OHMSVILLE

MISSION BOOKLET

The Bijou

A lamp, a motor and a shutter is every machine that ever showed a picture that moved.

Contents

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A lamp, a motor and a shutter is every machine that ever showed a picture that moved.

A lamp, a motor and a shutter, which is every machine that showed a picture that moved between 1878 and the Lumieres. Five builds: a disc turning 68.6 times a second under a steady lamp, which is a grey ring; a 555 flashing once a turn, which is one horse standing still; the same board with a hand on the knob, running the horse forward at 42 frames a second and backwards at 36; a capacitor filled over thirty seconds and spent in thirty milliseconds, which is the flash board out of a disposable camera; and the photocell, which is the only electric part a camera ever really had.

A Blur

BEFORE

Put twelve drawings round the rim of a disc, spin it on the motor, and light it. You will not see twelve drawings.

AFTER

The disc turns 68.6 times a second and the frames cross the window 823 times a second. The eye holds a picture for about a twentieth of a second, so it sums forty of them into a grey ring. A steady lamp shows you everything at once, which is the same as showing you nothing.

HOW PEOPLE GOT THERE

1878 Eadweard Muybridge set a row of cameras along a track at Leland Stanford's Palo Alto farm in 1878 and tripped them with threads as the horse ran through. The question was whether a galloping horse ever has all four feet off the ground. It does — and the frames that answered it are the twelve on this rim.

Stanford University Libraries, Muybridge collection; Library of Congress Prints & Photographs Division, "The Horse in Motion" (1878).

The Shutter

BEFORE

Something has to pick one frame out of the 823. A 555 flashing a red LED is a shutter with no moving parts — set its rate and see what the light catches.

AFTER

At 68.8 flashes a second, one per turn of the disc, every flash arrives with the same drawing in the window. The blur becomes one horse standing still. The 9 V lamp cannot do this job: its filament is still glowing when the next flash is due, so it measures a flat dim glow instead of a strobe.

HOW PEOPLE GOT THERE

1891 W. K. L. Dickson built the Kinetoscope for Edison: an electric motor pulling film past an incandescent lamp behind a spinning slotted shutter. It had a peephole because only one person can stand where the picture is. The Lumieres put the same three parts on a wall four years later by adding a lens.

Library of Congress, "Inventing Entertainment: the Motion Pictures and Sound Recordings of the Edison Companies"; Smithsonian National Museum of American History, Edison collections.

Slow, Frozen, Backwards

BEFORE

The motor is not going to change speed. Turn the pot anyway, and watch who the horse is actually taking orders from.

AFTER

At 65.3 flashes a second the horse gallops forward at 42 frames a second; at 71.8 it gallops backwards at 36. Twelve frames times the gap between the disc and the strobe is the frame rate, and the pot owns one of those two numbers.

HOW PEOPLE GOT THERE

1879 Muybridge painted his frames round a glass disc, spun it behind a counter-rotating slotted shutter and threw the result on a screen. He called it the zoopraxiscope. It is the same relation this chapter is turning a knob through: frames past a window, against flashes of light, and nothing else.

Kingston Museum, Muybridge bequest (his own zoopraxiscope and discs); Smithsonian National Museum of American History, early motion-picture collections.

Stored, Then Spent

BEFORE

The projector throws light out. A camera takes it in — and by the 1990s the interesting part of a camera was the board that saved up for the flash.

AFTER

Nine volts through 10 kilohms fills a 470 microfarad capacitor in about thirty seconds, and the lamp stays dark the whole time. The button hands all 0.019 joules to the lamp at once: a peak fifteen milliseconds later, over in about thirty. The real one stepped a single AA up to 330 volts first, which is 290 times the energy and the reason nobody opened one twice.

HOW PEOPLE GOT THERE

1986 Fujifilm sold the first single-use camera in 1986 — film, lens and shutter in a cardboard shell you handed back whole. The flash versions carried a blocking oscillator, a thumbnail transformer and one fat electrolytic, and a whole generation learned what a capacitor stores by opening one.

Fujifilm corporate history, Utsurun-desu (QuickSnap) 1986; Science Museum Group collection, single-use cameras.

The Camera Decides

BEFORE

The electric part of a camera is not the shutter. It is the thing that decides how long the shutter stays open, and on this bench that is the photocell.

AFTER

Sweep the light and the needle moves: the cell is a resistor that reads brightness, and the meter reads the cell. That is the camera measuring. No film is exposed here — the bench measures light, it does not record it.

HOW PEOPLE GOT THERE

1938 Kodak put a selenium photocell into the Super Six-20 in 1938 and let the meter set the aperture itself, the first camera that decided its own exposure. The cell in this chapter is cadmium sulphide rather than selenium, but it is answering the same question: how much light is there.

George Eastman Museum, technology collection (Kodak Super Six-20, 1938); Science Museum Group, photographic exposure meters.

Colophon

Generated from the modules the bench runs on: every circuit in this booklet is the circuit the simulator solves, and every word beside it is the word the manual panel prints.

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