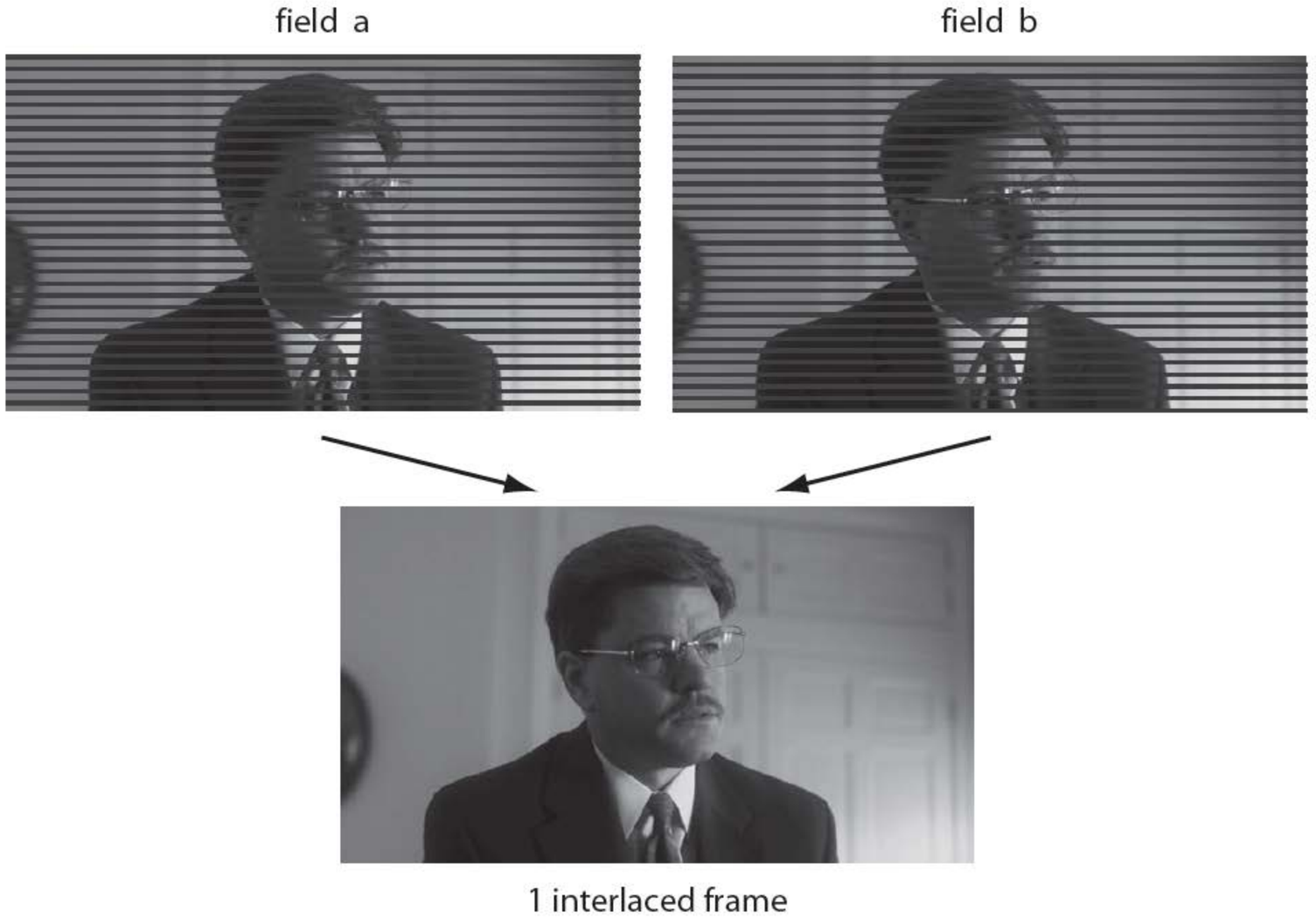


Video was standardized to work at 30 frames (or 60 fields) per second with 525 lines of picture (in North America).

Each frame is divided into 2 fields to prevent flicker.

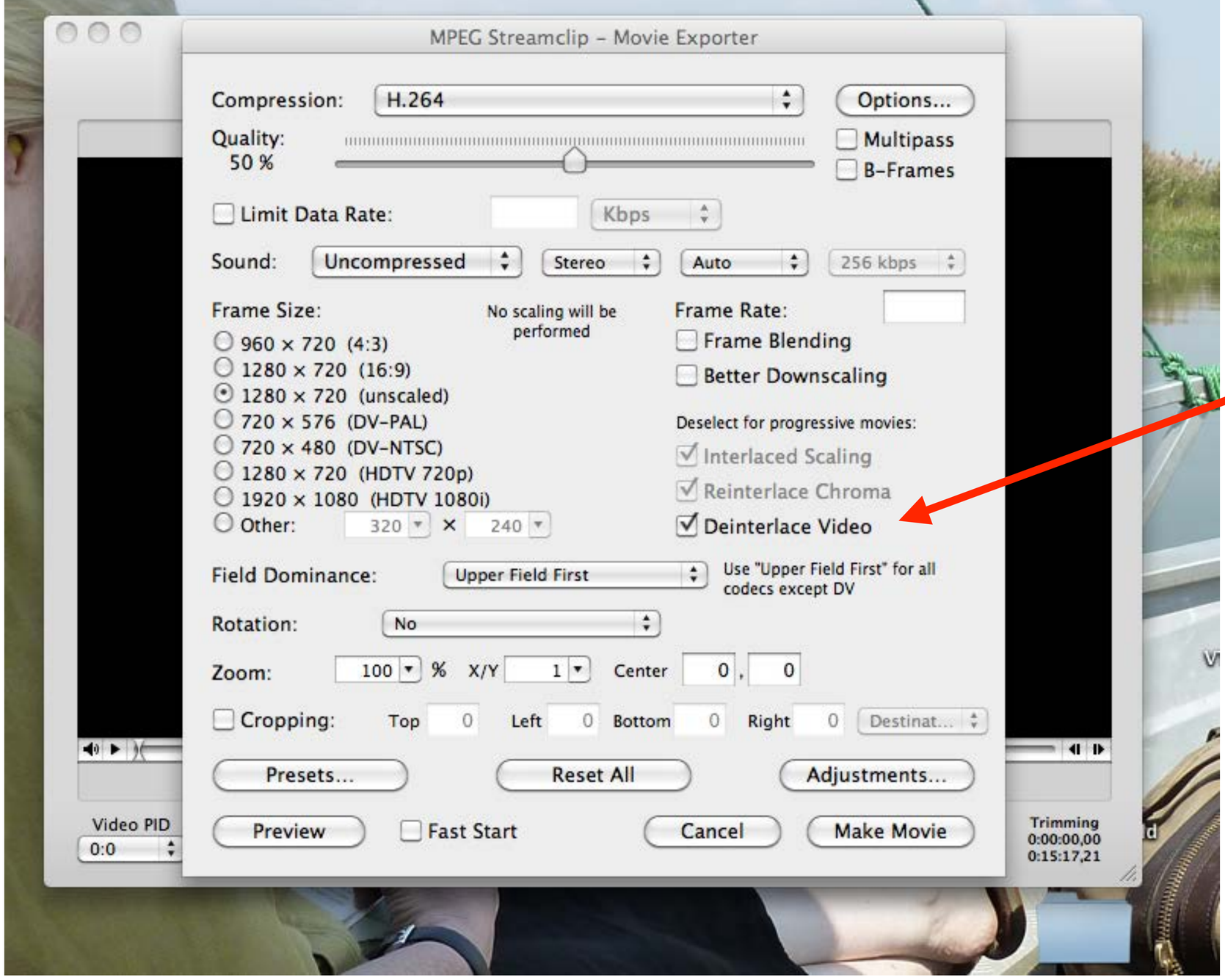
The Slowmo Guys explain: https://www.youtube.com/watch?v=3BJU2drrtCM

INTERLACED SCANNING

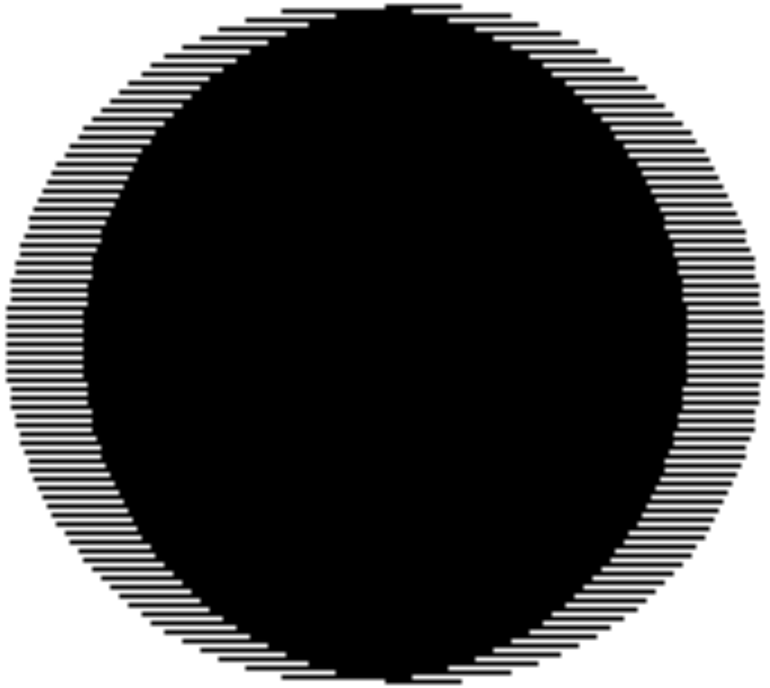


■ **Figure 9-3** Interlaced video. A single frame is created by scanning two alternate fields; first, the odd lines are scanned, from top to bottom, then the even lines are scanned, creating the second field.

■ **Figure 9-5** 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).

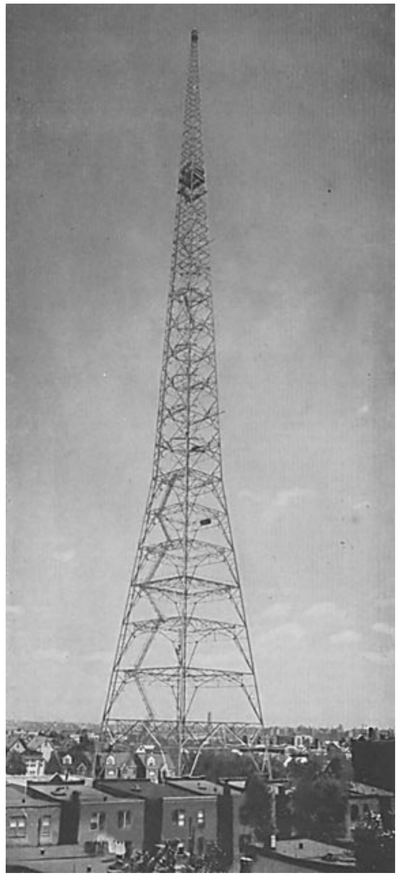


Choose “Deinterlace” For video to go online.



- Video was designed to work at 30 frames a second with 525 lines of picture. (in Northamerica.) Each frame is divided into 2 ‘fields’ to prevent flicker and cut bandwidth. The two fields are INTERLACED.

TV -- A Broadcast Medium



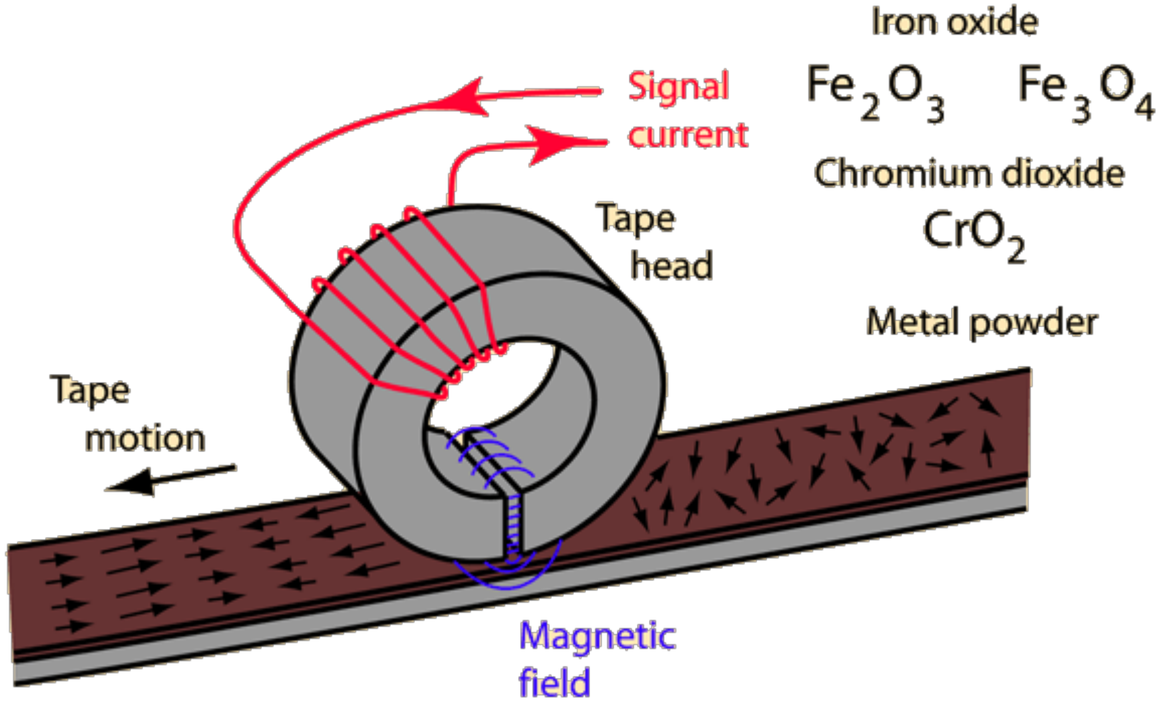
- In the early days of television in the 1940's and 1950's television is LIVE. In other words, no videotape. To keep a show it is filmed on 16mm B&W from the screen.

LET'S GO TO THE VIDEOTAPE

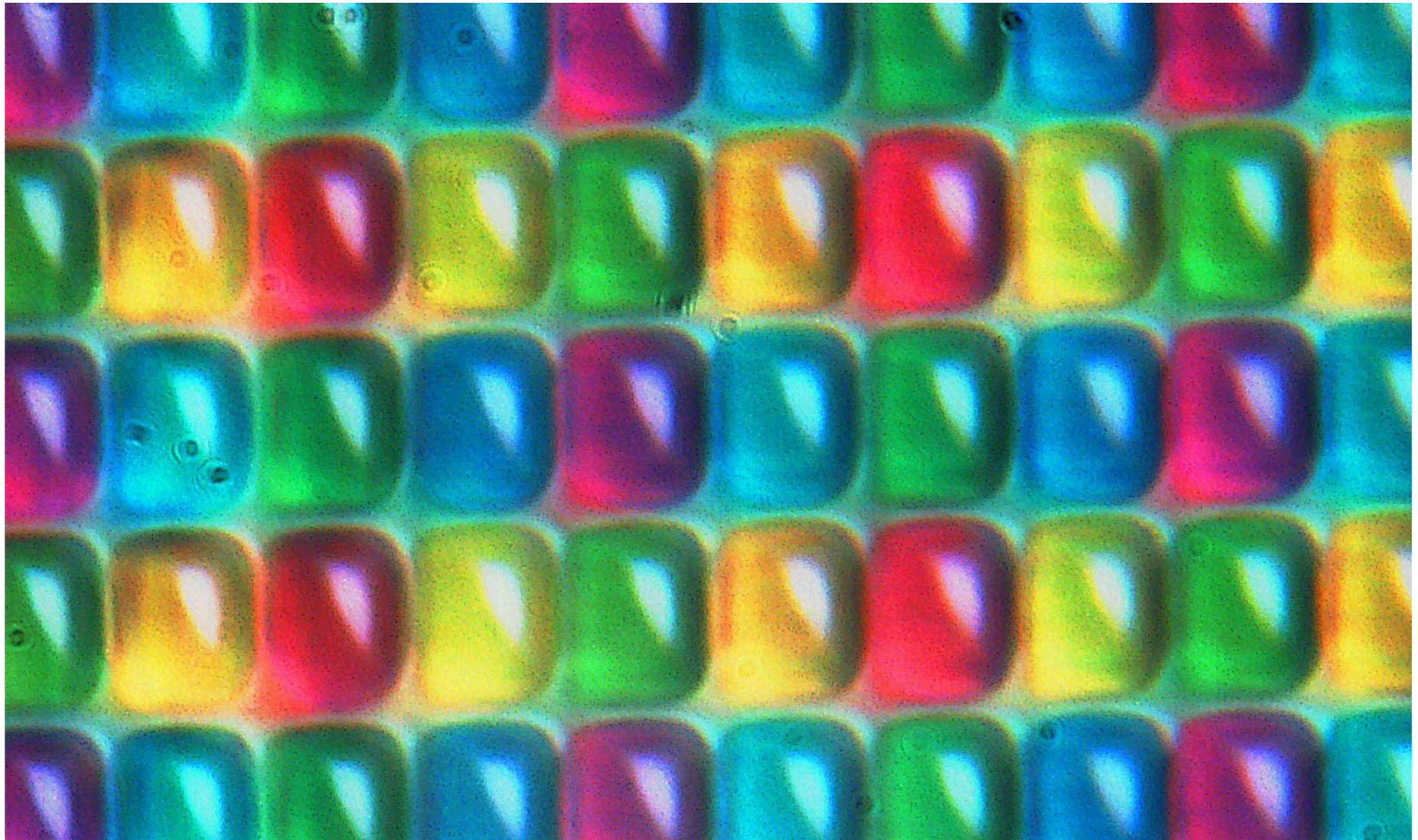
- In 1960 the Ampex Corporation introduced the first video tape machines. The tape was 2 inches wide. The record heads spun 90 degrees across the direction of the tape, solving the problem of tape speed vs. amount of information.

analog video

Analog:
incoming signal changes magnetic field, rearranges particles on tape. Translates into color and brightness information.

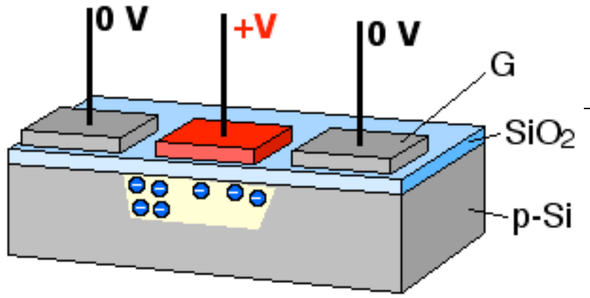


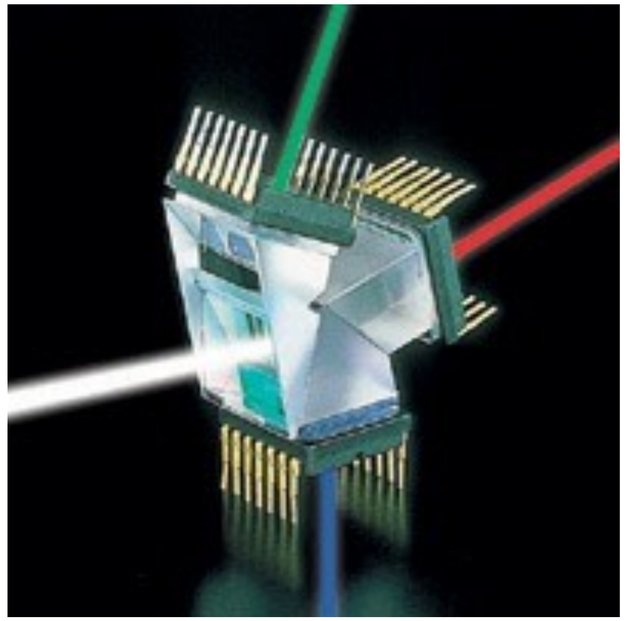
The Pixel is Born



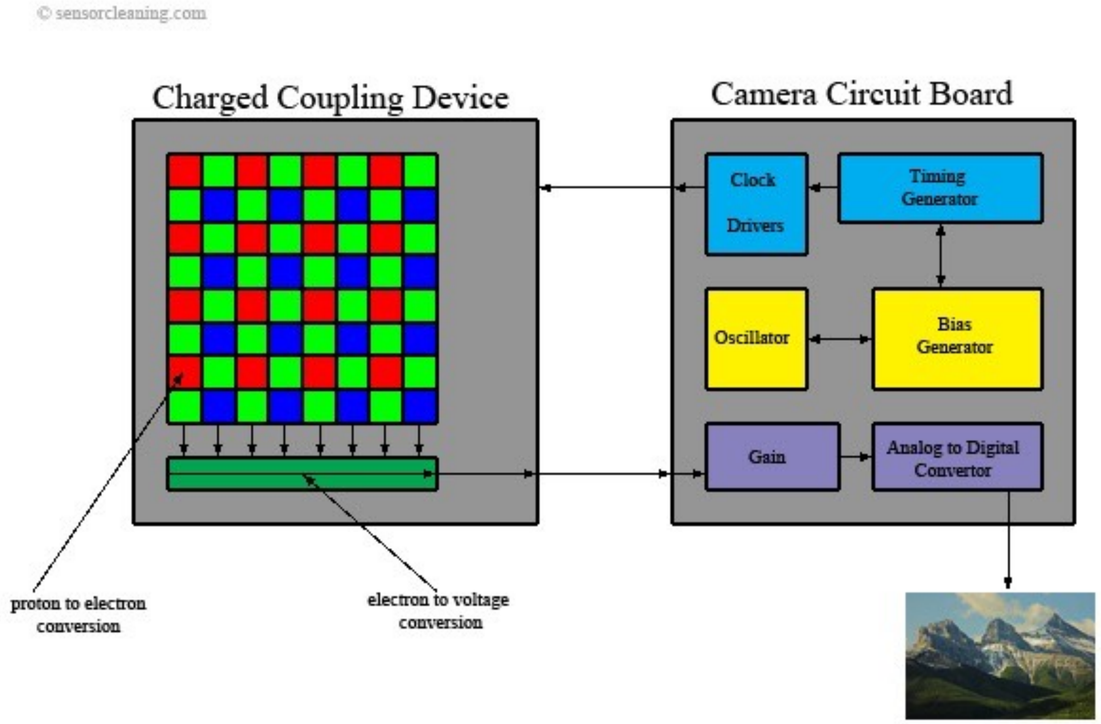
Charge Coupled Device

- The CCD became the heart of a new digital approach to image making.





Instead of scan lines, you now have rows of small sensors, dumping their signal info down in order.



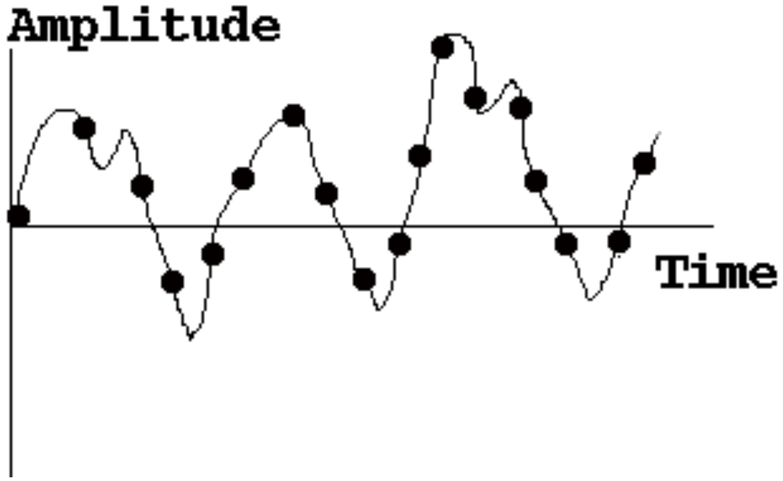
The ‘Camcorder’

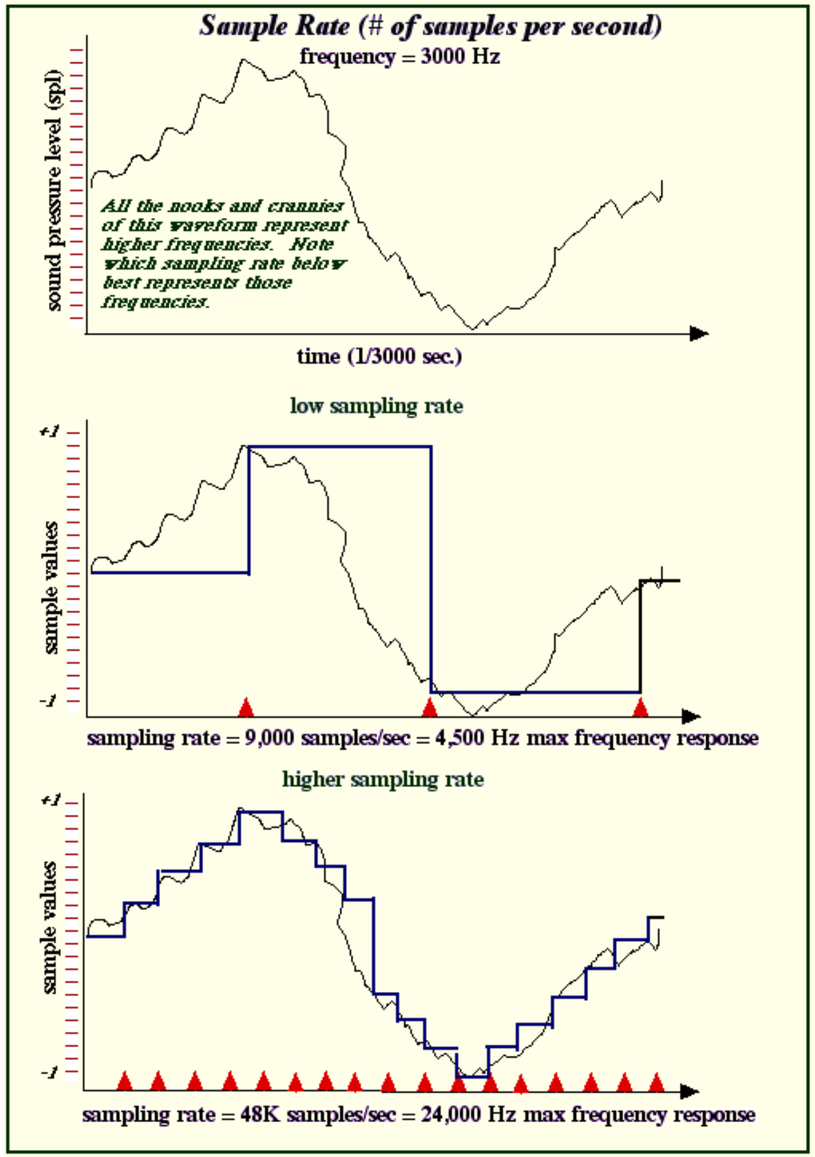
The replacement of picture tubes with CCDs meant that in the 1980s the camera and the VCR were combined. Note the signal is still analog.

Getting Digital

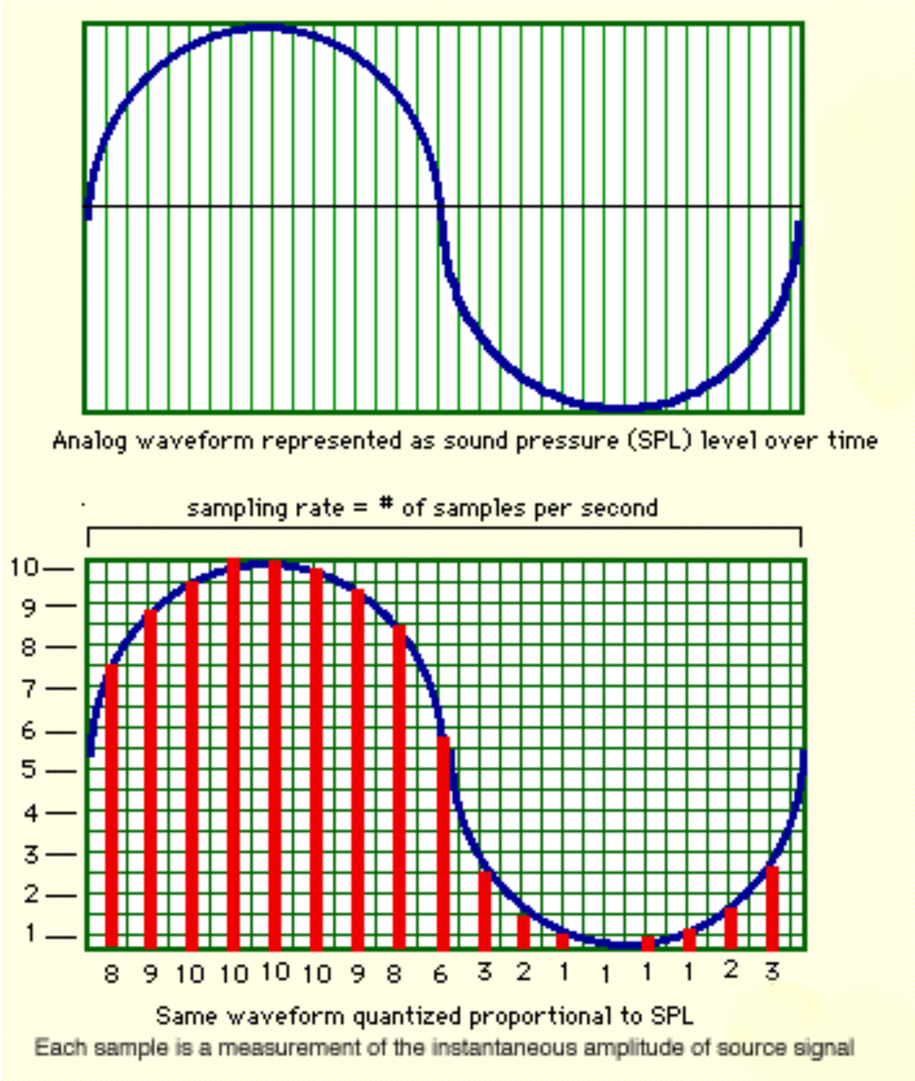
Digital Sampling

- Digital Sampling is the way analog waves of sound or image are broken down into a numeric equivalent, capable of being stored on a computer.





The **sample rate** refers to the number of samples per second, or the number of points on a graph of the waveform.



SAMPLING can be understood as creating a numeric equivalent to a series of points along the line of an analog wave

Unlike audio, the sample rate for video is not something you can change or choose.

Bitmapping or rasterizing

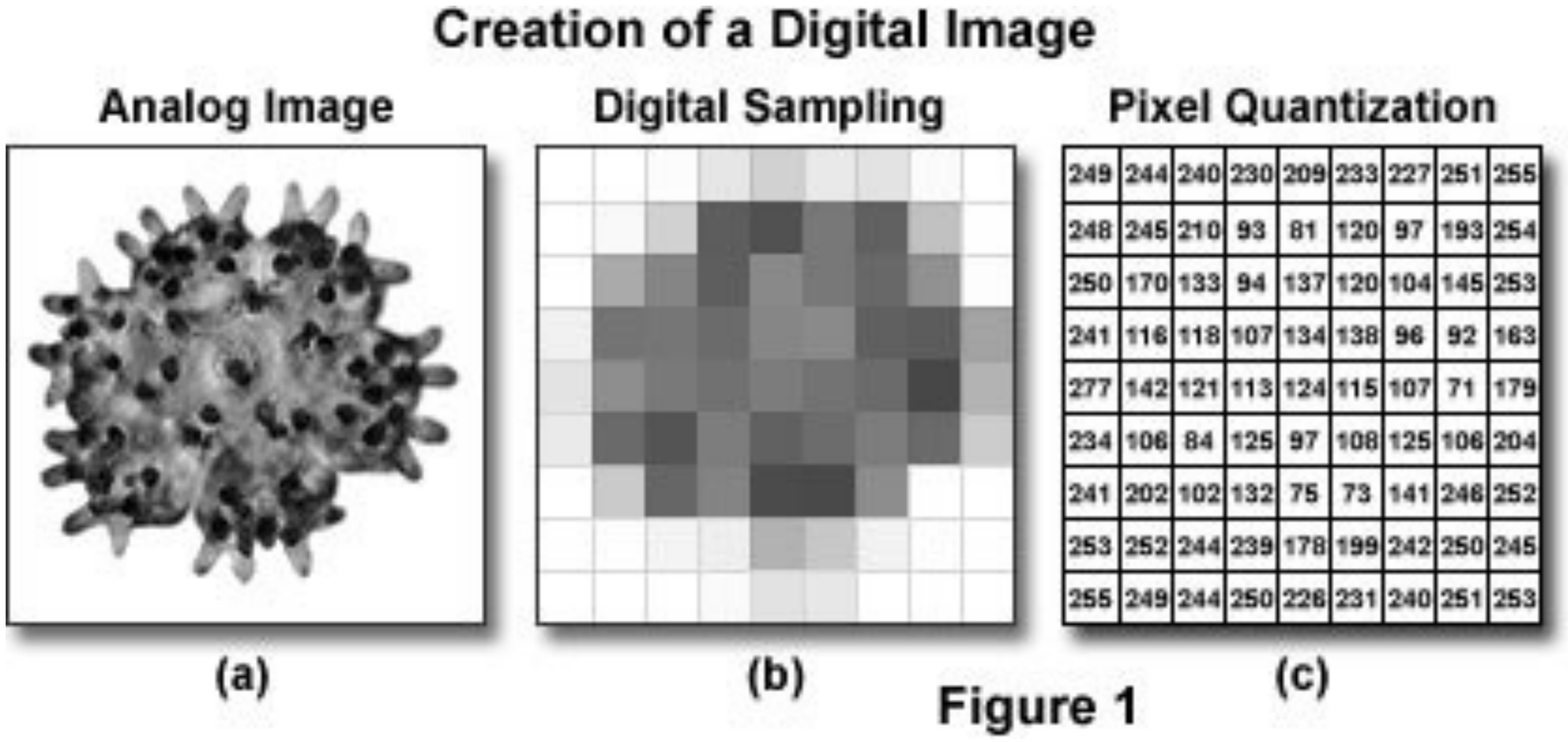
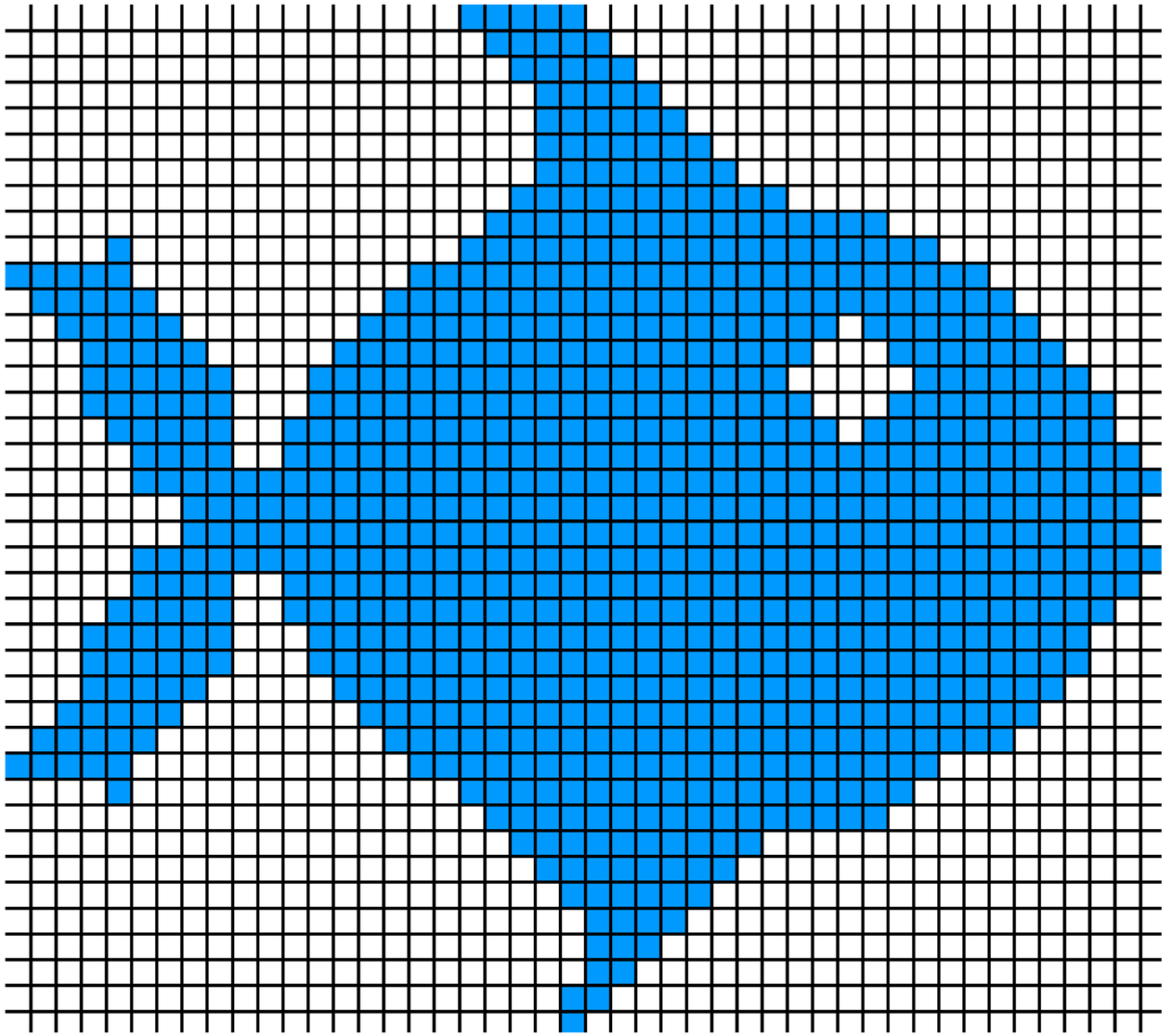


Figure 1

Digital systems that divide the screen into small sections are called **Raster** graphics systems.

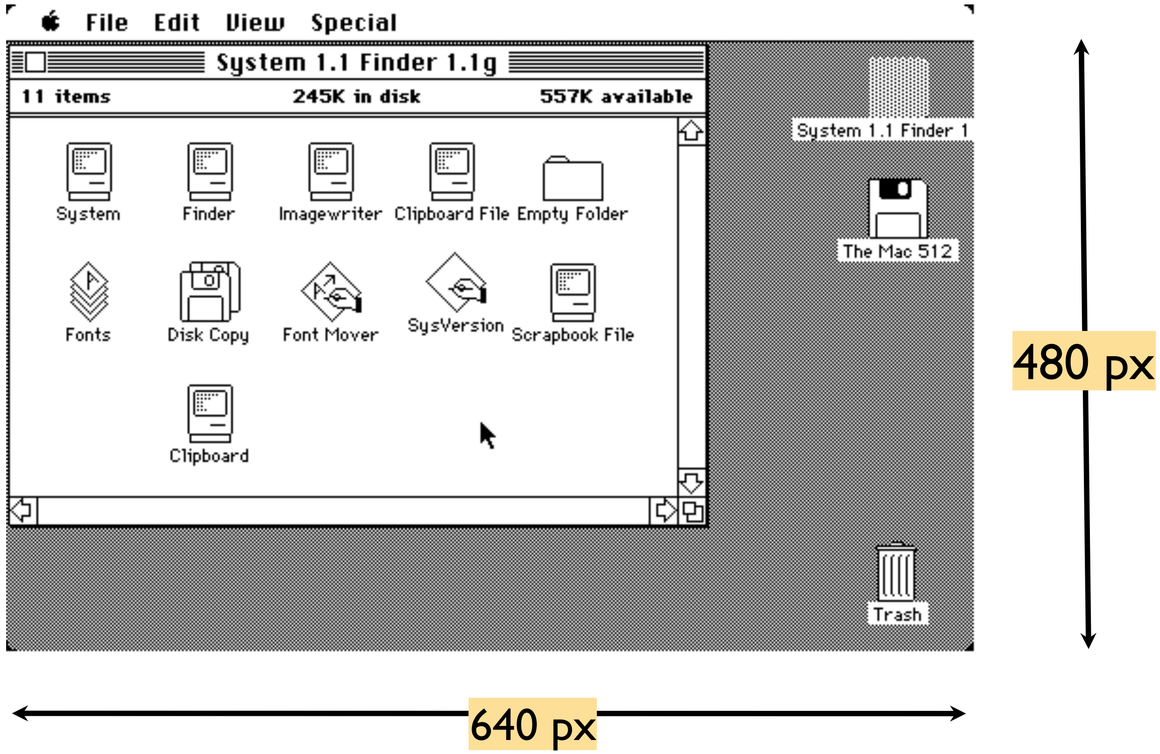
The image they create is called a **bitmap**.

The squares are called “**pixels**” and the more of them in a picture, the higher the **resolution**.



40x46

IMAGE SIZE

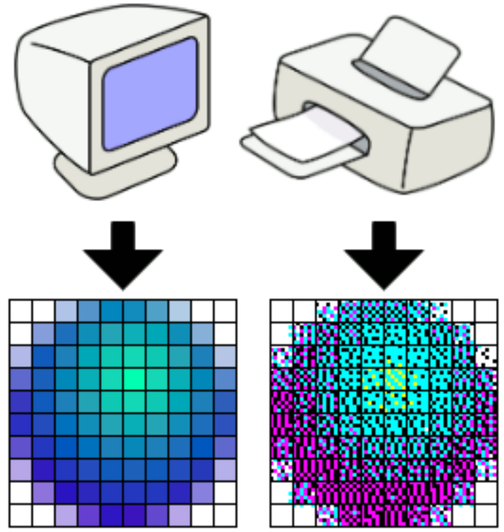


Originally, Macintosh came up with a screen 640 pixels across and 480 pixels high.

The Math: 640 x 480 = 307,200 pixels (0.3MB)

IMAGE RESOLUTION

dpi = ‘dots per inch’
ppi = ‘pixels per inch’

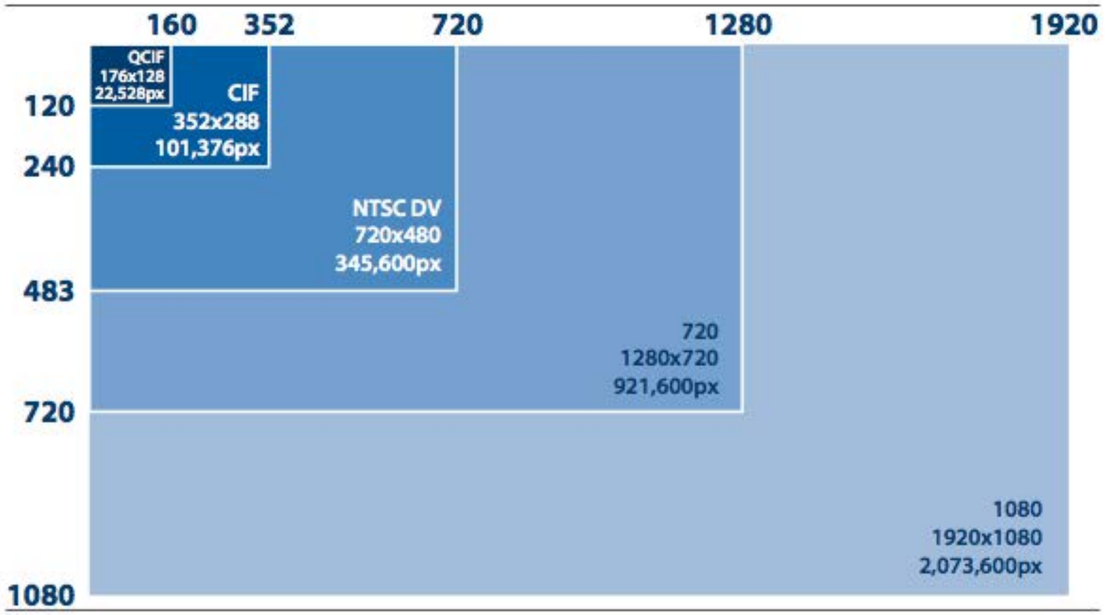


For web design, standard = 72 dpi

For printing, standard = 300 dpi

The High Definition Image

There are two main standards for HD, 720 and 1080 pixels (the height of the image).



The Canon C100 uses a CMOS (complementary metal oxide semiconductor) chip

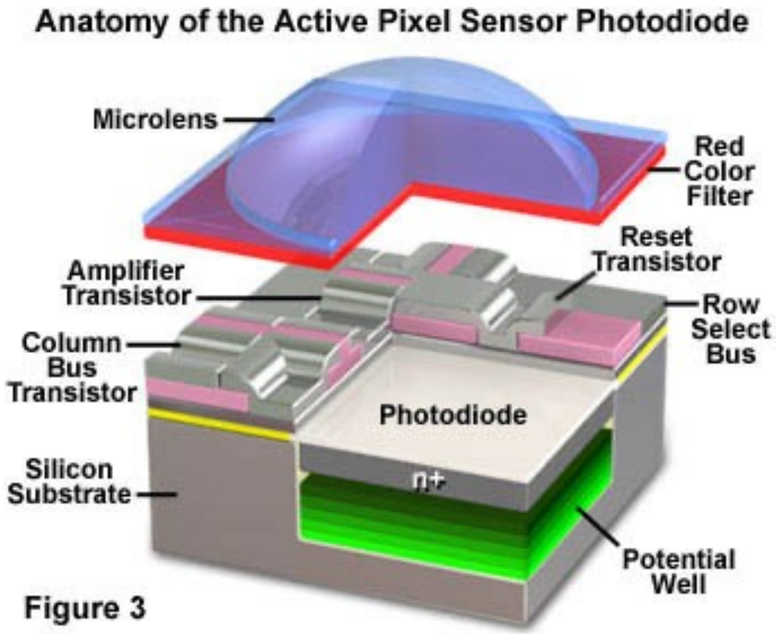
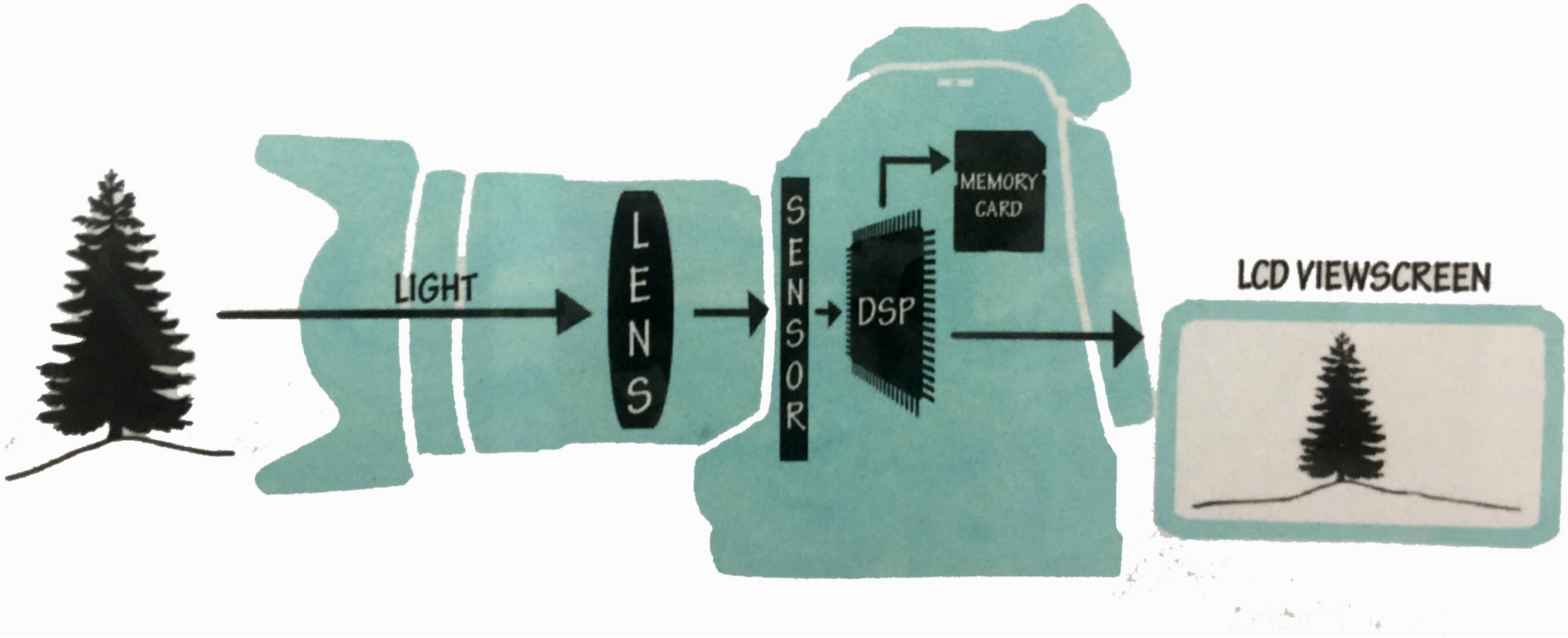
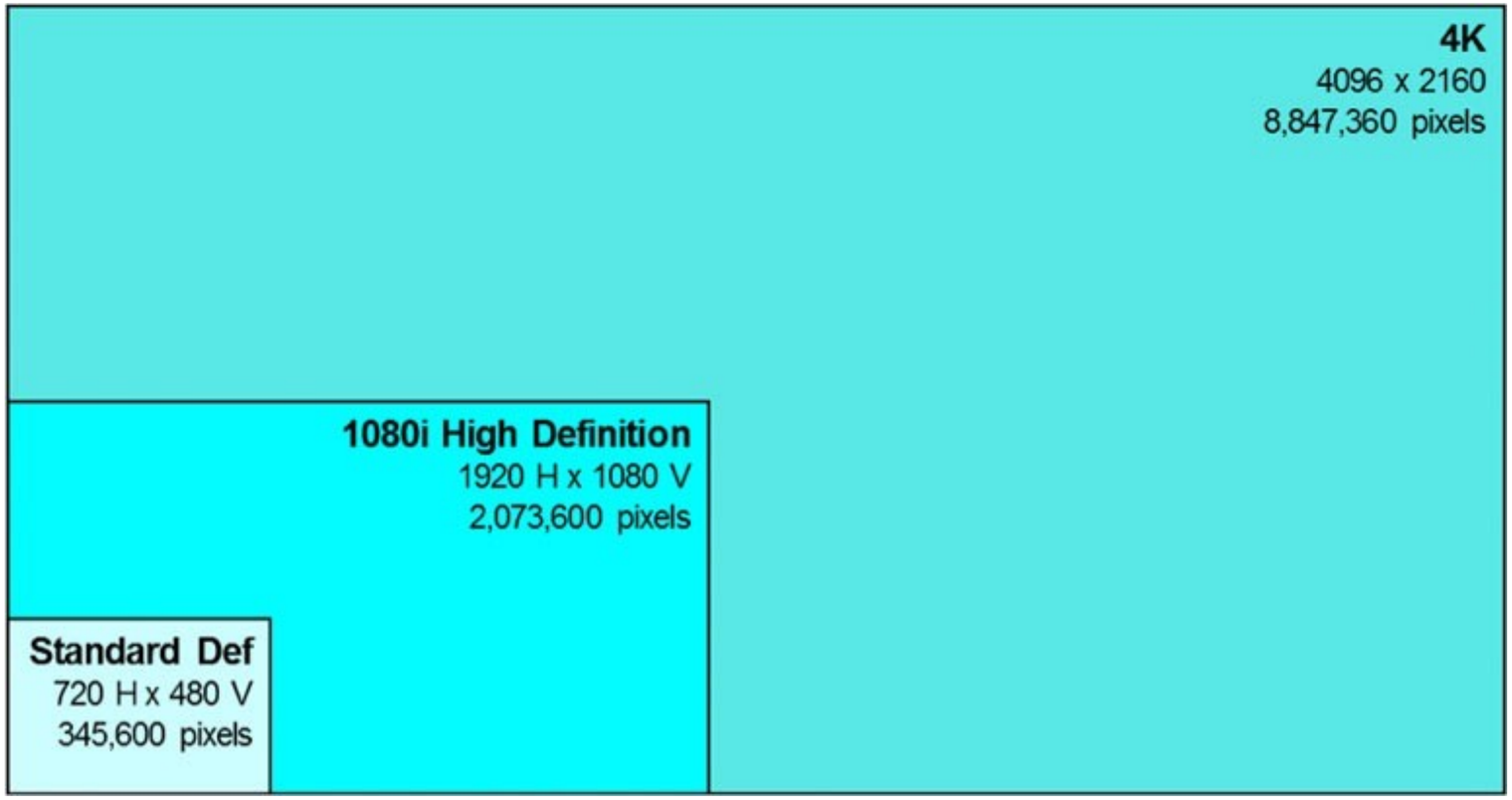


Figure 3


LIGHT
LENS
SENSOR
DSP
MEMORY CARD
LCD VIEWSCREEN

HD vs. 4K



“4K” is named for the approximately 4000 pixel width of the image. The image is about four times larger than the HD image.