Multiplier

Project overview video

DRAM

textbook
\[
\begin{array}{c}
0111 \\
1101 \\
0011 \\
0000 \\
0111 \\
0111
\end{array}
\]

\[
\begin{array}{c}
a \\
+ n \\
\end{array}
\]

\[
\begin{array}{c}
\text{ delays: } 3W \text{ ripple} \\
\text{ trick 1: Booth} \\
0.111 = 7 \\
1000 \div \\
-0001 = -1 \\
\text{ recode strings of 1s at a time odd/subtract} \\
\Rightarrow \frac{1}{2} \text{ as many odder}
\end{array}
\]

\[
\begin{array}{c}
\text{ trick 2: carry save}
\end{array}
\]
Video
1927 Philo T. Farnsworth, San Francisco
1941 US 525 line BW standard

back porch

front porch

a line on screen

1 line on screen

H-sync (V, H)

30 fps (interlaced) 60i 525i

30 ms / 525 lines

= 60 ms / line

Filament focus

pixel

V-sync H-sync

phosphors

electron beam

turn off gun on horizontal return (H-synch)

start at top on vertical return (V-synch)
Color!  Backward compatibility!

Composite Video
- modulate the analog B/W signal @ 3.58 MHz
- DC value is luminance (Y)
  5th & 6th components are Hue and Saturation
  (U)  (V)

Component analog interface
R  & G  & analog, W/ blanking.
DVI  Digital Video I
R  & G  & 
  (differential signals) bit rate is 10x clock rate
  CLK  = 25-165 MHz  & clock recovery
H,V on blue
HDMI

1024x768  1 MPix/frame
720x1080  2 MPix/frame.
  3 colors, 8 bits/color = 24 bit/pix

120 fps/sec
240 M pixel/sec.
720 MB/s
~ 5 Gbps

Chromed Clip

DVI

Serial control

Reserved

need 2 cycles of 17.5 to fill 3B color/pixel