Demo effects on the classic Amiga

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(Blueberry / Loonies)

Overview

- Introduction
- The display hardware
- The copper
- The blitter

Amiga 500

- Launched in 1987
- 7MHz Motorola 68000, 512kB RAM
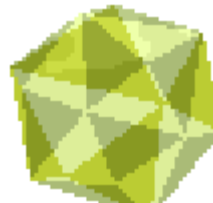- Custom chips for graphics, sound, disk, etc.

Now vs. then

- GeForce GTX 780: 5 TFLOPS peak
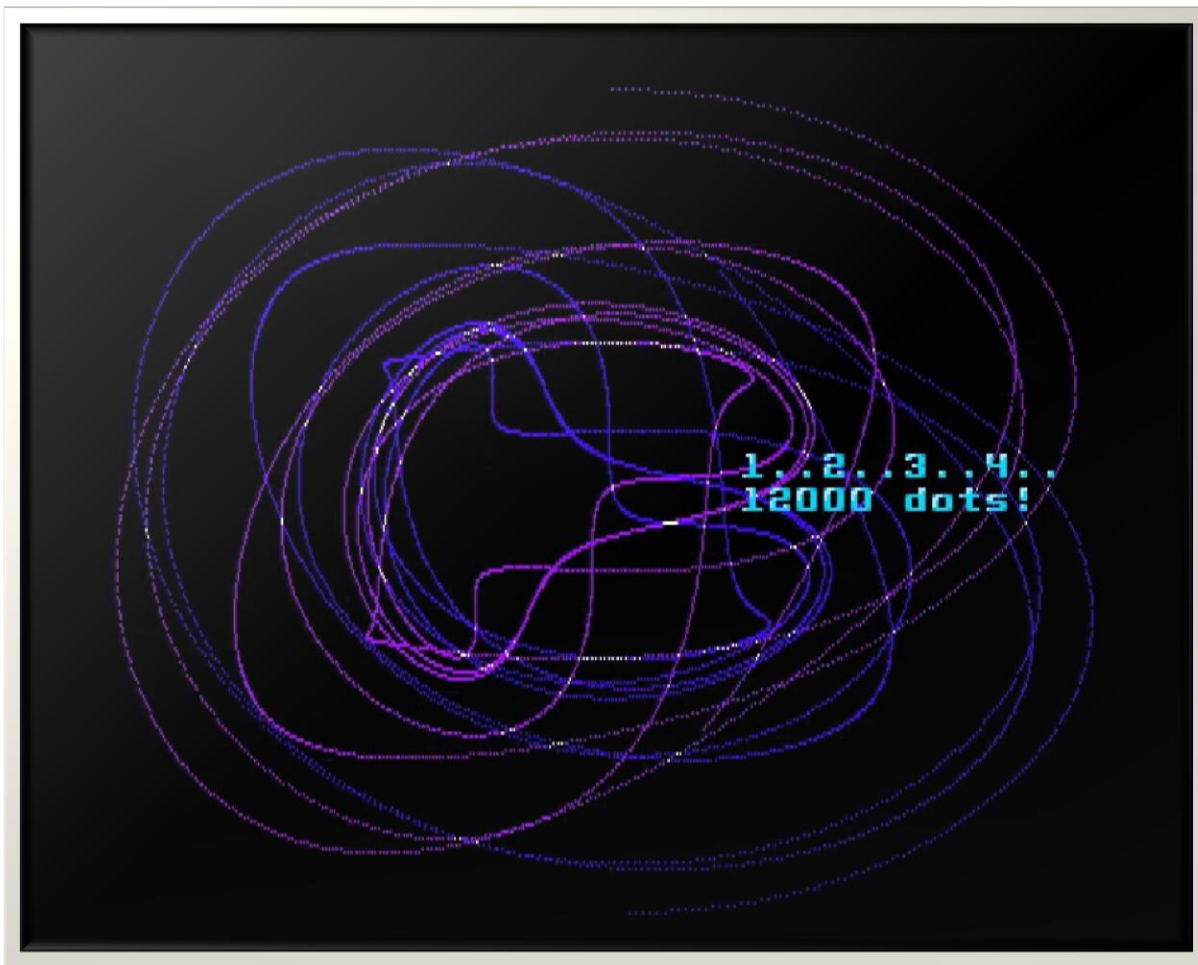 - At 1920 x 1080, 60 FPS

  40000 ops / pixel / frame

- Amiga 500: 7 MHz, ≥4 cycles / op
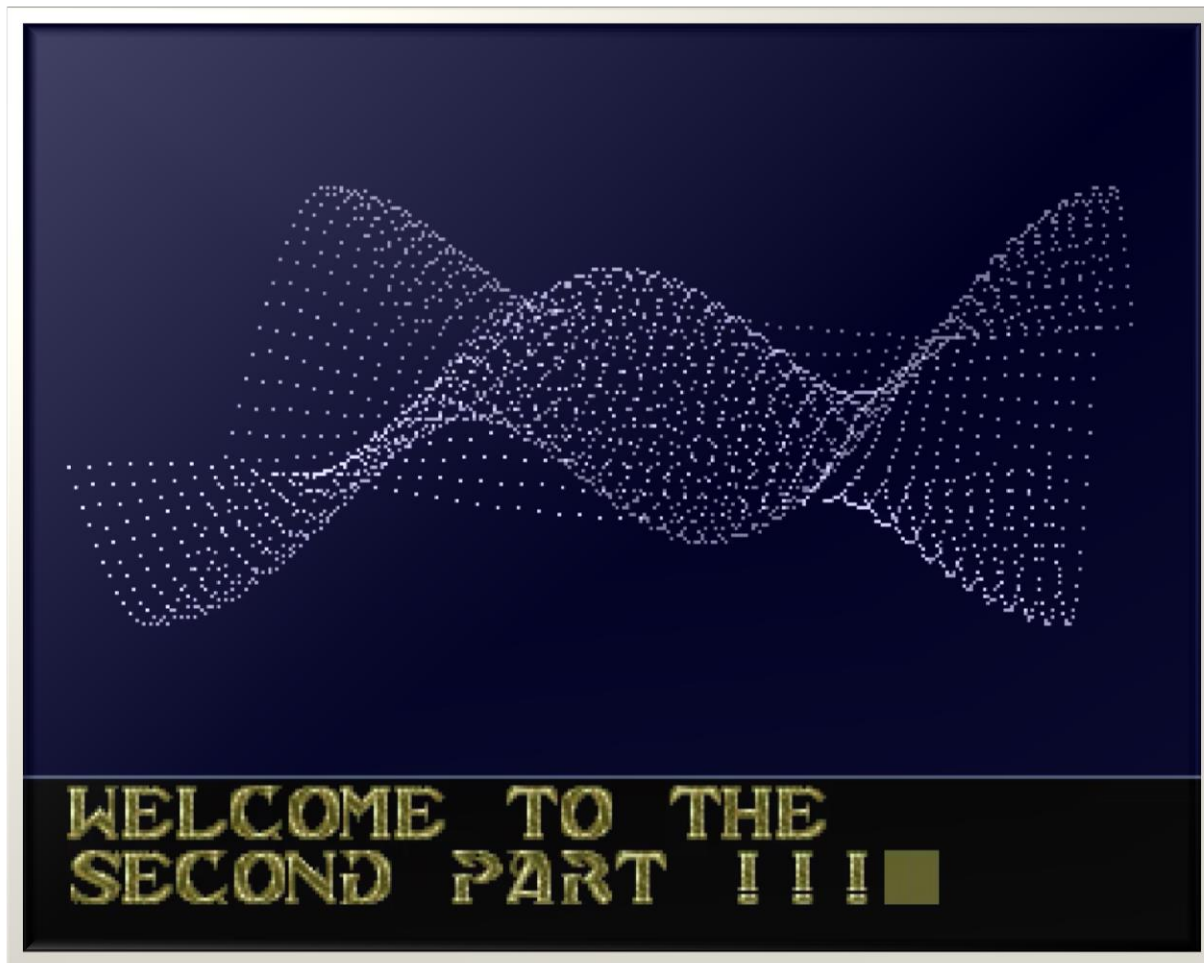 - At 320 x 256, 50 FPS

  0.4 ops / pixel / frame

Effect: Dots

From "Desert Dream" by Kefrens, 1993
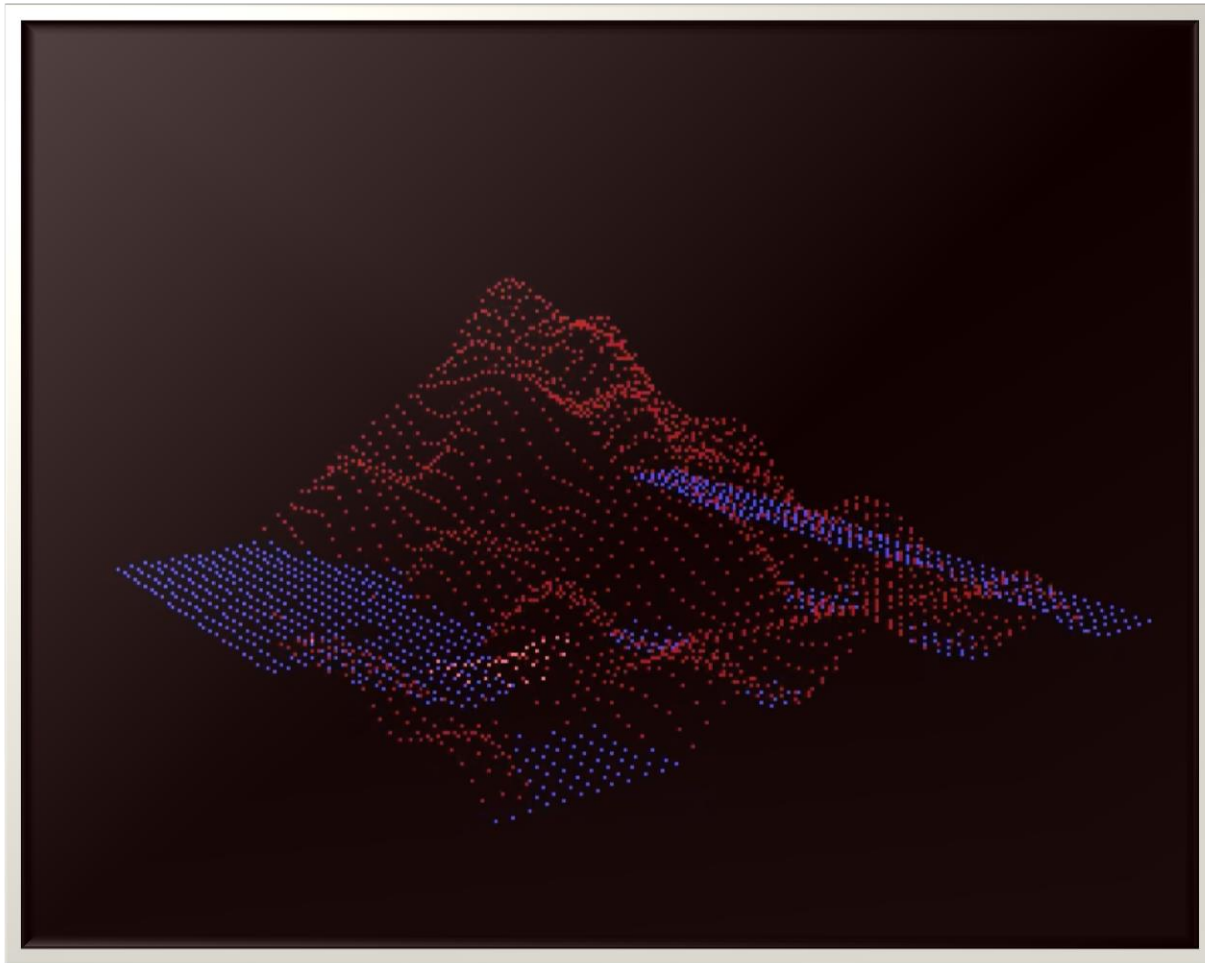
Effect: Sine Dots

From "World of Commodore" by Sanity, 1992

Effect: Dot Tunnel

From "Interference" by Sanity, 1993

Effect: Dot Landscape

From "Arte" by Sanity, 1993

Bitplanes

010011**1**0111110101 0011011010101010 101010

101010**0**1101101101 1001011110101000 1010010

000011**1**1110111011 1110000011110111 0111010

110100**0**1111011101 1011101110101110 1100100000

001011**1**1100001010 1111111000010100 1111110010

↓↓↓↓↓

10101 (21)

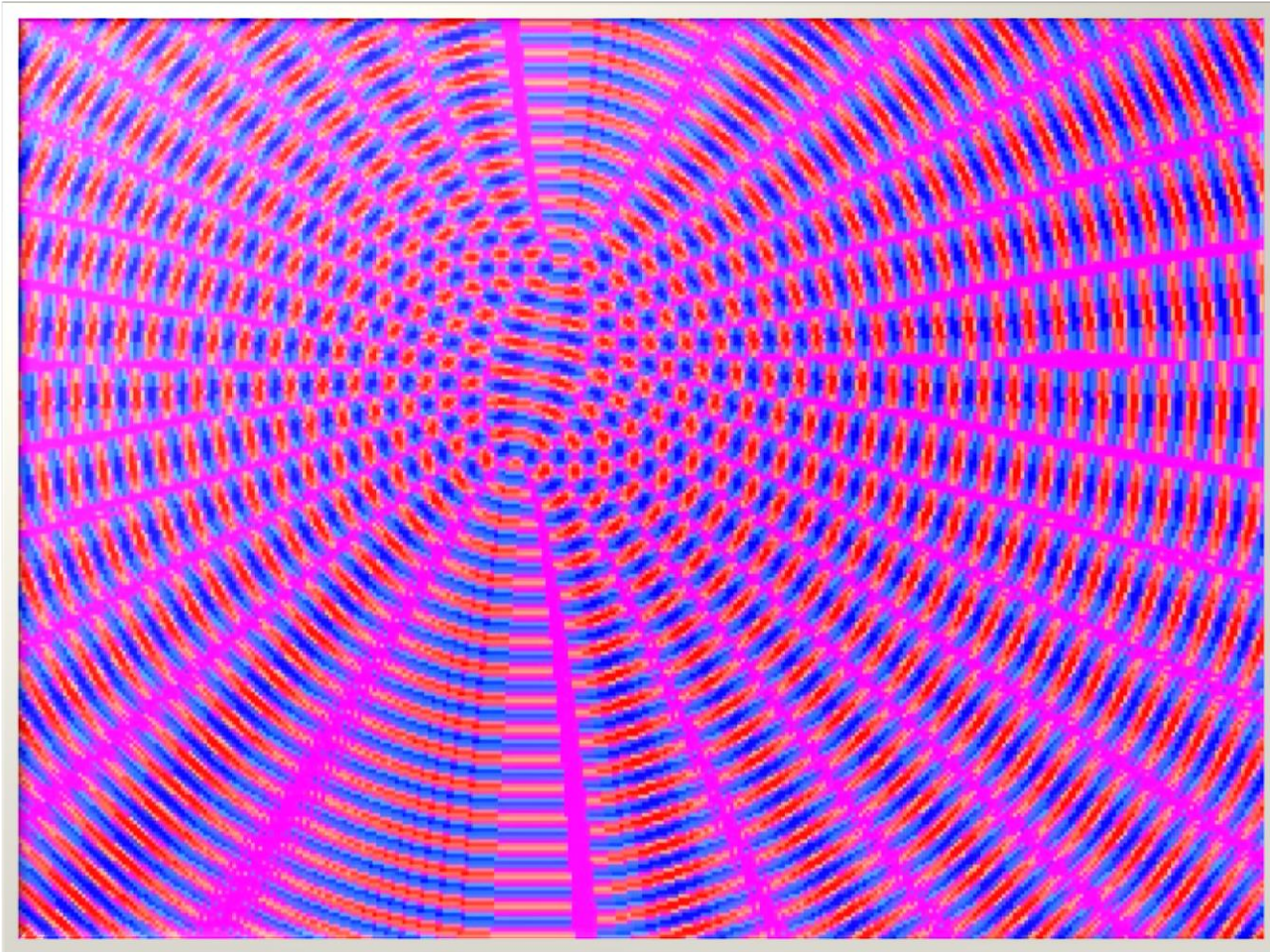| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |

Output color:

Playfield offset
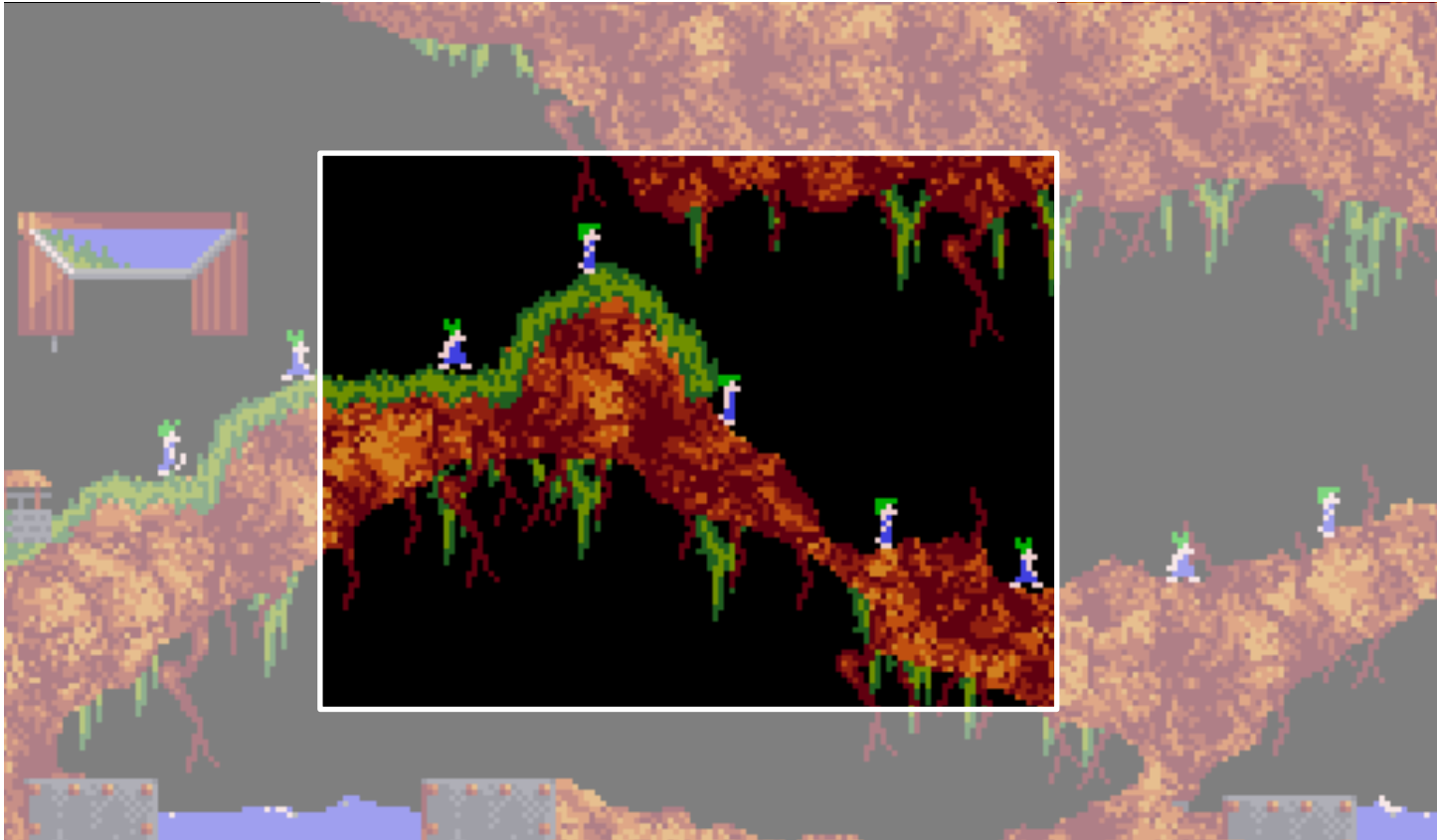
Screenshot from "Lemmings" game by DMA Design
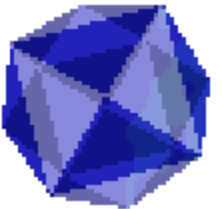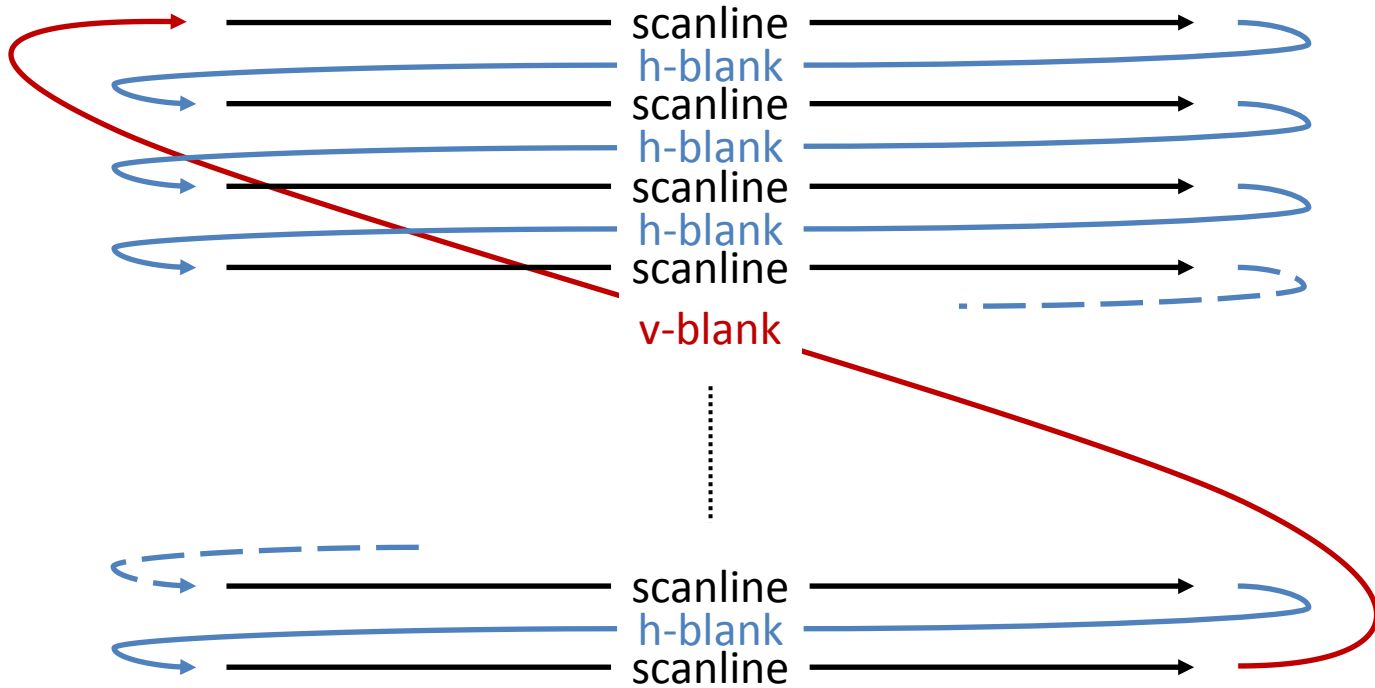
Effect: Interference

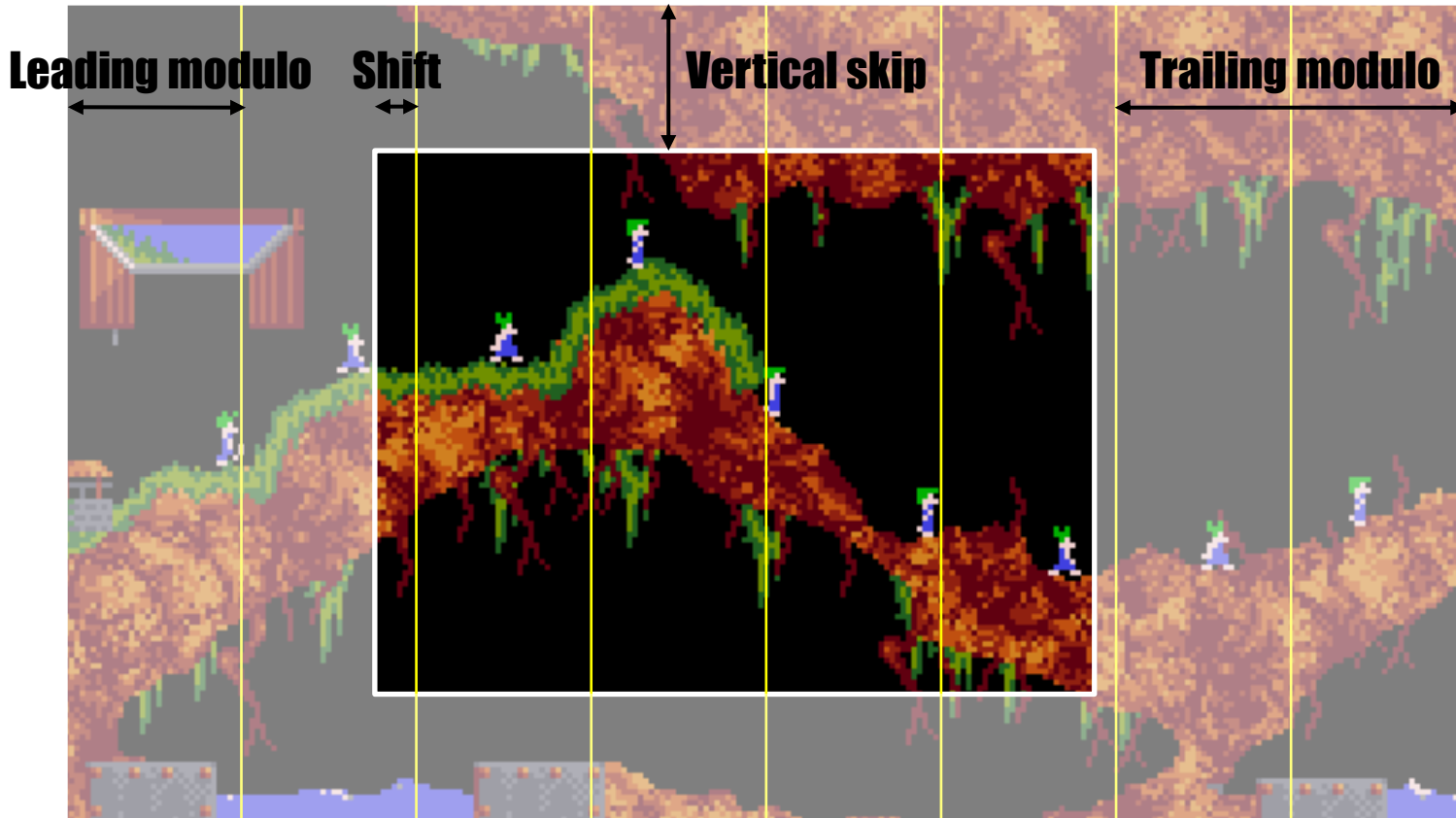From "Mesmerized" by Pure Metal Coders, 1990

Effect: Directional Light

From "Desert Dream" by Kefrens, 1993

Electron beam

scanline
h-blank
scanline
h-blank
scanline
h-blank
scanline

v-blank

scanline
h-blank
scanline

Playfield offset in detail

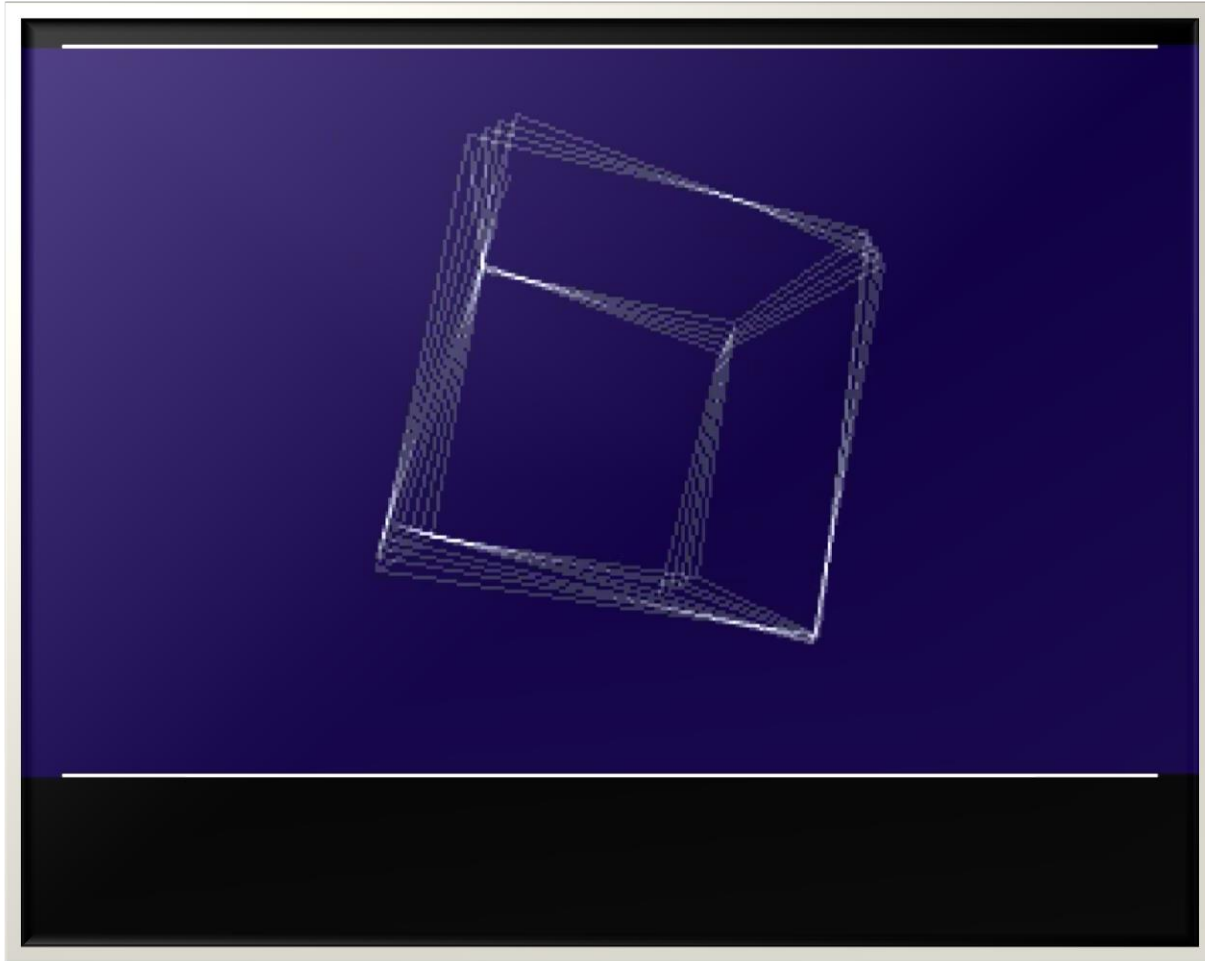**Leading modulo**   **Shift**   **Vertical skip**   **Trailing modulo**

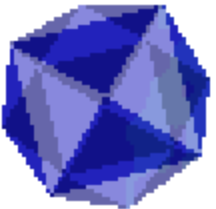# Effect: Vertical Bars
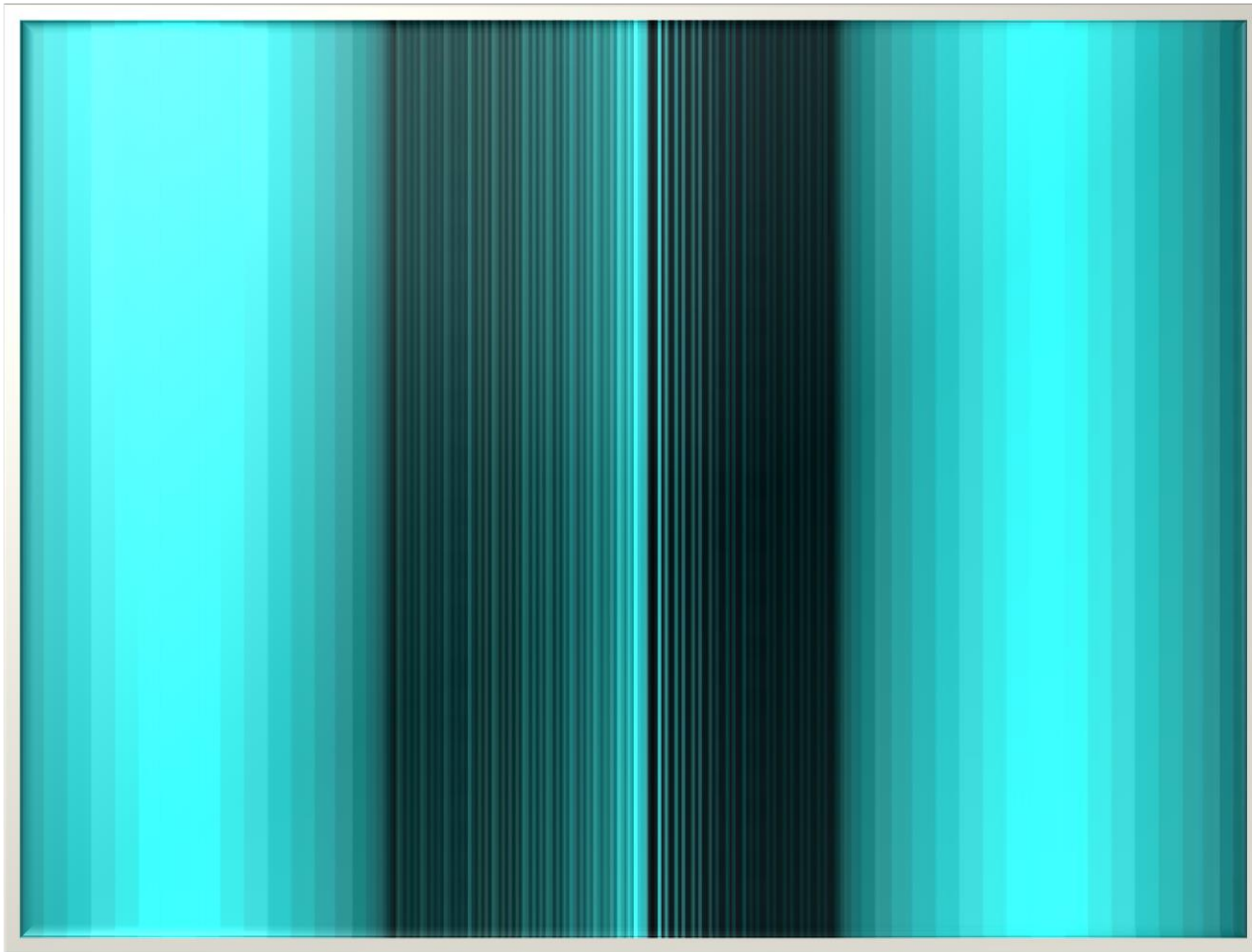
From "Overdose" by Delight, 1991

Effect: Motion Blur
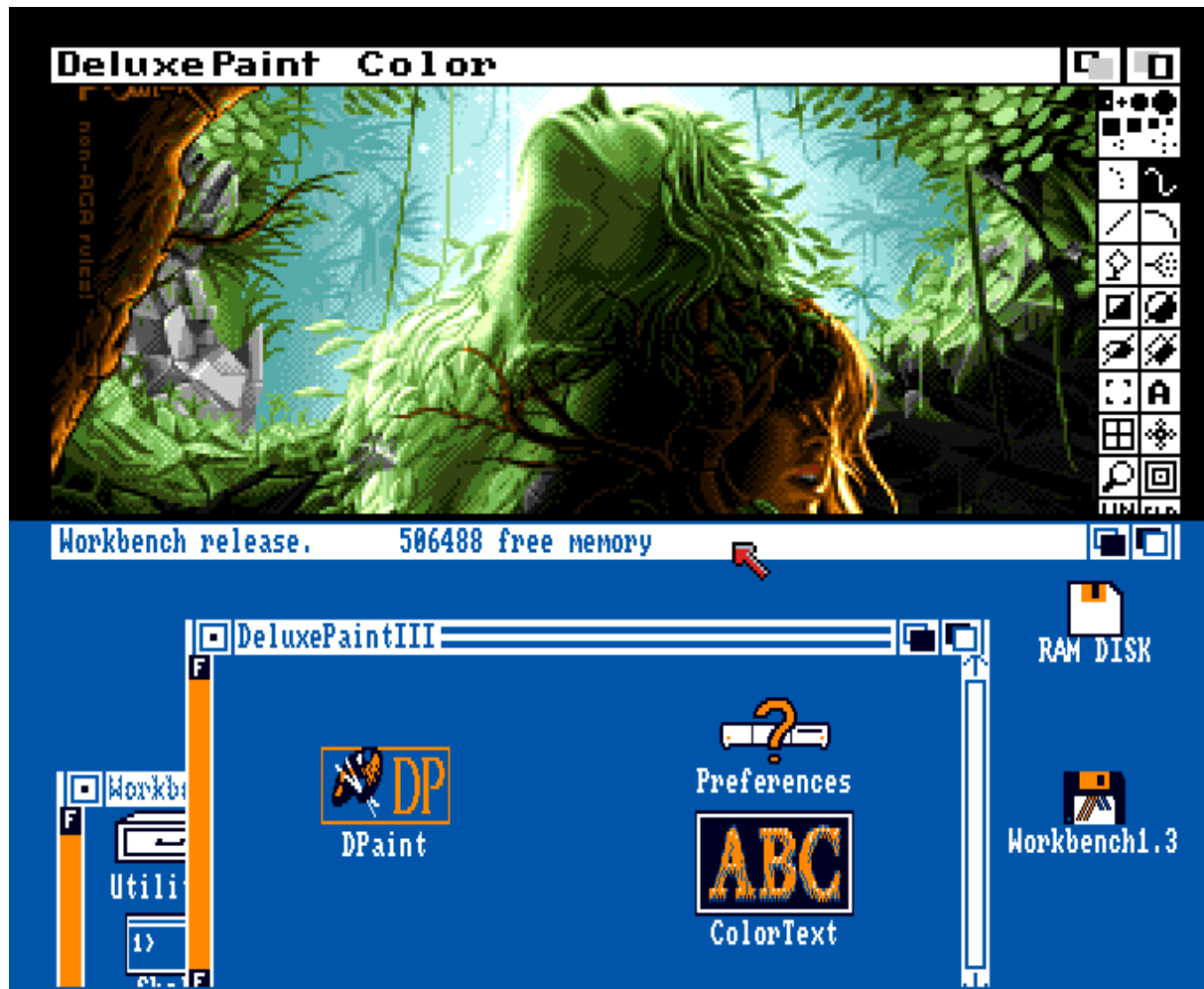

From "Hardwired" by Crionics, 1991

The Copper

- Co-processor with two instructions
  - MOVE: Write value to hardware register
  - WAIT: Wait for raster position
- Copper list
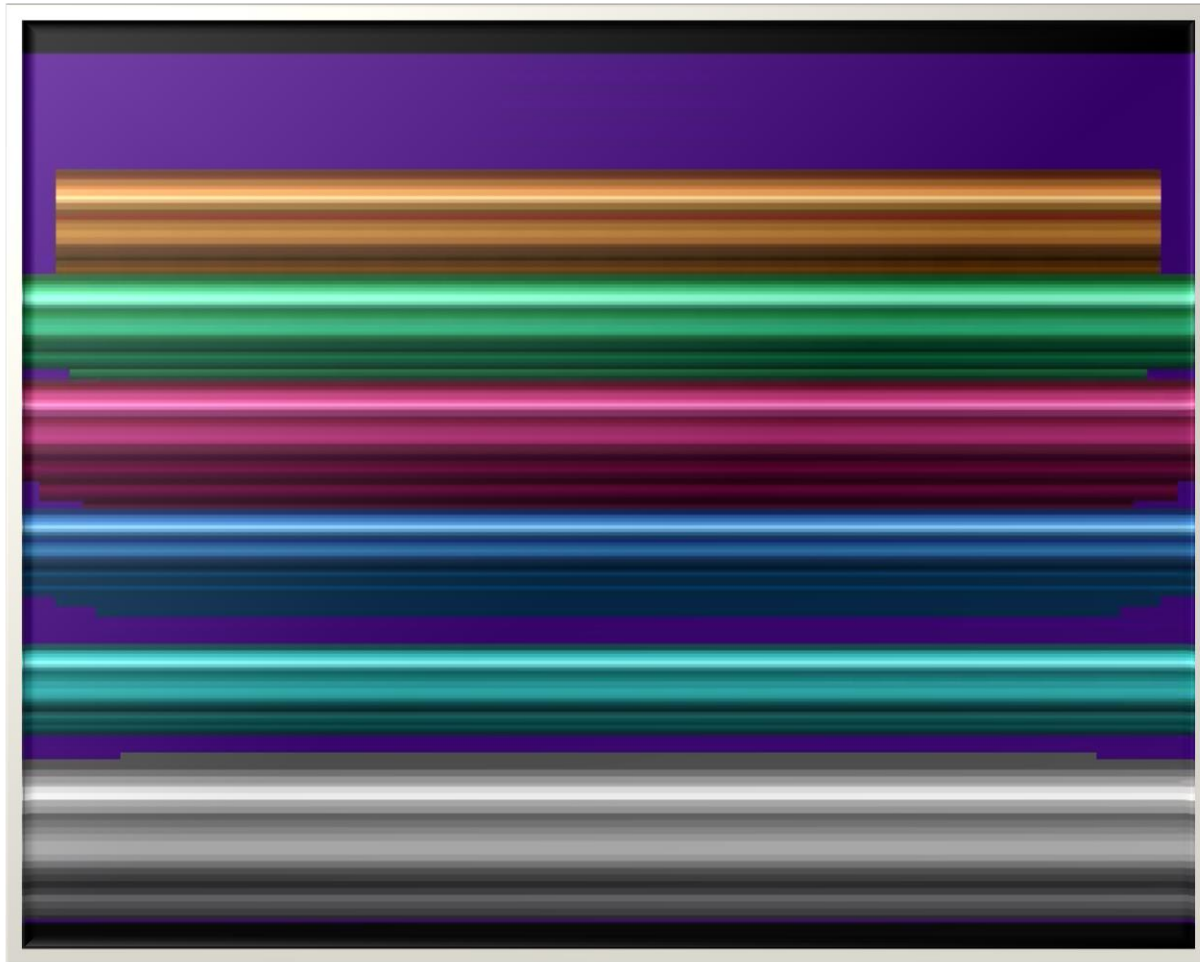- Starts execution at every v-blank

Split screen

Picture "Elements of Green" by Prowler
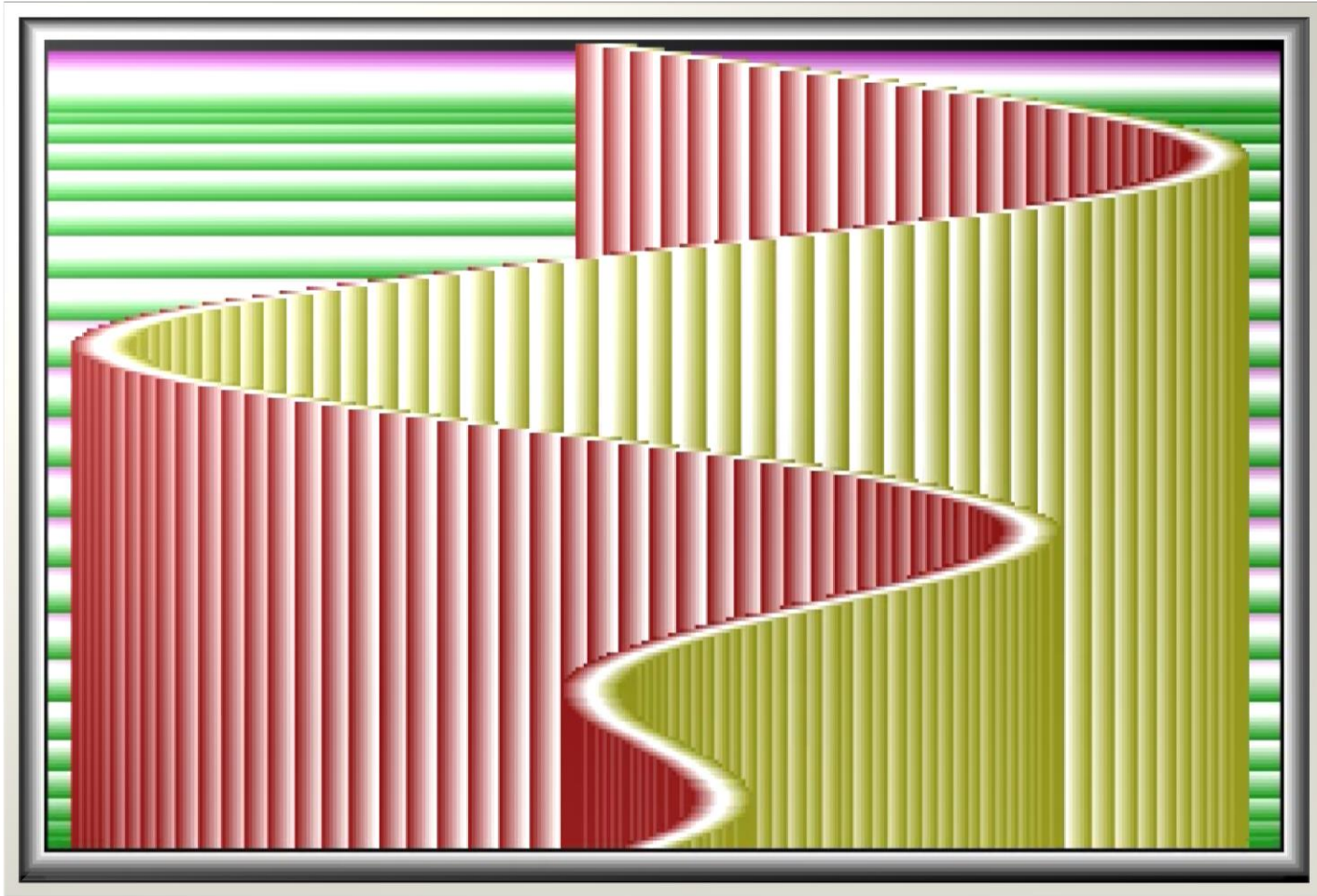
Effect: Copper Rainbow

From "Copper Master" by Angels, 1990
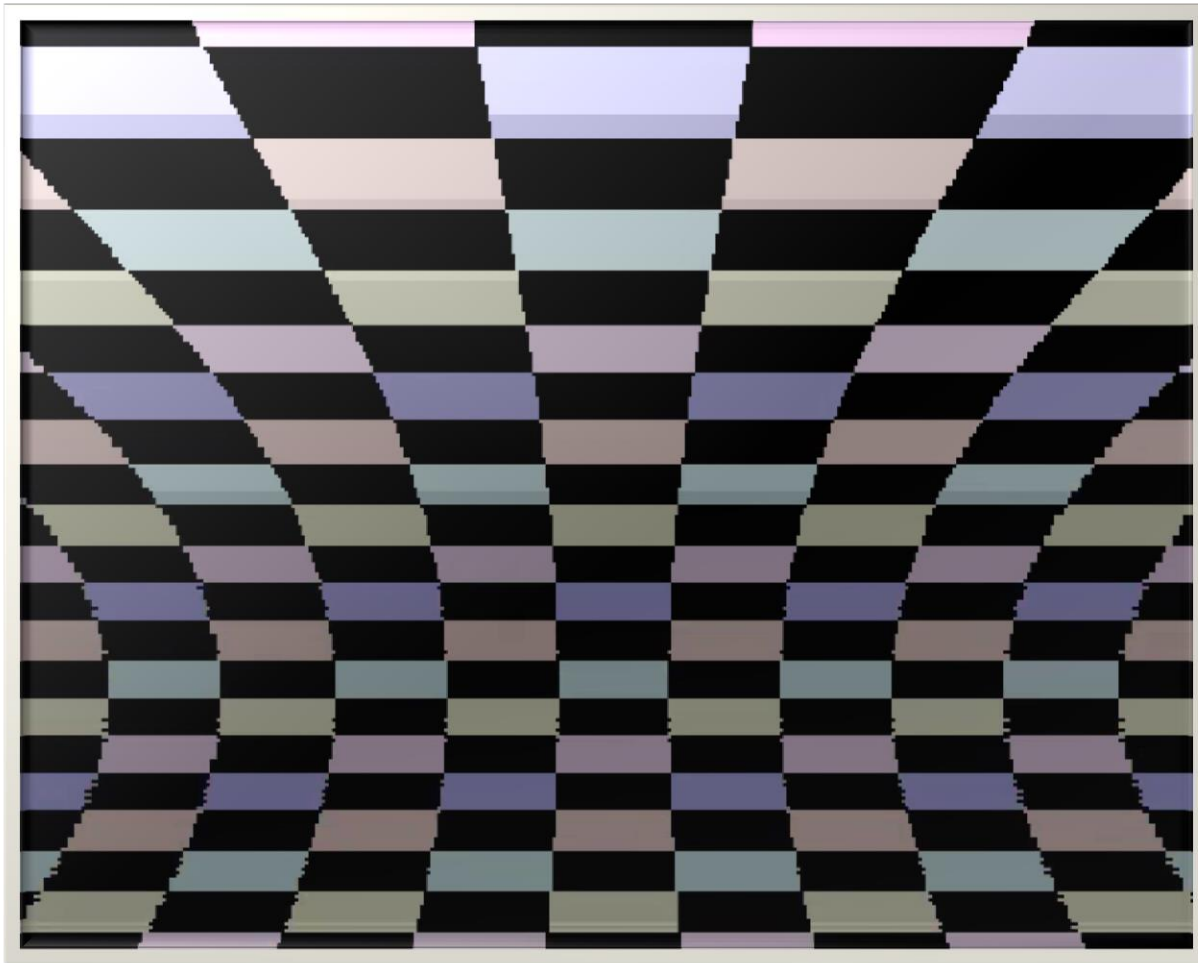
Effect: Copper Bars

From "Desert Dream" by Kefrens, 1993
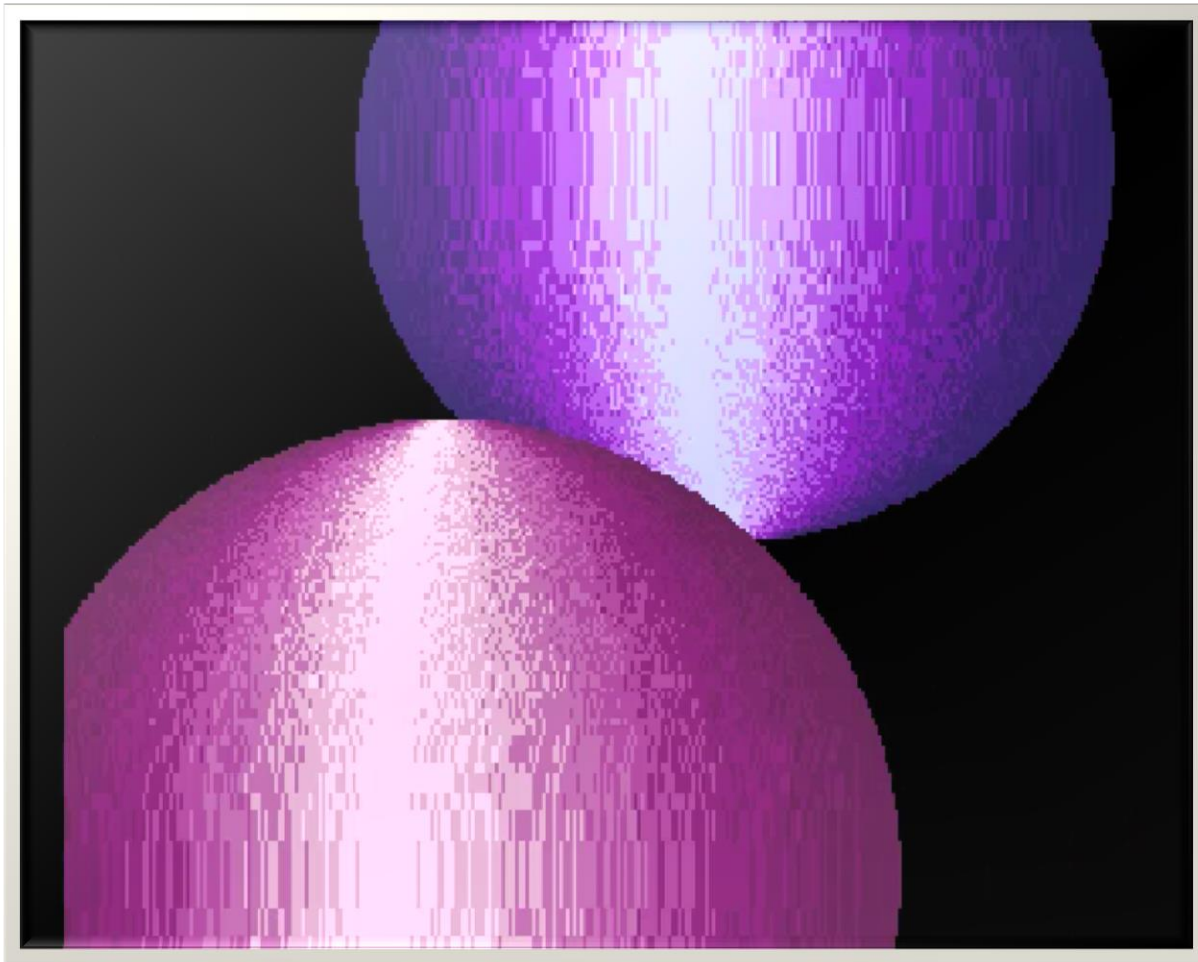
Effect: Kefrens Bars

From "Copper Master" by Angels, 1990

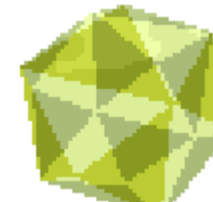# Effect: Wavy Checkerboard

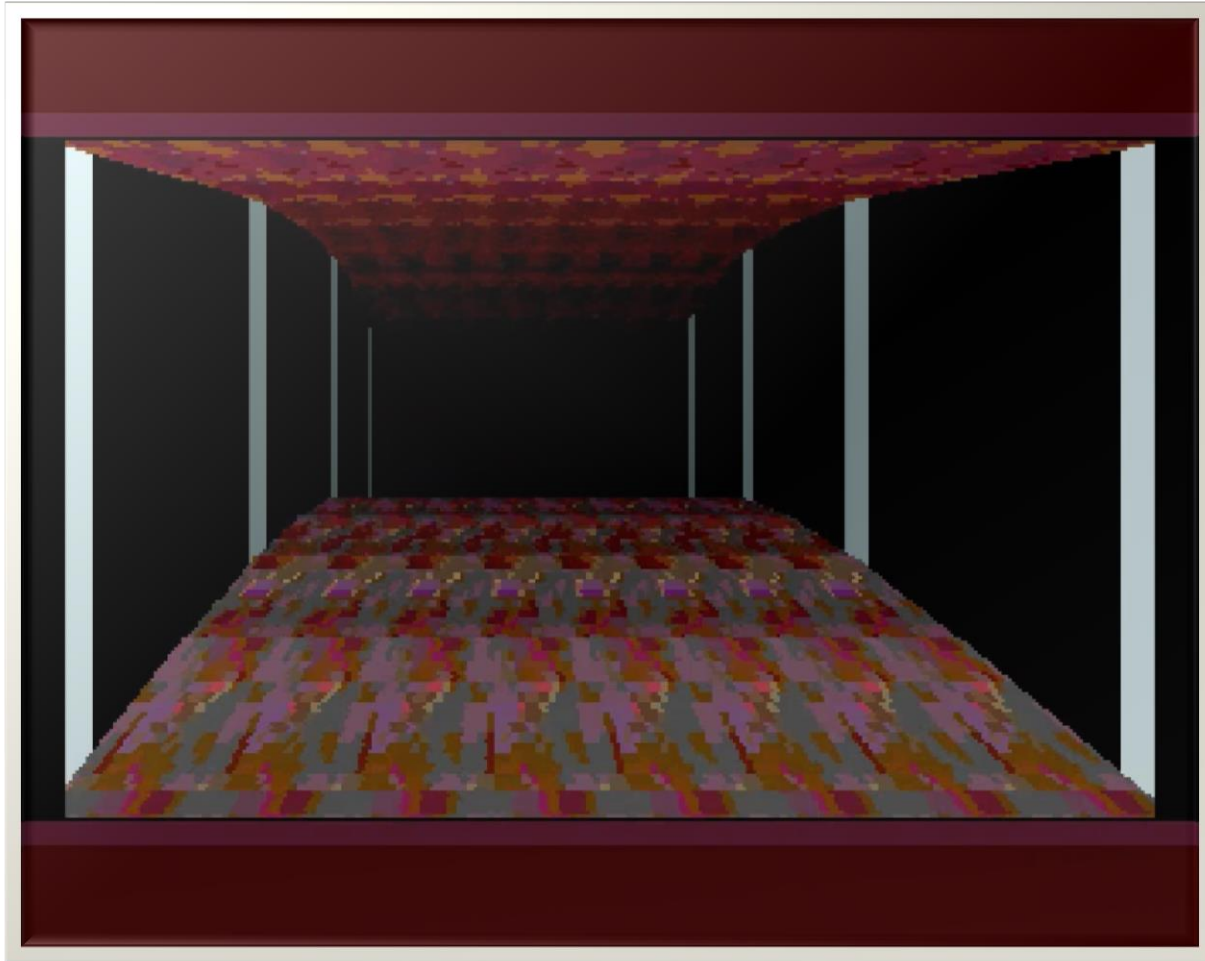From "Desert Dream" by Kefrens, 1993

Effect: Copper Balls

From "Desert Dream" by Kefrens, 1993

Effect: Stretched Texture

From "Arte" by Sanity, 1993

Effect: Stretched Image

From "Desert Dream" by Kefrens, 1993

The Blitter

Source A   ← A shift → 00001**1**1111000001111110

Source B   ← B sh → 000011001**1**1000110011101110

Source C   010101010101010**0**101010101010101010

110

111	110	101	100	011	010	001	000

Minterms

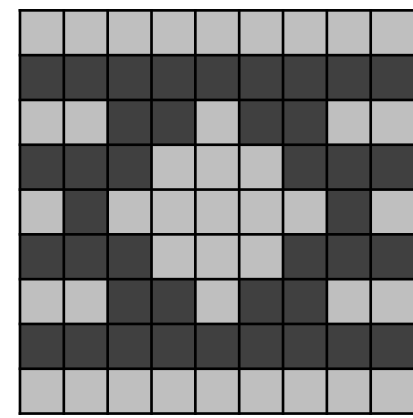| 1	1	0	0	1	0	1	0

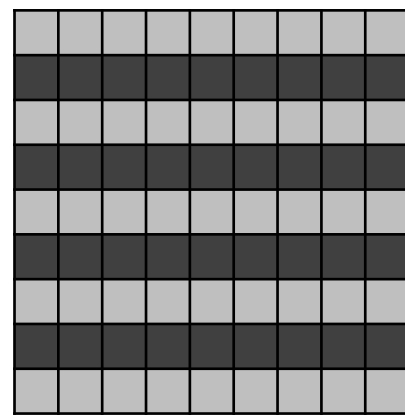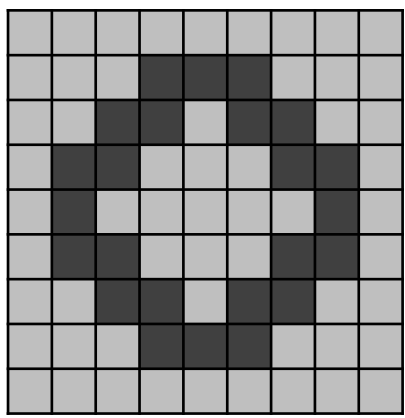Dest D   0101010101010**1**1110000101011011110
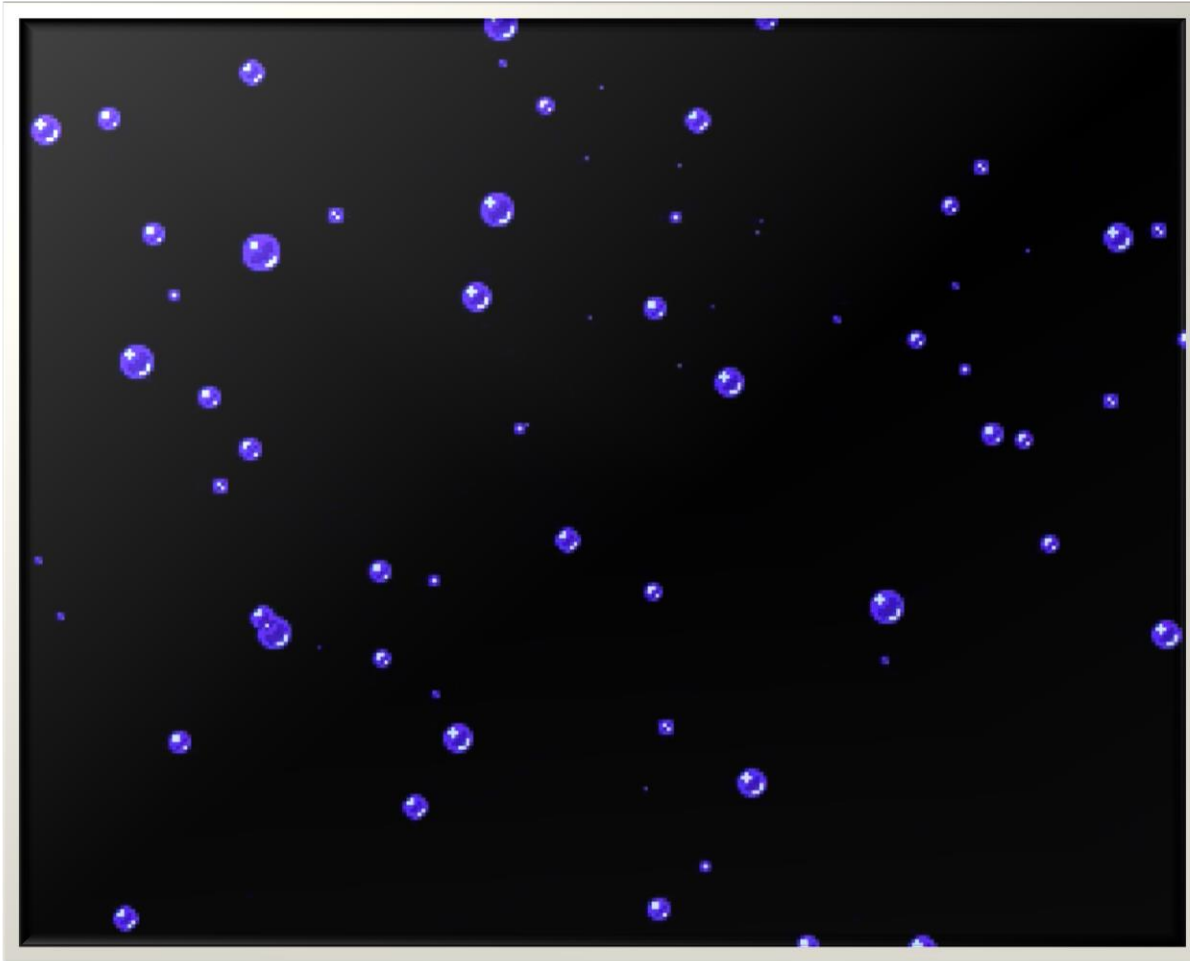
Cookie Cut

(A and B) or ((not A) and C)

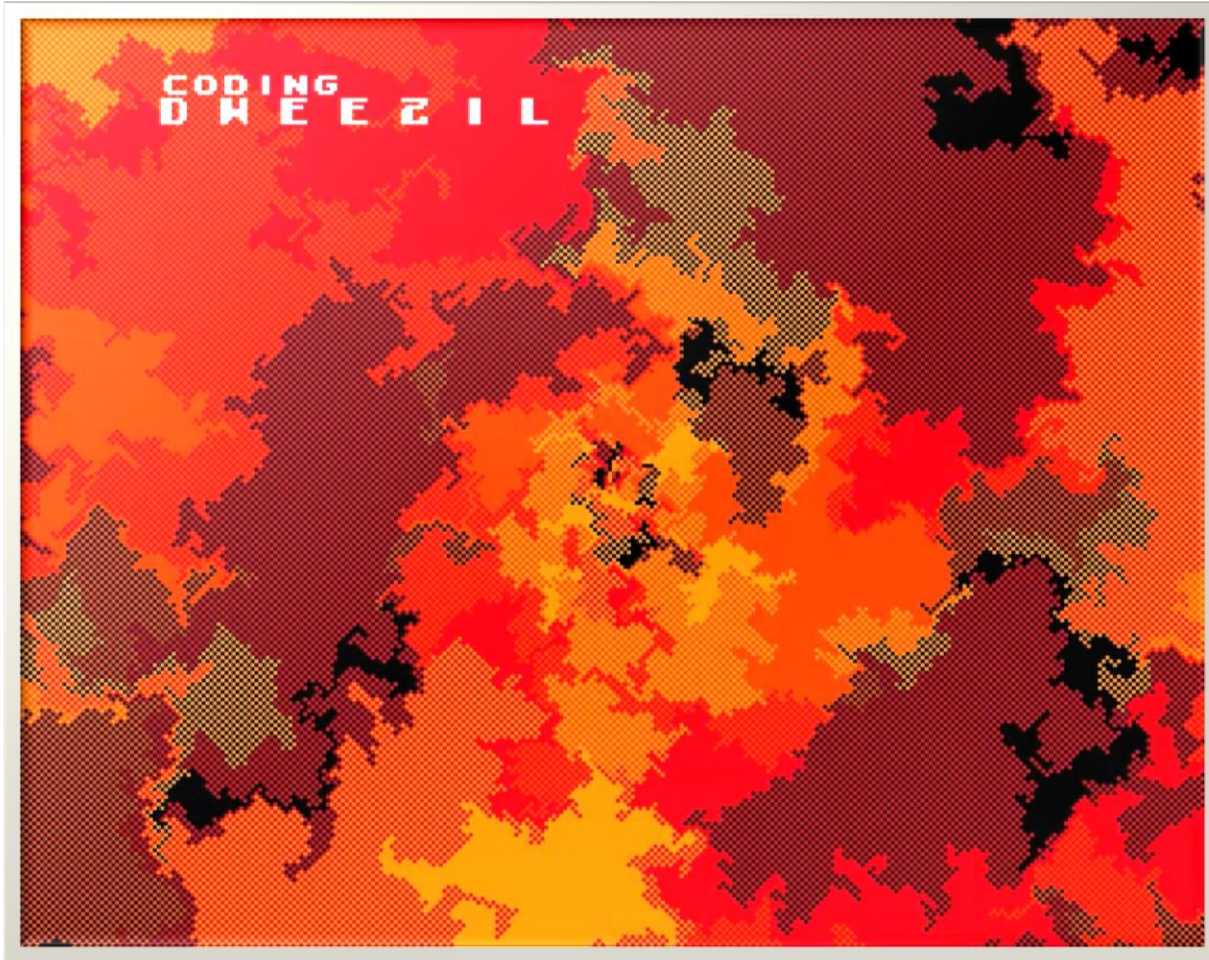| Source A Mask	Source B Image	Source C Screen	Dest D Result
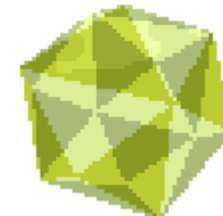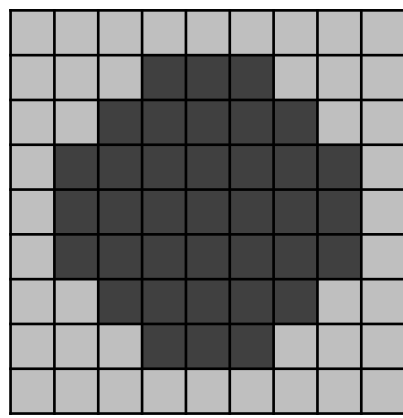
Effect: Bobs

From "Seeing is Believing" by Anarchy, 1991

Effect: Shade Bobs

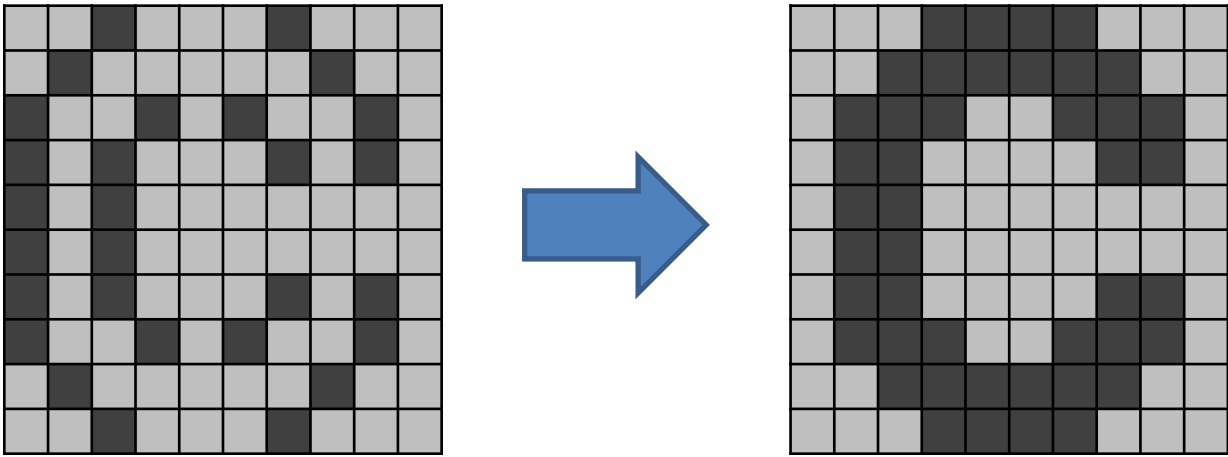From "Hardwired" by Crionics, 1991

Effect: Chaos Zoomer

From "Bananamen" by Stellar, 1993
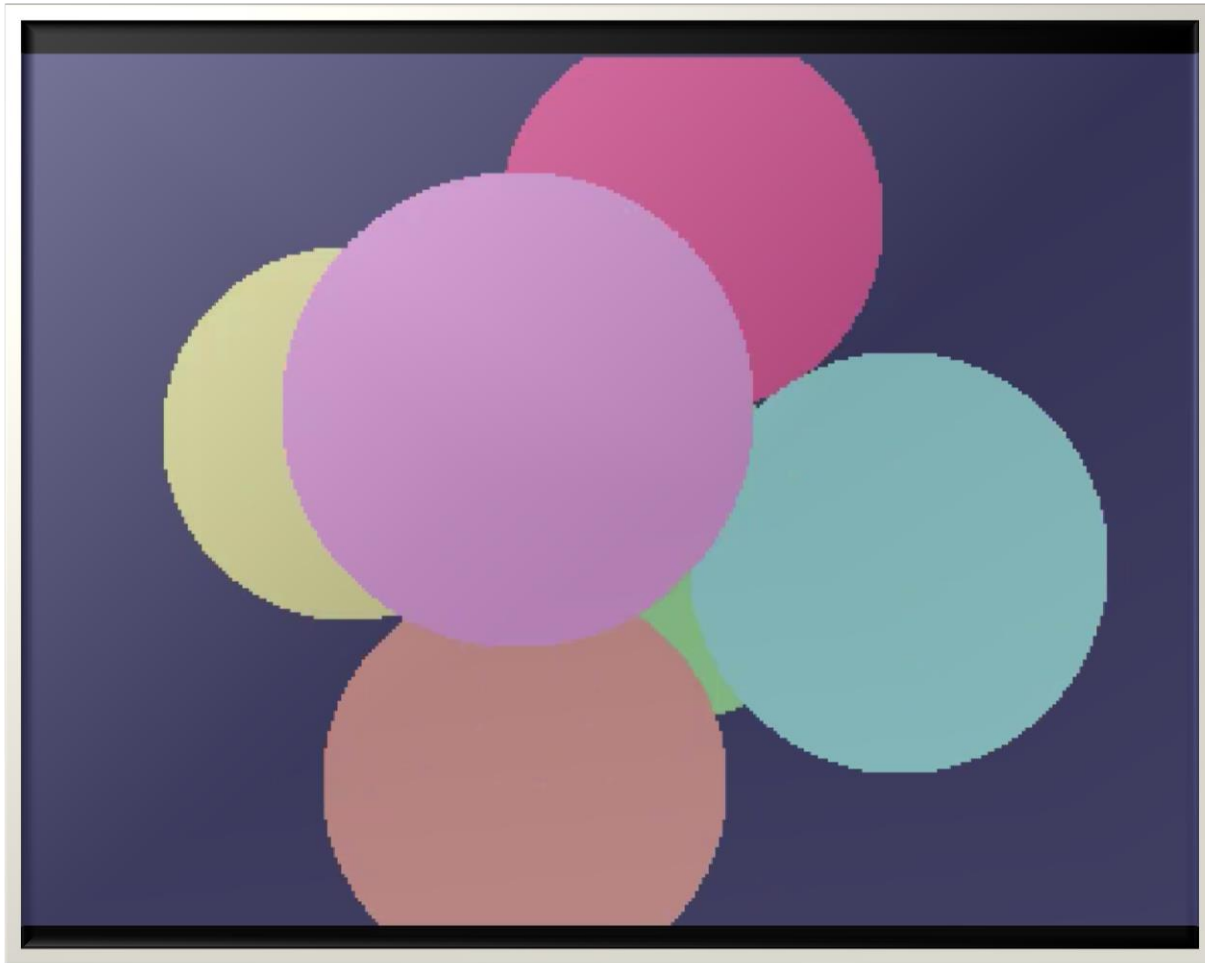
Blitter filling

From right to left, switch between 0 and 1 on each 1

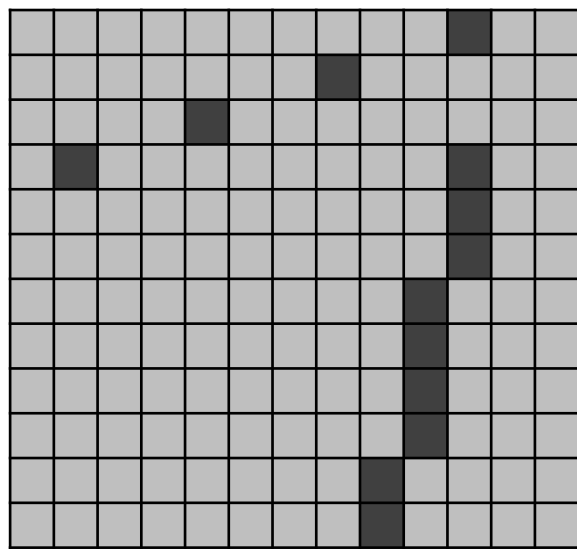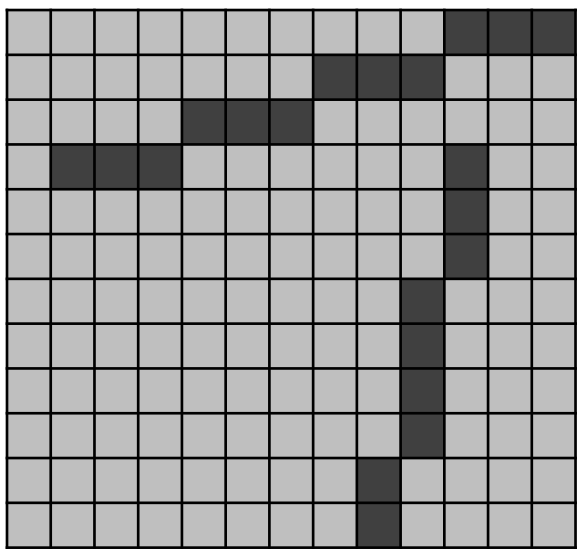(Inverse: XOR with itself shifted one bit to the left)

Effect: Filled Balls
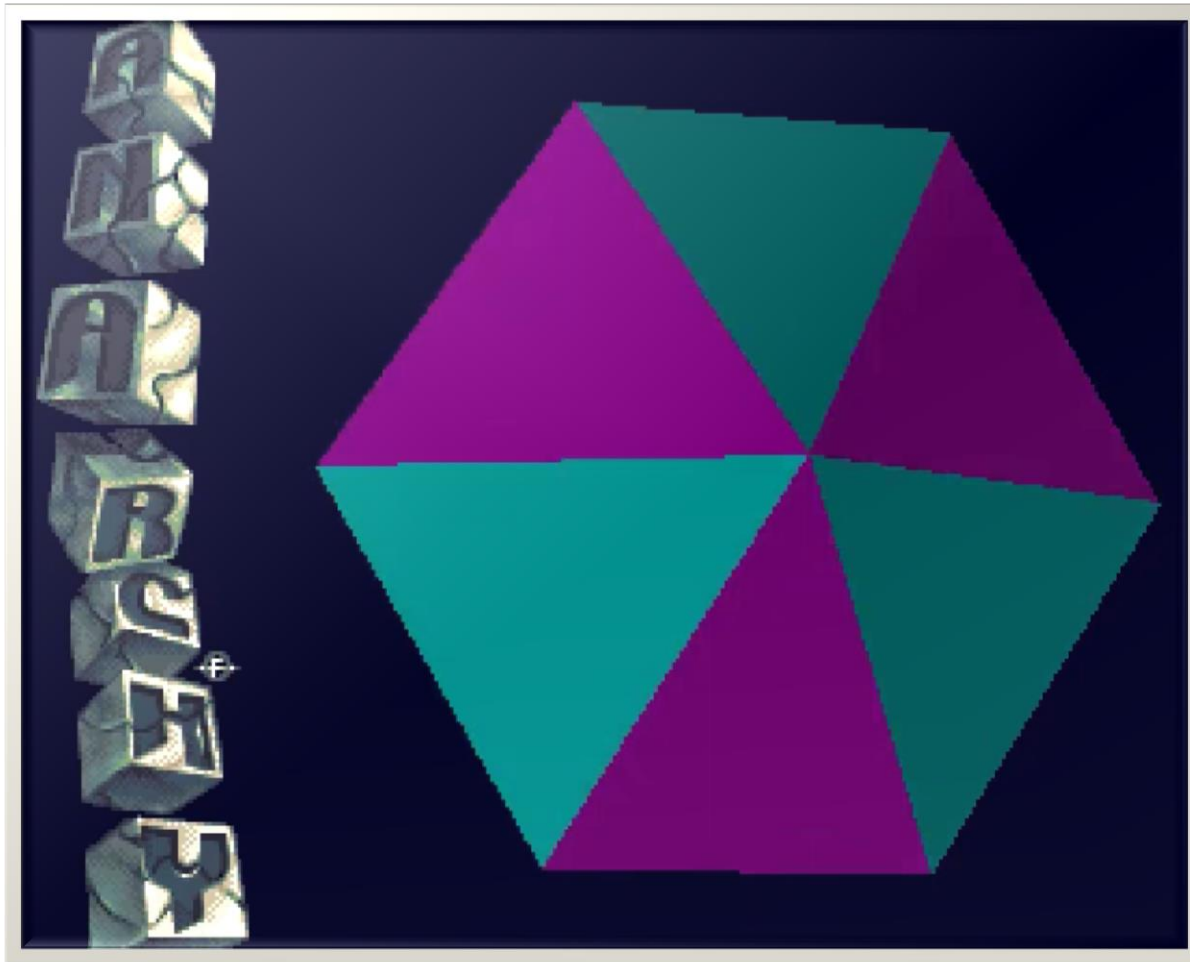

From "Interference" by Sanity, 1993

Blitter Line Drawing
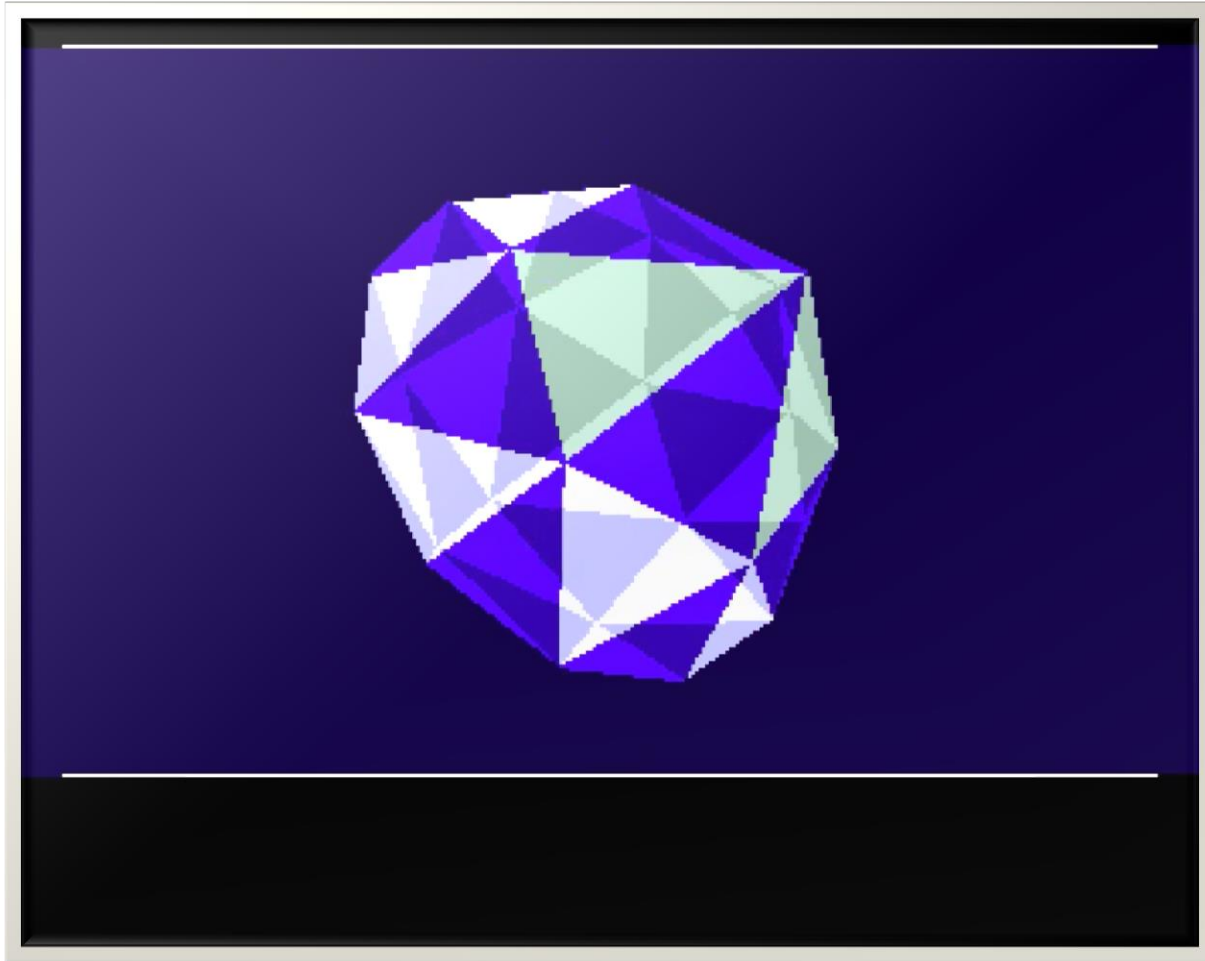

Solid lines

One pixel per scanline

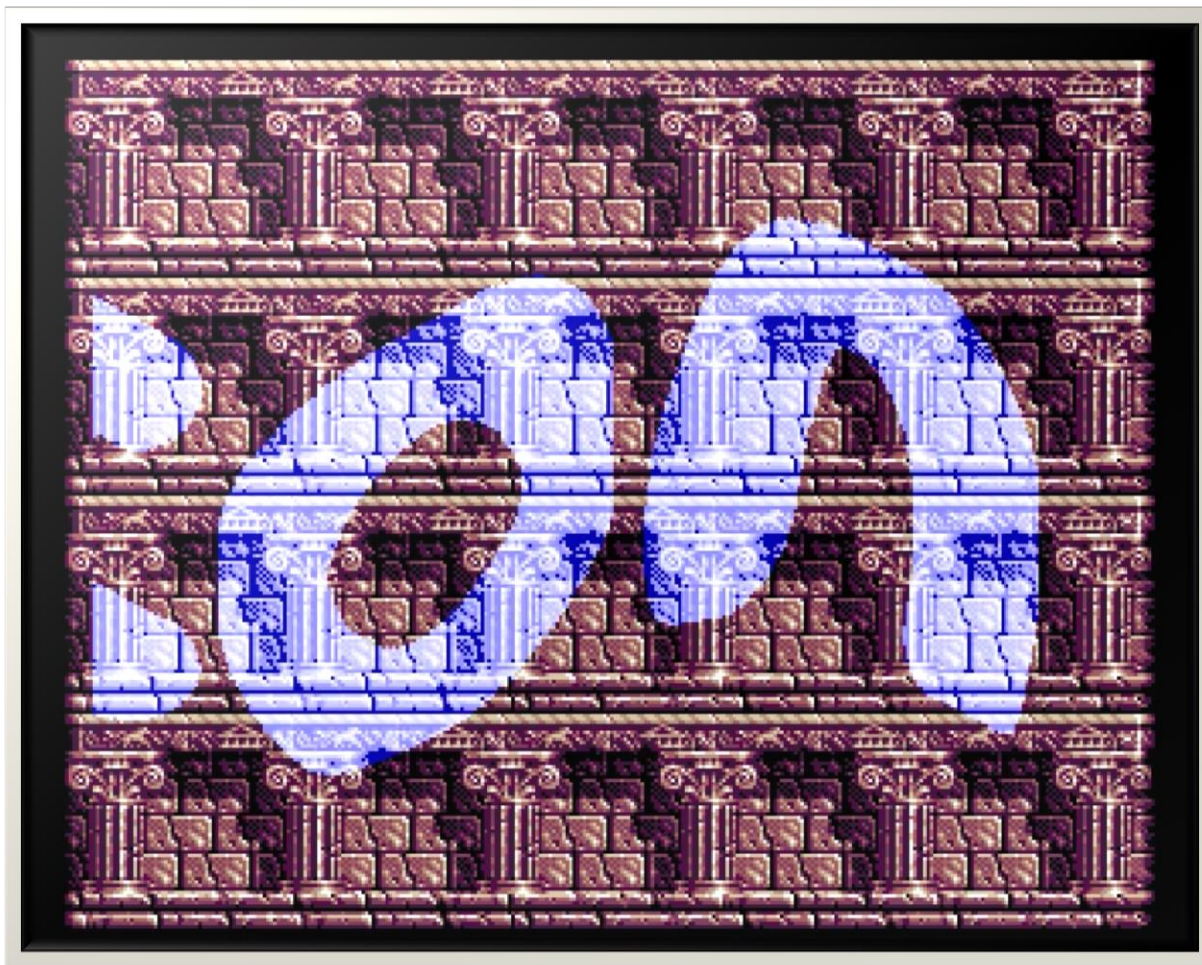# Effect: Filled Vector

From "Seeing is Believing" by Anarchy, 1991
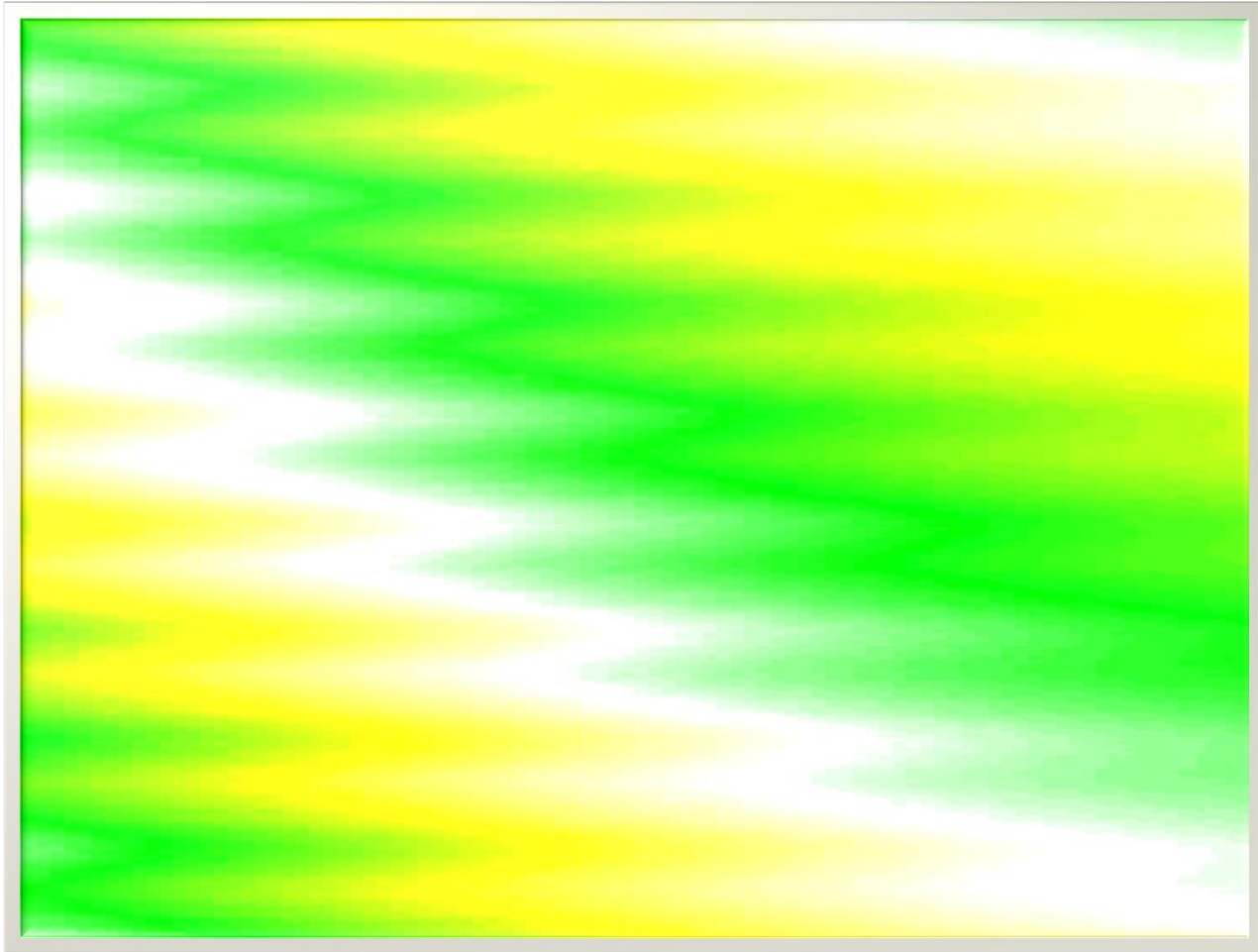
Effect: Glenz Vector

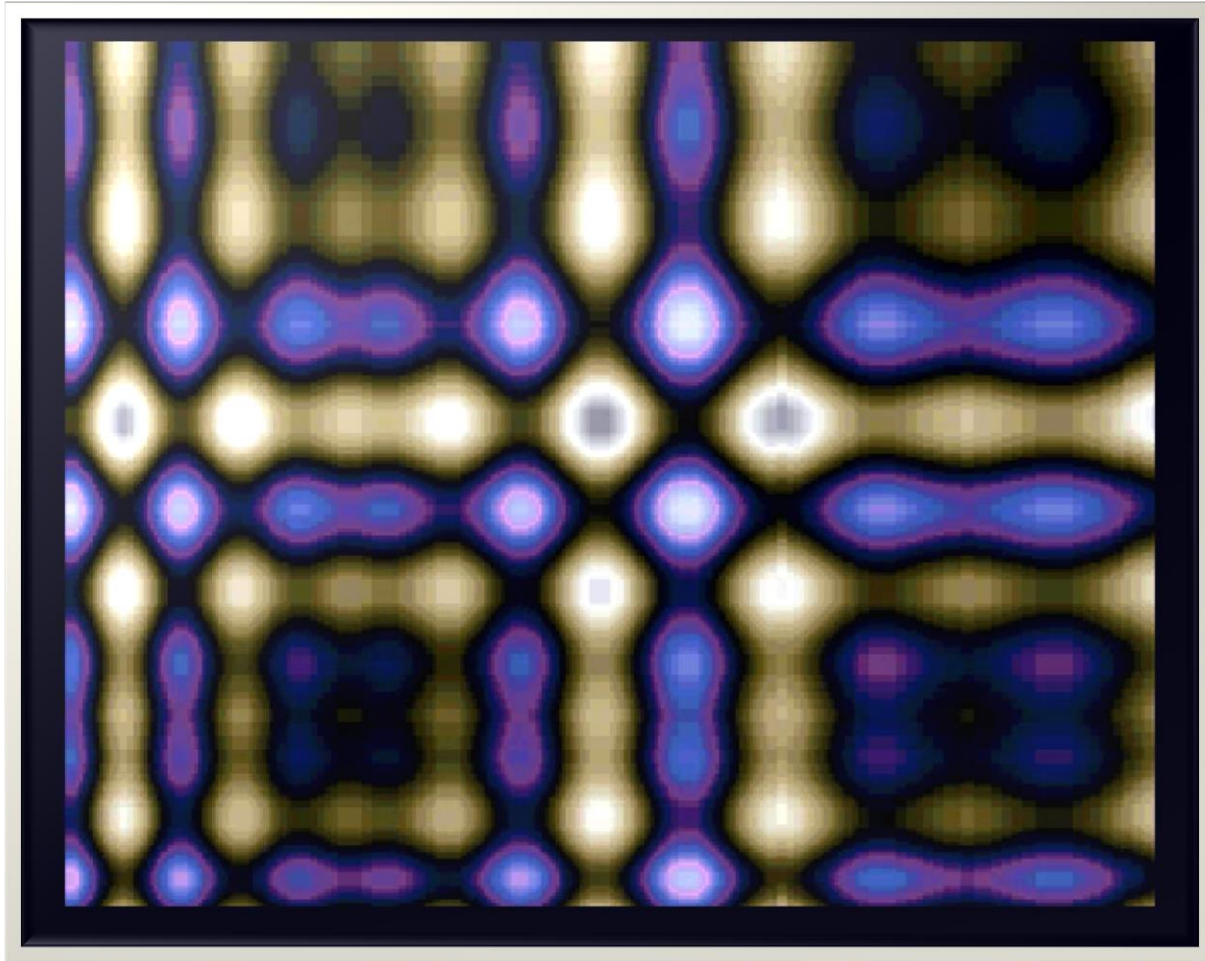From "Hardwired" by Crionics, 1991

Effect: Vertical Filling

From "World of Commodore" by Sanity, 1992
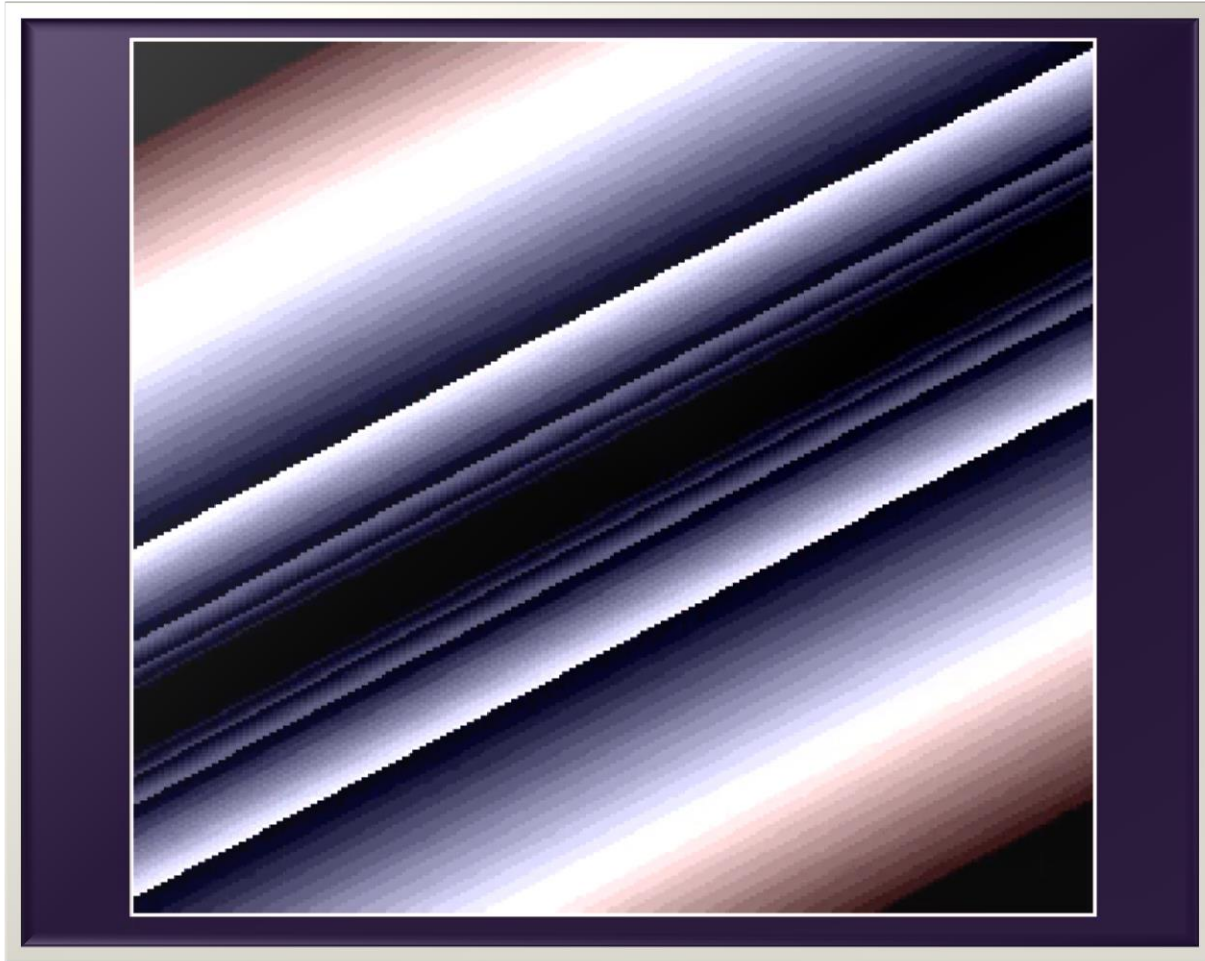
Effect: Plasma

From "Overdose" by Delight, 1991

Effect: Sine Plasma

From "Arte" by Sanity, 1993
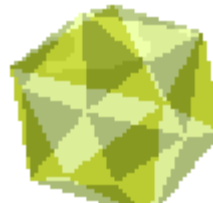
Effect: Raster Tunnel

From "Interference" by Sanity, 1993

List of demos

- Copper Master by Angels, 1990
- Mesmerized by Pure Metal Coders, 1990
- Overdose by Delight, 1991
- Seeing is Believing by Anarchy, 1991
- Hardwired by Crionics, 1991
- World of Commodore by Sanity, 1992
- Desert Dream by Kefrens, 1993
- Interference by Sanity, 1993
- Bananamen by Stellar, 1993
- Arte by Sanity, 1993

The End

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